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Sixth Edition

Logical Reasoning **and** Data Interpretation for CAT

ALSO USEFUL FOR OTHER MBA ENTRANCE EXAMINATIONS



Nishit K. Sinha

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Logical Reasoning and Data Interpretation for CAT

Sixth Edition



Nishit K. Sinha

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To

Papa and Ma

Kumar Kalyan Prasad Sinha and Sanjila Sinha

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Preface to the Sixth Edition

Logical Reasoning and Data Interpretation for CAT was envisaged to provide a complete preparation resource for every management aspirant, irrespective of training levels and preparation styles. Since its first edition, the book has remained the preferred choice of students due to the superior quality of its content, the user-friendly pedagogy, and the proven methodologies and approaches.

In our continued endeavor to raise the standard further and to ensure an upgraded and improved experience, we present the sixth edition.

Highlights

- An exclusive section containing 100 LRDI questions
- Solutions to all questions
- Explanations and answers to CAT 2017 LRDI paper (based on memory)
- Previous years questions for XAT and IIFT
- Embedded console with test papers on the Pearson website

I am sure this book will continue being the first choice among test takers.

Nishit K. Sinha

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Preface

Among the many resources in the market for CAT and other B school entrance examinations, there are none that place adequate emphasis for concept building in LRDI. This book fills this gap by bringing together concept building, application methodology, as well as question practice. Special care has been taken in this book to ensure that even a person who does not have a formal experience of LR or DI will find him/herself in a comfortable position with a little bit of effort. Besides, this book puts as proportionate an emphasis on LR and DI as put by the CAT in the recent years.

This unique book is useful for all kinds of students—those who are good at solving LR and/or DI questions as well as those who are not so. There are plenty of worked-out examples to enable the students to understand the techniques before moving on to the practice problems. Apart from this, once the practice questions at all the three levels—Foundation, Moderate and Advanced—have been tried, this book puts forth a mechanism to help the student in evaluating him/herself in a controlled, simulated environment in the form of Benchmarking Tests. And finally some more tests are there to evaluate oneself in the format of review tests.

The table below will give a fair idea of the proficiencies and approaches for different students for LRDI.

Student's Type/ response	Novices	Apprentices	Practitioners	Experts
Interpretation	Do not understand the basic concepts	Do not understand all the concepts underlying the problems. So, unable to attempt all the questions.	Understand all the concepts and attempt most of the main problems.	Can solve the problems correctly.
Approach	Do not know the methods to solve the problems	Unable to pick the correct method; mostly rely on luck to get the right answer.	Know and pick the correct method; have a sound strategy and solve the problems with skill, not luck.	Can use more than one strategy to solve the problem for a good number of questions.
Accuracy level	Unable to get correct answers most of the time	Mostly get the correct answer, with few errors.	Correct answers with hardly any mistakes. Use appropriate units.	Excellent level of accuracy as well as speed.

This book is designed to take care of students at all these four levels by giving them a customized preparation through the questions at different difficulty levels. This focus on providing customized content is at the heart of our drive to help every user be prepared for the LRDI in CAT.

STRUCTURE OF THE BOOK

This book is divided into four parts:

- **Part 1** facilitates framework and concept building in Logical Reasoning.
- **Part 2** guides the student in concepts building and development of the skills to apply these in Data Interpretation.

- **Part 3** consists of test papers with varying levels of difficulty and
- **Part 4** contains six previous years' CAT papers with solutions.

Each part has three different levels of problems: Foundation, Moderate and Advanced. These levels are hierarchical and sequential. Students are expected to progress through them in the same order. Movement from one level to another is largely a function of sufficient experience with the specific content. A student is unlikely to perform well at a particular level without the experience of the preceding level. Time spent at one level will help the student in imbibing and assimilating the methods and approach to solve problems, which in turn will make it easier for the student to tackle problems at the next, higher stage. In other words, hard work put at one level will allow an intuitive functioning later. If one level is not mastered before moving on to the next, though good students would appear to perform well at that higher level and may get the right answers, it would be without any sound reasoning for most of the times.

Benchmarking tests are also given at the end with comparative scores and then finally review tests to track your progress.

Although I have tried to be meticulous in preparing this text, some errors may have crept in. I invite each one of you to be a co-author of this book for the subsequent editions by making contribution in enhancing the value of this book with your suggestions and by bringing to our notice the errors, if any, so that they can be corrected in future.

I can be reached at *nsinha.alexander@gmail.com*

Nishit K. Sinha

About the Author

Nishit K. Sinha, an IIM Lucknow alumnus, has been training students for the CAT and other B-school entrance examinations for more than a decade. During this period, he has successfully trained more than 10,000 students of varying backgrounds to clear various MBA entrance examinations. To best analyze the pattern of all the major B-school entrance tests, as well as to remain up to date himself on the examination pattern, he appears for important examinations, such as the CAT and XAT every year.

He is Founder–Partner at his test prep organization dueNorth Academics LLP, based at Dehradun.

Acknowledgements

This book bears the imprint of many people—my colleagues, my students and my teachers who have had a significant impact on my thought process and have generously extended help whenever I needed.

With immense pride and humility, I acknowledge that the *decade long journey of this book* (1st edition came out almost a decade back) has been made possible because of the constructive feedback of the users' of this book, ideas generated through brainstorming with my friends in the coaching industry, Pearson's market intelligence reports and my own understanding of the entrance exams.

My special thanks to my brothers Ravi Shankar Prasad, Sharat Chandra Mayank, Amit Kumar and Vinit Kumar.

I would like to thank Sharel Simon and Vipin Kumar for giving the book the final shape. Thanks to Vikas Sharma and H. Nagaraja for ensuring that I get the timely and accurate feedback of the users.

Thanks is going to be a small word for my wife, who took care of family and home, giving me enough time to complete this project. Love to my young son who has started helping me with the errands. Sudhir, my man-Friday, who took care of small necessities, your contribution is noteworthy.

I may have forgotten some names here. I wish to express my gratitude towards all who have contributed in the making of this book.

Nishit Sinha

CAT Demystified

CAT stands for Common Admission Test. It is a test conducted by IIMs for admission into several programs offered by them. Besides IIMs, there are a good number of colleges which accept CAT score in their 1st round of selection process. As of now, there are 20 IIMs offering PGP at following locations: Ahmedabad, Bangalore, Calcutta, Lucknow, Indore, Kozhikode, Shillong, Ranchi, Rohtak, Raipur, Udaipur, Tiruchirappalli, Kashipur, Nagpur, Visakhapatnam, Jammu, Sambalpur, Sirmaur, Bodhgaya, Amritsar.

HISTORY OF CAT

In its history of almost four decades, CAT has changed its colours many a times in terms of number of questions, sections asked and orientation of the questions. Here we will discuss the examination pattern of the CAT from 2000 onwards.

	Number of sections	Total number of questions	Total Marks	
CAT 2000	3	165	N.A.	120 minutes
CAT 2001	3	165	N.A.	120 minutes
CAT 2002	3	150	N.A.	120 minutes
CAT 2003	3	150	N.A.	120 minutes
CAT 2004	3	123	150	120 minutes
CAT 2005	3	90	150	120 minutes
CAT 2006	3	75	300	150 minutes
CAT 2007	3	75	300	150 minutes
CAT 2008	3	90	360	150 minutes
CAT 2009	3	60	450 (scaled score)	135 minutes
CAT 2010	3	60	450 (scaled score)	135 minutes
CAT 2011	2	60	450 (scaled score)	140 minutes
CAT 2012	2	60	450 (scaled score)	140 minutes
CAT 2013	2	60	450 (scaled score)	140 minutes
CAT 2014	2	100	300	170 minutes
CAT 2015	3	100	300	180 minutes
CAT 2016	3	100	300	180 minutes
CAT 2017	3	100	300	180 minutes

Chart 1: Time Allotted Per Question

CAT 2011 had two sections: (a) Quantitative Ability & Data Interpretation (b) Verbal Ability & Logical Reasoning with 30 questions in each section. CAT 2011 also had sectional time limit of 70 minutes for each section.

Before CAT 2004, CAT did not mention that how many marks one question stands for? Marks carried per questions was announced for the first time in CAT 2004.

Quite obvious from the above table that time allotted to per question has risen sharply from CAT 2000 to CAT 2014 taking a small dip further. One possible conclusion drawn from here is that CAT is focussing more upon accuracy than speed, and secondly it expects students to gain a certain level of competence across all the areas in a particular section. With number of questions going down and time going up, students didn't have much of the choices of questions to choose from. Further, introduction of sectional timers has forced students to attempt questions in that particular section only.

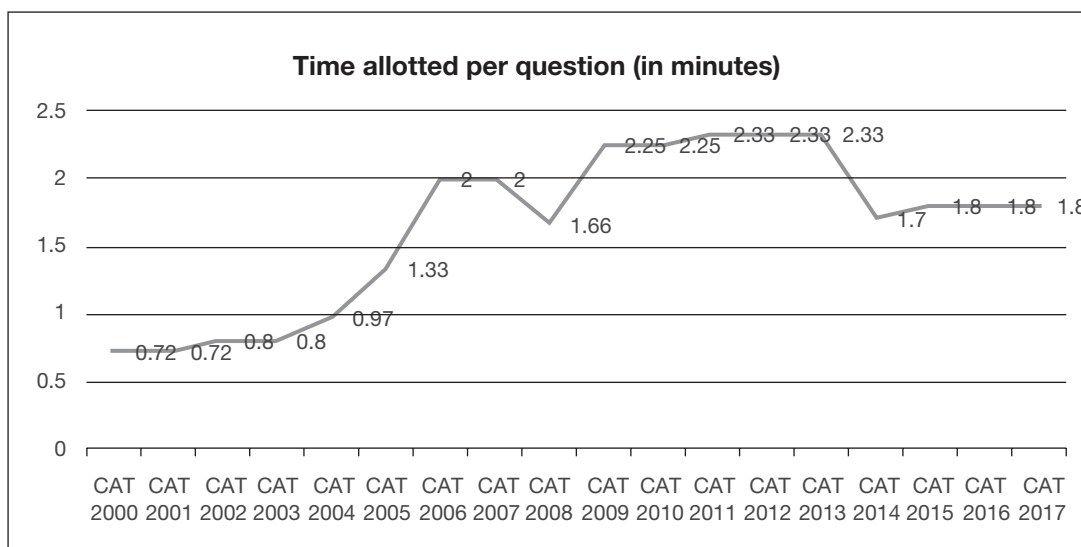


Chart 2: Sectional Breakups and Getting IIM Call

One thing that has remained constant during this period of CAT 2000 - CAT 2010 is the number of sections and the way these sections have been grouped – Quantitative Aptitude (QA), Logical Reasoning and Data Interpretation (LR / DI), and English Usage / Reading Comprehension (EU / RC).

Though CAT 2011 changed it all:

Year	QA	LR DI	EU RC	Total no. of questions
CAT 2000	55	55	55	165
CAT 2001	50	50	50	150
CAT 2002	50	50	50	150
CAT 2003	50	50	50	150
CAT 2004	35	38	50	123

CAT 2005	30	30	30	90
CAT 2006	25	25	25	75
CAT 2007	25	25	25	75
CAT 2008	25	25	40	90
CAT 2009	20	20	20	60
CAT 2010	20	20	20	60
CAT 2011	30 (QA + DI)		30 (Verbal + LR)	60
CAT 2012	30		30	60
CAT 2013	30		30	60
CAT 2014	50		50	100
CAT 2015	34	32	34	100
CAT 2016	34	32	34	100
CAT 2017	34	32	34	100

2-sections pattern continued till CAT 2014. From CAT 2015, total number of sections were three. CAT 2015 brought some questions in non-MCQ format –fill in the blanks questions, where an aspirant is required to type the answer. These questions had no negative marking.

Chart 3: Marks required to get atleast one IIM Call

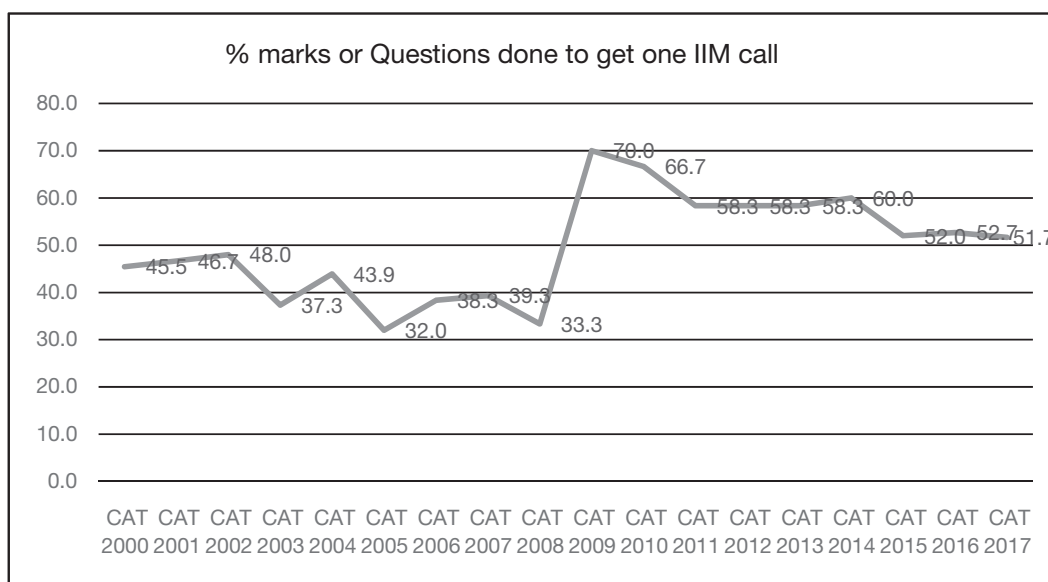
Past CAT trends show that a student is required to get around 70% of the marks to get atleast one IIM call (with clearing the sectional cut-off). Following table and bar chart gives us some clarity regarding the same:

Year	Total marks or questions	Marks /Qs required to get atleast one IIM call
CAT 2000	165	75
CAT 2001	150	70
CAT 2002	150	72
CAT 2003	150	56
CAT 2004	123	54
CAT 2005	150	48
CAT 2006	300	115
CAT 2007	300	118
CAT 2008	360	120

CAT 2009	60	42
CAT 2010	60	40
CAT 2011	60	35
CAT 2012	60	35
CAT 2013	60	35
CAT 2014	300	180
CAT 2015	300	156
CAT 2016	300	158
CAT 2017	300	155

Chart 4: Percentage obtained for IIM Call

Following line chart gives questions solved or marks required as a percentage of total marks or total questions (as applicable):



Note: Above calculation is based upon the data collected from the students who got IIM calls in that particular year.

So, to get atleast one IIM call in CAT 2008, a student was required to get 33.33% Marks out of total with clearing the cut-off across the sections. Though in the online format of CAT (since 2009), percentage questions to be done to get atleast one IIM call has gone up. Post 2011, % marks required to get atleast one IIM call has hovered in between 50%–60%.

Chart 5: No. of Questions and Time Per Question

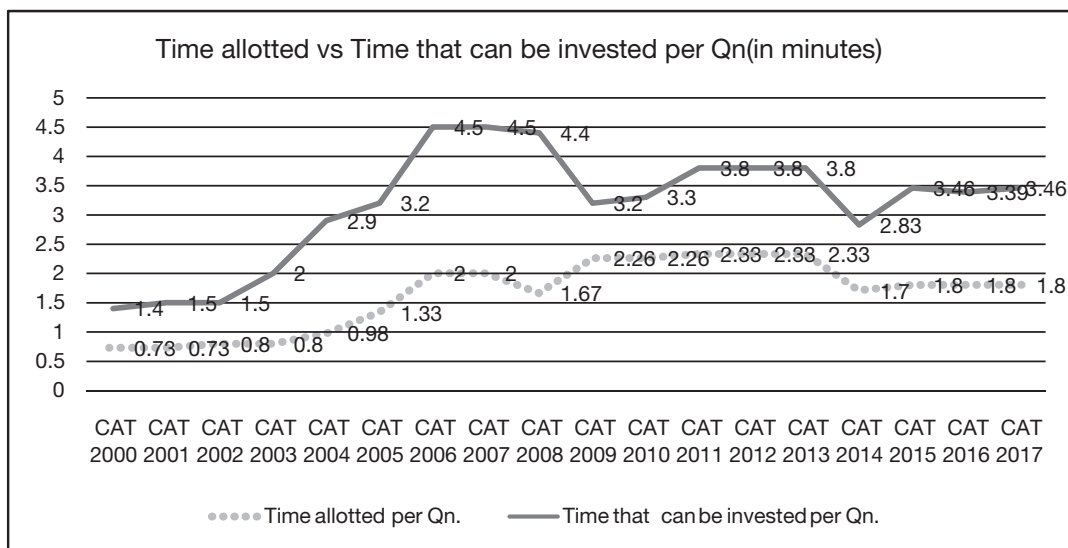
If we convert the requirement of marks to be obtained from the above line chart into questions to be done, we get the following table:

Year	No. of questions to be solved	Time allotted	Time invested per qn.
CAT 2000	85	120 minutes	1.4
CAT 2001	80	120 minutes	1.5
CAT 2002	81	120 minutes	1.5
CAT 2003	60	120 minutes	2.0
CAT 2004	42	120 minutes	2.9
CAT 2005	38	120 minutes	3.2
CAT 2006	33	150 minutes	4.5
CAT 2007	33	150 minutes	4.5
CAT 2008	34	150 minutes	4.4
CAT 2009	42	135 minutes	3.2
CAT 2010	40	135 minutes	3.3
CAT 2011	35	135 minutes	3.8
CAT 2012	35	135 minutes	3.8
CAT 2013	35	135 minutes	3.8
CAT 2014	60	170 minutes	2.83
CAT 2015	52	180 minutes	3.46
CAT 2016	53	180 minutes	3.39
CAT 2017	52	180 minutes	3.46

Chart 6: Time Allotted vs Time that can be Invested Per Question

For CAT 2000 to CAT 2008, at 90% accuracy with $1/4^{\text{th}}$ negative marking, these are the approximate number of questions to be done. For CAT 2009 to CAT 2011, net of these many questions to be done.

To summarize this whole discussion till now, we will compare chart 2 with chart 6 and present them in a unified line chart given below.



This line brings to us an important information—For CAT 2006, CAT 2007 or CAT 2008, Even if a student has taken approximately 4.5 minutes to solve a question correctly, s/he has got enough marks to get atleast one IIM call (provided s/he clears the sectional cut-off too). For the last three CAT papers (2015 – 2017), even if a student has taken 3.4 minutes to solve a question correctly, s/he would get sufficient marks to get atleast one IIM Call.

It also points out towards other side of story that a student can get calls from IIM by solving nearly half of the total questions, skipping entire half of the questions.

How to Use This Book

There are few important guidelines mentioned below that we must keep in our mind while going through any book, be it a text book or a reference book or a book on LR/DI or QA of CAT:

1. Passive reader Vs Active learner

A passive reader is a person who goes through any content in real time frame without putting any efforts to induce the learning, assuming that there will be a tomorrow when he would come back to the same content and learn the things given. We know that either tomorrow never comes or it comes so late that everything is almost over.

An active learner is a person who keeps a piece of paper and a pencil/pen with him so that he can integrate the various activities like reading–learning–practicing at the same time. At the end of the process, this person realizes that she/he has a better understanding than the passive reader.

2. Mechanical process Vs Logical process

Mechanical process is the assembly line production system—put the input into the controlled system and we will receive the output. But unfortunately in CAT, now a days, neither the input (the fundas to be used) nor the output (process to arrive at the end) is given.

The logical process of solving the question not only involves the mechanical process of solving the question as the 1st step of learning, but also uses visualization of the problem scenario as the 2nd step of mental development. In this process, we slowly move towards a stage where a good number of problems can be done through mental mapping only, without using pen or paper.

In the past also, CAT used to be logical, but in the recent years, the need of being strong in visualization has become more.

Now, I treat the above written points as a choice—whether you want to be in the 1st category (Passive reader + Mechanical Process) or in the 2nd category (Active Learner + Logical Process). The choice made here will have a very serious implication on our capacity building and ability to use the same in cracking CAT.

HOW TO GO AHEAD WITH THIS BOOK?

When you start going through this book, I would request you to have above-mentioned points in your mind.

Let us see this in steps:

Step 1

Go through learning objectives and as you go through each and every word of the learning objectives, you should have the end result of getting into the IIMs in your mind. This will also help you in understanding all that is to be achieved in the chapter.

Step 2

I have given absolute freedom to the individuals to start with either Part 1 or Part 2 of the book, but definitely not the rest of the parts.

Start with the concept first and before proceeding towards the next concept, solve all the worked out examples related to that concept and move ahead only when you have internalized the same. Sometime, this might appear to be

drudgery, but see that you do it. Also, make sure you don't succumb to temptations like finishing the topic as fast as possible.

Step 3

Once you have got the confidence over whatever you have done previously, do the foundation exercise. It is a precursor to the actual CAT problems. Solve it without any time-constraint. This level tests mostly your comprehension of the concept and a bit of application. Most of the questions in this exercise will check only your understanding of the concept, and not the application of it. Ideally you should not give more than 2 minutes to any question in foundation exercise. If you get less than 75% questions correct, revise the concepts for which you got the answers wrong. One more suggestion—try to solve one exercise in one sitting, whatever time it takes. If you get the answers right, its good and if you don't get the answers correct, attempt the same questions once again in next sitting (preferably the next day).

Solving these will

- help to gain thorough understanding of the concepts
- provide interaction with the problems that are being asked at basic level
- Lead to confidence building

Step 4

Welcome to the moderate exercise. Questions at this level matches with CAT level and sometimes, above that level as well. This level tests your ability to apply a particular concept and also combination of concepts in single problem. If you are not able to solve a particular question, do not go for the solution until you have attempted the question at least thrice.

Solving these will—

- hone the Ability to identify easy and difficult questions
- develop Mental imaging and visualization of the problems
- Help in creating a neural-network inside the mind to think about the different processes to solve the problems
- Establish a logical connection between concepts and their application.

Step 5

Don't go for advanced level right now. Relax and don't solve any question of LR/DI for one day. Then the next day, take the benchmarking test. Your performance in this test will help you to assess yourself. Ideally, you should aim for anything above 85 percentile.

Step 6

Once the whole book is covered with all the moderate exercises and bench marking tests, go for the revision of the topics. From here on, you can jump on to the advanced level of questions. Most of the questions which you will get here are above CAT level. The idea is to prepare you at a level which is above CAT. If you excel at this level, CAT will be a cakewalk for you. Go for Practice Questions based upon recent CAT pattern now. Attempt the questions, try to solve, if you cannot solve, try once again. Give a second chance and solve them. Now if you cannot solve the problems, go for hints and solutions.

Step 7

Go to the Part 3 - Benchmarking test and target anything above 98 percentile. If you get it consistently in all the tests you are prepared for CAT. And if not, repeat the process from Step 4.

If in any one of these tests, you get less than 85 percentile, repeat the process from Step 3.

All the best for life!

Nishit K. Sinha

Mail me at—nsinha.alexander@gmail.com

PART 1

LOGICAL REASONING

SECTION 1

UNDERSTANDING LOGICAL REASONING

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Chapter

1

INTRODUCTION TO LOGICAL REASONING

LEARNING Objectives

In this chapter, you will learn:

- ☐ Logic as tool for inference
 - ☐ The strength of logical argument
 - ☐ Logic and decision making
 - ☐ Applying logic
-

Human life is full of situations where one is called to make a decision. This also includes making significant choices about what to believe and what not to. Although everyone prefers to believe what is true, we often disagree with each other about a particular issue due to the subjective nature of our judgements. We often find individuals or groups locked in conflict because our reactions to situations are guided by our impulses. Humankind has developed a mechanism through which we are able to move beyond our individualistic and idiosyncratic notions and establish indisputable facts. This mechanism is called Logical Reasoning and Logic has come to play a very important role in ascertaining what is more credible or whose reasoning is sounder.

It is imperative to understand that Logic is not mainly concerned about finding the ‘Truth.’ Logic’s prime interest lies in finding that, which can be established as a fact using several strands of reasoning supported by sophisticated arguments. It may seem like a big coincidence that the event or situation that is correct will have more substantial proofs or arguments in its favour, rather than the even or situation that is not so

For example, if we are discussing about the direction from which the sun rises, we will always have more proofs or stronger arguments in favour of east rather than west. However, if somehow we get more

proofs or stronger reasoning in favour of south, then it is more logical to say that the sun rises from south than to say that it rises from east.

An important application of the logic is in the area of law and the judicial system—an area where proceedings are heavily dependent on logical processes—of any civilized society. The following example tells a lot about the logic and its constituents:

While pronouncing his verdict in one of the most sensational murder cases in India, the judge said, “Though I know that this is the man who committed the crime, I acquit him, giving him the benefit of doubt.”

What is the judge saying?

Even though he knows that the defendant is indeed the culprit, the fact has not been proven, that is, it cannot be logically deduced on the basis of arguments and evidence; consequently the accused has to be acquitted.

Despite the above example some authoritativeness can indeed be attached to the way of logical reasoning. No matter how sceptical we are about the points from where we begin to reason, if we follow the rules of logic we will reach an acceptable conclusion. It is almost always possible to distinguish between correct from incorrect reasoning independent of our agreements or disagreements regarding substantive matters. Logic is the discipline that studies the distinction—both by

determining the conditions under which the truth of certain beliefs leads naturally to the truth of some other belief, and by drawing attention to the ways in which we may be led to believe something without the respect for its truth. This provides no guarantee that we will always arrive at the truth, because the beliefs or assumptions with which we begin are sometimes erroneous. But following the principles of correct reasoning does ensure that no additional mistake creeps in during the course of our progress.

Hence, Logic can be seen as a tool using which we find out the strength of reasoning or the various arguments put forward in favour of or against something. This is reflected in the origin of the word 'logic'. It takes its roots from the Greek word *logos* which means reason or principle. Taking a broad view, we can see several dimensions, or usages of the term logic. Some of these are given below:

1. A system of reasoning: Aristotle's logic.
2. A mode of reasoning: By that logic, we should sell the company tomorrow.
3. The formal, guiding principles of a discipline, school, or science.
4. The relationship between elements and between an element and the whole in a set of objects, individuals, principles, or events: There's a certain logic to the motion of rush-hour traffic.
5. In the field of Computer Science the term, logic, may mean any of the following:
 - a. The non-arithmetic operations performed by a computer, such as sorting, comparing, and matching, that involve yes-no decisions.
 - b. Computer circuitry.
 - c. Graphic representation of computer circuitry.

Terms related to Logic:

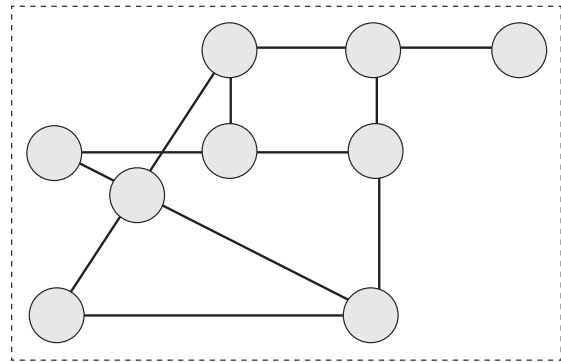
1. Consistency—An attribute of a logical system that is so constituted that none of the propositions deducible from the axioms contradict one another.
2. Completeness—This is an attribute of a logical system that is so constituted that a contradiction arises if any proposition is introduced that cannot be derived from the system.
3. Corollary—An inference that follows directly from the proof of the another proposition.
4. Non sequitur—A conclusion that does not follow from the premises.
5. Subject—The first term of a proposition
6. Predicate—What is predicted about the subject of a proposition.

7. Proof—A formal series of statements given showing that if something is a fact, then something else necessarily follows from it.
8. Paradox—A self contradiction (As in the statement—'I always lie' is a paradox.)
9. Postulate—A declaration of something self evident.
10. Proposition—A statement that affirms or denies something and is either true or false.
11. Negation—A proposition that is true if and only if another proposition is false.
12. Axiom—A proposition that is always true and does not require proofs or disproofs to be true.
13. Tautology—A statement that is always necessarily true (As in the statement—'He is honest or he is not honest.)
14. Contradiction—Opposite of consistency.
15. Logical relation—A relation between propositions.
16. Inductive Reasoning—Proceedings from particular facts to a general conclusion.
17. Deductive reasoning—Proceedings from general facts to a particular conclusion.

REASONING QUESTIONS AND PUZZLES

Puzzle 1

Put the digits from 1 to 9 into the given circles so that the sum of the numbers in each straight line is the same.



Puzzle 2

Our local town hall has a clock which strikes on the hour and also strikes just once on the half hour. While I was awake the other night, I heard the clock strike once, but I could not tell what time it was. Half an hour later it struck once again, but I still could not tell what time it was. Finally, half an hour later it struck once again and I knew what the time was. What time was it?

Puzzle 3

You are running in a marathon and you overtake the person in second place, what position are you now in?

Puzzle 4

Tree-Tent is a logical game (similar to minesweeper) in which the aim is to identify all tents in the grid. Each tree is exactly connected to only one tent. A tent can be found in a horizontally or vertically adjacent square of a tree. The tents are never placed adjacent to each other, neither vertical, horizontal, nor diagonal. The numbers outside the grid give the total number of tents in the corresponding row or column. A tree might be next to two tents, but is only connected to one, and vice versa. Find all the tents.

								1
	♠			♠				1
	♠	♠						1
								1
							♠	1
					♠			2
		♠						1
			♠			♠	♠	2
1	1	3	1	1	1	1	1	

Puzzle 5

Find the highest total—you can only move up or right—using the mathematical signs coming on the way.

+	4	−	2	+	2
2	+	2	−	2	+
−	1	+	2	−	4
2	−	1	+	1	−
+	1	−	2	+	3
3	+	3	−	4	+

Puzzle 6

In the above question, if we can move up and left only, then what is the maximum sum that we can get?

Puzzle 7

Abhishek said that he was born on 29 February 1900. What birthday will he celebrate in the year 2000?

Puzzle 8

During a recent police investigation, IG Khan was interrogating five criminals—A, B, C, D and E—to try and identify who is the culprit. Below is a summary of their statements:

- A: it wasn't E
it was B
B: it wasn't C
it wasn't E
C: it was E
it wasn't A
D: it was C
it was B
E: it was D
it wasn't A

It was well known that each suspect told exactly one lie. Can you determine who the criminal is?

Puzzle 9

At the local school, I was chatting to my sister's friends and noticed a number of things. Jessica has mousey coloured hair and the girl with black hair was wearing a green dress. Lucy is not blonde and Lauren does not have brown hair, Chloe was wearing a blue dress. The blonde girl was not wearing red and Lauren was not wearing green. I can't remember which girl was wearing a yellow dress. Can you determine the colours of the girl's dresses and their hair?

Puzzle 10

Draw a continuous line that travels in order from 1 to 6. You can only move horizontally and vertically, the line must not cross itself and every square is visited.

			3		
4				1	
	6		5		
2					

Puzzle 11

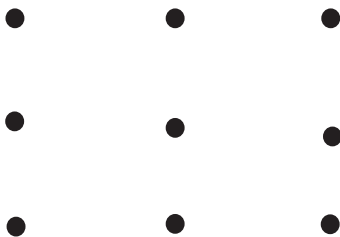
A bank customer had ₹100 in his account. He then made 6 withdrawals, totalling ₹100. He kept a record of these withdrawals, and the balance remaining in the account, as follows:

Withdrawals (₹)	Balance left (₹)
50	50
25	25
10	15
8	7
5	2
2	0
100	99

When he added up the columns as above, he assumed that he must owe ₹1 to the bank. Was he right?

Puzzle 12

Can you draw exactly 4 straight lines that pass through ALL 9 spots, without removing your pen from the paper?

**Puzzle 13**

In a football syndicate, the winnings amounted to ₹7657. There were more than 30 people in the syndicate but less than 100. Each won exactly the same number of rupees and no paise were involved. How much did each win?

Puzzle 14 to 16

Here is a snippet of curious multiple-choice entrance exam.

14. The answer to question 15 is
(a) B (b) C
(c) A
15. The first question with (B) as the correct answer is
(a) Q3 (b) Q1
(c) Q2
16. The only option not used so far is
(a) A (b) B
(c) C

Puzzle 17

If yesterday was Saturday's tomorrow and tomorrow was Wednesday's yesterday, what day would it be today?

Puzzle 18 to 20

Directions for questions 18 to 20: *Read the passage given below and solve the questions based on it.*

In a shooting competition, a person is allowed to shoot at four targets successively, followed by the next shooter. When all the shooters have finished one such round, the process is repeated. If a target is hit, the shooter gets 2 points and if he misses the target, the other shooters are awarded one point each. The first shooter to get 60 points wins the shooting competition. In a contest among three persons—Akhil, Bharat and Chand, their score at the end is as follows:

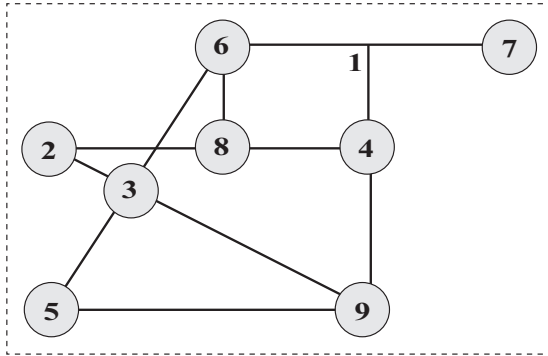
Akhil = 60, Bharat = 53 and Chand = 43.

Out of a total of 78 shots being fired, only 43 hit the target.

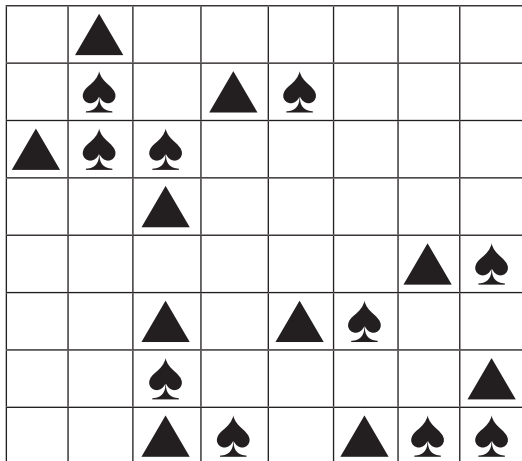
18. Who was the first to shoot?
(a) Akhil
(b) Bharat
(c) Chand
(d) Cannot be determined
19. Who was the second to shoot?
(a) Akhil
(b) Bharat
(c) Chand
(d) Cannot be determined
20. Who was the third to shoot?
(a) Akhil
(b) Bharat
(c) Chand
(d) Cannot be determined

Hints and Explanations

1.



2. 1.30 in the morning. The initial single strike was at 12.30.
3. If you think that you are now in first place, then think again! If you overtake the person in second place, you are now in second place yourself.
- 4.



5. 10

+		4	–	2	+	2
2		+	2	–	2	+
–		1	+	2	–	4
2		–	1	+	1	–
+		1	–	2	+	3
3		+	3	–	4	+

6. 14

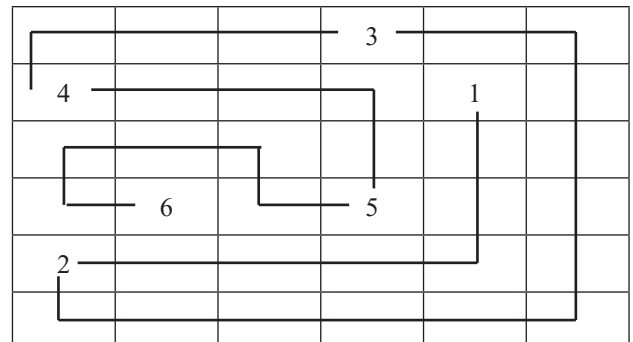
+	4	–	2	+	2
2	+	2	–	2	+
–	1	+	2	–	4
2	–	1	+	1	–
+	1	–	2	+	3
3	+	3	–	4	+

7. Abhishek was lying, 1900 was not a leap year.
8. C committed the terrible crime. The way to solve this puzzle is to look at each clue. We know that exactly one of each person's statements is true. Looking at A statements, let's check to see 'it was B is true? If 'it was B is true, then we know the other statement is false, hence it was E. This is a contradiction. Hence, we now know it wasn't B, nor E (as 'it wasn't E must be the true statement). Looking at C statement, we can similarly determine that it wasn't A either. E statement gives us that it wasn't D, which leaves only C as the culprit.

9.

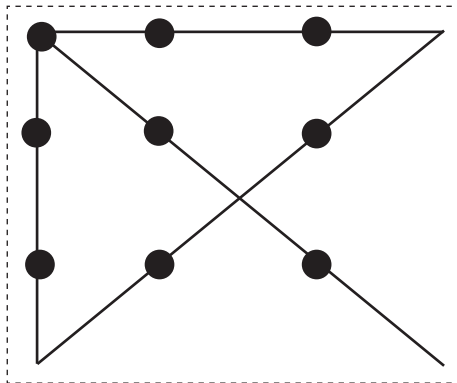
Name	Dress colour	Hair colour
Jessica	Red	Mousey
Lauren	Yellow	Blonde
Lucy	Green	Black
Chloe	Blue	Brown

10.



11. There is no reason what ever why the customer's original deposit of ₹100 should equal the total of the balances left after each withdrawal. The total of withdrawals in the left-hand column must always equal ₹100, but it is purely a coincidence that the total of the right-hand column is close to ₹100.

12.



13. 31 Each one won ₹247.

14 to 16

14. (c)

15. (a)

16. (b)

17. Monday

18 to 20

Scenario—The problem set given above involves many facts—the scheme of firing shots, the way the points are awarded, the number of shots fired and the number of shots hitting the target.

Observation—After going through the set up given above, following points should come of the surface:

- i. One round of firing involves 12 shots being fired, four shots by each shooter.
- ii. Since 12 shots are being fired in one round, so a total of 72 shots are being fired in six such rounds. Out of the 72 shots, 24 shots have been fired by each of them. Now, in the next six shots, 4 shots must have been fired by the person who was the first person to shoot and rest two must have been fired by the person who was the second person to shoot.
- iii. So, total number of shots fired by the 1st person = 28

Total number of shots fired by the 2nd person = 26

Total number of shots fired by the 3rd person = 24

Problem—Besides the problems given in the question set, let us raise some more pertinent points regarding this set:

- i. Since Akhil was the first on to get 60 points, can we assume that Akhil was the first one to shoot? If yes, then why and if no, then why?
- ii. Since Bharat was the second ranker, can we assume that Bharat was the second one to shoot? If yes, then why and if no, then why?

FLAW DETECTOR—While operating on the surface only gives us an idea that Akhil was the first one to shoot because he got 60 points first, it also gives us the reason why we get this conclusion—because we were operating on surface only.

Understand the points scheme—A person can get points without hitting any target or even without firing shots. As it is given that two points are awarded for a hit and one point is awarded to the opponents in case of a miss. It might be a possibility that Akhil would have got 59 points or 58 points or so in his round, and then other shooters go to shoot, they miss and in turn Akhil gets the point, and thus he gets 60 points.

And otherwise also, a deep thinking tells us that game ends with second shooter (because a total of 78 shots are fired), so Akhil could be at best second shooter and not the first shooter.

Explanation—As we have discussed above also, this question set involves many facts and hence lets make some equations.

	Hits	Miss	Points
Akhil	A	b	2a + d + f
Bharat	C	d	2c + b + f
Chand	E	f	2e + b + d

We are using six variables above, so we need to have six equations to solve this set. Let us make the equations—

$$\begin{aligned} \text{Points scored by Akhil} &= 2a + d + f = 60 && \dots\dots\dots(i) \\ \text{Points scored by Bharat} &= 2c + b + f = 53 && \dots\dots\dots(ii) \\ \text{Points scored by Chand} &= 2e + b + d = 43 && \dots\dots\dots(iii) \\ \text{Total hits} &= a + c + e = 43 && \dots\dots\dots(iv) \\ \text{Total misses} &= b + d + f = 35 && \dots\dots\dots(v) \end{aligned}$$

Till now we have been able to construct only five equations. Since we have used all the given information, we cannot have a sixth equation directly from the given set. Hence, we will introduce the 'hypothetical equations' now that will work as sixth equation.

Assume that Akhil is the first one to start, so $a + b = 28$ (vi)

Doing (i) – (v) gives us: $2a - b = 25$ (vii)

Adding (vi) and (vii),

$3a = 53$, since we are not getting the integral value of 'a' from here, we would conclude that (vi)th equation $a + b = 28$ is not a valid equation and so Akhil is not the first one to shoot.

Similarly, assuming Bharat to be the first one to shoot gives us: $c + d = 28$ (viii)
Solving equation (ii) and equation (v), $2c - d = 18$...(ix)

Adding equation (viii) and equation (ix), $3c = 46$. Again we are not getting the integral value of c from here, so Bharat is not the first one to shoot.

Obviously, it means Chandan is the first one to shoot. Let us check that also:

If Chandan is the first one to shoot then, $e + f = 28$..(x)
Solving equation (iii) and equation (v), $2e - f = 8$...(xi)

Adding equation (x) and equation (xi), $3e = 36$, so, $e = 12$.

Similarly, to find out the second shooter, we will insert, one by one, an additional equation besides the above given 5 equations, by assuming that Akhil is the second one to shoot (and hence $a + b = 26$). If it does not satisfy the given conditions, then we will construct the additional equation by assuming Chandan to be the second shooter (and hence $c + d = 26$).

Alternative Solution—The more the number of variables, the more difficult the solution will be.

Let us reduce some variables and start directly from the 'hypothetical equation' itself.

Assume that the total number of hits by the first one to shoot = N, so total number of misses by him = $28 - N$.

So, total number of misses by the other two shooters = $35 - (28 - N) = N + 7$

[Total number of shots fired by all the shooters = 78 and total hits by all the shooters = 43, so total number of misses by all the shooters = 35]

So, the points scored by the first person to shoot = $2N + N + 7 = 3N + 7$

Now, if Akhil is the first one to shoot, then $3N + 7 = 60 \Rightarrow 3N = 53$

Since no integral value of N is obtained from here, so Akhil is not the first one to start.

Again, if Bharat is the second one to shoot, then $3N + 7 = 53 \Rightarrow 3N = 46$

We are not getting integral value of N, so Bharat is not the first one to shoot.

Hence, Chandan is the first one to shoot.

Let us verify that:

If Chandan is the first one to shoot, then $3N + 7 = 43 \Rightarrow 3N = 36 \Rightarrow N = 12$

Now to find the second person to shoot, assume that the total number of hits by the second shooter = M, so total number of misses by him = $26 - M$.

So, total number of misses by the other two shooters = $35 - (26 - M) = M + 9$

Or, the points scored by the second person to shoot = $2M + M + 9 = 3M + 9$

If Akhil is the second one to shoot, then $3M + 9 = 60 \Rightarrow 3M = 51 \Rightarrow M = 17$

Hence, Bharat is the second one to shoot.

18. (c)

19. (a)

20. (b)

Chapter

2

DEVELOPING THE SKILLS

LEARNING Objectives

In this chapter, you will learn:

- ☐ What constitutes Logical Reasoning?
 - ☐ Different types of Logical Reasoning questions
 - ☐ Skill set required to excel in Logical Reasoning
 - ☐ Approach to solve the questions
-

CONSTITUENTS OF LOGICAL REASONING

Before we move on to solving the questions, it is very imperative that we understand the constituents of the Logical Reasoning Questions and at the same time the skill-sets required to crack them.

Logical reasoning questions are designed to measure the students' ability to understand the structure of relationships and to draw conclusions from it. Students will be asked to make deductions from a set of statements, conditions or rules that describe the relationships among various variables such as persons, places, things or events. These questions simulate the kinds of detailed analyses of relationships that management students must perform in solving problems. Additionally, they require the ability to reason clearly and deductively from a given set of rules or restrictions; all under a strict time frame.

Each logical reasoning question contains three separate parts—

- (i) Scenario
- (ii) Rules and
- (iii) Question/s

Scenario

The scenario introduces a set of variables—people, places, things or events involved in an easy to understand activity such as sitting in seats or singing songs.

Here is an example:

A postman has to deliver exactly seven letters—N, O, P, Q, R, S and T on seven days of a week; not necessarily in the same order. The seven deliveries must be made according to certain conditions.

In the above situation, there are two variable sets—the letters N, O, P, Q, R, S and T and seven different delivery positions, which would be numbered 1 through 7 for the different days of the week.

In the above situation, there are two variable sets—the letters N, O, P, Q, R, S and T and seven different delivery positions, which would be numbered 1 through 7 for the different days of the week.

Rules

The scenario is followed by a series of rules or conditions which impose specific restrictions upon the relationships among the subjects. Rules can also be seen as a set of statements that describe the relationships between the

variables. An LR set may include as few as two or as many as ten rules or may be more. Besides, these rules or conditions specify the relationship between the different variables.

Here are the rules that accompanied the above given LR set:

- (i) Letter P and Letter O have to be delivered on consecutive days.
- (ii) The postman cannot deliver letter O and letter S on consecutive days.
- (iii) Letter T has to be delivered on the fourth day of the week.
- (iv) The postman has to deliver S and N both before delivering letter Q.
- (v) It is also given that Monday is assumed to be the first day of the week.

Rules also help us in providing a proper sequence of events or arrangement of several variables involved in the question. We will discuss more about ‘Sequencing and Arrangement’ in Chapter 4 of this section.

Questions

The rules are followed by a series of questions about the relationships defined by the conditions. The questions call for a deductive analysis and a right correspondence between the scenario and the rules. This third and final part of any LR set, tests the students’ knowledge about the relationships between the variables, the structural features of the given set, and the way these relationships and features change as the conditions in the set change.

As in QA problems, one and only one response can be proven beyond any doubt to be the correct one. In CAT, the number of questions per set normally ranges from one to six, although CAT does not follow certain pattern.

All initial rules or conditions are applied to all the questions given thereof. However, sometimes a particular question might introduce something new after suspending the parent information. Hence, students are expected to consider each question separately from the other questions. Do not carry over information provided in any particular question to the other questions.

Some of the sample questions pertaining to the above LR set are as follows:

1. Which of the following lists an acceptable order of deliveries of letters?
 - (a) NQPTOSR (b) POSTRNQ
 - (c) NRSTPQO (d) RSOTNPQ

2. Which of the following is a complete list of the days on which letter O could be delivered?
 - (a) Wednesday, Friday
 - (b) Wednesday, Friday, Sunday
 - (c) Wednesday, Thursday, Friday
 - (d) Any day of the week except Saturday
3. Which of the following cannot be true?
 - (a) Letter Q is delivered on Wednesday
 - (b) Letter Q is delivered on Friday
 - (c) Letter R is delivered on Wednesday
 - (d) Letter S is delivered on Tuesday

We will go through the solution of the questions given above after discussing the Skills set required to excel in the Logical Reasoning section.

SKILL-SET REQUIRED

We have understood and observed uptill now that the LR questions test the following:

- Command of the details given,
- Formal deductive abilities,
- Understanding of how rules limit and order behavior, and
- Ability to cope up with many pieces of data simultaneously to solve the problems.

In my experience of dealing with a good number of students, most of them already have these skills, the problem lies with the fact that they probably haven’t acquired the know-how to apply these skills to their best advantage in the rarified atmosphere of a standardized time-bound skills-based test.

While discussing the various skills required, we will assume that a student has no prior background of solving these kinds of questions and owing to this; he/she is almost at a very basic level.

Skill 1— Understanding the Information

This simply means that, “Are you able to decipher the different kinds of statements given?”

Let us have a look at these statements:

- (i) Game B must be played on the day following the day on which game F is played.
- (ii) Game D must be staged on Sunday and is not to be immediately preceded by game B.

- (iii) The population of Maharashtra is followed by the population of Bihar whereas population of Orissa is preceded by the population of Bihar.

Which of the following options is least likely to be wrong?

Obviously, the above written statements are just a part of any particular LR set, but play an important role in making a sequence of events. Besides, there can be a few questions, which by virtue of juggling with the words, can become difficult to comprehend within that time-bound test ambience. This can best be understood by looking at a few examples with their proper explanations.

Sometimes just for the sake of making a statement difficult to understand, the test makers start playing with the words, as seen in the following example:

Statement (i) – There are three cottages in a row and three friends A, B and C are living in these cottages, one person in each cottage. The cottage of A is in between the cottages of B and C.

Statement (ii) – There are three cottages in a row facing south and three friends A, B and C are living in these cottages one person in each cottage. When A, B and C are standing in front of their houses facing north, A makes a statement that cottage of one of B and C is on his right and another cottage is on his left.

Statement (iii) – There are three cottages in a row numbered 1 through 3 and three friends A, B and C are living in these cottages, one person in each cottage. A finds that his cottage number is less than the cottage number of one of his friends.

We do understand that the interpretation of all the three statements is the same i.e., the order of their cottages being—BAC or CAB.

At the same time, we should understand some of the basic statements pertaining to the questions. To answer these questions, we should focus on the nature of the right and wrong answer choices:

Question reads as...	Its meaning...
Which one of the following statements could be true?	A statement that could be true. The remaining wrong choices will be statements that cannot be definitely true. (i.e., statements that must be false)
Which one of the following statements cannot be true?	A statement that cannot be true (must be false). The remaining wrong choices will be the statements that can either be definitely true or at least could be true.
Which one of the following statements must be true?	A statement that must be true. The remaining wrong choices will be statements that either cannot be true or only could be true.
All of the following statements could be true EXCEPT.....	A statement that cannot be true. The remaining wrong choices will be statements that either could be true or are definitely true.
All of the following statements must be true EXCEPT...	A statement that either cannot be true or merely could be true. The remaining wrong choices will be statements that must be true.
Which one of the following statements could be false?	A statement that cannot be true or could be true or false. The remaining wrong choices will be the statements that must be true.
Which one of the following statements must be false?	A statement that cannot be true. The remaining wrong choices will be the statements that are either definitely true or only could be true.
Which of the following statements is least likely to be wrong?	A statement that is true. The remaining options will be false.

Skill 2—Diagramming the Information

This is the most important stage of solving any LR set. This particular skill in itself requires the students to be aware of various factors related to the scenario and the rules, such as:

- What kind of diagram viz., table or line diagram etc., is the most best suitable for the given set?
- How many variables are there in the set and out of the given variables, which of the variables are most helpful in making the diagram and representing the rules and the scenario?

Ideally, in case of two variables, the work done in creating the setup and making inferences will be sufficient to answer the question. But the problem starts surfacing when the number of variables increases to three or more. We will discuss more about the variables and the way to use them to our benefit later in this chapter.

Besides the given data in the LR set, sometimes the questions which supply a new piece of information specific to that question alone, also tend to help us in achieving a complete diagram. And this is the reason why students should do this diagramming work next to the question itself, if enough space is available. This provides you several benefits:

- By doing the work next to the problem, you increase the visual connection between your diagram and the LR set.
- If you need to come back to a question, when you return you will be able to clearly see the work done up to that point.

There are two approaches that are widely propagated and used to form a diagram. Let us look at the pros and cons related to the approaches:

Approach 1

Do the work for each question on the main diagram

This approach suggests that the work for each question should be done on the main diagram itself. In order to utilize this method, you must erase your previous work before beginning each question. However, erasing your work has a number of negative effects too: you could accidentally erase important information that applies to all the questions and more importantly, every time you erase your work you lose some of the knowledge that you created about the game.

Rather what I would suggest as a thumb rule: do not erase any work that you have done unless you have made a mistake.

Approach 2

Create a “grid” and do the work for each question in the rows within the grid

This approach requires you to create a grid near the main setup. The work for each question is then done within the rows of the grid, as follows:

Questions/Scenario or conditions	1	2	3	4	5
Q 1	A	B	C		
Q 2	B	A			C
Q 3		D	E	A	D

After going through the above discussion, we can conclude that

- Drawing the grid along with the main setup requires a large amount of space, which might not be always available in the test paper. In contrast, doing the work next to the question is space-efficient.
- In case of LR sets with less than four variables, working next to the question is always efficient, as it allows you to draw the most appropriate diagram for the given scenario.

Lastly, since the LR sets asked in the CAT are too dynamic in nature, the proper use of scratch work is an important pre-requisite.

Skill 3—Sequencing the Information to get the Answer

Uptill now, we have understood how the given variables can be arranged in a proper structure. Before moving on to the actual problem solving of two or more variables, we have now reached a stage (theoretically) where the given information is to be used to solve the LR set. The idea is to focus on what the question requires of you, before starting the solving process.

Remember some of the very basic rules:

- Always pay special attention to the sequencing aspect in every set. Many questions are answered just by thinking, “What things are left? Where can (or must) they be placed and at which position?”

- Many a times it will happen that we don't fully grasp a LR situation. In such cases keep asking yourself questions and go through a couple of "what ifs?" to keep the LR set going. Whenever you are in a fix, ask yourself, "What if it goes here? What does that mean for the other things?" Even if you don't get any help from this, but it's still time worth spent because it helps you to understand the LR set better.
- The best way to deal with any LR set is to build it directly into a diagram from the given information. Sometimes, the students are expected to fill some of the unoccupied places on their own by assuming something. Then it becomes essential to segregate the given information in the LR set with your assumed information. You can do it by encircling the data assumed by you.
- While assuming some information on your own, always keep an eye on the options provided along with the question. Sometimes you might get a lot of help from the options as well.
- Remember that the test-maker has scattered the easy, the moderate and the difficult questions across the entire paper in no proper order. So, solve the question which you find the easiest first, and not the one which is Q 1.

MANAGING THE VARIABLES

Let me clarify at the onset, that the variables which we are talking about here are not the same as the mathematical variables. Rather, what we mean to say is that the word variable here represents all the entities, be it the name of a place, a person or the days; a book which they might have been reading or practically anything given in the LR set. Additionally, there will be some rules or conditions encompassing these variables. And as it is correctly said, "Our variables are our resources"; similarly we should use the variables given to us in our questions, in the same way.

Understandably, a LR set can have two or more variables. Let us see some examples:

Example 1: Two variable LR set

Six plays, viz., *Ram teri Ganga maili*, *Satya*, *Don*, *Bakri.com*, *Andha Mughal* and *Angrezo Bharat aao*, are to be staged, one on each day starting from Monday to Saturday.

In the above written statement, which can also be the opening statement of an LR set, we see that there are two sets of variables—

- (A) Six plays and
- (B) Six days as six different positions

Now according to the given conditions, we will be establishing the correspondence between these plays and the days on which they can happen.

Example 2: Three variable LR set

There are five men working in *Due North Inc.* namely A, B, C, D and E. Their respective salaries are different and they are married to five women namely F, G, H, I and J.

In this situation, there are three sets of variables—

- (A) Five men working in an organization.
- (B) Their respective salaries which are different.
- (C) Their wives, which are of course different.

Before plotting the diagram for the above set, the most important thing to remember here is the fact that we can establish direct correspondence on paper, only between two variables, and so the third variable is to be kept in the mind. Now, to choose the two variables out of the given three variables, we should keep an eye on the rules or the given conditions. The more the conditions related to a particular variable are given, the more the chances are of it being taken as one of those two variables which are to be used in the diagram on the paper.

Example 3: More than three variable LR set

Five men from five different states of India work in a factory and each of them performs a different job. Each man commutes to work using a different mode of transport and most work on different shifts. There are three shifts—1st shift, 9 A.M.–12 Noon; 2nd shift, 12 Noon–3 P.M. and 3rd shift, 3 P.M.–6 P.M. All the people working on the same shift come at the same time.

How many variables are there in the above LR set?

Let us count—

- (A) 1st variable – five men
- (B) 2nd variable – five states
- (C) 3rd variable – different job
- (D) 4th variable – mode of transport
- (E) 5th variable – work-shift

We do understand that most of the time managing fewer variables is easier than managing more variables.

From here we will start with LR sets of two variables and then move on to the LR sets of a higher number of variables.

One thing I would like to reiterate— Please don't just read this book; rather, sit with a pen/pencil and paper

- X (Tuesday) then – U (Monday) --- (Rule 3)
- Z – W --- (Rule 4)

And then the five places—

Monday Tuesday Wednesday Thursday Friday

- 1.(a) Since box W is to be delivered on the day immediately after the day on which box Z is delivered, box W cannot be delivered on Monday.
- 2.(d) Box U is to be delivered the day after box T. So, the order is: T – U. This is the second such pair after Z – W which is to be accommodated into the 5-days schedule.

Now start visualizing the days for X to be delivered:

Monday – Not possible

Tuesday – Not possible, otherwise one of the pairs from T – U and Z – W will be required to split up.

Wednesday – If X is to be delivered then one of the pairs will be delivered on Monday–Tuesday and other pair on Thursday–Friday with either box T being delivered on Monday/Thursday or box Z being delivered on Monday/Thursday.

Now, T cannot be delivered on Monday otherwise X will be delivered on Friday (Rule 2).

If T is delivered on Thursday, then U will be delivered on Friday and compulsorily, Z will be delivered on Monday and W on Tuesday.

This delivery schedule is in accordance with the given rules. So, box X can be delivered on Wednesday.

Thursday – Not possible, otherwise one of the pairs from T – U and Z – W will be required to split up.

Friday – If X is to be delivered then one of the pairs will be delivered on Monday–Tuesday and other pair on Wednesday–Thursday with either box T being delivered on Monday/Wednesday OR box Z being delivered on Monday/Wednesday.

The following delivery schedule scheme can be followed:

Monday – T Tuesday – U
Wednesday – Z Thursday – W
Friday – X

Hence box X can be delivered on either Wednesday or Friday.

- 3.(c) Let us make the diagrams:

Monday Tuesday Wednesday Thursday Friday
W

If W is on Wednesday, then Z will be on Tuesday.

Monday Tuesday Wednesday Thursday Friday
 Z W

Checking the options:

Option (a). Box U is delivered on Friday.

We are left with three boxes T, U and X and three days—Monday, Tuesday and Friday.

Now let us take the stock of the situation now:

For Monday—X cannot be delivered on Monday, so X has to be delivered on either Thursday or Friday.

If T is delivered on Monday, then X will be delivered on Friday and consequently, U on Thursday.

If U is delivered on Monday, then the rest two will be delivered on the remaining two days.

So, box U cannot be delivered on Monday.

Option (b) We can eliminate this option very easily.

Monday Tuesday Wednesday Thursday Friday
 Z W

Option (c)

Monday Tuesday Wednesday Thursday Friday
Z W

Now moving ahead from here:

If U is delivered on Monday, then X and T can be delivered on Thursday and Friday respectively.

Hence, option (c) could be true.

Work for students: Check the veracity of option (d).

- 4.(a) Box U is delivered on Wednesday.

Monday Tuesday Wednesday Thursday Friday
U

Now, Z will be delivered on either Monday or Thursday.

$$\begin{array}{ccccc} \underline{\text{Monday}} & \underline{\text{Tuesday}} & \underline{\text{Wednesday}} & \underline{\text{Thursday}} & \underline{\text{Friday}} \\ & & & & (1) \\ Z & & W & & U \\ & & \text{OR} & & \end{array}$$

Monday Tuesday Wednesday Thursday Friday
(2)
U Z W

We can see that (2) is not possible, because T has to be delivered on Monday (X cannot be delivered on Monday) and in that case X should be delivered on Friday, which is not possible.

So, (1) has to be true. T and X can be interchangeably delivered on Thursday or Friday without violating any condition.

So, option (a) is definitely true.

This question can be used to generate a set of new questions as well. One such question could have been made by replacing “must be” with “could be”. Of course in that case, more than one option would have become true out of the given four options.

However, two variables LR set questions should be seen more as ‘Sequencing and Arrangement’ questions. We will discuss more about this in Chapter 4.

Problems in Three Variables

Directions for questions 5 to 6: Read the following passage and solve the questions based on it.

- (i) Six men—Rajesh, Dinesh, Lokesh, Nilesh, Shailesh and Himesh work in different companies, namely, P, Q, R, S, T and U, and each one wears a company-sponsored different coloured tie, i.e., Brown, Green, Pink, Yellow, Purple and Red, though not necessarily in the same order.
 - (ii) The one wearing a Brown tie works in company S and the one wearing a Green tie works in company P.
 - (iii) Himesh does not work in company R or T.
 - (iv) Rajesh wears a Pink tie and works in company Q.
 - (v) Nilesh does not work in company T and a purple colour tie is not given by the company R.
 - (vi) Shailesh works in company U and neither Nilesh nor Dinesh works in the company S.
 - (vii) Company T does not sponsor Purple or Yellow coloured ties and Lokesh works in company P.
5. Which colour tie is given by the Company R?
 - (a) Cannot be determined
 - (b) Brown
 - (c) Green
 - (d) None of these
 6. Which of the following “colour of tie-company-person” combinations is correct?
 - (a) Green-R-Nilesh
 - (b) Brown-S-Lokesh
 - (c) Red-T-Dinesh
 - (d) Yellow-R-Shailesh

Solution

Scenario

There are three variables involved in this question set: Name of the person, company and the colour of tie.

- There are six persons—Rajesh, Dinesh, Lokesh, Nilesh, Shailesh and Himesh

- There are six organizations—P, Q, R, S, T and U
- There are six coloured ties—Brown, Green, Pink, Yellow, Purple and Red.

Rules

Using the rules, we can make the following table:

Tie	Company	Name
Brown	S	Himesh
Green	P	Lokesh
Pink	Q	Rajesh
Purple	U	Shailesh
Yellow	R	Nilesh
Red	T	Dinesh

- 5.(d) The colour of the tie provided by the company R is Yellow. Hence, the answer is option (d). None of these.
- 6.(c) Obviously, the answer is option (c).

Problems in More Than Three Variables

Directions for questions 7 to 8: Read the following passage and solve the questions based on it.

Five men from five different states work in an office and each of them performs a different work. Each comes to the office using a different mode of travel and most work on different shifts (There are three shifts; the second shift starts after the first shift and ends before the third shift). All the five persons working in the same shift come at the same time.

- (i) Hari, who isn’t from West Bengal (WB), does not walk to work.
- (ii) Narayan is not a GL.
- (iii) The man who works in the third shift and whose name isn’t Javed doesn’t use the bus.
- (iv) Simon, who isn’t from UP, uses a bicycle to go to work. He isn’t a technician.
- (v) The man from Karnataka isn’t called Narayan and he comes to work after the assembler but before Abbas.
- (vi) The man from Bihar and the person who walks, both work on the first shift.

- (vii) The GL comes to work before the man who uses the train.
 (viii) Javed comes to work after the man from Gujarat but before the man who uses a scooter.
 (ix) Narayan and the man who uses the bus work on the same shift.
 (x) The man from UP and the tester work in the second shift.
 (xi) The stock clerk works on the third shift.

7. Which of the following statement(s) is (are) true?
 I. The man from Karnataka and the stock clerk work in the same shift.
 II. Abbas and the technician work in the same shift.
 III. The man who comes by bus and Simon work in the same shift.
 IV. Hari and the man who comes walking work in the same shift.
 (a) I only (b) None
 (c) IV only (d) All are true
8. Which of the following statement(s) is (are) true?
 I. The GL comes by bus and the assembler walks to work.
 II. The stock clerk comes by bus and the tester by train.
 III. The stock clerk comes by scooter and the technician by train.
 IV. The assembler comes by bicycle and the tester by train.
 (a) I and III only (b) II only
 (c) I only (d) None

Solution

Scenario

We have already seen that this question set is of 5 variables

- 1st variable – Five men
 2nd variable – Five states
 3rd variable – Different job
 4th variable – Mode of travel
 5th variable – Work-shift

- (A) The five persons are—Hari, Narayan, Simon, Javed and Abbas.
 (B) The five modes of travel are—Bus, Walk, Bicycle, Train and Scooter.
 (C) The five states are—Bihar, UP, WB, Karnataka and Gujarat.

- (D) The five works are—GL, Assembler, Tester, Technician and Stock Clerk.
 (E) The three shifts are—1st shift, 2nd shift and 3rd shift.

Rules

There are two major bottlenecks with this problem set:

- Most of the statements given in the beginning have a negative connotation.
- A total of eleven statements are given.

Ideally, in these types of situations where a good amount of information is given, we should first go through all the statements and then find out the statement with the maximum concrete facts.

Let us first make a table denoting all the variables:

	Shift	State	Work	Mode of Travel
Hari				
Narayan				
Simon				
Javed				
Abbas				
Statement (v)		Karnataka – 2nd shift – Neither Abbas nor Narayan	Assembler – 1st shift	Abbas – 3rd shift
Statement (viii)		Javed – 2nd shift Gujarat – 1st shift Scooter – 3rd shift		
Statement (vi)		Bihar – 1st shift Walk – 1st shift		
Statement (x)		UP – 2nd shift Tester – 2nd shift		
Statement (iv)		Narayan – 1st shift Bus – 1st shift		

What deductions can we make from the above statements?

Deduction 1 – Since there are five persons and two persons each are coming in the 1st shift and 2nd

shift, so we can conclude that only one person is coming in the 3rd shift. We will do more deductions after filling up the space for the person who comes in the 3rd shift.

Abbas – 3rd shift – Scooter – Stock Clerk (Using statement xi)

However we are still not sure about the state to which Abbas belongs. Let us find it out through the process of elimination:

Possible states—Bihar, UP, WB, Gujarat, Karnataka

Possible state for Abbas—

Statement (x)		Statement (v)		
~~Bihar,~~	~~UP,~~	WB,	~~Gujarat,~~	~~Karna~~
Statement (vi)		Statement (viii)		

Hence West Bengal is the only possibility for Abbas.

Let us fill the table with the newly acquired information:

	Shift	State	Work	Mode of Travel
Hari				
Narayan	1st	Gujarat/ Bihar		Bus/Walk
Simon				
Javed				
Abbas	3rd	WB	Stock Clerk	Scooter

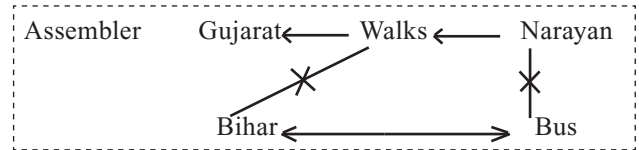
We can fill up some more blanks above with the various possibilities (as we did in the case of Narayan's state).

Now we have a good amount of information regarding the persons working in the first shift:

1st shift –

Assembler	Gujarat	Walks	Narayan
	Bihar		Bus

Thus, we can have the following arrangement:

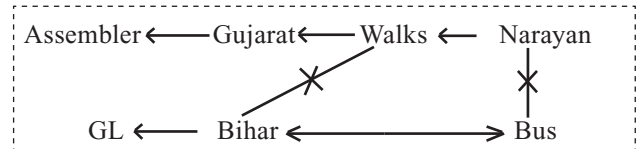


Still we are not sure if Narayan is an assembler or not? To find it out, we will go to some other unused statements. Let us use statement (vii):

Statement (vii): GL – 1st shift

Train user – 2nd shift (Because person who commutes by train cannot come in 3rd shift, as Abbas is coming in 3rd shift).

Using statement (ii), Narayan is not a GL, so he has to be an Assembler.



Let us fill up the table with the new information again:

	Shift	State	Work	Mode of Travel
Hari				
Narayan	1st	Gujarat	Assembler	Walk
Simon				
Javed				
Abbas	3rd	WB	Stock Clerk	Scooter

To find out the 2nd person working in 1st shift, now we will use the process of elimination:

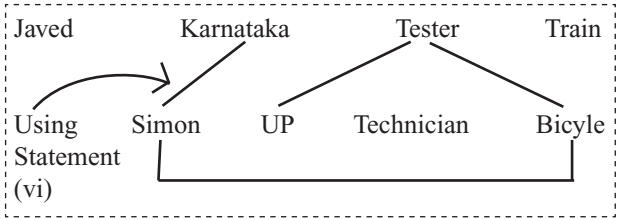
Hari	~~Narayan~~	Simon	~~Javed~~	~~Abbas~~
	Already done	Statement (viii)		Already done

The possible options for the 2nd person is either Hari or Simon. Using statement (iv), Simon comes on a bicycle. However, the 2nd person working in the 1st shift comes by bus. So, Simon is not possible in the

1st shift. Hence, Hari is the 2nd person coming in the first shift.

	Shift	State	Work	Mode of Travel
Hari	1st	Bihar	GL	Bus
Narayan	1st	Gujarat	Assembler	Walk
Simon				
Javed				
Abbas	3rd	WB	Stock Clerk	Scooter

Now we are left with the variables attached to only the 2nd shift. Let us write them one by one:



Hence, the final table is:

	Shift	State	Work	Mode of Travel
Hari	1st	Bihar	GL	Bus
Narayan	1st	Gujarat	Assembler	Walk
Simon	2nd	Karnataka	Tester	Bicycle
Javed	2nd	UP	Technician	Train
Abbas	3rd	WB	Stock Clerk	Scooter

PRACTICE EXERCISE 1

Directions for questions 1 to 5: Read the following passage and solve the questions based on it.

- (i) Six students P, Q, R, S, T and U are in different branches of Engineering viz., IT, Mechanical, Chemical, Electrical, Metallurgy and Electronics but not necessarily in the same order.
- (ii) Each of them is a resident of a different city viz., Mumbai, Kolkata, Chennai, Patna, Hyderabad and Bangalore. R is the resident of Patna but he is not in chemical or electrical. T, who is in mechanical, is not a resident of Mumbai or Hyderabad. Q is from Kolkata and he is in electrical. The student from Chennai is in electronics; S is from Mumbai; P is in metallurgy.
- Which of the following is not the correct combination of student and subject?
(a) P-Metallurgy (b) Q-Electrical
(c) U-Electronics (d) S-IT
 - Which student is from Chennai?
(a) R (b) U
(c) S (d) T
 - Which city does P belong to?
(a) Chennai
(b) Kolkata
(c) Hyderabad
(d) Cannot be determined
 - Which student is from Bangalore?
(a) T (b) Q
(c) S (d) T or P
 - Which subject is being studied by R?
(a) Electronics (b) Mechanical
(c) Metallurgy (d) None of these

Directions for questions 6 to 10: Read the following passage and solve the questions based on it.

- (i) Five friends P, Q, R, S and T travelled to five different cities, Chennai, Kolkata, Delhi, Bangalore and Hyderabad, by five different modes of transport, bus, train, airplane, car, and boat, from Mumbai.
- (ii) The person who travelled to Delhi did not travel by boat
- (iii) R went to Bangalore by car and Q went to Kolkata by airplane
- (iv) S travelled by boat whereas T travelled by train

- (v) Mumbai is not connected by bus to Delhi and Chennai.
- Which of the following combinations of person and mode is not correct?
(a) T-Airplane (b) R-Car
(c) S-boat (d) P-Bus
 - Which of the following combinations is true for S?
(a) Chennai-bus
(b) Chennai-boat
(c) Delhi-bus
(d) Cannot be determined
 - Which of the following combinations of place and mode is not correct?
(a) Chennai-boat
(b) Kolkata-airplane
(c) Hyderabad-bus
(d) Delhi-bus
 - The person travelling to Delhi went by which of the following modes?
(a) Bus (b) Train
(c) Airplane (d) Car
 - Who among the following travelled to Delhi?
(a) T
(b) S
(c) R
(d) Cannot be determined

Directions for questions 11 to 15: Read the following passage and solve the questions based on it.

Six persons Amar, Bijay, Chetan, Disha, Esha and Farukh took up a job with an organization in a week from Monday to Saturday. Each of them joined for different posts on different days. The posts were of—clerk, officer, technician, manager, supervisor and sales executive, though not necessarily in the same order.

Farukh joined as a manager on the first day. Bijay joined as a supervisor but neither on Wednesday nor Friday. Disha joined as a technician on Thursday. Chetan joined the firm as an officer on Wednesday. Esha joined as a clerk on Tuesday. Amar joined as a sales executive.

- Who joined the firm on Wednesday?
(a) Bijay
(b) Chetan
(c) Bijay or Chetan
(d) Cannot be determined

12. Who was the last person to join the firm?

- (a) Esha
- (b) Farukh
- (c) Amar
- (d) Bijay

13. On which of the following days did the Sales Executive join?

- (a) Tuesday
- (b) Thursday
- (c) Saturday
- (d) Friday

14. Which of the following is correctly matched regarding the posts and day of joining?

- (a) Manager – Tuesday
- (b) Officer – Wednesday
- (c) Clerk – Thursday
- (d) Technician – Monday

15. Who joined on Wednesday?

- (a) Chetan
- (b) Clerk
- (c) Amar
- (d) Manager

ANSWER KEYS

1. (d) 2. (b) 3. (c) 4. (a) 5. (d) 6. (a) 7. (b) 8. (d) 9. (b) 10. (a)
 11. (b) 12. (d) 13. (d) 14. (b) 15. (a)

HINTS AND EXPLANATIONS

1 to 5

Student	Place	Branch
R	Patna	Chemical, Electrical (×)
T	Mumbai, Hyderabad (×)	Mechanical
Q	Kolkata	Electrical
	Chennai	Electronics
S	Mumbai	
P		Metallurgy

The following bold letters can be filled easily with the given information.

Student	Place	Branch
R	Patna	IT
T	Bangalore	Mechanical
Q	Kolkata	Electrical

Student	Place	Branch
U	Chennai	Electronics
S	Mumbai	Chemical
P	Hyderabad	Metallurgy

6 to 10

P – Hyderabad-bus
 Q – Kolkata-airplane
 R – Bangalore-car
 S – Chennai-boat
 T – Delhi-train

11 to 15

Person	Posts	Days
Farukh	Manager	Monday
Bijay	Supervisor	Saturday
Disha	Technician	Thursday
Chetan	Officer	Wednesday
Esha	Clerk	Tuesday
Amar	Sales executive	Friday

PRACTICE EXERCISE 2

Directions for questions 1 to 2: *Read the following passage and solve the questions based on it.*

- (i) Six books on different subjects, viz., History, Geography, English, Hindi, Economics and Psychology, are arranged in a pile (not necessarily in the same order). Each book belongs to different persons whose names are Debasis, Harsh, Vishwas, Ravi, Sanjay and Neeta.
- (ii) English book, which is kept on the top, belongs to Debasis, Psychology book, which is kept at the bottom does not belong to Sanjay or Ravi.
- (iii) Economics book belongs to Harsh and is kept immediately below Hindi.
- (iv) History book is immediately above Geography and immediately below Economics. Hindi book belongs to Neeta and History book belongs to Ravi.
- Whom does the Psychology book belong to?
(a) Neeta
(b) Vishwas
(c) Harsh
(d) Cannot be determined
 - Which book is fourth from the bottom?
(a) History
(b) Geography
(c) Economics
(d) Hindi

Directions for questions 3 to 6: *Read the following passage and solve the questions based on it.*

- (i) Mr Sharma has five sons—A, K, S, R and N. While going for a party, they wore different coloured shirts viz., red, yellow, blue, white and green (not necessarily in the same order).
- (ii) Each one of them has different likings viz., reading, playing, traveling, singing and writing in no particular order.
- (iii) K, who has a liking for singing, does not wear a yellow shirt. S wears a red shirt and does not like reading or writing. N likes to play and does not wear a blue or yellow shirt. A has a liking for writing and R does not wear a yellow or green shirt.
- What is the colour of K's shirt?
(a) White
(b) Green
(c) Blue
(d) Data inadequate
 - Who has a liking for reading?
(a) R
(b) A
(c) K
(d) Data inadequate

- Which of the following combination of son-colour of shirt-liking is correct?
(a) R – blue – reading
(b) N – white – playing
(c) A – yellow – writing
(d) N – green – playing
- For how many sons can the colour of shirt be definitely determined?
(a) 1
(b) 2
(c) 3
(d) 4

Directions for questions 7 to 10: *Read the following passage and solve the questions based on it.*

There were ten papers in the last year 10th standard CBSE exam. Following guidelines have been issued to schedule the examination:

- Examination board has organized the exams for ten papers viz., A, B, C, D, E, F, G, H, I and J on six days of the week with a holiday on Sunday; not having more than two papers on any of the days.
 - Exam begins on Wednesday with paper F.
 - D is accompanied by some other paper but not on Thursday. A and G are on the same day immediately after the holiday.
 - There is only one paper on the last day and Saturday. B is immediately followed by H, which is immediately followed by I.
 - C is on Saturday. H is not on the same day as J.
- Examination for which of the following pairs of papers is on Thursday?
(a) HE
(b) DB
(c) FD
(d) Data inadequate
 - Examination for which of the following papers is on the next day of D?
(a) B
(b) C
(c) I
(d) H
 - Examination for which of the following papers is on the last day?
(a) B
(b) E
(c) J
(d) Data inadequate
 - Examination for paper F is on the same day as which of the following papers?
(a) E
(b) D
(c) I
(d) None of these

Directions for questions 11 to 15: Read the following passage below and solve the questions based on it.

There are seven professors A, B, C, D, E, F and G teaching seven subjects History, Geography, Physics, Chemistry, Maths, Biology and English from Monday to Friday at Gaya College. Each professor teaches a different subject and not more than two subjects are taught on any one of the days.

- (i) Chemistry is taught by professor B on Tuesday.
 - (ii) Professor D teaches on Friday but neither Geography nor Physics.
 - (iii) Professor F teaches History but neither on Thursday nor on Friday.
 - (iv) Professor A teaches English on the day on which History is taught.
 - (v) Professor C teaches Maths on Monday.
 - (vi) Geography and Chemistry are taught on the same day.
 - (vii) Professor G teaches on Thursday.
11. On which of the following days is English taught?
(a) Wednesday (b) Monday
(c) Tuesday (d) Cannot be determined
 12. Which of the following subjects is taught by professor G?
(a) Biology (b) Geography
(c) Physics (d) Chemistry
 13. On which of the following days is Geography taught?
(a) Monday (b) Tuesday
(c) Wednesday (d) Thursday
 14. Which subject is taught on Friday?
(a) Physics (b) History
(c) Geography (d) Biology
 15. Which of the following pairs of professors teaches on Tuesday?
(a) B and D (b) A and B
(c) B and F (d) None of these

Directions for questions 16 to 18: Read the following passage and solve the questions based on it.

- (i) Seven friends P, Q, R, S, T, U and W have gathered at the Patna airport. However, only five of them are scheduled to go to five different places Delhi, Chennai, Lucknow, Bangalore and Kolkata.

- (ii) Five of them are executives with specializations in Administrative (Admn), Human Resource management (HRM), Marketing, Systems and Finance.
 - (iii) T is an executive and he is going to Chennai and his specialization is neither Finance nor Marketing.
 - (iv) W is a system specialist and is going to Delhi. U is an executive but is not going anywhere.
 - (v) Q is an executive with specialization in HRM but has come at the airport to see his friends only.
 - (vi) P is an executive but not from Marketing and is going to one of the destinations but not to Bangalore or Kolkata.
16. Who among the following specializes in Marketing?
(a) S (b) P
(c) U (d) Cannot be determined
 17. What is the specialization of R?
(a) Finance
(b) Marketing
(c) Either Marketing or Finance
(d) None of these
 18. Who is going to Bangalore?
(a) R (b) S
(c) P (d) Cannot be determined

Directions for questions 19 to 20: Read the following passage and solve the questions based on it.

- (i) Six men B, D, C, M, J and K are split in two groups of three each and are made to stand in two rows, such that a man in one row is exactly facing a man in the other row.
 - (ii) M is not at the ends of any row and is to the right of J, who is facing C. K is to the left of D, who is facing M.
19. Which of the following groups of men are in the same row?
(a) BMD (b) MJK
(c) BDC (d) None of these
 20. Who is to the immediate left of B?
(a) M (b) D
(c) J (d) Data inadequate

ANSWER KEYS

1. (b) 2. (c) 3. (d) 4. (a) 5. (c) 6. (b) 7. (a) 8. (b) 9. (c) 10. (d)
 11. (a) 12. (c) 13. (b) 14. (d) 15. (d) 16. (c) 17. (d) 18. (d) 19. (d) 20. (a)

HINTS AND EXPLANATIONS

1 to 2

1.	English	Debasis
2.	Hindi	Neeta
3.	Economics	Harsh
4.	History	Ravi
5.	Geography	Sanjay
6.	Psychology	Vishwas

3 to 6

Son	Colour of Shirt	Likes
A	yellow	writing
K	white/blue/green	singing
S	red	traveling
R	blue/white	reading
N	green/white	playing

3. white or blue or green

7 to 10

Wed	Thu	Fri	Sat	Mon	Tue
F, B	H, E	I, D	C	A, G	J

11 to 15

Seven professors are: A, B, C, D, E, F and G.

Seven subjects are: History, Geography, Physics, Chemistry, Maths, Biology and English. Subjects are

taught on Monday, Tuesday, Wednesday, Thursday and Friday.

From statements (i), (v) and (vii), we get the following:

Table 1

Person	Subject	Day
B	Chemistry	Tuesday
C	Maths	Monday
G	—	Thursday

Now, with the help of (ii), (iii), (iv) and (vi) we get the following table:

Table 2

Person	Subject	Day
B	Geography	Tuesday
	Chemistry	Tuesday
C	Maths	Monday
G		Thursday
D		Friday
F	History	—
A	English	—

From Table 2, it is obvious that E teaches Geography on Tuesday.

Now, we know that History and English are not taught on Tuesday, Monday, Thursday and Friday. Hence, History and English are taught on Wednesday.

Again from Table 2, it is obvious that D teaches either Physics or Biology. But from Ans. (ii) D does not teach Physics. Hence, D teaches Biology.

So, using elimination techniques, G teaches Physics.
Hence, the obtained information can be summarized as below:

Table 3

	Person	Subject	Day
1.	E	Geography	Tuesday
2.	B	Chemistry	Tuesday
3.	C	Maths	Monday
4.	G	Physics	Tuesday
5.	D	Biology	Friday
6.	F	History	Wednesday
7.	A	English	Wednesday

16 to 18

Using the given information, we get the following:

Person	Specialization	Destination
T	Finance, Marketing (×)	Chennai ... (i)
W	Systems	Delhi ... (ii)
U		Going nowhere ... (iii)

Person	Specialization	Destination
Q	HRM	Going nowhere ... (iv)
P	Marketing (x)	Bangalore, Kolkata... (x) ... (v)

It is given that there are five destinations. Using (i), (ii) and (v) we can definitely determine that:

P – Lucknow

Now, there are five executives.

Using (i), (ii) and (iv)

T – A – Chennai

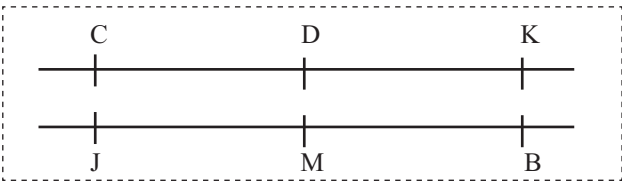
Now P – F – Lucknow

Now, the only remaining field of specialization can be allotted to U.

Hence, U – M – Going nowhere

So, the remaining two friends R and S are not executives but are going either to Bangalore or to Kolkata.

19 to 20



Chapter

3

LOGICAL LINKS

LEARNING Objectives

In this chapter, you will learn:

- ☐ What is logical link?
 - ☐ Different types of logical links and their meanings
 - ☐ Inclusive vs exclusive meaning of logical links
 - ☐ Different types of questions
 - ☐ Approach to solve the questions
-

While discussing Logic in Chapter 1, we understood how Logic helps us in understanding and examining every proposition/statement. However, in order to construct the formal rules of inference we need to take care of some of the very common ‘words’, which we define as Logical Links. It is to be understood very clearly that these words alone cannot work as Logical Links.

These Logical Links help us in examining the reversibility of logic, too.

WHAT DO WE UNDERSTAND BY LOGICAL LINKS?

Before we move ahead, let us consider some statements which will help us in getting a clear picture of Logical Links in our mind:

- If it rains, then the farmers will be happy.
- Either my party will secure majority in the parliament or my government will resign.
- If India does not win a gold medal in chess in the Doha Asian Games, then Indians will not be happy.
- If America mobilizes or Britain protests to the UN, then China will call for a meeting of all the Asian countries.

In all the given statements, there are one or two key words playing the maximum role in deciding the direction and nature of the statement like, if the statement has a negative connotation or it brings an element of uncertainty or causes a concern or brings some conditionality.

In the first example, the combination “If – then” is working like a conditional clause. In the second example, the combination “either – or”; in the third example, the combination “If not – then” and similarly in the fourth statement, the combination “If – then” works as a Logical Link.

HOW DO WE DEFINE A LOGICAL LINK?

Statements like “I will go to watch a movie” or “She will go to a picnic” are known as simple statements. Now we can join these two simple statements in a number of ways:

- Either I will go to watch a movie or she will go to a picnic.
- If I go to watch a movie, then she will go to a picnic.
- If I go to watch a movie, only then will she go to a picnic.

Or, if we allow a bit of change in the nature of statements then statements could be seen as follows too:

- If I go to watch a movie, then she will not go to a picnic.
- If I do not go to watch a movie, then she will go to a picnic.
- If I do not go to watch a movie, then she will not go to a picnic.
- If I do not go to watch a movie, only then will she not go to a picnic.
- If I go to watch a movie, only then will she not go to a picnic.

After we have joined the simple statements, we call these statements Compound Statements. And the words which we use to join two simple statements are known as Logical Links.

SOME STANDARD LOGICAL LINKS AND THEIR USAGES

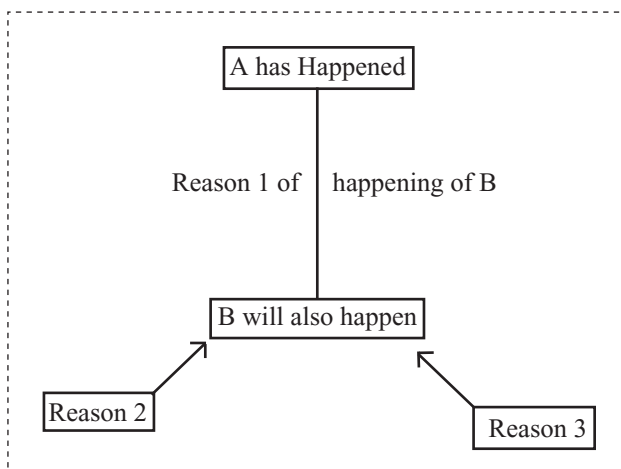
A. If – then

“If – then” is one of the most important Logical Links. Its usage includes the affirmative as well as the negative statement. Following are some of the structured applications of this logical link:

If A happens then B happens

Given – A has happened.
Conclusion – B will happen.
This is a valid conclusion.

See this through the following diagram:



Example 1

1. If the terrorists' demands are met, then lawlessness will prevail.
Given – The terrorist's demands have been met.
Conclusion – Lawlessness will prevail.

If A happens then B happens

Given – A has not happened.
Conclusion – B will not happen.
This is an invalid conclusion.

Using the diagram given above, despite A has not happened, B might happen owing to the occurrence of either reason 2 or reason 3 etc.

Example 2

2. If the terrorists' demands are met, then lawlessness will prevail.
Given – The terrorist's demands have not been met.
Conclusion – Lawlessness will not prevail.
This is an invalid conclusion.

Example 3

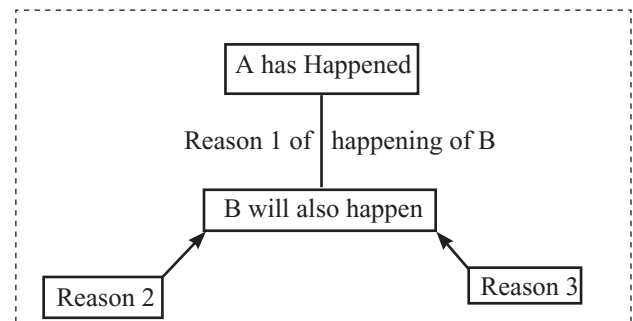
3. If you fall down from the roof, then your legs will get fractured.
Given – You have not fallen down the roof.
Conclusion – Your legs will not get fractured.

This is an invalid conclusion. What we should understand here is the fact that falling down the roof is just one of the ways by which the legs can get fractured and there can be other ways also of the legs getting fractured e.g., meeting with an accident or getting beaten up etc. And just because you have not fallen down the roof, we cannot be sure that the legs have not got fractured.

If A happens then B happens

Given – B has happened.
Conclusion – A would also have happened.
This is an invalid conclusion.

Once again go through the same diagram:



Obviously, B can happen due to reason 2 or reason 3 also and is not dependent on 'reason 1 only'.

Example 4

4. If you fall down from the roof, then your legs will get fractured.
Given – Your legs have got fractured.
Conclusion – You have fallen down the roof.
This is an invalid conclusion.

Again, going through the explanation given above, we know that falling down the roof is not the only reason for the legs getting fractured. So just because the legs have got fractured, we cannot conclude that a person has fallen down the roof.

Example 5

5. If it rains, then farmers become happy.
Given – Farmers are happy.
Conclusion – It must have rained.
This is an invalid conclusion.

We do understand that farmers can have more than one reason for being happy, and having rain is just one of them. So, if farmers are happy we cannot definitely conclude that it must have rained.

If A happens then B happens

Given – B has not happened.
Conclusion – A would also not have happened.
This is a valid conclusion.

Example 6

6. If you fall down from the roof, then your legs will get fractured.
Given – Your legs have not got fractured.
Conclusion – You have not fallen down from the roof.
This is a valid conclusion.

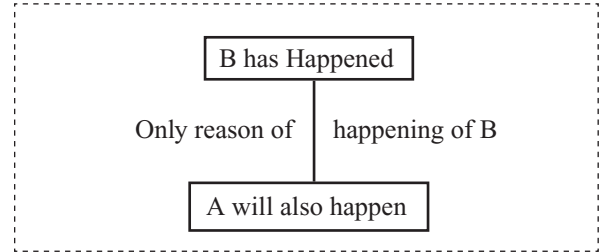
Understand this—You give a contract to a goon to make Mr A fall down from the roof tonight and as a result Mr A's legs will automatically get fractured. But the next morning you see Mr A walking and looking perfectly all right. He can walk like this because his legs are not fractured, so the direct response will be—The goon has not done his job of making Mr A fall down from the roof. With this, a lot many accidents might not have happened with Mr A, but he must not have fallen down the roof too.

B. Only if – then

Only if A happens then B happens

Given – B has happened.
Conclusion – A would also have happened.
This is a valid conclusion.

See the diagram for this:



Example 7

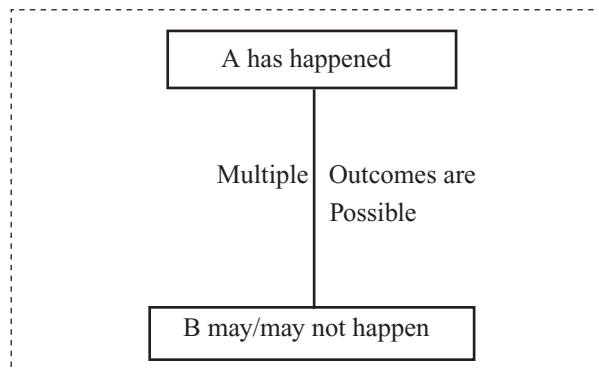
7. If you die, only then you go to heaven.
Given – You have gone to heaven.
Conclusion – You have died.
This is a valid conclusion.

Here, the only way in which a person can go to heaven is to die. So, if a person has gone to heaven, he must have died too.

Only if A happens then B happens

Given – A has happened.
Conclusion – B will also happen.
This is an invalid conclusion.

See the diagram for this:



Example 8

8. If you die only then you go to heaven.
Given – You have not died.
Conclusion – You will not go to heaven.
This is a valid conclusion.

Example 9

9. If you die only then you go to heaven.
 Given – You have died.
 Conclusion – You will go to heaven.

This is an invalid conclusion. However, the conclusion “You may go to heaven” is valid.

Sometimes we can even see that two compound statements have been joined with multiple Logical Links. One such statement can be:

If A happens, then B happens. If A does not happen then C happens. So what will be the impact on C if A has happened/A has not happened?

Let us understand this situation with an example:

Example 10

10. If the terrorists’ demands are met, then lawlessness will prevail. And if the terrorists’ demands are not met, then the hostages will be murdered.
 Consider the statements given below:
 (i) Lawlessness has not prevailed.
 (ii) The hostages have been murdered.
 (iii) The terrorists’ demands have been met.
 (iv) The terrorists’ demands have not been met.

Which of the following options does not show a proper cause-effect relationship?

- (a) i-ii (b) iv-ii
 (c) iii-ii (d) ii-iv

Let us take the options one by one:

Option (a) i-ii

Since lawlessness has not prevailed (i), it means that the terrorists’ demands have not been met. And if the terrorists’ demands have not been met, then the hostages will be murdered (ii). So, this option shows a valid relationship.

Option (b) iv-ii

Since the terrorists’ demands have not been met, the hostages will be murdered. This is a direct conclusion. So, it is a valid relationship.

Option (c) iii-ii

Since the terrorists’ demands have been met, lawlessness will prevail. Now, from here we cannot deduce that the hostages will be murdered. So, it is not a valid relationship.

Option (d) ii-iv

Since the hostages have been murdered, the terrorists’ demands must not have been met. So, this is also a valid relationship.

Hence option (c) is not a valid cause-effect relationship.

B. Either – or

We use a lot many statements involving “Either– or” as a logical link in our day-to-day life too. In case of reasoning questions also, we see very similar statements with very similar interpretations. However, for a proper understanding, we should be very clear with the structure of these statements. Some of these structured statements are given here under.

There are two situations possible here:

- **Inclusive** It means ‘and/or’ where at least one term must be true or they can both be true simultaneously. This is the case of set $A \cup B$, where any member of this set (A union B) should be present in at least one of the sets.
- **Exclusive** It means one must be true and the other must be false. Both terms cannot be true and both cannot be false.

The popular English language concept of or is often ambiguous between these two meanings, but the difference is pivotal in evaluating the Logical Link questions asked in the CAT.

Understand this argument:

Either P or Q.

Not P.

Therefore, Q is valid and indifferent between both inclusive and exclusive meanings. However, only in the ‘exclusive’ meaning is the following form valid:

Either P or Q (exclusive).

P.

Therefore, not Q.

With the ‘inclusive’ meaning, we cannot draw a definitely true conclusion from the situation given above.

Remember, for the purpose of CAT we have to consider the statements in their ‘exclusive’ sense.

Either A will happen or B will happen

Given – A will happen.

Conclusion – B will not happen

This is a valid conclusion.

Either A will happen or B will happen

Given – A will not happen.

Conclusion – B will happen

This is a valid conclusion.

Either A will happen or B will happen

Given – B will happen.
Conclusion – A will not happen
This is a valid conclusion.

Either A will happen or B will happen

Given – B will not happen.
Conclusion – A will happen
This is a valid conclusion.

Understandably, in case of ‘Either A will happen or B will happen’, not happening of one part ensures the happening of the other part because one of the parts has to be true. Similarly, we should remember that happening of one part ensures ‘not happening’ of the other part.

Summarizing the above discussion,

Either A will happen or B will happen		Validity	Truth-metre
A has happened	B will not happen	Valid	Definitely True
A has not happened	B will happen	Valid	Definitely True
B has happened	A will not happen	Valid	Definitely True
B has not happened	A will happen	Valid	Definitely True

Further, it should be understood that the statement ‘Either A will happen or B will happen’ and statement ‘A will happen or B will happen’ are one and the same.

Example 11

11. Either A is 200 m from B and B is 100 m from C or A is 300 m from C.
(i) A is 200 m from B and B is 100 m from C.
(ii) A is 300 m from C.
(iii) A is not 200 m from B and B is not 100 m from C.
(iv) A is not 300 m from C.
Which of the following is an incorrect ordered relationship?
(a) ii-iii (b) i-iv
(c) iii-ii (d) i-iii

Solution

Go through the options.

Option (a) ii-iii

A being 300 m from C ensures that A is not 200 m from B and B is not 100 m from C. So, ii-iii is a correct relationship.

Option (b) i-iv

We definitely have a true pair here as well.

Option (c) iii-ii

Since one of the two statements given in the example has to be true; and in this case one statement is given to be wrong; so, the other statement has to be true.

Hence, if A is not 200 m from B and B is not 100 m from C then the statement A is 300 m from C has to be true.

So, this is a valid conclusion.

Option (d) i-iii

Obviously, this is not true.

PRACTICE EXERCISE 1

1. I will buy the airplane only if it is the costliest and the fastest.
 - (a) I did not buy the airplane and it is neither the fastest nor the costliest.
 - (b) I bought the airplane and it is not the costliest nor is it the fastest.
 - (c) The airplane is the fastest and the costliest and I did not buy it.
 - (d) I bought the airplane and it is the fastest and the costliest.
2. I work very hard whenever there is a need.
 - (a) I work very hard and there is a need.
 - (b) I did not work hard and there is no need.
 - (c) I did not work hard and there is no need.
 - (d) Both (b) and (c)
3. I wear a pad every time I bat.
 - (i) I batted.
 - (ii) I didn't bat.
 - (iii) I wore a pad.
 - (iv) I didn't wear a pad.
 - (a) ii-iv (b) iii-i
 - (c) iv-ii (d) i-iv
4. I get cold feet whenever I see a lion.
 - (i) I saw a lion.
 - (ii) I didn't see a lion.
 - (iii) I got cold feet.
 - (iv) I didn't get cold feet.
 - (a) iii-i (b) ii-iv
 - (c) iv-ii (d) ii-iii
5. Whenever Devdas comes, Umrao Jaan sings.
 - (i) Umrao Jaan is singing.
 - (ii) Devdas has come.
 - (iii) Devdas hasn't come.
 - (iv) Umrao Jaan is not singing.
 - (a) iii-i (b) ii-iv
 - (c) iv-ii (d) ii-iii
6. I can see the star only if I go to the planetarium.
 - (i) I went to the planetarium.
 - (ii) I didn't see the star.
 - (iii) I saw the star.
 - (iv) I didn't go to the planetarium.
 - (a) ii-iv (b) iv-ii
 - (c) i-ii (d) iii-iv
7. I can find Chinese toys only if I go to the fair.
 - (i) I didn't find Chinese toys.
 - (ii) I found Chinese toys.
 - (iii) I went to the fair.
 - (iv) I didn't go to the fair.
 - (a) iii-iv (b) iii-ii
 - (c) iii-i (d) i-iv
8. I will befriend Som only if he returns my book.
 - (i) I befriended Som.
 - (ii) Som returned my book.
 - (iii) I won't befriend Som.
 - (iv) Som didn't return my book.
 - (a) ii-i (b) ii-iii
 - (c) iv-iii (d) iii-iv
9. Only in Bengal, you can see the Bengal Tiger.
 - (i) You went to Bengal.
 - (ii) You didn't go to Bengal.
 - (iii) You saw the Bengal Tiger.
 - (iv) You didn't see the Bengal Tiger.
 - (a) i-iii (b) iv-ii
 - (c) i-iv (d) ii-iv
10. You cannot clear the CAT unless you are hard working.
 - (i) You are hard working.
 - (ii) You can clear the CAT.
 - (iii) You are not hard working.
 - (iv) You cannot clear the CAT.
 - (a) ii-iv (b) i-iii
 - (c) iii-iv (d) i-ii
11. Amit Kumar is either an engineer or a doctor.
 - (i) Amit Kumar is an engineer.
 - (ii) Amit Kumar is not a doctor
 - (iii) Amit Kumar is not an engineer.
 - (iv) Amit Kumar is a doctor.
 - (a) i-ii (b) i-iv
 - (c) iv-i (d) ii-iii
12. Either Raghav is sick or he is stoned.
 - (i) Raghav is sick.
 - (ii) Raghav is not sick.
 - (iii) Raghav is stoned.
 - (iv) Raghav is not stoned.
 - (a) i-ii (b) iv-i
 - (c) i-iii (d) iii-iv
13. When I see an RGV movie I have a bad dream.
 - (i) I saw an RGV movie.
 - (ii) I did not see an RGV movie.
 - (iii) I did not have a bad dream.
 - (iv) I had a bad dream.

- (a) iii-ii (b) iv-i
(c) ii-iii (d) i-iii
14. Raju gets a mild flu whenever he eats an ice cream.
(i) Raju gets a mild flu.
(ii) Raju does not eat an ice cream.
(iii) Raju does not get a mild flu.
(iv) Raju ate an ice cream.
(a) i-ii (b) iv-iii
(c) i-iii (d) iii-ii
15. Either SRK is angry or he shows mock anger.
(i) SRK shows mock anger.
(ii) SRK is angry.
(iii) SRK does not show mock anger.
(iv) SRK is not angry.
(a) iii-ii (b) iv-i
(c) ii-i (d) iii-ii and iv-i
16. Whenever my mother scolds me, I either hide behind my father or complain to my grandma.
(a) If I complain to my grandma or I hide behind my father, then my mother must have scolded me.
(b) If I did not complain to my grandma and I did not hide behind my father, then my mother must not have scolded me.
(c) If my mother does not scold me, I will neither hide behind my father nor complain to my grandma.
(d) None of these
17. Either the paper is big or the pencil is small.
(i) The paper is big.
(ii) The paper is not big.
(iii) The pencil is small.
(iv) The pencil is not small.
(a) i-iii (b) iv-ii
(c) ii-iii (d) iii-i
18. Either lion is not big or the fox is cruel.
(i) The lion is big.
(ii) The lion is not big.
(iii) The fox is cruel.
(iv) The fox is not cruel.
(a) ii-iii (b) i-iii
(c) iii-ii (d) i-iv
19. If the milk is not cold then I will not go to school and will not have dinner.
(a) If I have gone to school or I have not had dinner; then the milk is not cold.
(b) If I have gone to school and I have had dinner, then the milk is cold.
(c) If I have gone to school and I have not had dinner then the milk is cold.
(d) If I have gone to school or I have had dinner, then the milk is cold.
20. Unless you catch the criminals, the crimes will not stop.
(i) The criminals have been caught.
(ii) The crimes have stopped.
(iii) The criminals have not been caught.
(iv) The crimes have not stopped.
(a) iv-iii (b) iii-iv
(c) ii-iii (d) iv-i

ANSWER KEYS

1. (d) 2. (c) 3. (c) 4. (c) 5. (d) 6. (b) 7. (d) 8. (c) 9. (d) 10. (c)
11. (a) 12. (b) 13. (a) 14. (d) 15. (d) 16. (b) 17. (c) 18. (b) 19. (d) 20. (b)

HINTS AND EXPLANATIONS

1. If I bought aeroplane, it must be the fastest & the costliest. If I did not buy the aeroplane it is either not the fastest or not the costliest or neither fastest nor the costliest (not necessarily neither fastest nor the costliest). Only option (d) show a feasible case of buying the aeroplane
Correct option is (d)
2. If there is need I will definitely work hard. But, if I worked hard, it does not necessarily mean that there was need. Similarly, if I did not work hard there must not been need else I must have worked hard. So, option (c) show feasible case of not working hard as there is no need
Correct option is (c)

3. If I wear a pad every time I bat, then it also shows that if I did not wear a pad, I did not bat. So, (ii) follows (iv) logically.
Please note that wearing a pad does not mean I batted. Logic is given other way round, that If I bat, then I wear a pad.
I may wear a pad, but do not bat.
Correct option is (c)
4. If I get cold feet whenever I see a lion, then if I didn't get cold feet, I must not have seen a lion. So, (ii) follows (iv) logically
Correct option is (c)
5. Whenever Devdas comes, Umrao Jaan sings. So, if Devdas has come, Umrao Jaan must be singing. So, (ii) follows (i) logically
Correct option is (d)
6. If I can see a star only if I go to the planetarium, and then if I didn't go to the planetarium, I must not have seen a star. So, (ii) follows (iv) logically
Correct option is (b)
7. If I can find Chinese toys only if I go to the fair, then if I didn't find the Chinese toys, I didn't go to the fair. So, (iv) follows (i) logically
Correct option is (d)
8. If I will befriend Som only if he returns my book, then if he didn't return my book, I won't befriend him. So, (iii) follows (iv) logically
Correct option is (c)
9. If you can see the Bengal tiger only in Bengal, then if you didn't go to Bengal you didn't see the Bengal tiger. So, (iv) follows (ii) logically
Correct option is (d)
10. If you cannot clear the CAT unless you are hardworking, then if you are not hardworking you cannot clear the CAT. So, (iv) follows (iii) logically
Correct option is (c)
11. If Amit Kumar is either an engineer or doctor, then if he is an engineer he cannot be a doctor. So, (ii) follows (i) logically
Correct option is (a)
12. Either Raghav is sick or he is stoned. So, if he is not stoned he must be sick. So, (i) follows (iv) logically
Correct option is (b)
13. When I see a RGV movie I had a bad dream. So, if I did not have a bad dream, I did not see a RGV movie. So, (ii) follows (iii) logically
Correct option is (a)
14. Raju gets a mild flu whenever he eats an ice-cream. So, if he does not get a mild flu he has not eaten an ice-cream. So, (ii) follows (iii) logically
Correct option is (d)
15. Either SRK is angry or he shows mock anger. So, if he does not show mock anger, he is angry. Also, if he is not angry he shows mock anger. So, (i) follows (iv) logically & (ii) follows (iii) logically
Correct option is (d)
16. If whenever my mother scolds me, I either hide behind my father or complain to my grandma. Then, if I did not complain to my grandma & did not hide behind my father, my mother must not have scolded me
Correct option is (b)
17. Either the paper is big or the pencil is small. So, if paper is not big, the pencil must be small. So, (iii) follows (ii) logically
Correct option is (c)
18. Either the lion is not big or the fox is cruel. So, if lion is big, the fox is cruel. Therefore, (iii) follows (i) logically
Correct option is (b)
19. If the milk is not cold then I will not go to the school & will not have dinner. Then, if I had gone to school or I had dinner, the milk is cold
Correct option is (d)
20. Unless you catch the criminals, the crimes will not stop. So, if the criminals have not been caught, the crimes must not have stopped. Therefore, (iv) follows (iii) logically
Correct option is (b)

Chapter

4

SEQUENCING AND ARRANGEMENT

LEARNING Objectives

In this chapter, you will learn:

- ☐ Meaning of Sequencing and Arrangement
 - ☐ Different types of Sequencing and Arrangement questions
 - ☐ Circular Arrangement
 - ☐ Approach to solve the questions
-

In the CAT and other major B-School exams, sequencing and arrangement questions constitute a major portion of the paper. In this chapter, we will discuss sequencing and arrangement both as a skill and as a type of question.

However, throughout this book, other than this chapter, we will be using the word sequencing and arrangement more as a skill, rather than as a type of question.

While discussing the constituents of Logical reasoning in Chapter 2—Developing the Skills, we went through the definitions and interpretations of variables and understood the mechanisms to solve the LR questions. Besides, we covered Sequencing, which is just a part of the whole gamut of solving questions, and the problems of two/three/more than three variables.

We will start from the same place where we left in Chapter 2.

WHAT IS SEQUENCING AND ARRANGEMENT?

Sequencing is the act of putting things in a specific sequence, order or a list. In our day-to-day life too, we

go through many examples of sequencing or arranging things and events such as:

While writing appointments on a calendar or a mobile,

While placing an order in a restaurant—Talumein soup, kebabs, ice cream and finally mocha,

While taking a test and deciding which section is to be attempted first, second and so on.

The only difference between sequencing in our practical life and the LR set will be the fact that the LR set given in the questions will have a prior order of variables. As a student your job will be to find out that order or sequence.

TYPES OF SEQUENCING AND ARRANGEMENT

While a good number of times the statements/conditions given in the LR set will specify the exact positioning of the entities given. However, many a times only the relative positioning of the variables will be given.

Let us see some examples of such statements:

Context	Statement reads as
Which variables are exactly placed in the sequence?	M is fourth.
Which variables are forbidden from a specific position in the sequence?	M is not fifth.
Which variables are next to, before or immediately preceding or following one another?	M and N are consecutive. A is next to B. No variable comes between A and B. A and B are consecutively in the sequence.
Which variables cannot be next to, before or immediately preceding or following one another?	A does not immediately precede or follow B. A is not immediately before or after B. M and N are not consecutive in the sequence.
How far apart in the sequence are two particular variables?	Exactly two people come between A and B.
What is the relative position of A and B in the sequence?	A comes before B in the queue. M comes after N in the queue.

In the above given examples, we observe two types of sequencing:

Strict Sequencing and Arrangement

In these kinds of sequencing, relative positioning of the variables will be almost fixed. These are the rules which give us the exact position of the variables.

Example

Directions for questions 1 to 3: Read the following passage below and solve the questions based on it.

During the summer placements at MU, which will run for a single week in June starting from Monday through Friday; Due North Inc. will interview three applicants Omkara, Tyagi, and Keshu. Exactly five interviews will be conducted in this week long schedule with strictly one interview per day.

Further information about the schedule of the interviews is as follows:

- Each applicant is interviewed at least once.
- Omkara is interviewed twice on two consecutive days.
- Tyagi has to meet his girl friend Billo on Wednesday, therefore he cannot be interviewed on Wednesday.
- Keshu is not interviewed on Friday as he has to go to meet Dolly who is Omkara’s wife.
- If Tyagi is interviewed on Monday then Keshu must be interviewed on Tuesday.

1. Which out of the following week’s schedule could be true?
 - (a) The person who is interviewed on Tuesday is also interviewed on Thursday.
 - (b) The person who is interviewed on Wednesday is also interviewed on Friday.
 - (c) The person who is interviewed on Monday is also interviewed on Tuesday.
 - (d) Tyagi is interviewed on Monday and Thursday.
2. If in addition to Omkara, one more person is interviewed on two consecutive days, then which of the following could be true?
 - (a) Tyagi is interviewed on Monday and Omkara is interviewed on Wednesday.
 - (b) Tyagi is interviewed on Tuesday and Friday.
 - (c) Tyagi is interviewed on Tuesday and Omkara is interviewed on Friday.
 - (d) Keshu is interviewed on Tuesday and Omkara is interviewed on Thursday
3. If the week’s interview schedule has the same applicant scheduled for Monday and Thursday then on which day must Tyagi be interviewed?
 - (a) Monday
 - (b) Tuesday
 - (c) Wednesday
 - (d) Friday

Solution

Scenario

There are three applicants—Omkara (O), Tyagi (T) and Keshu (K) and they are to interviewed for five interviews, Monday through Friday. Looking at the given limitations of exactly one interview per day and with only three applicants for five interviews, some of the applicants must be interviewed more than once.

Rules

The interviews are conducted one per day starting on Monday through Friday. Hence sketch a weekly schedule with five spaces first.

M	T	W	T	F
└	└	└	└	└

The first condition says each applicant will be interviewed at least once. The next condition says Omkara is interviewed on two consecutive days—lets have an OO block for two consecutive days. The next two conditions tell about the days on which Tyagi and Keshu cannot be interviewed; mark this information in your diagram. The last condition says that if Tyagi is interviewed on Monday, Keshu must be interviewed on Tuesday.

T (MON) then – K (TUE)

The OO block for Omkara is the only big restricting factor present here. There is nothing that stops its placement on any particular pair of days in the schedule. But since Omkara is interviewed on exactly two days and Tyagi and Keshu are each to be interviewed at least once, you have four out of the five entities. The fifth interview will go to either P or S.

If Tyagi is interviewed on Monday, Keshu is interviewed on Tuesday, then Omkara will be interviewed either on Wednesday-Thursday or Thursday-Friday. Hence, one thing is sure that Omkara is definitely interviewed on Thursday. And if any of this does not happen, then it means that Tyagi won't be interviewed on Monday.

T (MON) then – K (TUE)

Mon	Tue	Wed	Thu	Fri
T		K	O	O
-----	-----	-----	-----	-----
				O O

1. (c)

To find out the 'could be true' statements, we should eliminate the options that must be false.

Option (a) does not allow to place the pair of days for Omkara anywhere, so it can't be true.

Option (b) cannot be true either: Tyagi is not interviewed on Wednesday and Keshu is not

interviewed on Friday, the only applicant who can be interviewed on both Wednesday and Friday is Omkara, but his two interviews must happen on consecutive days.

Option (d) also can't be true; if Tyagi is interviewed on Monday, we have already concluded that Omkara will be interviewed on Thursday.

Only option (c) could be true.

2. (d)

According to the conditions given in the question, besides an OO block, we will have either a TT block or a KK block.

Going through the options:

Option (a) suggests that if Tyagi is on Monday, then Keshu has to be on Tuesday. But with Keshu on Tuesday and Omkara on Wednesday and Thursday, we don't have the consecutive days block left either for PP or SS, so option (a) is ruled out.

Option (b) cannot be the answer because here Tyagi is interviewed on two non-consecutive days, and that stops every body besides Omkara to go on two consecutive days.

Option (c) Omkara is on Friday, so he is interviewed on Thursday also. Since both Keshu and Omkara can't go on Wednesday (using condition 3) Keshu must be interviewed on Wednesday. Taking Tyagi on Tuesday, he must be the second person to be interviewed on two consecutive day—Monday and Tuesday. But if we put Tyagi on Monday then Keshu should be interviewed on Tuesday.

So option (c) cannot be the answer.

Option (d) is the only option left out, so this has to be the answer.

If Keshu is on Tuesday and Omkara is on Thursday, then Keshu can be on Monday and Omkara can be on Wednesday. Now Tyagi can be interviewed on Friday.

M	T	W	T	F
└	└	└	└	└
Keshu	Keshu	Omkara	Omkara	Tyagi

3. (d)

If the same applicant is to be scheduled for both Monday and Thursday, then it can't be Omkara, who must have the interview on two consecutive days. It can't be Tyagi too, because Tyagi on

Monday and Omkara on Thursday is not an acceptable set. So it must be Keshu. Now, Monday and Thursday are taken up by Keshu, then Omkara must be interviewed on Tuesday and Wednesday (the only consecutive days left). Hence Tyagi must be on Friday. Option (d) is correct.

Loose Sequencing and Arrangement

In this kind of sequencing, the data given will tell us the relative positioning of one variable with respect to the other variable; without giving the exact position.

Example

Directions for questions 4 to 5: Read the following passage and solve the questions based on it.

Eight parties—Forward Block, Hindustan Party, Janta Party, Lokmat, New Socialist party, Praja party, Socialist party and TDP, contested in the last general election. The number of seats won by these parties vary largely. While announcing the final results, The election commission expressed the following observation regarding the number of seats won by these parties in terms of their popularity (the more the popularity, the more is the number of seats won by the party and vice-versa).

(While doing the ranking, take the first to be being the party with the maximum seats won and the eighth to be the party with minimum seats won.)

- (i) No two parties won the same number of seats.
- (ii) The Socialist party and the Forward block are each less popular than the TDP.
- (iii) The Socialist party is more popular than the Janta party.
- (iv) The Lokmat and the New Socialist party are each less popular than the Forward block.
- (v) The Hindustan party and the Lokmat are each less popular than the Janta party.
- (vi) The Praja party is less popular than the Lokmat.
- (vi) The Praja party is not the eighth in rank.

Scenario

When planning the diagram for the sequencing first, decide if it should be drawn horizontally or vertically. To draw the diagram here, we will think of the rankings in terms of top to bottom.

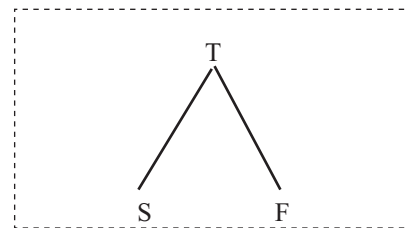
Unlike the problems done in the strict sequencing section, writing 1 to 8 or creating eight spaces will

not serve the purpose owing to the fact that no exact information regarding the positioning of variables e.g., (The Praja party is not eighth) is given.

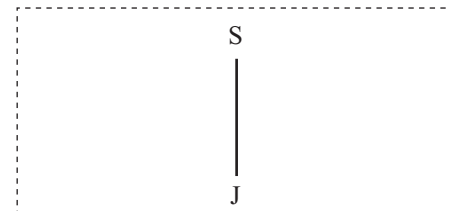
Rules

Start visualizing. Let us name each party with its first letter as in the Forward Block is F etc.

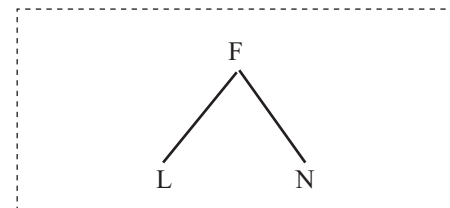
The first condition states that S and F are both less popular than T. Here we don't know anything about the space between these two entities, just the order. Draw T above both S and F by keeping in mind that nothing is said about the relationship between S and F.



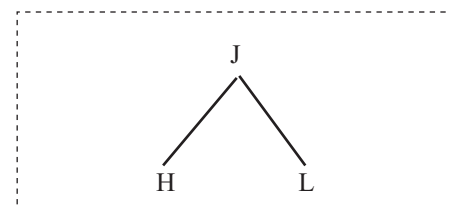
The second condition: S is more popular than J



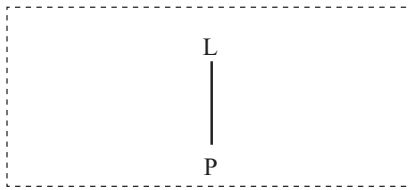
Next condition: Both L and N are less popular than F



Next condition: Both H and L are below J

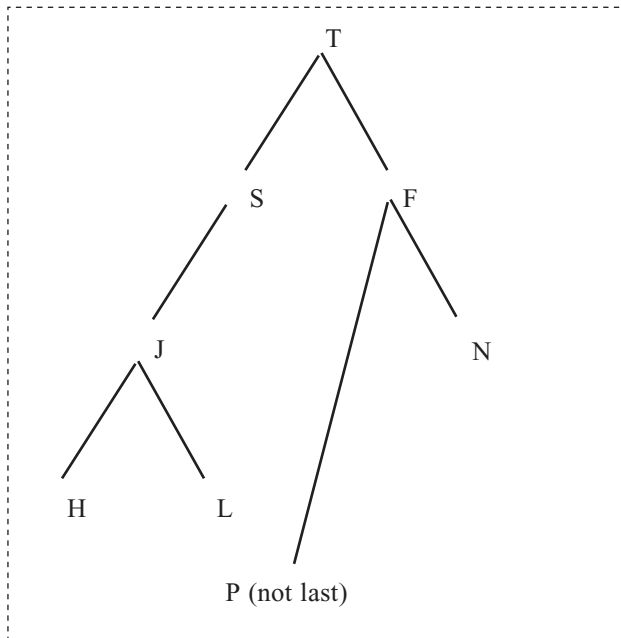


Next condition: P is less popular than L



Last condition: P is not the eighth. “P ≠ 8” or “P is not the last”

Let us now start joining the information. If we connect S from condition 2 to condition 1, this is exactly what we get:



After joining the rules, we have the relationship between more parties.

Which is higher, F or P? Of course F is higher, and we know we can determine the relationship between them because we can travel from one to the other in one direction.

FLAW DETECTOR—Now have a look at F and H. Can we say that F is higher than H? The answer is No. It is all because of the fact that to go from F to H, we would have to “travel” along the tree in more than one direction (first up then down, or first down then up). By doing this there is no definite relationship. F could be ranked higher than H or H could be higher than F. Which party is ranked last? Either H or N.

Lets now consider the questions.

4. Which of the following could be the order of the parties listed from winning the maximum number of seats to the minimum number of seats?

(a) T, F, S, L, J, N, P, H
 (b) S, T, F, N, J, L, P, H
 (c) T, S, J, H, F, P, L, N
 (d) T, S, J, F, L, N, P, H

(All the parties are being denoted by their first letter).

4. (d)

To start with, this could be seen as the complete and accurate list, since all parties are taken into consideration in each answer choice.

Now, start going through the options.

Apply each condition to the given options. Option (b) violates condition (i) by making S more popular than T, therefore option (b) must be incorrect. Condition (ii) and (iii) don't help eliminate any options, but (a) violates condition (iv) by making L more popular than J, and is hence incorrect. Option (c) gives P a higher popularity than L, a violation of condition (v). We have eliminated three options. So the remaining option D has to be the correct answer.

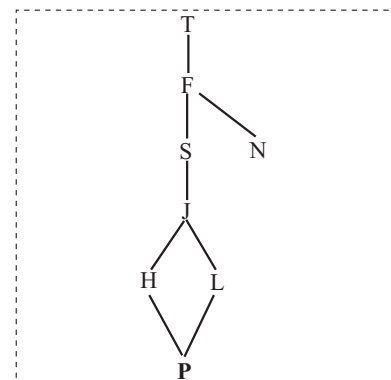
5. If the Forward block is more popular than the Socialist Party and the Hindustan party is more popular than the Praja Party, then which of the following must be true of the number of seats won by different parties in the election?

(a) The Hindustan Party is sixth.
 (b) The Lokmat is sixth.
 (c) The Lokmat is seventh.
 (d) The New Socialist Party is eighth.

5. (d)

Let us again use the first letter of the parties as their symbol.

This “if” question places two additional conditions on the order of popularity. The first condition places F above S. The second condition places H above P. Redraw your sketch to incorporate these new conditions:



Going through the options against the backdrop of the introduction of new facts like F is assigned to position 2 and the elimination of H as a possibility for the last position (leaving only N available for that slot) in the new sketch, option (d) is correct. Since both H and L could be in the sixth position, (a) and (b) don't have to be true, although these are probably true. Also, if L is placed at the seventh position, then P would have to be in the last position. And this violates the last condition, making option (c) incorrect.

Circular Arrangement

The Circular Arrangement questions are not necessarily the questions regarding a situation where in we need to make the seating arrangement around a circular table. It can be a rectangular table or even a hexagonal table. We should understand Circular Arrangement as an arrangement having a closed loop.

This can be understood with the following diagrams also:

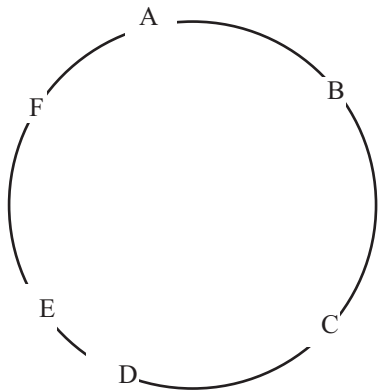


Figure 1

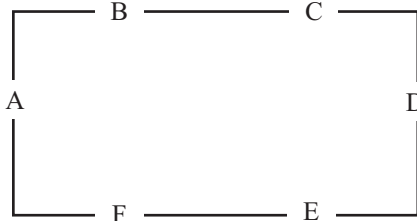


Figure 2

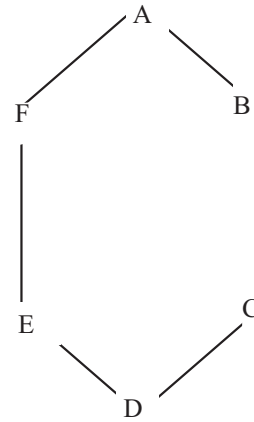


Figure 3

The above given diagrams might appear to us as three different structures/arrangements. However, there would be a minimal difference in the descriptions given for the above situations. In all the diagrams, we find the following things common:

- A is sitting opposite to D.
- B is sitting on the immediate left of A.
- E is sitting in between F and D.

Now if we go on to making the diagrams pertaining to the details given, we will be clueless about the kind the diagram which is going to be formed.

If we form the question as—A, B, C, D, E and F are sitting around a circular table... → We would be using fig. 1.

If we form the question as—A, B, C, D, E and F are sitting around a rectangular table..... → We would be using fig. 2.

If we form the question as—A, B, C, D, E and F are sitting around a hexagonal table..... → We would be using fig. 3.

Similarly, we might be using a totally different arrangement in accordance with the given statements.

However, one thing that should be very clear in our mind is that, in any circular arrangement, what ever be the structure, the loop should be closed.

Example

Directions for questions 6 to 7: Read the following passage and solve the questions based on it.

Five leaders from undivided India—Pt Nehru (P), M.K. Gandhi (M), Rajendra Prasad (R), Subhash Chandra Bose (S) and Tyagi (T) participated during the 2nd Round Table Conference at London in 1930.

It was noted that Pt Nehru sat two seats to the left of Rajendra Prasad and M.K. Gandhi sat two seats to the right of Rajendra Prasad.

6. If Subhash Chandra Bose sat between M. K. Gandhi and Rajendra Prasad, then who sat to the immediate right of Pt Nehru?
- (a) Tyagi (b) Subhash Chandra Bose
(c) M.K. Gandhi (d) Rajendra Prasad
7. If Subhash Chandra Bose did not sit next to M. K. Gandhi, then who sat between M K Gandhi and Subhash Chandra Bose?
- (a) Rajendra Prasad
(b) Pt Nehru
(c) Tyagi
(d) Cannot be determined

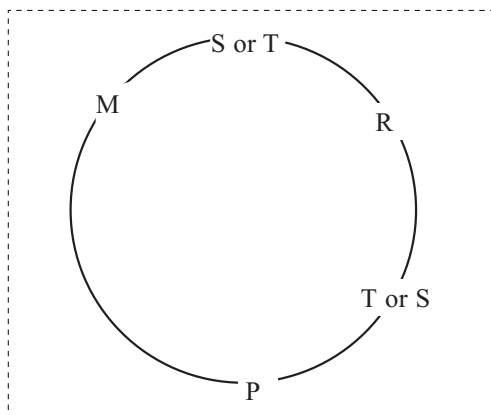
Solutions

Scenario

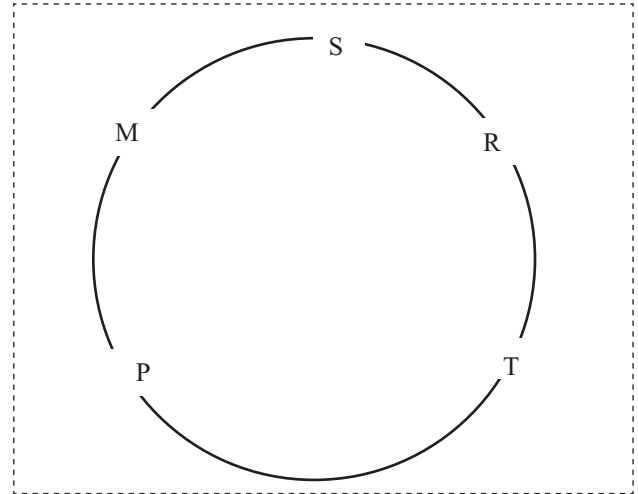
There are five leaders and five sitting positions.

Rules

Pt Nehru sat two seats to the left of Rajendra Prasad and M.K. Gandhi sat two seats to the right of Rajendra Prasad. Let us see this with the help of a diagram:

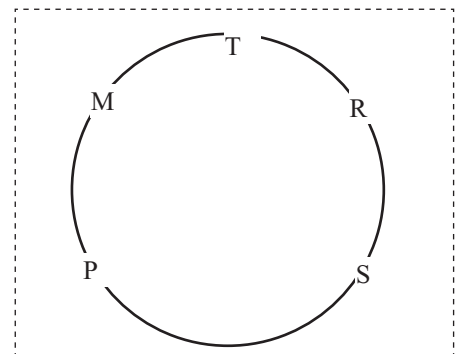


6. (a)
If Subhash Chandra Bose sat between M. K. Gandhi and Rajendra Prasad, then the arrangement would be as follows:



It is obvious from the above given diagram that Tyagi sat to the immediate right of Pt Nehru. Hence option (a) is the answer.

7. (b)
If Subhash Chandra Bose did not sit next to M K Gandhi, then the seating arrangement would be as follows:



Hence, option (b) is the answer.

PRACTICE EXERCISE 1

Directions for questions 1 to 4: *Read the following passage and solve the questions based on it.*

- (i) A resort has 6 rooms—A, B, C, D, E and F. Rooms 'A' and 'C' can accommodate two persons each; the rest can accommodate only one person each.
 - (ii) Eight persons P, Q, R, S, T, U, W and X are to live in these rooms. Q, T, and X are females while the rest are males. Persons of different genders can't be put together in the same room.
 - (iii) No man is willing to live in room C or F.
 - (iv) P wants to live alone but doesn't want to live in room B or D.
 - (v) S needs a partner but is not ready to live with either U or W.
 - (vi) X does not want to share her room.
1. Who among the following will live in room E?
(a) U (b) W
(c) P (d) Cannot be determined
 2. Which of the given statements is not needed to complete the living arrangement so far?
(a) ii (b) iv
(c) v (d) All are necessary
 3. In which of the following rooms will U live?
(a) B (b) D
(c) A (d) B or D
 4. X will live in which of the following rooms?
(a) C (b) F
(c) B (d) Cannot be determined

Directions for questions 5 to 8: *Read the passage and solve the questions based on it.*

- (i) There are six different DVDs of different movies P, Q, R, S, T and U. These DVDs are kept one above the other on a shelf and belong to six different people—A, B, C, D, E and F. It is not necessary that the orders of these DVDs and persons are the same.
- (ii) The DVD of movie Q is kept between the DVD of movie P and T and the DVD of movie S is kept between the DVD of movie P and U. The DVD of movie R is immediately above the DVD of movie T.
- (iii) C's DVD is kept on the top. A does not have the DVDs of movies T and S. The DVD of movie P belongs to F. The DVD of movie U belongs neither to B nor to A. D's DVD is kept at the bottom.

5. Which movie DVD belongs to A?
(a) Q (b) S
(c) P (d) T
6. Who owns the DVD of movie T?
(a) B (b) E
(c) C or E (d) B or E
7. Who owns the DVD of movie U?
(a) B (b) E
(c) D (d) C
8. The DVD of which of the following movies is kept on the top?
(a) T (b) R
(c) U (d) Cannot be determined

Directions for questions 9 to 13: *Read the following passage and solve the questions based on it.*

A, B, C, D, E, F and G are seven persons who travel to office everyday by a particular train which stops at five stations 1, 2, 3, 4 and 5 respectively after leaving its base station.

- (1) Three among them get on the train at the base station.
 - (2) D gets down at the next station at which F gets down.
 - (3) B does not get down either with A or F.
 - (4) G alone gets on at station 3 and gets down with C after having passed one station.
 - (5) A travels between only two stations and gets down at station 5.
 - (6) None of them gets on at station 2.
 - (7) C gets on with F but does not get on with either B or D.
 - (8) E gets on with two others and gets down alone after D.
 - (9) B and D work in the same office and they get down together at station 3.
 - (10) None of them got down at station 1.
9. At which station does E get down?
(a) 2 (b) 3
(c) 4 (d) Cannot be determined
 10. At which station do both C and F get on?
(a) 1 (b) 2
(c) 4 (d) None of these
 11. At which of the following stations do B and D get on?
(a) 1 (b) 2
(c) 3 (d) Cannot be determined

12. After how many stations does E get down?
 (a) One (b) Two
 (c) Three (d) Four
13. At which station, maximum people get down?
 (a) 2 (b) 5
 (c) 3 (d) 4

Directions for questions 14 to 17: Read the following passage and solve the questions based on it.

Three men (Tom, Peter and Jack) and three women (Eliza, Anne and Karen) are spending a few months at a hillside. They are to stay in a row of nine houses, which are facing north, each one living in his or her own house. There are no others staying in the same row of houses. Following are the details given regarding each of their houses:

- (i) Anne, Tom and Jack do not want to stay in any house, which is at the end of the row.
 - (ii) Eliza and Anne are unwilling to stay beside any occupied house.
 - (iii) When Karen, Peter and Jack stand facing north, Karen finds that houses of both Peter and Jack are on her left-hand side.
 - (iv) Between Anne and Jack's house there is just one vacant house.
 - (v) None of the girls occupy adjacent houses.
 - (vi) The house occupied by Tom is next to the house at the end.
 - (vii) House of P is at one of the ends.
 - (viii) Tom is beside Peter.
14. Which of the above statements can be said to be redundant?
 (a) Point (i) (b) Point (ii)
 (c) Point (iii) (d) Point (v)
15. How many of them occupy houses beside to a vacant house?
 (a) 2 (b) 3
 (c) 4 (d) 5
16. Which among these statement(s) is/are definitely true?
 I. Anne is between Eliza and Jack.
 II. At the most four persons can have occupy houses on either side of them.
 III. Tom stays beside Peter.
- (a) I
 (b) II
 (c) I and III
 (d) II and III
17. If we number all the houses from 1 through 9 and assign the house of P as number 1, then house number/s of how many people can NOT be definitely ascertained?
 (a) 0 (b) 1
 (c) 2 (d) 3

Directions for questions 18 to 20: Read the following passage and solve the questions based on it.

Mr Sinha has six children—Pankaj, Ravi, Santosh, Tipu, Vikash and Prakash. They all were born on 13th November, but each was born in a different year, during six consecutive years. It is also known that

- (i) Pankaj is elder to Santosh.
 - (ii) Ravi is elder to both Tipu and Vikash.
 - (iii) Prakash is two years older than Tipu.
 - (iv) Pankaj was born either in the year 2002 or 2003.
 - (v) The oldest member of the group was born in the year 2000.
18. Which of the following could be a correct list of the group, from the youngest to the oldest?
 (a) Santosh, Pankaj, Ravi, Tipu, Vikash, Prakash
 (b) Santosh, Vikash, Pankaj, Tipu, Prakash, Ravi
 (c) Santosh, Vikash, Tipu, Prakash, Pankaj, Ravi
 (d) Santosh, Vikash, Tipu, Pankaj, Prakash, Ravi
19. If Pankaj was born in 2002, then which of the following is definitely true?
 (a) Ravi was born in 2000.
 (b) Prakash was born in 2001
 (c) Santosh was born in 2003
 (d) Vikash was born in 2003
20. If Prakash is the eldest child, then which of the following is definitely true?
 (a) Ravi was born in 2001
 (b) Tipu was born in 2001
 (c) Santosh was born in 2004
 (d) Pankaj was born in 2004

ANSWER KEYS

1. (c) 2. (d) 3. (d) 4. (b) 5. (a) 6. (d) 7. (c) 8. (b) 9. (c) 10. (d)
11. (d) 12. (d) 13. (b) 14. (d) 15. (c) 16. (c) 17. (a) 18. (d) 19. (a) 20. (a)

HINTS AND EXPLANATIONS

1 to 4

Room	Person
A	-
B	-
C	-
D	-
E	-
F	-

From (iii) and the other given facts, two women will live in room C.
From (iii) and (iv), P will live in room E.
From (v) and (iii), S will live in room A with R (because P will live alone). From (vi) and (iii), X will live in room F.
Hence Q and T will live in room C.
Now the whole scene looks like this:

Room	Person
A	S, R
B	U/W
C	Q, T
D	W/U
E	P
F	X

5 to 8

From (ii)

P

Q

T

P

S

U

T

Q

P

U

S

P

From the last sentence of (ii), only one possibility remains

R

T

Q

P

S

U

Now, using (iii) and the above derived result:

R

T

Q

P

S

U

C

E/B

A

F

B/E

D

9 to 13

Persons traveling are: A, B, C, D, E, F and G.
Stations are base station, station 1, station 2, station 3, station 4, and station 5.
Using information (i), (iv), (v), (vi), (vii), (viii) and (x)

Station	Get on	Get down
Base station	- - -	× × ×
1		× × ×
2	× × ×	
3	Only G	B, D
4	A	Only E
5	× × ×	A, G, C

Using (ii) F gets down at station 2 and he got on either at the base station or at station 1.

Now, since F got down at station 2 and he had got on with C, it means that both C and F got on either at the base station or at station 1.

Again, since B and D get down at station 3, this means they too got on either at the base station or at station 1.

It is given that E got on with two other persons i.e., in a group of three persons. Obviously, E got on at the base station.

Summarizing the whole information:

Station	Get on	Get down
Base Station	E and (C, F) or (B, D)	× × ×
1	(C, F) or (B, D)	× × ×
2	× × ×	Only F
3	Only G	B, D
4	A	Only E
5	× × ×	A G C

14 to 17

The first thing that we should do is make nine houses (symbols) in a row:

- - - - -

Now try to find out the information that we are sure about:

1. T is in either house 2 or house 8.
2. A/T/J cannot be in house 1 or 9.
3. Houses beside E and A have to be unoccupied.

4. House numbers of P and J have to be less than the house number of K, i.e., the order should be PJK or JPK, not necessarily together.
5. There are six people and 9 houses to be occupied by them.

Using point 5, 3 houses have to be vacant. It is possible only if neither E nor A are at the ends or else E is at one of the ends and the difference in the houses of E and A is more than 1.

Understand this—

If both of them are at the ends—

E	Vacant	3	4	5	6	7	Vacant	A
-	-	-	-	-	-	-	-	-

Well, this is otherwise also not possible because it violates condition (i) given in the question. In this case, only two houses are vacant.

If one of them is at the ends—

E	Vacant	3	4	5	6	7	8	9
-	-	-	-	-	-	-	-	-

If E is at 1 and A is anywhere from 4 to 8, then the total number of vacant houses = 3, but if E is at 1 and A is at 3, then only two houses will be vacant.

Now start taking the positions:

P	T	Vacant	E	Vacant	A	Vacant	J	K
-	-	-	-	-	-	-	-	-

14. We have not referred to statement (v) till now, therefore it is the redundant statement.
15. Obviously, four people are living beside a vacant house.

18 to 20

18. This question is a typical example of the kind of questions which can be solved without actually making the whole diagram. Let us see:

Using the second statement (Ravi is elder to both Tipu and Vikash), we can eliminate option (a) Using the third statement (Prakash is two years older than Tipu), we eliminate (b) and (c). We are left with (d), which must be correct.

19. This question can also be solved without using a diagram, however for the sake of discussing the solution, let us consult a diagram.

2000	2001	2002	2003	2004	2005
	Prakash	Pankaj	Tipu		
		Pankaj	Prakash	Tipu	

Using statement (iii), Prakash is two years older than Tipu. Using the diagram, the only possible places which Prakash and Tipu can have are either 2003 and 2005 or 2001 and 2003.

Using statement (i), Pankaj is elder to Santosh, so the only possible place left for Santosh is 2004.

Using Statement (ii), Ravi is elder to Tipu and Vikash. Hence, the only place left for Ravi is 2000.

20. Using the diagram once again

2000	2001	2002	2003	2004	2005
Prakash		Tipu	Pankaj		

Assuming Prakash to be the eldest in the group, he must have been born in 2000, that means Tipu was born in the year 2002.

Hence, we can conclude that Pankaj was born in 2003. Now using statement (ii), Ravi was elder to both Tipu and Vikash. Hence Ravi must have been born in 2001 and Vikash in either 2004 or 2005.

PRACTICE EXERCISE 2

Directions for questions 1 to 3: Read the following passage and solve the questions based on it.

In an obsession with the letter P, a person named all his sons starting with P.

- (i) These are the six names—Pailashanand, Pamleshnanand, Punalanand, Pedaranand, Parananand, Pamalanand.
- (ii) Pailashanand is not the heaviest while Pedaranand is not the most handsome.
- (iii) The lightest of the group is the most handsome of the group.
- (iv) Pamleshnanand is more handsome than Pamalanand, who is more handsome than Parananand.
- (v) Pailashanand is less handsome than Pamalanand but is heavier than Pamalanand.
- (vi) Pamleshnanand is lighter than Parananand but heavier than Punalanand.
- (vii) Parananand is more handsome than Pailashanand while Pamalanand is heavier than Parananand.

1. Who is the heaviest of the group?
(a) Pailashanand (b) Pedaranand
(c) Pamleshnanand (d) Pamalanand
2. What is the rank of Pamalanand in the decreasing order of weight?
(a) Third (b) Fourth
(c) Fifth (d) Second
3. Who is most handsome?
(a) Pamleshnanand (b) Pedaranand
(c) Pamalanand (d) Punalanand

Directions for questions 4 to 7: Read the following passage and solve the questions based on it.

In the recent fashion show LFW, seven fashion designers presented their clothes to the viewers. Names of the fashion designers have been withheld due to security reasons, however to identify their clothes it has been decided that the first letter of their names will be used for their outfits. The names of the different fashion designers:

C, L, W, G, D, J, and S. Outfits made by these designers have been placed in a row in the following order:

- (i) S is placed on the immediately left of C.
- (ii) C is fourth to the left of D.
- (iii) L is between G and W.

- (iv) D, which is the third to the right of G, is at one of the ends.
4. How many outfits have been placed between J and G?
(a) 4 (b) 3
(c) 2 (d) 1
 5. What is the position of C?
(a) Second to the left of L
(b) Second to the left of W
(c) Third to the left of G
(d) Between S and J
 6. Which two outfits are at the two ends?
(a) S and D (b) S and W
(c) J and W (d) J and D
 7. Which of the following is not true?
(a) S and C are consecutively placed.
(b) J is at one of the ends.
(c) There are two outfits between C and W.
(d) Positions of J and W are interchangeable.

Directions for questions 8 to 11: Read the following passage and solve the questions based on it.

- (i) A, B, C, D, E, F and G are seven members of a family standing in a row (not necessarily in the same order) facing a particular direction.
- (ii) C and B have as many members between them as G and C have between them.
- (iii) D, who is 3rd from the extreme left, is 3rd to the left of E.
- (iv) A and D are neighbours and F and C are neighbours.

8. Which of the following statements may be false?
(a) A is 3rd to the left of F
(c) D is 3rd to the left of E
(b) F is 3rd to the right of A
(d) B is 3rd to the left of C
9. Which of the following statements is true?
(a) C and E are neighbours
(b) E is to the immediate left of F
(c) C is to the immediate left of D
(d) A is to the immediate left of D
10. Who is at the extreme right?
(a) G
(b) B
(c) E
(d) Data inadequate

11. Which of the following gives two pairs of neighbours?
 (a) A, C and D, C
 (b) A, B and E, G
 (c) D, C and E, F
 (d) C, F and C, E

Directions for questions 12 to 16: Read the following passage and solve the questions based on it.

Five students—Pankaj, Jatin, Robin, Dinkar and Rahul went for the Group Discussion (GD) and the (Personal Interview) (PI). The panel judged these five students and gave them rankings for the GD and the PI in a descending order. Rahul, who was ranked first in the GD, was last in the PI. Robin had the same ranking in both and was just above Rahul in the PI. In the GD, Pankaj was just above Dinkar but in the PI he was in the middle, after Jatin.

12. Who ranked first in the PI?
 (a) Jatin (b) Rahul
 (c) Robin (d) None of these
13. Who ranked fifth in the GD?
 (a) Dinkar (b) Jatin
 (c) Robin (d) Data inadequate
14. Who among the following has the same rank in both the GD and the PI?
 (a) Pankaj
 (b) Robin
 (c) Dinkar
 (d) None of the five students
15. To get the final selection list, the ranks of the students in the GD and the PI are added up. The lower the sum of the ranks, the better the performance. Who among the following has the maximum chances of getting selected. (The better the performance, the better are the chances of getting selected).
- (a) Pankaj (b) Jatin
 (c) Robin (d) Dinkar
16. In the last question, who among the following has the least chance of getting selected?
 (a) Pankaj (b) Jatin
 (c) Robin (d) Dinkar

Directions for questions 17 to 20: Read the following passage and solve the questions based on it.

- (i) A, B, C, D, E, F, G and H are standing in a row facing north.
 (ii) B is not a neighbour of G.
 (iii) F is at the immediate right of G and neighbour of E.
 (iv) G is not at the extreme end.
 (v) A is sixth to the left of E.
 (vi) H is sixth to the right of C.
17. Who among the following are neighbours?
 (a) AB (b) CG
 (c) FH (d) CA
18. Which one among the following defines the position of D?
 (a) Fourth to the right of H
 (b) Third to the right of A
 (c) Neighbour of B and F
 (d) To the immediate left of B
19. Which of the following is true?
 (a) C is to the immediate left of A
 (b) D is a neighbour of B and F
 (c) G is to the immediate right of D
 (d) A and E are at the extreme ends
20. After making the linear arrangement, we join them to form a circular arrangement by joining A and H. Which of the following is the odd one out?
 (a) B-H (b) E-D
 (c) B-F (d) H-G

ANSWER KEYS

1. (b) 2. (a) 3. (d) 4. (c) 5. (a) 6. (d) 7. (d) 8. (d) 9. (d) 10. (d)
 11. (c) 12. (d) 13. (b) 14. (b) 15. (d) 16. (c) 17. (d) 18. (b) 19. (c) 20. (c)

HINTS AND EXPLANATIONS

1 to 3

In this set, we will need to make two series—one for comparing beauty and the other for comparing weights. From (iv) and (vii), we can deduce the series for comparing beauty as

Pamleshanand > Pamalanand > Parananand > Pailashanand

From (v), (vi) and (vii), we deduce the series for comparing as

Pailashanand > Pamalanand > Parananand > Pamleshanand > Punalanand.

Further, since Pailashanand is not the heaviest in the group (ii), Pedaranand has to be heavier than Pailashanand. Thus, the series for comparing weights will be Pedaranand > Pailashanand > Pamalanand > Parananand > Pamaleshanand > Punalanand.

⇒ Punalanand is lightest in the group and hence, the most handsome (iii).

Therefore the series for comparing beauty will be

Punalanand > Pamaleshanand > Pamalanand > Parananand > Pailashanand.

From (ii), we can say that Pedaranand is less handsome than Punalanand.

4 to 7

Using the first condition—S is on the immediate left of C, i.e., S C

Using the second condition—There are three outfits between C and D. C _ _ _ D

Using the third condition—

G L W or W L G

Using the fourth condition—There are 2 outfits between G and D, these should be L and W and this arrangement satisfies the second condition too.

C G L W D

Using the result from the first condition:

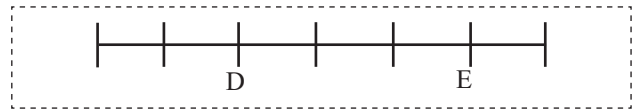
S C G L W D

As D is at one corner, J must be at the second corner as there is no empty space anywhere else. So the complete arrangement is:

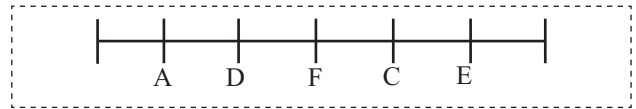
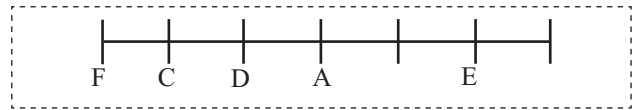
J S C G L W D

8 to 11

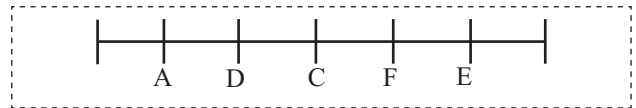
From (iii)



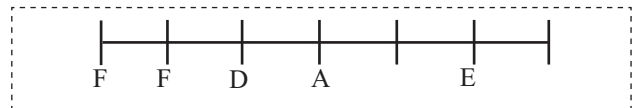
Combining (iii) and (iv), we get the following arrangements:



or



or



So, the possible arrangements are:

GADCFEB

or

BADCFEG.

8. Because position of B is not fixed.
11. As the position of B and G are not fixed, option b is not definitely true.

12 to 16

	GD	PI
Pankaj	2	3
Jatin	5	2
Robin	4	4
Dinkar	3	1
Rahul	1	5

17 to 20

Using the information given,

GFE

..... (iii),

Now statements (v) and (vi) may be combined as:

AC - - - - EH (vii)

Or CA - - - - - HE (viii)

But (viii) is not possible because it violates statement (iv).

Combining (iii) and (vii), we get

AC - - GFEH (viii)

Now, from statement (ii) and deduction (viii), we get

ACB - GFEH (ix)

This blank can be filled by 'D', hence the arrangement is ACBDGFEH.

- 20.** Two persons are sitting between all the four pairs, but in three of them it is clockwise and one of them is having it in anti-clockwise.

Chapter

5

SERIES

LEARNING Objectives

In this chapter, you will learn:

- ☐ Different types of series
 - ☐ Methods to solve the questions
 - ☐ Approach building
-

Questions from this topic are frequently asked in exams like XAT/SNAP/MAT etc., and Campus Recruitment Examinations.

‘Series’ questions expect students to analyse the pattern, and extrapolate on the basis of the rule or pattern identified. There are different types of rules in a series. Some of these are listed below:

The Prime Number Series

Prime numbers have only two distinct factors like 2, 3, 5, 7, 11, 13, 17.... Occurrence of these numbers does not follow any particular rule.

Examples

- (a) 3, 5, 7, 11, 13, 17, _____
Rule – Series contains a prime number series will have the next number as 19.
- (b) 5, 7, 10, 15, 22, _____
Rule – Series contains the difference between two successive numbers is 2, 3, 5, 7 and so on, which are prime numbers. Hence the next number of

the series will be 22 (the last given number) + 11 (the next prime number) = 33.

- (c) 4, 9, 25, 49, 121, _____
Rule – Series is the squares of the prime numbers. $(2)^2 = 4$, $(3)^2 = 9$ and so on. Hence the next number will be 169 which is $(13)^2$.
- (d) 1, 5, 14, 39, 88, _____
Rule – Difference between two consecutive numbers of the given series is the squares of prime numbers. Hence the next number will be $88 + 121 = 209$.

The Difference Series

In these types of series, pattern would be obtained by finding the difference between terms. Differences are categorized as 1st order difference, 2nd order difference, 3rd order difference and so on.

What is the “Order of Difference”:

Let us understand this with the help of some examples:

1st order difference is the difference between two consecutive terms of the series. If 1st order difference is constant, then general term of the series will be a linear equation.

1st order difference $\rightarrow$ $\begin{array}{ccccccccc} & 2 & & 5 & & 10 & & 17 & & 26 & & 37 \\ \downarrow & & \downarrow & & \downarrow & & \downarrow & & \downarrow & & \downarrow & & \downarrow \\ 3 & & 5 & & 7 & & 9 & & 11 & & \end{array}$

2nd order difference is the difference between the consecutive terms obtained from the 1st order difference. If 2nd order difference is constant, then general term of the series will be a quadratic equation.

1st order difference $\rightarrow$ $\begin{array}{ccccccccc} & 2 & & 5 & & 10 & & 17 & & 26 & & 37 \\ \downarrow & & \downarrow & & \downarrow & & \downarrow & & \downarrow & & \downarrow & & \downarrow \\ 3 & & 5 & & 7 & & 9 & & 11 & & \end{array}$
 2nd order difference $\rightarrow$ $\begin{array}{ccccccccc} & & & 2 & & 2 & & 2 & & 2 & & \\ \downarrow & & \downarrow & & \downarrow & & \downarrow & & \downarrow & & \downarrow & & \downarrow \\ 2 & & 2 & & 2 & & 2 & & 2 & & \end{array}$

And so on, 3rd order difference will be difference between the consecutive terms obtained from the 2nd order difference. If 3rd order difference is constant, then general term of the series will be a cubic equation.

1st order difference $\rightarrow$ $\begin{array}{ccccccccc} & 2 & & 5 & & 10 & & 17 & & 26 & & 37 \\ \downarrow & & \downarrow & & \downarrow & & \downarrow & & \downarrow & & \downarrow & & \downarrow \\ 3 & & 5 & & 7 & & 9 & & 11 & & \end{array}$
 2nd order difference $\rightarrow$ $\begin{array}{ccccccccc} & & & 2 & & 2 & & 2 & & 2 & & \\ \downarrow & & \downarrow & & \downarrow & & \downarrow & & \downarrow & & \downarrow & & \downarrow \\ 2 & & 2 & & 2 & & 2 & & 2 & & \end{array}$
 3rd order difference $\rightarrow$ $\begin{array}{ccccccccc} & & & & & 0 & & 0 & & 0 & & \\ \downarrow & & \downarrow & & \downarrow & & \downarrow & & \downarrow & & \downarrow & & \downarrow \\ 0 & & 0 & & 0 & & 0 & & 0 & & \end{array}$

Since in the series 2, 5, 10, 17, 26, 37 – 2nd order difference is constant, hence the general term of this series is a quadratic equation. We can also conclude that if 2nd order difference is constant, then general term of the series cannot be linear equation.

Rule followed here = $(n^2 + 1)$. Hence next term = $7^2 + 1 = 50$. In general, we can find out any term of this series by putting the value of n . For example, 10th term will be $10^2 + 1 = 101$.

How to identify the general rule

For this series, 2nd order difference is constant. Hence general term will be a quadratic equation.

Let us assume that the general term for n^{th} term = $an^2 + bn + c$.

$T_1 = a + b + c$ (we obtain this by putting $n = 1$ in $an^2 + bn + c$) = 2 (as given in the question) ...(1)

$T_2 = 4a + 2b + c$ (we obtain this by putting $n = 2$ in $an^2 + bn + c$) = 5 ...(2)

$T_3 = 9a + 3b + c$ (we obtain this by putting $n = 3$ in $an^2 + bn + c$) = 10 ...(3)

Now, we have three variables and three equations. To solve further, we would 1st eliminate one variable keeping the equations in two variable. Then, we would have two simultaneous equations in two variables

Subtract equation (1) from equation (2):

$$\begin{array}{r} 4a + 2b + c = 5 \\ - \quad a + b + c = 2 \\ \hline 3a + b = 3 \end{array}$$

Subtract equation (1) from equation (3):

$$\begin{array}{r} 9a + 3b + c = 10 \\ - \quad a + b + c = 2 \\ \hline 8a + 2b = 8 \end{array}$$

Now we obtain two new equations in two variables:

$$3a + b = 3 \quad \dots(4)$$

$$8a + 2b = 8 \text{ OR } 4a + b = 4 \quad \dots(5)$$

Solving (4) and (5) gives:

$$a = 1, b = 0, c = 1$$

$$\text{Hence general term } n^{\text{th}} \text{ term} = an^2 + bn + c = n^2 + 1$$

Examples:

- (a) 8, 16, 24, 32, 40, _____

In this series, the difference between two successive terms is same i.e., 8. Hence the next number in the series will be $40 + 8 = 48$.

- (b) 6, 13, 27, 55, 111, _____

In this series, the difference between two consecutive numbers is 2, 4, 6, 8... Hence the next term will be 33.

- (c) 13, 14, 18, 27, 43, _____

Difference between the two successive terms are 1, 4, 9, 16, 25, etc., which are the squares of 1, 2, 3, 4, 5... Hence the next term of the series will be $43 + 25 = 68$

The Product Series

A series is called a product series when the term is obtained by multiplying by a constant or any other number.

Examples

- (a) 3, 12, 48, 192, 768, _____

In this series, multiplying the previous term by four gets each next term. Hence the next term will be obtained by multiplying 768 by 4. The term will be 3072

- (b) 3, 6, 18, 90, 630, _____

Here the numbers are being multiplied by consecutive prime numbers i.e., 2, 3, 5, 7, 11 and so on. Hence the next number in the series will be $630 \times 11 = 6930$.

The Mixed Series

The mixed series has three types of forms involved, which can be classified as follows:

- (a) A mixed series may be formed by mixing two different series.

Example

3, 6, 24, 30, 63, 72, _____, 132

In this series, the difference between the terms of each pair formed by two consecutive terms is 3, 6, 9, 12 Hence the missing number is $132 - 12 = 120$.

- (b) A mixed series may be formed by the mixture of two series, which are placed alternately.

Example

2, 6, 10, 3, 9, 13, 4, 12, _____

In this series, the first term is multiplied by 3 to get the second term and 4 is added to the product to get the 3rd term. Hence the answer will be $12 + 4 = 16$. here a new series starts after every three terms.

The Square And Cube Series

Example

1, 4, 27, 16, 125, _____

Here the numbers in the series are formed by alternately placing the cubes of odd numbers and squares of even numbers. Hence the next term will be 36.

PRACTICE EXERCISE 1

1. 8, 12, 10, 16, 12, _____
(a) 10 (b) 20
(c) 30 (d) 40
 2. 7, 15, 32, _____, 138, 281
(a) 57 (b) 67
(c) 77 (d) 87
 3. 4, 6, 9, 14, _____
(a) 16 (b) 18
(c) 20 (d) 23
 4. 36, 28, 24, 22, _____
(a) 18 (b) 20
(c) 21 (d) 22
 5. 260, 216, 128, 108, 62, 54, _____, 27
(a) 39 (b) 49
(c) 29 (d) 19
 6. 2, 6, 12, 20, 30, _____
(a) 32 (b) 42
(c) 52 (d) 62
 7. 1, 5, 11, 19, 29, _____, 55
(a) 45 (b) 39
(c) 41 (d) 47
 8. 0, 3, 8, 15, _____, 35, 48
(a) 22 (b) 11
(c) 24 (d) 26
 9. 36, 30, 24, 18, _____
(a) 22 (b) 12
(c) 21 (d) 11
 10. 2, 5, 9, 19, 37, _____
(a) 47 (b) 87
(c) 75 (d) 85
 11. 6, 8, 9, 12, 14, 18, _____
(a) 19 (b) 21
(c) 23 (d) 25
 12. 9, 15, 23, 33, 45, _____
(a) 55 (b) 57
(c) 59 (d) 61
 13. 1, 0, 3, 2, 5, 6, _____, 12, 9, 20
(a) 10 (b) 7
(c) 8 (d) 12
 14. 2, 0, 5, 3, _____, 8, 17
(a) 9 (b) 10
(c) 6 (d) 8
 15. 3, 7, 13, 21, 31, _____
(a) 43 (b) 34
(c) 56 (d) 45
 16. 6, 15, 33, 69, _____, 285
(a) 137 (b) 141
(c) 143 (d) 147
 17. 0, 5, 22, 57, 116, _____
(a) 216 (b) 205
(c) 207 (d) 192
 18. 1, 2, 4, 8, 16, _____
(a) 20 (b) 24
(c) 28 (d) 32
 19. 0, 7, 26, 63, 124, _____
(a) 195 (b) 208
(c) 215 (d) 240
 20. 1, 5, 11, 19, 29, 41, 55, _____
(a) 68 (b) 70
(c) 82 (d) 71
 21. 123, 129, 141, _____, 159, 165
(a) 147 (b) 148
(c) 149 (d) 151
 22. 27, 64, 125, 216, 343, _____
(a) 416 (b) 512
(c) 686 (d) 559
- Directions for questions 23 to 27:** In each of the following question a number series is given. After the series, a number is given followed by (a), (b), (c), (d) and (e). You have to complete the series starting with the number given, following the sequence of the original series and answer the questions that follow the series.
- 23.
12	30	120	460	1368	2730
16	(A)	(B)	(C)	(D)	(E)
- What will come in place of (D)?
(a) 1384 (b) 2642
(c) 2808 (d) 1988
- 24.
154	462	231	693	346.5	1039.5
276	(a)	(b)	(c)	(d)	(e)
- What will come in place of (e)?
(a) 1746 (b) 621
(c) 1242 (d) 1863

25.

582 574 601 537 662 446
 204 (A) (B) (C) (D) (E)

What will come in place of (D)?

- (a) 284 (b) 68
 (c) 174 (d) 331

26.

7 91 1001 7007 35035
 14.5 (A) (B) (C) (D)

What will come in place of (C)?

- (a) 21132.5
 (b) 14514.5
 (c) 20020.5
 (d) 13864.5

27.

85 43 44 67.5 137 345
 125 (A) (B) (C) (D) (E)

What will come in place of (C)?

- (a) 86 (b) 107.5
 (c) 112.5 (d) 97.5

Directions for questions 28 to 30: Find what should come in place of question mark (?) in the following number series:

28.

12 12 18 45 180 1170 ?
 (a) 12285 (b) 10530
 (c) 11700 (d) 12870

29.

444 467 513 582 674 789 ?
 (a) 950 (b) 904
 (c) 927 (d) 881

30.

23 25 53 163 657 ?
 (a) 4096 (b) 2401
 (c) 1764 (d) 3291

ANSWER KEYS

1. (b)	2. (b)	3. (d)	4. (c)	5. (c)	6. (b)	7. (c)	8. (c)	9. (b)	10. (c)
11. (b)	12. (c)	13. (b)	14. (b)	15. (a)	16. (b)	17. (b)	18. (d)	19. (c)	20. (d)
21. (a)	22. (b)	23. (c)	24. (d)	25. (a)	26. (b)	27. (d)	28. (a)	29. (c)	30. (d)

HINTS AND EXPLANATIONS

- In this series the 1st, 3rd, 5th terms are multiplied by 2 and 4 is subtracted from the product whereas the 2nd, 4th terms are multiplied by 2 and 4 is added to the product.
- Each term is doubled and consecutive numbers starting from 1, 2, 3 are added to the sum to get the next term. i.e., $2 \times 32 = 64 + 3 = 67$
- Here the preceding term is multiplied by 2 and then 2, 3, 4 etc. are subtracted from the product.
- Each number is half the preceding number plus 10.
- The alternate numbers form two different series. The missing number belongs to the one beginning with
260. in this subtract 4 and divide the difference by 2 to get the next number. So the missing number is $62 - 4 = 58/2 = 29$
- The numbers are alternately multiplied by 3 and divided by 2.
- The terms are got by adding even numbers starting from 4 to the preceding term.
- The terms are obtained by adding odd numbers from 3, 5, ... to the preceding term.
- The number goes down by 6 each time.
- Multiply each preceding number by 2, add 1 and subtract 1 alternately.

11. Alternate terms of the given series form two series
.... 1st 6, 9, 14, 21, and the 2nd 8, 12, 18
12. The terms of the given series are 3^2 , $4^2 - 1$, $5^2 - 2$, $6^2 - 3$, $7^2 - 4$, $8^2 - 5$
13. Alternate terms of the given series form two different series. 1st 1, 3, 5, 7, 9 and the 2nd is 0, 2, 6, 12, 20.
14. Alternate terms of the given series form two different series. 1st 2, 5, 10, 17 ($n^2 + 1$) and the 2nd is 0, 3, 8 ($n^2 - 1$).
15. Series is: +2, +4, +6, +8, +10. Hence next term will be $+12 = 31 + 12 = 43$.
16. 1st to 4th & 6th terms are 6, 15, 33, 69, x, 285. These terms are 3×2 , 3×5 , 3×11 , 3×23 , x, 3×95
It can be observed all terms are $3 \times a_n$. Where $a_1 = 2$ & $a_n = 2a_{n-1} + 1$. So, $x = 3 \times [2(23) + 1] = 3 \times 47 = 141$
17. The 1st to 5th terms are 0, 5, 22, 57, 116. These terms are $1^3 - 1$, $2^3 - 3$, $3^3 - 5$, $4^3 - 7$, $5^3 - 9$. So, these are $1^3 - 1$, $2^3 - 3$, $3^3 - 5$, $4^3 - 7$, $5^3 - 9$. So, nth term of series is $n^3 - (2n - 1)$. So, 6th term of series is $6^3 - (2 \times 6 - 1) = 216 - 11 = 205$
18. In this series each term is twice of its last term. So, the term after 16 is twice of 16 i.e. 32.
19. The nth term of series is given as $n^3 - 1$. So, the missing term (i.e. 6th term) = $6^3 - 1 = 216 - 1 = 215$.
20. The common difference between consecutive terms is increasing by 2. There is difference of 14 between 41 & 55. So, the difference between 55 & next term must be 16. So, next term is $55 + 16 = 71$
21. The common difference between consecutive terms is 6, 12, 6, 12 & so on. So, the term next to 141 is $141 + 6 = 147$
22. The general term is $T_n = (n + 2)^3$. So, the 6th term is $T_6 = (6 + 2)^3 = 8^3 = 512$
23. The given series is based on the following pattern:
 $30 = 12 \times 6 - 7 \times 6$
 $120 = 30 \times 5 - 6 \times 5$
 $460 = 120 \times 4 - 5 \times 4$
 $1368 = 460 \times 3 - 4 \times 3$
 $2730 = 1368 \times 2 - 3 \times 2$
 Similarly,
 (a) $= 16 \times 6 - 7 \times 6 = 96 - 42 = 54$
 (b) $= 54 \times 5 - 6 \times 5 = 240$
 (c) $= 240 \times 4 - 5 \times 4 = 940$
 (d) $= 940 \times 3 - 4 \times 3 = 2808$
 Hence, 2808 will come in place of d.
24. The given series is based on the following pattern:
 $154 \quad 462 \quad 231 \quad 693 \quad 346.5 \quad 1039.5$
 $\times 3 \quad \div 2 \quad \times 3 \quad \div 2 \quad \times 3$
 Similarly,
 $\begin{array}{ccccc} a & b & c & d & e \\ 276 & 828 & 414 & 1242 & 621 & 1863 \\ \times 3 & \div 2 & \times 3 & \div 2 & \times 3 \end{array}$
 Hence, 1863 will come in place of e.
25. The given series is based on the following pattern:
 $582 \quad 574 \quad 601 \quad 537 \quad 662 \quad 446$
 $-2^3 \quad +3^3 \quad -4^3 \quad +5^3 \quad -6^3$
 Similarly,
 $\begin{array}{ccccc} a & b & c & d & \\ 204 & 196 & 223 & 159 & 284 \\ -2^3 & +3^3 & -4^3 & +5^3 & \end{array}$
 Hence, 284 will come in place of d.
26. The given series is based on the following pattern:
 $7 \quad 91 \quad 1001 \quad 7007 \quad 35035$
 $\times 13 \quad \times 11 \quad \times 7 \quad \times 5$
 Similarly,
 $\begin{array}{ccccc} a & b & c & & \\ 14.5 & 188.5 & 2073.5 & 14514.5 & \\ \times 13 & \times 11 & \times 7 & \end{array}$
 Hence, 14514.5 will come in place of c.
27. The given series is based on the following pattern:
 $85 \quad 43 \quad 44 \quad 67.5 \quad 137 \quad 345$
 $\times 0.5 + 0.5 \times 1 \div 1 \times 1.5 + 1.5 \times 2 \div 2 \times 2.5 \div 2.5$
 Similarly,
 $\begin{array}{ccccc} a & b & c & & \\ 125 & 63 & 64 & 97.5 & \\ \times 0.5 + 0.5 & \times 1 \div 1 & \times 1.5 \div 1.5 & \end{array}$
 Hence, 97.5 will come in place of c.
28. The given number series is based on the following pattern:
 $12 \times 1 = 12$
 $12 \times 1.5 = 18$
 $18 \times (1 + 1.5) = 18 \times 2.5 = 45$
 $45 \times (1.5 + 2.5) = 45 \times 4 = 180$
 $180 \times (4 + 2.5) = 180 \times 6.5 = 1170$
 $\therefore ? = 1170 \times (4 + 6.5) = 12285$
 Hence, 12285 will replace the question mark.
29. The given number series is based on the following pattern:
 $467 - 444 = 23 = 23 \times 1$
 $513 - 467 = 46 = 23 \times 2$
 $582 - 513 = 69 = 23 \times 3$

$$674 - 582 = 92 = 23 \times 4$$

$$789 - 674 = 115 = 23 \times 5$$

$$\therefore ? = 789 + 23 \times 6 = 789 + 138 = 927$$

Hence, 927 will replace the question mark.

30. The given number series is based on the following pattern:

$$23 \times 1 + 2 = 25$$

$$25 \times 2 + 3 = 53$$

$$53 \times 3 + 4 = 163$$

$$163 \times 4 + 5 = 657$$

$$657 \times 5 + 6 = 3291$$

Hence, 3291 will replace the question mark.

Chapter

6

TEAM SELECTION

LEARNING Objectives

In this chapter, you will learn:

- ☐ Different types of Team Selection Questions
 - ☐ Notations to mark the data
 - ☐ Language Interpretation
 - ☐ Methods to solve the questions
-

Questions belonging to this genre will provide a set of objects or people etc. and then a set of conditions. On the basis of these conditions, one is expected to make choices regarding the formation of the team. It is advisable to jot down the conditions and items to be formed into teams carefully.

In most of these set of questions, you will find that the parent data provides the basic guidelines and subsequently every question introduces one new condition.

It is imperative here to understand that while parent data is applicable to all the questions in the set, data supplied in any question is applicable to that particular question only, and not to the other questions unless specified otherwise.

Understanding the Keywords and Types of Statements

These questions will throw a gauntlet of simple but contextually confusing words at the students. Some of these words/types of statements have been listed below:

1. At least one element – It means one or more – Symbolically, we can represent this as: $1+$
2. At most one element – It means zero or one – Symbolically, we can represent this as: $0/1$
3. At most two elements – It means zero or one or two – Symbolically, we can represent this as: $0/1/2$.
4. Conditional clauses [Read chapter “Logical Links” in this book to understand these conditional clauses better]:

If A is selected, then B will also be selected.

Following inferences can be drawn:

- (a) If A is selected, B has to be selected.
- (b) There cannot be a case where A is selected but B is not selected.
- (c) It is possible that B has been selected but A may be/may not be selected.
- (d) If B has not been selected, then we can conclude that A also has not been selected.
- (e) It is not possible that B has not been selected, but A has been selected [rephrasing of inference (b) above].

In a nutshell, A alone cannot be selected though B alone can be selected.

Go through the following problem sets to understand the type of problems and techniques to solve the same. Do not look at the solution till you are convinced that you have attempted it at your best level.

Directions for questions 1 to 6: Read the information given below and solve the questions based on it.

Three adult women (R, S, and T), two adult men (U and V), and four children (W, X, Y, and Z) are going to a watch a movie. Though, during the online booking of the

tickets, they realized that the nine seats available for the show are in three different classes—Silver Class, Gold Class and Lounge. The layout also showed that in each class, three adjacent seats are available.

To watch the movie, they decide to have the three groups of three members each as per the following conditions:

- No adults of the same gender can be together in ONE group.
- W cannot be in R's group.
- X must be in a group with S or U or both.

PRACTICE EXERCISE 1

Team selection for exercise1 Q1 to Q6

- If R is the only adult in one group, the other members of her group must be
(a) W and Y (b) X and Y
(c) X and Z (d) Y and Z
- R and U share a good rapport, and hence decide to be in the same group. Who can be in the second and third groups, respectively?
(a) S, T, W; V, Y, Z (b) S, X, Y; T, W, Z
(c) T, V, W; S, Y, Z (d) W, X, Y; S, V, Z
- Which of the following pairs of people can be in the same group as W?
(a) R and Y (b) S and U
(c) S and V (d) U and V
- Which of the following must be true?
(a) One of the women is in a group with two children.
(b) One of the two men is in a group with W.
(c) R is in a group with a man.
(d) One of the groups includes no children.
- Any of the following pairs of people could be in a group with X EXCEPT
(a) R and U (b) S and T
(c) S and U (d) S and W
- Given that T, Y, and Z form one group. Which of the following must be together in one of the other groups?
(a) R, S, V (b) R, U, W
(c) S, U, W (d) S, V, W

Directions for questions 7 to 10: Read the information given below and solve the questions based on it.

dueNorth presently employs three Marketing Managers (MM)—A, B and C and five faculty members—D, E, F, G and H. Company is planning to open a new office. It is planning to relocate two of the three marketing managers and three of the five faculty members to the new office. Management wants to ensure that the individuals who do not function well together should not be sent as a part of the team.

Following information was available to the HR department of dueNorth:

Marketing Managers A and C cannot be sent as a team to the new office.

C and E are excellent performers, though, they do

not share good rapport, and hence should not be sent together.

If D is sent, then G cannot be sent, and vice versa. D and F should not be together in a team.

- If D goes to the new office which of the following is (are) true?
A. C cannot go B. A cannot go
C. H must also go
(a) A only (b) B and C only
(c) A and C only (d) A, B and C
- If A is to be moved as one of the Marketing Managers, which of the following cannot be a possible working unit?
(a) ABDEH
(b) ABFGH
(c) ABEGH
(d) ABDGH
- If C and F are moved to the new office, how many combinations are possible?
(a) 0 (b) 1
(c) 2 (d) 3
- Who among the Marketing Managers and the faculty members is sure to find a berth in the new office?
(a) D (b) H
(c) G (d) B

Directions for questions 11 to 13: Read the information given below and solve the questions based on it.

Seven students at a B school who live in a dormitory are being formed into groups that consist of two or three or four members at a time. The groups may change but at any time, each person can be a part of one and only one group. The following guidelines have to be adhered to while forming the groups

- The students are Nitin, Priyanka, Rahul, Sumit, Tanay, Urmila and Vinay.
- Nitin cannot be in the same group as Sumit.
- Tanay must be in a group that includes either Sumit or Vinay but not both.
- Vinay has to be in a group that does not contain even number of members.

- Which of the following is a possible list of three groups that can coexist?

1	Nitin, Vinay	Tanay, Rahul, Urmila	Sumit, Priyanka

2	Nitin, Tanay	Vinay, Rahul, Sumit	Priyanka, Urmila
3	Nitin, Urmila	Rahul, Sumit	Vinay, Tanay, Priyanka
4	Urmila, Sumit	Vinay, Tanay	Priyanka, Nitin, Rahul

12. If a group of 3 members and another of 4 members is formed and one of these two groups has Vinay and Urmila, who else is likely to be in the same group?
 (a) Nitin (b) Sumit
 (c) Priyanka (d) Rahul
13. If a group of three is formed with Rahul, Tanay and Vinay, then how many groups will be there amongst the seven students?
 (a) 2
 (b) 3
 (c) either 2 or 3
 (d) insufficient Data

Directions for questions 14 to 15: Read the passage given below and solve the questions based on it.

Digviza and three other members of her yoga club dined out together. Each woman ordered either salad or soup to start with, and one of the three entrees (a dish served before the main course)—cabbage rolls, eggs benedict, or lasagna. Refer to the clues given below and answer the following questions:

- Every order was different. Each dish mentioned above was ordered at least once.
- Kejri and the lady who ordered the salad both ordered lasagna as the entree.
- Rajdev and Sonila both ordered soup as the first course.
- Sonila did not order the eggs benedict.

14. How many women ordered salad?
 (a) 1 (b) 2
 (c) 3 (d) 4
15. Who ordered salad and cabbage rolls?
 (a) Digviza (b) Rajdev
 (c) Sonila (d) None

Directions for questions 16 to 20: Read the information given below and solve the questions based on it.

K, L, M, N, P, Q, R, S, U and W are the only ten members in a department. There is a proposal to form a team from within the members of the department,

subject to the following conditions:

- A team must include exactly one among P, R, and S.
- A team must include either M or Q, but not both.
- If a team includes K, then it must also include L, and vice versa.
- If a team includes one among S, U, and W, then it must also include the other two.
- L and N cannot be members of the same team.
- L and U cannot be members of the same team.
- The size of a team is defined as the number of members in the team.

16. Who cannot be a member of a team of size 3?
 (a) L (b) M
 (c) N (d) P
 (e) Q
17. Who can be a member of a team of size 5?
 (a) K (b) L
 (c) M (d) P
 (e) R
18. What would be the size of the largest possible team?
 (a) 8 (b) 7
 (c) 6 (d) 5
 (e) cannot be determined
19. What could be the size of a team that includes K?
 (a) 2 or 3 (b) 2 or 4
 (c) 3 or 4 (d) Only 2
 (e) Only 4
20. In how many ways a team can be constituted so that the team includes N?
 (a) 2 (b) 3
 (c) 4 (d) 5
 (e) 6

Directions for questions 21 to 25: Read the information given below and solve the questions based on it.

There are three projects—P1, P2 and P3. A student can select either one project or two projects or all the three projects subject to the conditions given below:

Condition 1: Both P1 and P2 have to be selected.

Condition 2: Either P1 or P3, but not both, has to be selected.

Condition 3: P2 can be selected only if P3 has been selected.

Condition 4: P1 can be selected only if P3 has been selected.

21. How many different selections can be made if no conditions are imposed?
 (a) 5 (b) 6
 (c) 7 (d) 8
 (e) 4
22. How many selections can be made to meet condition 1 as given above?
 (a) 1 (b) 2
 (c) 3 (d) 4
 (e) 0
23. How many selections can be made to meet condition 2 as given above?
- (a) 2 (b) 3
 (c) 4 (d) 5
 (e) 1
24. How many selections can be made meeting the conditions 2 and 3 as given above?
 (a) 0 (b) 1
 (c) 2 (d) 0 or 1
 (e) None of these
25. How many selections can be made meeting the conditions 1, 2 and 3 as given above?
 (a) 0 (b) 1
 (c) 2 (d) 3
 (e) None of these

ANSWER KEYS

1. (d) 2. (c) 3. (c) 4. (a) 5. (b) 6. (d) 7. (c) 8. (d) 9. (b) 10. (d)
 11. (c) 12. (a) 13. (b) 14. (a) 15. (d) 16. (a) 17. (c) 18. (d) 19. (e) 20. (e)
 21. (c) 22. (b) 23. (c) 24. (e) 25. (a)

HINTS AND EXPLANATIONS

1 to 6

1. Since W cannot be in R's group, we can eliminate 1st option. X can only be in a group with S or U or both. Since R is the only adult, neither S nor U can be in the group. So, 2nd option and 3rd option can be eliminated as both contain X. 4th option is the correct answer because the only two children remaining to fill out the group with R are Y and Z.

Hence option (d) is the answer.

2. 1st option contains two women S and T in the second group. Hence 1st option is eliminated. Similarly, in the 2nd option, first group contains U and V, both men; hence 2nd can be eliminated.

Since X must be in a group with S or U, or both, the second option and 4th option can be eliminated.

3rd option, consisting of groups R, U, X; T, V, W; and S, Y, Z, meets all of the restrictions and is the correct answer.

Hence option (c) is the answer.

3. S, V, and W could form a group if the other two groups were R, Y, Z, and T, U, X or R, U, X and T, Y, Z. Thus, the third option is the correct answer.

Option (a) is incorrect. W cannot be in R's group.

Option (b) is incorrect. If S and U are in the same group, X must fill the remaining seat. But option shows that W will take the seat. Therefore, it is not possible.

D is not correct. U and V are both men and cannot be in the same group.

Hence option (c) is the answer.

4. Now this is a sitter:

Option (a) is obviously correct, because there are three women and only one woman can be in ONE group, so each of the three groups must contain a woman. Further, there are more children than groups, hence at least one group must have two children. That group will include a woman along with the two children.

Option (b) is incorrect. S, W, X; R, U, Y; and T, V, Z is one of several possible sets of seating groups in which W is not in the same group as one of the two men.

Option (c) is incorrect. Using option (a) we can say that that woman can be R. Hence at best, this option is probably true, and not must be true.

Option (d) is also incorrect. Every group must include one child, because a group of three with no children would have to include two adults of the same sex, which is not possible as per the 1st condition.

Hence option (a) is the answer.

5. Option a is possible and hence not the answer. R, U, X; S, V, W; and T, Y, Z is one of several possible sets of seating groups in which R and U are in X's group.

S and T are both women and cannot be in the same group. Therefore, B is the correct answer.

Option (c) is also possible and hence cannot be the answer. S, U, X; R, Z, Y; and T, V, W is one of several possible sets of seating groups in which S and U are in X's group.

Option (d) is also incorrect. S, W, X; R, V, Y; and T, U, Z is one of several possible sets of seating groups in which S and W are in X's group.

Hence option (b) is the answer.

6. If T, Y, and Z form one group, the remaining two groups must be chosen from among R, S, U, V, W, and X.

Now, out of these, R and S are females and U and V are males.

R and S must be in different groups as well as U and V must be in different groups (hence 1st option is wrong). W must be in the group with S because W cannot be in the group with R (condition 2). X must thus be in the group with R, because both U and V are men and cannot both be in R's group. Since X must be in a group with U or S, and S is already in another group, the remaining slot with R and X must be taken by U. It means V will fill the remaining space in S's group. Hence option (d) is the answer.

7 to 10

7. D and G as well as D and F cannot work together. New office requires 3 faculty members. Therefore, E, H should go. C and E cannot function together as a team. As E has to go, C cannot go. Therefore, A and B have to be the marketing managers if D is posted to San Jose.

Hence option (c) is the answer.

8. ABDGH is not a working unit as D and G cannot work together. Hence option (d) is the answer.
9. If C and F are moved to the new office, then B should be the only other marketing manager who can go. Therefore, the managers are BC. Of the

faculty members, E cannot go. Therefore, one has to choose 3 faculty members from D, F, G, H. D cannot be sent because if he goes, then F and G cannot go. Therefore, FGH are the faculty members and B, C are the marketing managers. Only one option available.

Hence option (b) is the answer.

10. B is sure to find a berth in the group. Hence option (d) is the answer.

11 to 13

11. Only in option c, all the conditions are satisfied. Vinay is in a group of 3. Tanay is in a group that has Vinay or Sumit, but not both and Nitin is not in the same group as Sumit. Hence option (c) is the answer.

12. Vinay has to be in a group that has 3 members. So, only one more member can be in that group. If Sumit is in that group, then Tanay cannot be a part of the other group as Tanay has to be in a group in which either Vinay or Sumit is there. So, Sumit has to be a part of the group that has 4 people. In which case, Nitin cannot be in the group that has 4 people and has to be a part of the group that has Vinay and Urmila. Hence option (a) is the answer.

13. Nitin cannot be in the same group as Sumit. Therefore, we need to have two more groups in addition to the one formed with the three people. So, there will be 3 groups amongst the seven students. Hence option (b) is the answer.

14 to 15

Digviza ordered the salad and lasagna.
Rajdev ordered the soup and eggs benedict.
Sonila ordered the soup and cabbage rolls.
Kejri ordered the soup and lasagna.

14. Option (a) is the answer.

15. Option (d) is the answer.

16 to 20

16. In the team of size 3, one member will be from P, R and S and one member will be from M and Q.

Now only one member has to be determined and we know that K and L will be always in team and since there is place for only 1 member, hence K and L will not be in team of 3 members.

Hence, option (a) is the answer.

17. If we take K and L we cannot take N and U so the size of team will be 4 only. Now we will take S from first statement so U and W will also be there. Now as

U so there L cannot be there and hence K will also not be there. As L is not in team so we can take N so 4 members of team are S, U, W and N and because of second statement any one of M or Q will be there and only M is given in the options

Hence, option (c) is the answer.

18. Using first statement, if we take P or R, U and W cannot be in team. To get maximum members in team we should take S and from 4th statement U and W will also be in the team. Now either M or Q will be included in the team, and since U is there L can't be included in the team hence K will also not be there.

Now as L is not in the team, N can be included in the team. So team with maximum numbers of members will be S, W, U, N and any one from M and Q.

Hence maximum possible size of team of team is 5.

Alternatively,

Start with all the 10 members and keep removing the member who cannot be in the team.

K L M N P Q R S U W

Using condition 1, only one out of P, R and S can come. At the same time, S, U and W will come together. Hence we should select S out of P, R and S.

K L M N ~~P~~ Q ~~R~~ S U W

Next, since U has come, L cannot come. So we remove L.

K ~~L~~ M N ~~P~~ Q ~~R~~ S U W

Using point (2), only one out of M or Q can come. So eliminate M and retain Q (we could have done otherwise also).

K ~~L~~ ~~M~~ N ~~P~~ Q ~~R~~ S U W

Using point (3), if L is removed, K will also be removed.

~~K~~ ~~L~~ ~~M~~ N P Q ~~R~~ S U W

Remaining members can be part of ONE team.

Maximum team size = 5.

Hence, option (d) is the answer.

19. If we have to take K, L will always be there so U and N will not be in the team. As U is not in the team so S and W will also not be included in the team.

As anyone from P and R will always be there in team and same in the case with M and Q, so the size of team that include K will always be 4.

Hence, option (e) is the answer.

20. Following are the ways in which a team can be constituted:

- (1) P, M, N
- (2) P, Q, N
- (3) R, M, N
- (4) R, Q, N
- (5) S, U, W, N, M
- (6) S, U, W, N, Q

Hence, option (e) is the answer.

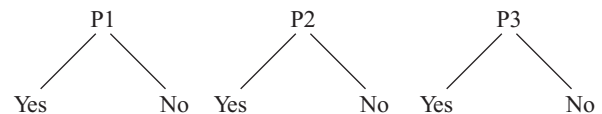
21 to 25

21. If no conditions are imposed, we have following choices to select either one project or two projects and three projects [This is the part of parent statement, and conditions start afterwards]:

P1; P2; P3; P1 and P2; P1 and P3; P2 and P3; P1, P2 and P3 $\Rightarrow$ 7 choices.

Alternatively:

For every project, we have two choices – either to select this or not to select this.



Total number of choices = $2 \times 2 \times 2 = 8$

Out of this we will remove one choice that has— No, No, No.

Hence option (c) is the answer.

22. We can use the solution to Q. 21 as our base. We will keep on eliminating the options that are not applicable:

P1; P2; P3; P1 and P2; P1 and P3; P2 and P3; P1, P2 and P3

Condition 1: Both P1 and P2 have to be selected.

Hence, only possible selections = P1 and P2; P1, P2 and P3 $\Rightarrow$ 2 choices.

Hence option (b) is the answer.

23. Exhaustive sets = P1; P2; P3; P1 and P2; P1 and P3; P2 and P3; P1, P2 and P3

Condition 2: Either P1 or P3, but not both, has to be selected.

Hence, only possible selections = P1; P3; P1 and P2; P2 and P3 $\Rightarrow$ 4 choices.

Hence option (c) is the answer.

- 24.** Possible selections as per condition 2 = P1; P3; P1 and P2; P2 and P3

Condition 3: P2 can be selected only if P3 has been selected $\Rightarrow$ P3 can be selected alone, but P2 cannot be selected without the selection of P3.

Hence, only possible selections = P1; P3; P2 and P3 $\Rightarrow$ 3 choices.

Hence option (E) is the answer.

- 25.** Possible selections as per condition 2 and condition 3 = P1; P3; P2 and P3

Condition 1: Both P1 and P2 have to be selected.

Hence, only possible selections = None.

Hence option (a) is the answer.

PRACTICE EXERCISE 2

Directions for questions 1 to 4: *Read the information given below and solve the questions based on it.*

Hosting Filmfare award ceremony is a big affair. There are lot of things to be done—anchoring, managing the filler entertainment on-stage performance, crowd management, security etc. To conduct the filler entertainment on-stage performances, name of two male actors—Abhi and Riteish—and three female actors—Rani, Shreya and Alia—have been finalized. These five actors will give a performance of a satire play named “Angrezo Bharat Aao” that has exactly eight roles.

Following conditions are to be kept in mind while allocating roles:

Roles 1, 2 and 3 must be played by male actors.

Roles 4, 5 and 6 must be played by female actors.

Roles 7 and 8 can be played by either male or female actors.

Each actor must play at least one role.

The pairs of roles below are the only pairs that do NOT require the actors playing the roles to be on stage at the same time:

Roles 1 and 2 Roles 3 and 6

Roles 3 and 7 Roles 4 and 5

Roles 4 and 8 Roles 5 and 8

Appearances in these roles are spaced far enough apart to allow time for costume changes for actors playing more than one role.

Rani and Shreya cannot play roles that require them to be on stage together at the same time.

- Each of the following pairs of roles could be played by the same actor EXCEPT
 - roles 1 and 2
 - roles 3 and 6
 - roles 3 and 7
 - roles 4 and 8
- If Riteish plays role 1, which of the following must be true?
 - Abhi plays role 2
 - Abhi plays role 7
 - Shreya plays role 4
 - Rani plays role 4
- Which of the following is an acceptable assignment of roles 4, 5 and 6 respectively?
 - Rani, Rani, Rani
 - Rani, Alia, Rani
 - Rani, Shreya, Alia
 - Shreya, Alia, Rani

- Abhi could play any of the following roles EXCEPT?
 - 1
 - 2
 - 3
 - 8

Directions for questions 5 to 8: *Read the information given below and solve the questions based on it.*

On a Sunday, five friends—ohn, Karan, Ranbir, Mithun and Onir—have gathered to play a game called Trios consisting of three rounds. In each round of the game, exactly three of these friends will play. Consider following rules regarding the participation:

No person can play in three consecutive rounds.

No person can sit out two consecutive rounds.

In any game, each of the five persons must play in exactly three rounds.

- If John, Karan and Ranbir play in a first round, which of the following could be playing in that game's second round?
 - John, Karan, Mithun
 - John, Karan, Onir
 - John, Ranbir, Mithun
 - Karan, Mithun, Onir
- In an individual game, Karan, Ranbir and Mithun Play in the first round and John, Ranbir and Mithun play in the third round. Then the players in the second round must be:
 - John, Karan, Ranbir
 - John, Karan, Mithun
 - John, Karan, Onir
 - Karan, Ranbir, Onir
- In an individual game, Ranbir and Onir do not play in the first round. Which of the following must be true?
 - Ranbir plays in rounds three and four
 - Onir plays in rounds three and five
 - Ranbir and Onir both play in round four
 - Ranbir and Onir both play in round five
- In an individual game, John, Ranbir and Mithun play in the first round, and Karan, Mithun and Onir play in the second round, which of the following must play in the fourth round?
 - John
 - Karan
 - Ranbir
 - Mithun

Directions for questions 9 to 11: *Read the information given below and solve the questions based on it.*

During the Chemistry practical examination, a naughty student removed the labels pasted on the four

bottles—that contain colorless liquids. Incharge of the lab knows that there are only six possibilities of the liquids present in the bottles—pure X liquid, pure Y liquid, pure Z liquid, or any mixture of these. No two bottles are filled with the same liquid or the same combination of any of these. The only feasible way of testing for the identity of the liquids is to use strips of Mitlus paper—that turns red, black, or yellow depending on which of certain liquids it is dipped in. The full table of colour changes when Mitlus paper is dipped inside is given below:

Liquid	Turns to the colour when Mitlus paper is dipped inside
Pure X	Black
Pure Y	Red
Pure Z	Black
X and Y	Yellow
X and Z	Yellow
Y and Z	Red
X and Y and Z	Black

9. If none of the four liquids turns the Mitlus paper yellow, each of the following must be the contents of one of the bottles EXCEPT
 - (a) Pure X
 - (b) Pure Y
 - (c) Y mixed with Z
 - (d) X, Y, and Z mixed together
10. If the liquid in the first bottle tested turns the Mitlus paper red, and if the liquid in the second bottle tested turns the paper yellow, then a mix of some of the liquid from each of the first two bottles tested will turn the Mitlus paper
 - (a) Yellow
 - (b) Either red or black
 - (c) Either red or yellow
 - (d) Either black or yellow
11. If the liquid in the first bottle tested turns the Mitlus paper red and the liquid in the second bottle tested turns it black, and if a mix of some of the liquids from each of the first two bottles tested turns it red, then which of the following must be true?
 - (a) The first bottle tested contains pure Y
 - (b) The first bottle tested contains Y mixed with Z.

- (c) The second bottle tested contains pure X.
- (d) The second bottle tested contains pure Z.

Directions for questions 12 to 15: Read the information given below and solve the questions based on it.

Fargo, Goodday and HomeTrade are three retail companies, and Q, R, S, and T are four research associates. Each associate works for at least one of the retail companies.

Q always works for Fargo and at least one of the other companies.

Some of the time Goodday employs only one of these associates, the rest of the time it employs exactly two of them.

Fargo and HomeTrade each employ exactly two of these detectives all the time.

Answer all the questions on the basis of the information given above.

12. If R works for HomeTrade only, and if S works for Goodday and HomeTrade only, then T works for
 - (a) Fargo only
 - (b) Goodday only
 - (c) HomeTrade only
 - (d) Both Fargo and Goodday
13. If Q and R both work for the same two retail companies, T must work for
 - (a) Both Fargo and Goodday
 - (b) Both Fargo and HomeTrade
 - (c) Either Fargo or Goodday but not both
 - (d) Either Goodday or HomeTrade but not both
14. If only S works for Goodday, which of the following must be true?
 - (a) R works for either Fargo or Goodday but not both
 - (b) T works for either Goodday or HomeTrade but not both
 - (c) R and T cannot work for the same company
 - (d) Q and R cannot work for the same company.
15. If G employs only one detective, which of the following must be true?
 - I. R works for two companies
 - II. T works for Goodday
 - III. S works for only one company
 - (a) I only
 - (b) II only
 - (c) III only
 - (d) I and II only

Directions for questions 16 to 19: Read the information given below and solve the questions based on it.

When I went to buy an aquarium for my home, I was given a choice of seven fish species—F, G, H, I, J, K,

and L—to be chosen from. I decided to put exactly six fishes (of same or different species) to be put in the aquarium. Though I was told by the owner of the shop that some of these fishes are quite violent towards other species of the fishes and if I put those fishes in the same aquarium tank, they will fight, and I obviously want to avoid that situation.

Consider the following restrictions

Fish of species F will fight with fish of species H, J, and K.

Fish of species I will fight with fish of species G and K.

If three or more fish of species I are in one aquarium tank, they will fight with each other.

Fish of species J will fight with fish of species I.

If a fish of species G is to be in a aquarium tank, at least one fish of species K must also be in the aquarium tank.

16. If an aquarium tank is to contain fish of exactly three different species, which of the following could be these species?
 (a) F, G and I (b) F, I and K
 (c) G, H, and I (d) H, I, and J
17. Only two species of the fishes are to be put in the aquarium tank with the condition that three fishes of species J have to be out of six fishes to be put in the aquarium tank. Other three fishes in that aquarium tank could be from which of the following species?
 (a) F (b) G
 (c) H (d) I
18. If aquarium tank is to contain fish of exactly four different species, which of the following species of the fish cannot be put?
 (a) F (b) G
 (c) H (d) J
19. Which of the following species of the fishes can be put into aquarium tank with fish of species G?
 (a) F and I (b) F and J
 (c) H and I (d) H and K

Directions for questions 20 to 25: Read the information given below and solve the questions based on it.

Members of the upper house and lower house are to be selected from exactly six qualified candidates. The six candidates are U, V, W, X, Y and Z.

Consider the following:

Each house must have exactly three members.

The two houses must have at least one member in common.

If X is selected for a house, Y must also be selected for that house.

20. If the members of the Upper House are selected first, which of the following could be those selected?
 (a) U, V and X (b) U, X and Z
 (c) V, W and X (d) V, X and Y
21. If the two houses have parallel terms of office, which of the following could be selected as the members of the Upper House and as the members of the Lower House, respectively, for one such term of office?
 (a) U, V and W; X, Y and Z
 (b) U, W and Y; V, X and Z
 (c) U, X and Y; U, X and Z
 (d) W, X and Y; X, Y and Z
22. If the members of the Upper House are V, W, and Z, and if the Lower House is to have as many members in common with the Upper House as the rules allow, the Lower House must consist of
 (a) U, V and W
 (b) V, W and Z
 (c) W, Y and Z
 (d) X, Y and Z
23. Assume that U, V and W make up the Upper House, and W, Y, and Z make up the Lower House. Which of these house members could yield his or her place on a house to X without causing any other changes?
 (a) U (b) W
 (c) Y (d) Z
24. If U and X are each selected for a house and only Z is selected for both house, which of the following must be true?
 (a) V is selected for the same house as W.
 (b) W is selected for the same house as Y.
 (c) U is selected for a different house than Y.
 (d) X is selected for a different house than Y.
25. If X and Z are both selected for the Upper House, and if U is selected for the Lower House, each of the following pairs of people could be the other two members of the Lower House EXCEPT
 (a) V and W (b) V and Z
 (c) W and Y (d) Y and Z

ANSWER KEYS

1. (b)	2. (b)	3. (c)	4. (d)	5. (d)	6. (c)	7. (d)	8. (d)	9. (d)	10. (d)
11. (d)	12. (a)	13. (d)	14. (c)	15. (c)	16. (d)	17. (c)	18. (a)	19. (d)	20. (d)
21. (d)	22. (b)	23. (d)	24. (c)	25. (a)					

HINTS AND EXPLANATIONS

1 to 4

There are 8 roles & 5 actors such that 2 are male actors & 3 are female actors. Role 1 & 2 are not played at same time. Both are to be played by male actor. So, same male actor can play both roles. Roles 3 & 7 are not played at same time & role 3 is to be played by a male actor. So, same male actor can play both roles. Also, roles 3 & 6, 4 & 8, 5 & 8 are not to be played at same time & so these 2 (in pairs) can be played by same actors. Also, roles 4, 5 & 6 must be played by female actors & role 8 can be played by male or female. There are 3 female actors. So, 1 of female actor must play either roles 4 & 8 or 5 & 8. Other 2 plays role 6 & role 4/5 (whichever is not played by female actor who also played role 8). So, we have 5 actors playing roles as:

- a) Role 1 & 2 are played by same male actor
- b) Roles 3 & 7 are played by same male actor
- c) Role 4/5 (any 1 of 4 & 5) & 8 played by same female actor
- d) Role 6 played by a female actor
- e) Role 4/5 (any 1 of 4 & 5) played by a female actor

1. Role 1 & 2 are not played at same time. Both are to be played by male actor. So, same male actor can play both roles. Role 3 & 7 are not played at same time. Role 3 is to be played by male actor. Role 7 can be played by either male or female actor. So, if a male play Role 7, then same male actor can play both roles. Role 4 & 8 are not played at same time. Role 4 is to be played by female actor. Role 8 can be played by either male or female actor. So, if a female play Role 8, then same female actor can play both roles. So, option (a), (c) & (d) are not correct. Role 3 & 6 are not played at same time. But, Role 3 must be played by male actor while Role 6 must be played by female actor. So, Roles 3 & 6 cannot be played by the same actor. Correct option is (b)
2. From general solution we know 1 of the male actor is playing roles 1 & 2. The other male actor is playing roles 3 & 7. As Ritesh is playing role 1, so he is also playing role 2. Every actor must play at least 1 role.

So, Abhi must play roles 3 & 7. So, Abhi plays role 7. Correct option is (b)

3. From general solution we know that roles 4, 5 & 6 are played by different female actors. So, options (a) & (b) are incorrect. Further we know that roles 4 & 6 are played together. It is also given that Rani & Shreya cannot play roles which require them to be together on stage. So, any 1 of them is neither playing role 4 nor 6. But in option (d), Shreya & Rani are playing roles 4 & 6 respectively, so this option is also incorrect. The given arrangement in option (c) is feasible as Shreya is playing role 5 (i.e. neither 4 nor 6). Correct option is (c)
4. From general solution we know that role 8 is played by a female actor. Abhi is male actor, so he cannot play role 8. He can play any of roles 1, 2 & 3 (also 7), but cannot play role 8. Correct option is (d)

5 to 8

5. None of the players can sit out 2 consecutive rounds. In options (a) & (c), Onir will sit out 2 consecutive rounds. So, these are incorrect options. In option (b), Mithun will sit out 2 consecutive rounds. So, it is incorrect option. Only option (d) is feasible. Correct option is (d)
6. None of the players can sit out 2 consecutive rounds. So, the 2 players John & Onir, who were not in 1st round, must play in 2nd round. Only option (c) shows both John & Onir in 2nd round. Correct option is (c)
7. If Ranbir & Onir did not played in 1st round, then the players who played in 1st round must be- John, Karan & Mithun. In 2nd round we must have- Ranbir, Onir & John/Karan/Mithun (i.e. any 1 from John, Karan & Mithun). If we assume 3rd person to be John (we can take any 1 of these 3 as we must focus on Ranbir & Onir & not of these 3). So, we can assume in 2nd round we have- Ranbir, Onir & John

To **check option (a)**: Option (a) is incorrect as according to it, Ranbir played 3 consecutive rounds.

To check option (b): If we assume Onir played in round 3, then he cannot play in round 4 (as he cannot play in 3 consecutive rounds). But, he will play in round 5 (as cannot sit out 2 consecutive rounds). But, it is not necessary that he must play in round 3, as we can repeat any 1 from Ranbir, Onir & John (who played in round 2). So, we cannot say he must have played in round 3 & 5 (we can say that he could have played in round 3 & 5). So, option (b) is not correct

To check option (c): If we assume Ranbir & Onir played in round 4, then none of them played in round 3 (as then they would have played in 3 consecutive rounds 2, 3 & 4). But we can repeat any 1 from Ranbir, Onir & John (who played in round 2). So, option (c) is not correct. (Actually it cannot be said that it must be true, however, it can be true like option (b))

To check option (d): There may be 2 cases:

- Neither Ranbir nor Onir is repeated in round 3 (after playing round 2). Then both of them must be repeated in round 4. Now only 1 of them can be repeated in round 5. So, any 1 of them can appear in 3 rounds. But, the other can appear in only 2 rounds. But, every player must appear in 3 rounds in game of 5 rounds. So, it is not possible
- One of them (Ranbir or Onir) is repeated in 3rd round. Let this be Onir. Then Onir cannot be repeated in 4th round (as he will be in 3 rounds consecutively which is not possible). Now, the other one i.e Ranbir must play in 4th round (as no player can sit out in 2 consecutive rounds). Now Onir must play in round 5 (as no player can sit out in 2 consecutive rounds). Ranbir must also play in round 5 (as every player must appear in 3 rounds in game of 5 rounds). So, Onir plays in 2nd, 3rd & 5th round. Ranbir plays in 2nd, 4th & 5th round.

So, it is concluded that both Ranbir & Onir must play in round 5. So, option (d) is correct answer

- Mithun played in both 1st & 2nd round. So, he cannot play in 3rd round (as he will be in 3 rounds consecutively which is not possible). Now, he must play in 4th round as no player can sit out in 2 consecutive rounds. Therefore, Mithun must play in the 4th round. Correct option is (d)

9 to 11

- The liquid from 1st bottle turns Mitlus paper red, so it has either Pure Y or Y & Z. The liquid from 2nd bottle

turns Mitlus paper yellow, so it has either Pure X & Y or X & Z. If we mix liquids from both the bottles, we get 3 possibilities-

- X & Y – it will turn the Mitlus paper Yellow
- X & Z – it will turn the Mitlus paper Yellow
- X & Y & Z- it will turn the Mitlus paper Black

So, if we mix the liquids from both the bottles, the liquid will turn the Mitlus paper either black or yellow. Correct option is (d)

- The 1st bottle is either Pure Y or Y & Z as it turns the Mitlus paper red. The 2nd bottle is either Pure Z or X & Y & Z as it turns the Mitlus paper black. The mix from both bottles turns the Mitlus paper red, so the mix must be either Y or Y & Z. From these, it can be concluded that the mix is Y & Z. So, 1st bottle is either only Y or Y & Z. The 2nd bottle must be only Z (it cannot be X & Y & Z). Option (d) is correct

12 to 15

- R works for HomeTrade only. S works for Goodday & HomeTrade only. We know HomeTrade employs exactly 2 employees. So, HomeTrade has employed R & S. We also know that Q works for Fargo & at least 1 of the other company. So, Q must be working for Goodday too (but not for HomeTrade as it has exactly 2 research associates). Goodday employs either 1 or 2 research associates. So, Goodday has employed 2 research associates S & Q. T can work for Fargo only (other 2 companies are already having 2 research associates with them). Correct option is (a)
- Q always works for Fargo & at least 1 of the other companies. It is also given that Q & R both work for the same 2 retail companies. So, 1 of these companies must be Fargo & other is either Goodday or HomeTrade. Fargo 7 HomeTrade employs exactly 2 people & Goodday can employ 1 or 2 people. So, in this case Goodday must employ 2 people. We also know each person must work in at least 1 company. So, both S & T are working in exactly 1 company & they are working in Goodday & HomeTrade such that exactly 1 of them is working in HomeTrade & other person is working in Goodday. So, for T we can conclude that he/she is working in either Goodday or HomeTrade but not in both. Correct option is (d)
- Only S works for Goodday. So, Goodday has employed only 1 person (S). Now, both Fargo & HomeTrade employs exactly 2 people each. Q always works for Fargo & at least 1 of the other companies. So, Q is working for both Fargo & HomeTrade. We also know

each person must work in at least 1 company. So, both R & T are working in exactly 1 company & they are working in Fargo & HomeTrade such that exactly 1 of them is working in HomeTrade & other person is working in Fargo. So, we can conclude that R & T cannot work for the same company. Correct option is (c)

15. We are given that Goodday employs only 1 detective. We also know that both Fargo & HomeTrade employs exactly 2 people each. Q always works for Fargo & at least 1 of the other companies. So, Q is working for both Fargo & HomeTrade. We also know each person must work in at least 1 company. So, each one of R, S & T are working in exactly 1 company. But, we do not know who is working for which company. So, only III is correct. Correct option is (c)

16 to 19

16. In option (a) & (c) there is no fish of species K while there is fish of species G. So, both (a) & (c) are incorrect options. We cannot keep fish of species K with F (fish of species F fights with fish of species K). So, option (b) is incorrect. In option (d) no condition is violated. Correct option is (d)
17. Fish of species I cannot be kept with fish of species J. So, option (d) is incorrect. If we keep G, then K must also be kept, so option (b) is incorrect. Fish of species F will fight with fish of species J. So, option (a) is incorrect. We can keep 3 fishes of species H with 3 fishes of species J. Correct option is (c)
18. If we keep fish of the species F, then we cannot keep fish of species H, J or K. So, the 4 species will be F, G, I & L. Fish of species I & G cannot be kept together & we must also keep fish of species K with fish of species G. So, we can conclude that, if we keep fish of species F, we cannot keep 4 different species. Correct option is (a)
19. If there is fish of species G, we must also have fish of species K. So, options (a), (b) & (c) are incorrect options as K is not present in these options. Correct option is (d)

20 to 25

20. If X is selected for a House, Y must also be selected for that house. But in options (a), (b) & (c) X is selected but Y is not selected. So, these are incorrect options. Correct option is (d)
21. The 2 House must have at least 1 member in common, so option (a) is incorrect. If X is selected for a house, Y must also be selected for that House. But in options (b) & (c) Y is not selected for the House for which X is selected. So, these are incorrect options. Correct option is (d)
22. If we want to have as many members in common in both Houses as possible, then we should have all 3 common members in both Houses. So, members of Lower House are V, W & Z. Correct option is (b)
23. None of the members of Upper House can yield his or her place to X, as we must also have Y with X. So, there will be at least 2 changes needed (in next change Y will be added to Upper House). W from Lower House cannot yield his or her place to X, as he or she is only member between both Houses. Y from Lower House cannot yield his or her place to X, as he or she must also be present with X in same house. Only Z can be replaced by X. Correct option is (d)
24. Only common member for both Houses is Z. U & X are each selected for a house. So, we can conclude that one of the houses must have X, Y & Z as its 3 members (as it already has X & Z, we must keep Y with X). The other house has U & Z as its 2 members. The 3rd member may be W or V. So, we can say that U must be selected for a different house than Y. Correct option is (c)
25. If X & Z are selected for Upper House, then the 3 members of Upper House are X, Y & Z (as Y also be selected for the house for which X is selected). One of the members of Lower House is U. If we choose V & W as 2 other members, and then there cannot be any common member in both houses. But, we must have at least 1 common member in both houses. So, V & W cannot be selected. Correct option is (a)

Chapter

7

BLOOD RELATION

LEARNING Objectives

In this chapter, you will learn:

- ☐ Relations across the generations
- ☐ Approaching a question from back-end
- ☐ Mapping of generations to eliminate the options

Introduction to the Topic

This chapter is quite important for MBA exams like SNAP, MAT, CMAT etc., and Campus Recruitment Examinations.

Following kind of questions are expected in Family Tree questions:

- i. Find out the relationship of one person with other person.
- ii. Relationship will be provided and the sex of the person will be asked to determine.
- iii. Find out the total number of males or females in the family.

The only skill set required to solve these kinds of questions is a very simple thing—Do we have the ability to translate the given situation in the question into our real life? The more easily, we do this, the easier will be to solve the questions related to ‘family tree’.

To remember easily the relations may be divided into two sides as given below:

Paternal Side Relations

Father's father = Grandfather
Father's mother = Grandmother
Father's brother = Uncle
Father's sister = Aunt

Children of uncle = Cousin
Wife of uncle = Aunt
Son/daughter of aunt = Cousin
Husband of aunt = Uncle

Maternal Side Relations

Mother's father = Maternal grandfather
Mother's mother = Maternal grandmother
Mother's brother = Maternal uncle
Mother's sister = Aunt
Son/daughter of maternal uncle = Cousin
Wife of maternal uncle = Maternal aunt

Generation Chart

Generation 1	Grandfather, Grandmother (Both Paternal and Maternal)
Generation 2	Father, Mother, Father in Law, Mother in Law, Uncle, Aunt (Both Paternal and Maternal),
Generation 3	YOU, Brother, Sister, Cousins, Brother in Law, Sister in Law
Generation 4	Son, Daughter, Niece, Nephew
Generation 5	Grandson, Granddaughter

How to Approach a Question

While attempting a blood relation question, keep following thumb rules in mind:

- Ideally, these questions should be approached from the back end.
- Do a generation check—Keep a tab on level of generation—if the answer is in same generation as that of the subject or in a generation above one level or lower than the subject? This may not get you the answer always, but will help you in eliminating the options.

Example 1

If X is the brother of the son of Y's son, how is X related to Y?

Solution

Son of Y's Son – Grandson of Y

Next Step – Brother of the son of Y's son = Brother of (Grandson of Y) = Grandson of Y

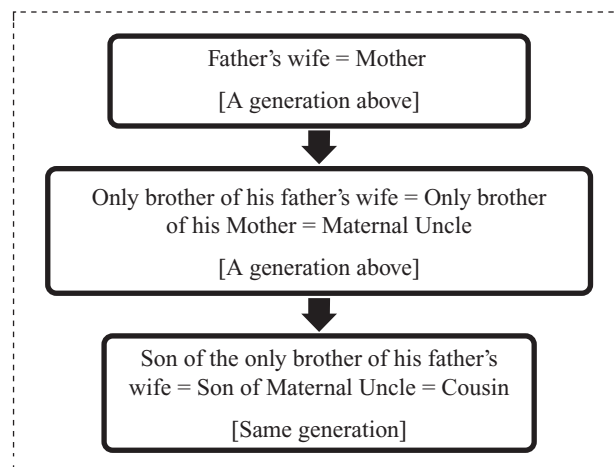
Example 2

Amit introduces Rahul as the son of the only brother of his father's wife. How is Rahul related to Amit?

- Cousin
- Son
- Uncle
- Son-in-law

Solution

In general, in these kinds of questions, we should start from the back-end.



Hence Cousin is the answer.

Hence option (a) is the answer.

Alternatively, we can eliminate few options by using the generation check.

Father's wife – A generation above (since father is a generation above, and father's wife will be in the same generation as that of father).

Only brother of his father's wife = Only brother + a generation above = A generation above

Son of the only brother of his father's wife = Son of + A generation above = Same generation

Hence answer should be in the same generation.

Now let us check the options:

- Cousin – same generation
- Son – One generation lower
- Uncle – One generation above
- Son-in-law – One generation lower

Hence option (a) cousin is the answer.

Example 3

A + B means A is the mother of B

A – B means A is the brother B

A @ B means A is the father of B and

A × B means A is the sister of B,

Which of the following shows that P is the maternal uncle of Q?

- $Q - N + M \times P$
- $P + S \times N - Q$
- $P - M + N \times Q$
- $Q - S @ P$

Solution

At first, do some mental mapping regarding how we want to achieve the asked. We have to obtain P is the maternal uncle of Q $\Rightarrow$ P is the brother of mother of Q (this is the simplest way we can arrive at the required). Now we will see the options one by one.

- $Q - N + M \times P$
Q – N means Q is the brother of N.

N + M means that N is the mother of M. Using above two statements, we can say that Q is the maternal uncle of M. Now to show that P is the maternal uncle of Q, next relation should be M is the brother/sister of Q.

$M \times P = M$ is the sister of P

So, the final relation that comes out is – Q is the maternal uncle of M and M is the sister of P,

hence Q is the maternal uncle of P. (This is exactly opposite of what we wanted to achieve).

- (b) $P + S \times N - Q$
 $P + S \times N = P$ is the mother of S and S is the sister of N $\Rightarrow$ P is the mother of N
 $N - Q = N$ is the brother of B $\Rightarrow$ P is the mother of B. Hence not true.
- (c) $P - M + N \times Q$
 $P - M + N = P$ is the brother of M and M is the mother of N $\Rightarrow$ P is the maternal uncle of N
 Next, $N \times Q = N$ is the sister of Q
 We already know that P is the maternal uncle of N and N is the sister of Q $\Rightarrow$ P is the maternal uncle of Q. Hence option (c) is the answer.
- (d) $Q - S @ P$
 $Q - S @ P = Q$ is the brother of S and S is the father of B $\Rightarrow$ Q is the uncle of B.

Example 4

$A + B$ means A is the sister of B
 $A - B$ means A is the brother of B
 $A \times B$ means A is the daughter of B.

Which of the following options show that E is the maternal uncle of D?

- (a) $D + F - E$
 (b) $D - F \times E$
 (c) $D \times F + E$
 (d) None of these

Solution

Going through the options:

- (a) $D + F - E = D$ is the sister of F and F is the brother of E $\Rightarrow$ This remains in the same generation (as in D and E are in the same generation), so we certainly know that “maternal uncle (which is one generation above)” relation cannot be established here. Hence option (a) cannot be the answer.
- (b) $D - F \times E = D$ is the brother of F and F is the daughter of B $\Rightarrow$ D is the son of B
- (c) $D \times F + E = D$ is the daughter of F and F is the sister of E $\Rightarrow$ E can be maternal uncle or maternal aunt of D depending upon if E is a male or a female. F is the sister of E indicates the gender of F (Female) only and does not tell anything about the gender of E. Hence option (d) None of these is the answer.

Example 5

Introducing a boy, a girl said, “He is the son of the daughter of the father of my uncle.” How is the boy related to the girl?

- (a) Cousin (b) Nephew
 (c) Uncle (d) Son-in-law

Solution

Father of the boy’s uncle $\Rightarrow$ the grandfather of the boy and daughter of the grandfather $\Rightarrow$

Aunt $\Rightarrow$ Son of aunt = Cousin

PRACTICE EXERCISE 1

- A girl introduced a boy as the son of the daughter of the father of her maternal uncle. The boy is girl's:
 - Son
 - Uncle
 - Son-in-law
 - cannot be determined
- Pointing out to a photograph, a man tells his friend 'She is the daughter of the only son of my father's wife'. How is the girl in the photograph related to the man?
 - Daughter
 - Cousin
 - Mother
 - Sister
- X introduces Y saying, "He is the husband of the granddaughter of the father of my father. How is Y related to X?
 - Brother
 - Son
 - Brother-in-law
 - Son-in-law
- Showing on to the man on the stage, Ritika said he is the brother of the daughter of the wife of my husband. How is the man on the stage related to Ritika?
 - Son
 - Husband
 - Cousin
 - Nephew

Directions for questions 5 to 8: Read the passage below and solve the questions based on it.

There is family of six persons A, B, C, D, E and F. Following information pertains to the members of this family:

- There are two married couples and the family members belong to three generations.
 - Each member has a distinct choice of colour among green, yellow, black, white, red and blue.
 - No lady member likes green or white colour.
 - C, who likes black colour is the daughter-in-law of E.
 - B is the brother of F and son of D and he likes blue.
 - A is grandmother of F and F does not like red.
 - There is a man liking green and his wife likes yellow colour.
- Which of the following is one of the married couples?
 - CD
 - DA
 - AC
 - none of these.
 - How many male members are there in the family?
 - 2
 - 3
 - 4
 - 1
 - F is the
 - Brother of B
 - Sister of B

- cannot be determined
- none of these

- Which one is the colour preference of A?
 - Red
 - Yellow
 - Red or yellow
 - cannot be determined

Directions for questions 9 to 12: Read the passage below and solve the questions based on it.

- In a family of six members A, B, C, D, E and F each one plays one game out of the six games snooker, Carom, Table Tennis, badminton, Bridge and Cricket.
 - Two are married couple.
 - B who plays carom, is daughter in law of E.
 - A is the father of D, the Table Tennis player, and D is father of C, who plays cricket.
 - F is the brother of (c)
 - Snooker is not played by a female member.
 - E's husband plays Badminton.
- Who among them plays bridge?
 - E
 - F
 - A
 - Data Inadequate
 - How is F related to A?
 - Granddaughter
 - Grandson
 - Son
 - Daughter
 - Who is husband of B?
 - D
 - A
 - C
 - cannot be determined
 - How many male members are there in the family?
 - Two only
 - Three only
 - Four only
 - Data inadequate

Directions for question 13 to 15: Read the information given below and solve the questions based on it.

M, N, O and P are all distinct individuals. Following points give the details of their relationship:

- M is the daughter of N.
 - N is the son of O.
 - O is the father of P.
- Which of the following statements is true?
 - O is the uncle of M.
 - P and N are brothers.
 - M is the daughter of P.
 - If B is the daughter of N, then M and B are sisters.

14. Which among the following statements is contradictory to the above premises?
 (a) P is the father of M.
 (d) O has three children.
 (c) M has one brother.
 (d) M is the granddaughter of O.

15. If B is the son of N and B has one brother, D, then
 I. M is the sister of (D)
 II. D and N are brothers.
 III. O is the grandfather of (D)
 (a) I only (b) II only
 (c) III only (d) I and III only

Directions for questions 16 to 18: Read the passage below and solve the questions based on it.

- (i) In a joint family of seven persons A, B, C, D, E, F and G, there are two married couples.
 (ii) G is a housewife and her husband is a lawyer. 'C' is the wife of 'B', 'A' is an engineer and is granddaughter of 'G'. 'D' is the father-in-law of 'C', a doctor, and father of 'E', a Professor. 'F' is A's brother and B's son.
16. How is F related to C?
 (a) Son (b) Brother
 (c) Daughter (d) Data inadequate
17. How is B related to E?
 (a) Sister (b) Uncle
 (c) Cousin (d) None of these
18. Who is a lawyer?
 (a) B (b) F
 (c) D (d) cannot be determined

Directions for questions 19 to 20: Go through the information given below and solve the questions based on it.

Prakash, Qureshi, Rajesh and Shabdesb live together in a house.

- I. Prakash lives with his (or her) parents.
 II. Qureshi lives with at least 3 persons younger than him (or her).
 III. Shabdesb lives with his mother, and is older than at least 2 persons living with him.
 IV. Rajesh lives with his (or her) son and is not older than Shabdesb.
19. Total number of persons in that house is ____.
 (a) 3 (b) 4
 (c) 5 (d) 6

20. Qureshi is Prakash's ____.
 (a) father (b) mother
 (c) son (d) grandmother

21. A @ B means A is the sister of B
 A \$ B means B is the mother of A
 A + B means A is the brother of B
 A = B means B is the father of A.

Which of the following means M is the maternal uncle of N?

- (a) $M = P + Q @ N$
 (b) $N + P = Q @ M$
 (c) $N @ P \$ Q @ M$
 (d) None of these
22. $M \times N$ means M is the daughter of N;
 $M + N$ means M is the father of N;
 $M \% N$ means M is the mother of N
 $M - N$ means M is the brother of N.

Given that $P \% Q + R - T \times K$, what is the relation of P to K?

- (a) Daughter-in-law
 (b) Sister-in-law
 (c) Aunt
 (d) None of these
23. $P + Q$ means P is the brother of Q;
 $P \times Q$ means P is the father of Q
 $P - Q$ means P is the sister of Q.

Which of the following relations shows that I is the niece of K?

- (a) $K + Y + Z - I$ (b) $K + Y \times I - Z$
 (c) $Z - I \times Y + K$ (d) $K \times Y + I - Z$
24. Pointing towards a girl, Mohit says, "This girl is the daughter of only a child of my father." What is the relation of Mohit's wife to that girl?
 (a) Daughter (b) Mother
 (c) Aunt (d) Sister

25. A \$ B means B is the father of A;
 A # B means B is the mother of A;
 A & B means B is the sister of A
 A @ B means B is the husband of A

Which of the following indicates that N is the grandmother of P?

- (a) $P \& Q \# M \$ N$
 (b) $P @ Q \$ M \# N$
 (c) $P \# Q \$ N \& M$
 (d) None of these

ANSWER KEYS

1. (d)	2. (a)	3. (c)	4. (a)	5. (a)	6. (c)	7. (a)	8. (b)	9. (a)	10. (b)
11. (a)	12. (d)	13. (d)	14. (a)	15. (d)	16. (a)	17. (d)	18. (c)	19. (b)	20. (d)
21. (d)	22. (d)	23. (b)	24. (b)	25. (d)					

HINTS AND EXPLANATIONS

1 to 4

- The girl's maternal uncle and the boy's mother are siblings because they have the same father. Hence the boy is either the brother of the girl if the boy's mother and the girl's mother is the same, or the boy is the cousin of the girl if there is/are any more sibling/s of the boy's mother other than the maternal uncle of the girl. Thus, the correct option is cannot be determined.
Correct option is (d)
- The man is himself the only son of his parents and the girl who he is pointing to in the photograph is his daughter.
Correct option is (a)
- The father of X's father is his grandfather. Moreover, X and the granddaughter mentioned in the question are siblings. Hence her husband i.e. Y is the brother-in-law of X.
Correct option is (c)
- "The wife of my husband" refers to Ritika, hence her daughter's brother will be her son. Thus the man on the stage is the son of Ritika.
Correct option is (a)

5 to 8

According to the sixth condition F is of third generation as he/she has a grandmother A. B is the brother of F and is of the same generation. Now there are three people left viz. E, D and C out of which one is of the first while two are of the second generation.

From the fourth condition we can say that C is of second generation as she is the daughter in law of E who is in turn is the husband of A. The person left is D who automatically is the husband of C.

B likes blue colour. C likes black so the lady who likes yellow is A and his husband E likes green. F doesn't like red so D is the person who likes red and F likes white.

- From the above information the married couple is CD.
Correct option is (a)

- The male members are E, D, B and F(as a female cannot like white but F likes white hence he is male).
Correct option is (c)
- F likes white hence is not a female, thus will be the brother of B.
Correct option is (a)
- According to the above solution the colour preference of A is yellow.
Correct option is (b)

9 to 12

In this question there are three generations. A is from the first generation and has a son D who in turn is the father of C. C is from the third generation who has a brother F. Now from the third statement it is clear that E is from the first generation and is the wife of A as there are two married couples. B is the daughter in law of E and D is the son of A, so B is the wife of D.

B plays carom, D plays table tennis, C plays cricket, A plays badminton. Now from the sixth statement it can be inferred that as a female does not play snooker hence it will be played by F and the remaining game i.e bridge will be played by E.

- E plays bridge.
Correct option is (a)
- As A is the father of D and F is the son of D hence F is the grandson of A.
Correct option is (b)
- The husband of B is D.
Correct option is (a)
- As the gender of C is not known, hence the number of male members cannot be determined.
Correct option is (d)

13 to 15

- As from the three statements it is clear that O is the grandfather of M and is the father of P and N. So, the first option is wrong.

The gender of P is not known so we can't say that P and N are brothers. Thus the second option is also invalid.

As M is the niece of P hence cannot be the daughter of P, so third option is also incorrect.

Now if B is the daughter of N, then N will have two children M and B, both of which are females, thus will be sisters. Hence the fourth option is correct.

Correct option is (d)

14. The first option is contradictory as P is either the uncle or aunt of M, not the father of M. The rest options can be correct if there is some additional information, but the first option is completely contradictory.

Correct option is (a)

15. If B is the son of N and has a brother D, then M is the sister of D and O is the grandfather of D. Hence the first and the third statements are correct.

Correct option is (d)

16 to 18

C is the wife of B, B has a son F and a daughter A as A is the granddaughter of G. G is the mother of B. As D is the father in law of C, hence D is the husband of G. D is the father of B and E.

Also, E is a professor, D is a lawyer (G's husband is a lawyer), G is a housewife, A is an engineer, C is a doctor.

16. From the above information B is the father of F, and the husband of C. Hence, F is the son of C.

Correct option is (a)

17. B is the brother of E.

Correct option is (d)

18. D is the lawyer.

Correct option is (c)

19 to 20

We are given 4 names. We cannot determine the gender of a person by name only. Prakash lives with his (or her) parents. So, at least 2 people are older than him (or her). Qureshi lives with 3 persons younger to him (or her). We also know Shabdesb lives with his mother & is older than at least 2 people living with him. So, his gender is Male & his mother must be Qureshi. Now, Rajesh lives with his (or her) son & is not older than Shabdesb. So, she must be female & wife of Shabdesb & mother of Prakash. So, we get in order of age (1 is eldest):

1. Qureshi (female) – Mother of Shabdesb
2. Shabdesb (male) – Son of Qureshi, Husband of Rajesh & Father of Prakash
3. Rajesh (female) – wife of Shabdesb & mother of Prakash
4. Prakash (male or female) – son or daughter of Shabdesb & Rajesh

19. There are total 4 persons in the house

Correct option is (b)

20. Qureshi is Prakash's grandmother

Correct option is (d)

21. According to the first option M is the father of P, Q and N.

The second expression states that N is the brother of P, who is the father of Q, who is the sister of M. Hence N is the maternal uncle of M.

From the third option it can be seen that N is the sister of P, who is the mother of Q, who is the sister of M. Thus, N is the maternal aunt of M.

None of the above option shows that M is the maternal uncle of N.

Correct option is (d)

22. According to the expression P is the mother of Q, who is the father of R, who is the brother of T, who is the daughter of N. P is the mother of Q and K is the wife of Q, hence P is the mother-in-law of K. Hence the answer is none of these.

Correct option is (d)

23. According to the second expression K is the brother of Y, who is the father of I. Hence K is the uncle of I. Also I is the sister of Z, thus it can be said that I is the niece of K.

Correct option is (b)

24. The only child of Mohit's father is Mohit himself and the girl is his daughter. Hence Mohit's wife will be the mother of the girl.

Correct option is (b)

25. From the first expression P is the maternal aunt of M, who is the father of N. Thus, P is the grandmother of N.

The second option says that P is the husband of Q and Q is the father of M, which is not possible because if P and Q is a couple then both of them cannot be males.

Third expression states that P is the mother of Q and Q is the father of N, hence P is the grandmother of N, not vice versa.

Hence none of the given options is correct.

Correct option is (d)

Chapter

8

DIRECTIONS DECISION MAKING

LEARNING Objectives

In this chapter, you will learn:

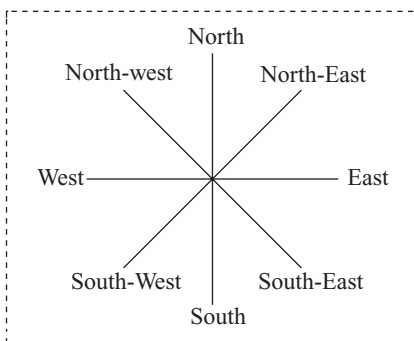
- ☐ Deciding the direction—pre movement and post movement
- ☐ Drawing the diagram
- ☐ Methods to solve the questions

Direction questions test student's ability to process the information based upon directions swiftly and make decisions on the basis of it. Further, mapping of the whole schema to things as per the conditions required and terms used like clockwise/anti-clockwise/southeast etc.

To solve these questions, student should have a clear idea of the directions and be able to draw the diagram as per the information given in the question.

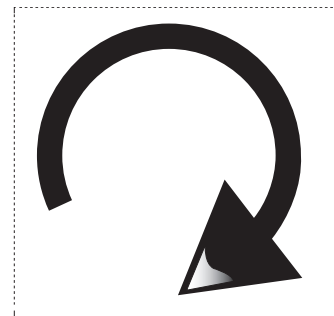
Pictorial Presentation of Directions/ Movements on a Map

(a) Directions



If question mentions North East, it means it is equally inclined with North and East (exactly at 45°).

(b) Clockwise movement



(c) Anti-clockwise movement



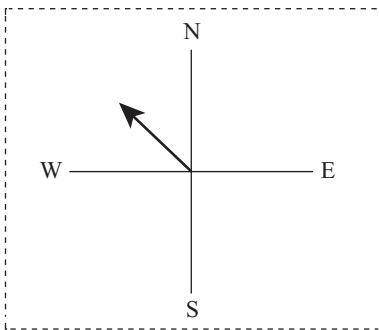
We will now learn how to draw the diagrams and arrive at final conclusion.

Example

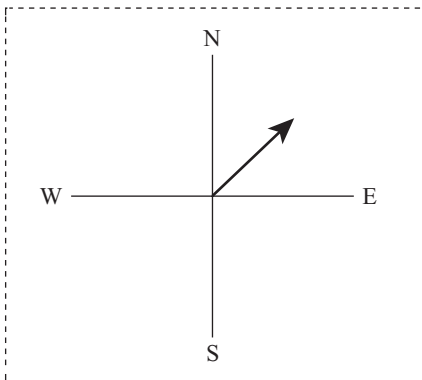
1. A man is facing north-west. He turns 90° in the clockwise direction and then 135° in the anti-clockwise direction. Which direction is he facing now?
- (a) East (b) West
(c) North (d) South

Solution

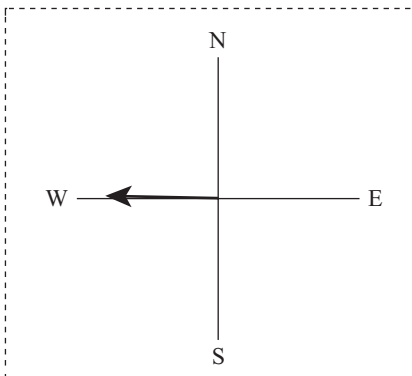
Step 1: A man is facing north-west.



Step 2: He turns 90° in the clockwise direction.



Step 3: And then 135° in the anti-clockwise direction.



As obvious from the diagram, he is now facing West. Hence option (b) is the answer.

Example

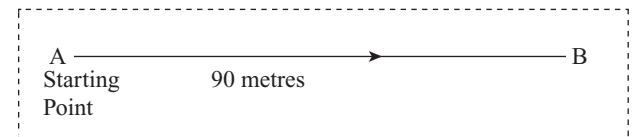
2. Goki is looking for his wife Vartika. He went 90 metres in the east before turning to his right. He went 20 metres before turning to his right again. He walked 30 metres further to look for Vartika at his uncle's place, but was told that Vartika has already left. Disappointed he went 100 metres to his north before meeting Vartika. How far did Goki meet his wife from starting point?
- (a) 80 metres
(b) 100 metres
(c) 140 metres
(d) 260 metres

Solution

Let us see the diagram:

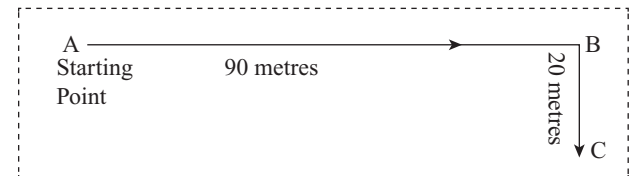
Step 1:

Goki moves 90 m eastwards to B,



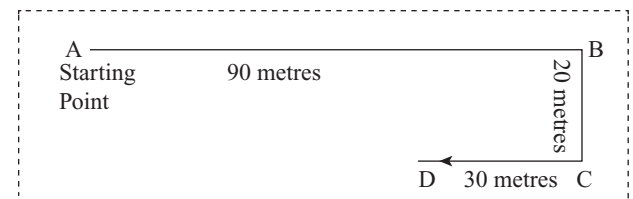
Step 2:

He, then, turns right and moves 20 m to C. At this point we are facing towards B. So right would be downwards.



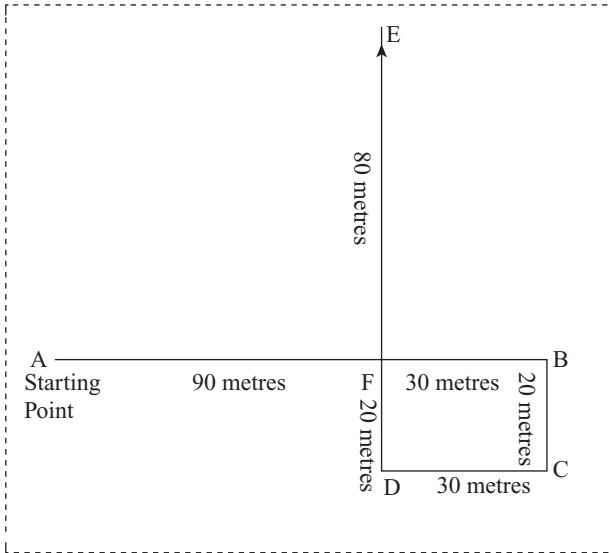
Step 3:

He again turns right and moves 30 m up to D.



Step 4:

Finally, he turns right and moves 100 m up to E.



Clearly, $AB = 90$ m, $BF = CD = 30$ m. So, $AF = AB - BF = 60$ m. Also $DE = 100$ m, $DF = BC = 20$ m.

So, $EF = DE - DF = 80$ m.

So, Goki found Vartika at a distance $= AE = \sqrt{AF^2 + FE^2} = 100$ m.

Hence option B is the answer.

Example

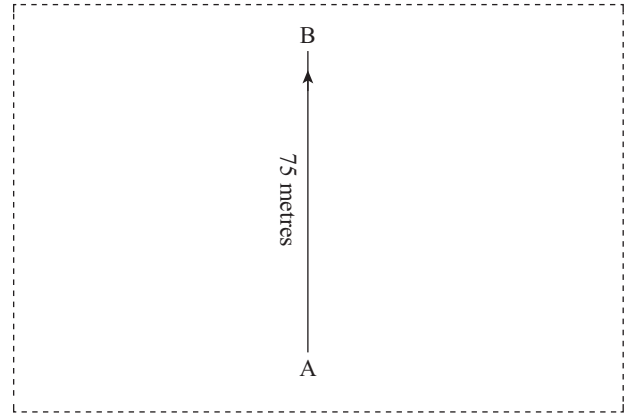
3. Neha Kavi moved a distance of 75 metres towards the north. She then turned to her left and walked for 25 metres, turned left again and walked 80 metres. Finally, she turned to the right at an angle of 45° . In which direction was she moving finally?
- North-east
 - North-west
 - South
 - South-west

Solution

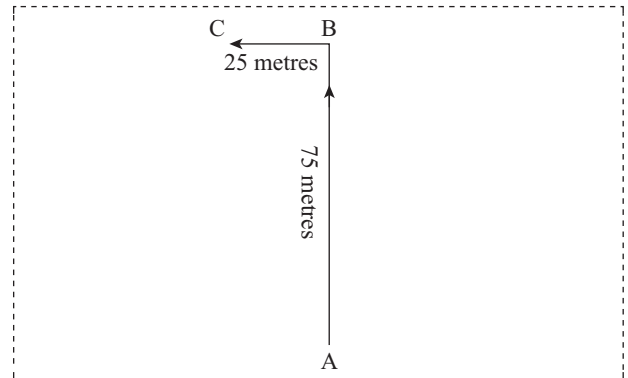
Let us see the diagram:

Step 1:

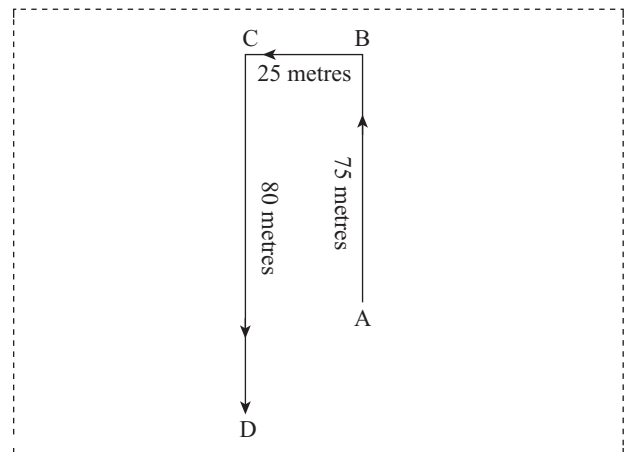
Neha Kavi moved a distance of 75 metres towards north to reach point B.


Step 2:

She turned left and walked 25 m to reach point C.

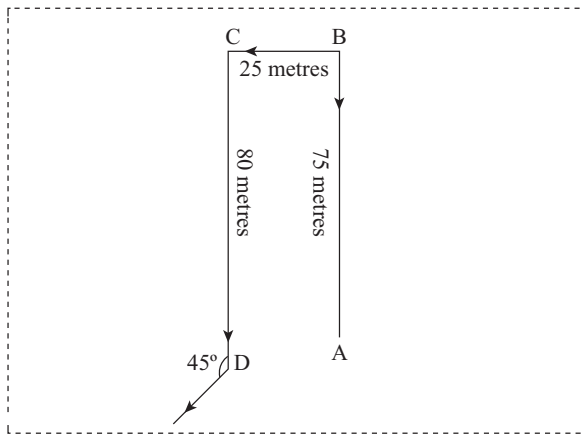

Step 3:

She then turned left again and moved 80 m to D.



Step 4:

Turning to the right at an angle of 45° .



It can be seen through the diagram that she is finally moving in the South-west direction.

Hence option (d) is the answer.

Example

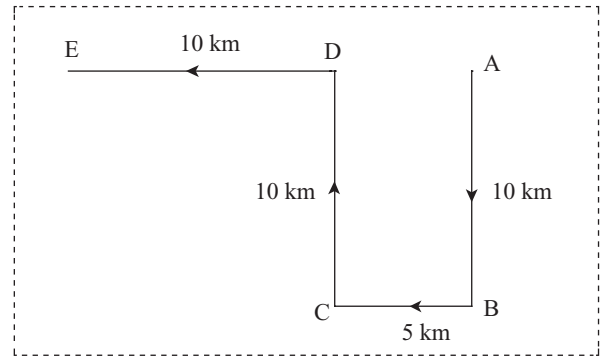
4. One day, Dileep left his home and walked 10 km southwards, turned right and walked 5 km, turned right and walked 10 km, walked left and then walked 10 km. How many kilometres will he have to walk to reach his home straight?
- (a) 10 km
(b) 15 km
(c) 20 km
(d) 25 km

Solution

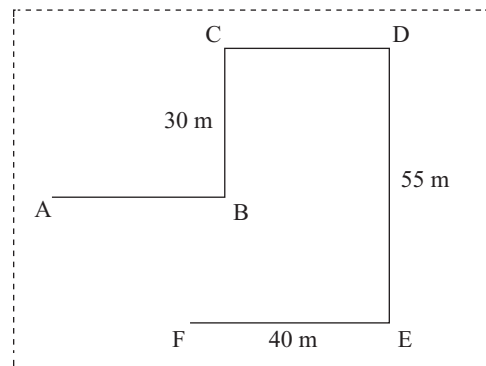
Now we will draw the whole situation in one unified diagram.

Dileep starts from his home at A, walks 10 km southwards till B, turns right and moves 5 km till C, turns right again and walks 10 km till D and finally turns left and walks 10 km till E.

It can be seen that his distance from initial position $A = AE = AD + DE = BC + DE = (5 + 10) \text{ km} = 15 \text{ km}$. Hence option (b) is the answer.

**Example**

5. Tanay is standing facing north. Turning to his right, he walks 25 metres. He then turns to his left and walks 30 metres. He, further, walks 25 metres to his right. He then walks to his right again and walks 55 metres. Finally, he turns to the right and walks 40 metres. In which direction is he now from his starting point?
- (a) South-west (b) South
(c) North-west (d) South-east

Solution

Tanay moves towards right from north direction. Therefore, he walks 25 m towards east to B, turns left, and moves 30 m to C, turns right and goes 25 m to D.

At D, he turns to right towards south and walks 55 m to E.

Next, he again turns to right and walks 40 m to F, which is his final position.

F is to the south-east of A. Therefore, he is to the south-east from his starting point.

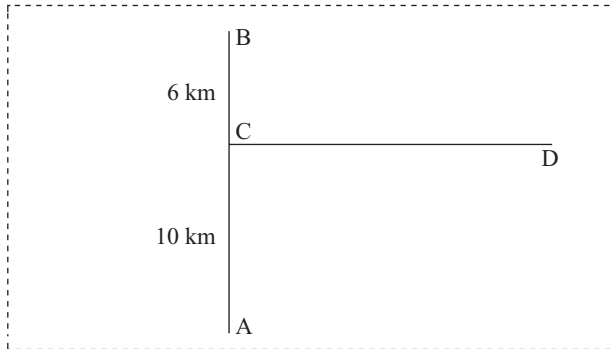
Hence option (d) is the answer.

Example

6. Kaveri walks 10 km towards North. From there she walks 6 km towards South. Then, she walks 3 km towards East. How far and in which direction is she with reference to her starting point?

Solution

Let us first draw the diagram:



Clearly, Kaveri moves from A 10 km northwards to reach point B, then moves 6 km southwards to reach point C, turns towards East and walks 3 km to reach point D.

Then, $AC = (AB - BC) = (10 - 6) = 4$ km and $CD = 3$ km.

So, Kaveri's distance from starting point A = $AD = \sqrt{AC^2 + CD^2} = \sqrt{4^2 + 3^2} = 5$ km.

Also, D is to the North-east of A.

Hence, option (d) is the answer.

Example

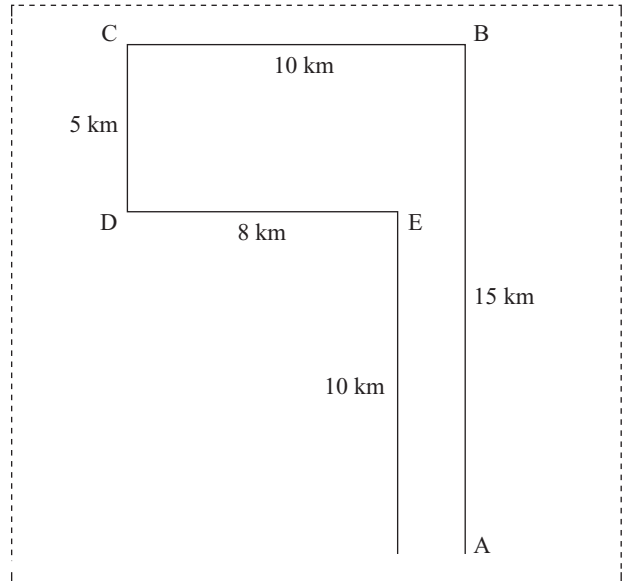
7. Gyan Prakash left for his college in his car. He drove 15 km towards north and then 10 km towards

west. He then turned to the south and covered 5 km. Further, he turned to the east and moved 8 km. Finally, he turned right and drove 10 km. how far and in which direction is he from his starting point?

- (a) 2 km West (b) 5 km East
(c) 3 km North (d) 6 km South

Solution

Let us see the diagram:



Gyan Prakash drove 15 km from A to B northwards and then 10 km from B to C towards west.

He then moves 5 km southwards from C to D and 8 km eastwards up to E.

Finally, he turned right and moved 10 km up to F.

So we can conclude that A and F lie in the same straight line and F lies to the west of A.

Hence Gyan Prakash's distance from the starting point A = $AF = (BC - DE) = (10 - 8) \text{ km} = 2$ km.

Hence option (a) is the answer.

PRACTICE EXERCISE 1

- I am facing east; I turn 100° in the clockwise direction and then 145° in the anti-clockwise direction. Which direction am I facing now?
(a) East (b) North-east
(c) North (d) South-west
- Amit walks 10 kilometers towards South. From there, he walks 6 kilometers towards North, then, he walks 3 kilometers towards his left. How far and in which direction is he with reference to his starting point?
(a) 5 kilometers South-west
(b) 5 kilometers North-east
(c) 7 kilometers east
(d) 7 kilometers West
- Mudit walks 20 metres towards North. He then turns left and walks 40 metres. He again turns left and walks 20 metres. Further, he moves 20 metres after turning to the right. How far is he from his starting point?
(a) 20 metres (b) 30 metres
(c) 50 metres (d) 60 metres
- Rajat starts from his home towards West. After walking for 30 metres, he turned right and walked 20 metres. Then he turned left and after walking a distance of 10 metres, turned to his left again and walked 40 metres. He now turns to the left and walks 5 metres. Finally, he turns to his left. In which direction is he walking now?
(a) North (b) South
(c) East (d) South-west
- Priyanka leaves from her home. She first walks 30 metres in North-west direction and then 30 metres in South-west direction. Next, she walks 30 metres in Southeast direction. Finally, she turns towards her house. In which direction is she moving?
(a) North-east (b) North-west
(c) south-east (d) South-west
- Surender goes 30 metres north, then turns right and walks 40 metres, then again turns right and walks 20 metres, then again turns right and walks 40 metres. How many metres is he from his starting point?
(a) 0 (b) 10
(c) 20 (d) 40
- Vineet walks 30 metres towards South. Then, turning to his right, he walks 30 metres. Then, turning to his left, he walks 20 metres, again, he turns to his left and walks 30 metres. How far is he from his starting point?
(a) 20 metres (b) 30 metres
(c) 60 metres (d) 50 metres
- Starting from a point P, Sumit walked 20 metres towards South, he turned left and walked 30 metres. He then turned left and walked 20 metres. He again turned left, walked 40 metres, and reached a point Q. How far and in which direction is the point Q from the point?
(a) 20 metres West (b) 10 metres East
(c) 10 metres West (d) 10 metres North
- Vijayendra walks 1 km towards East and then he turns to South and walks 5 km. Again, he turns to East and walks 2 km, after this he turns to North and walks 9 km now, how far is he from his starting point?
(a) 3 km (b) 4 km
(c) 5 km (d) 7 km
- Munu went 15 km to the west from his house, then turned left and walked 20 km. She then turned East and walked 25 km and finally turning left covered 20 km. How far was she from her house?
(a) 5 km (b) 10 km
(c) 40 km (d) 80 km
- Going 50 m to the South of her house, Ruchi turns left and goes another 20 m. Then, turning to North, she goes 30 m and then starts walking to her house. In which direction is she walking now?
(a) North-west (b) North
(c) South-east (d) East
- Maulik walks 20 m North, then he turns right and walks 30 m. Then he turns right and walks 35 m. then he turns left and walks 15 m. Further, he again turns left and walks 15 m. In which direction and how many metres away is he from his starting point?
(a) 15 metres West (b) 30 metres East
(c) 30 metres West (d) 45 metres East
- Front of Anjali's house faces the East. From the backside of her house, she walks straight 50 metres, then turns to the right and walks 50 metres again. Finally, she turns towards left and stops after walking 25 metres. Anjali is in which direction from the starting point?
(a) South-east (b) North-east
(c) South-west (d) North-west
- Vikash walked 15 m towards north from his home. Then he turned west and walked 10 m. Then he turned south and walked 5 m. Lastly, turning to east,

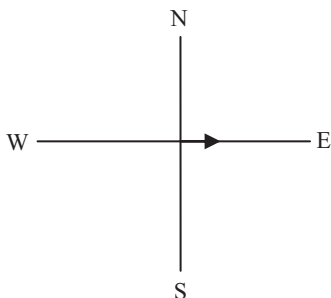
- he walked 10 m. In which direction is he from his house?
- (a) East (b) North
(c) South (d) West
15. I am facing South now. I take two right turns walking, walk 20 m and 10 m respectively. Then I turn left and walk 10 m and then turning right walk 20 m. Then I turn right again and walk 60 m. In which direction am I from the starting point?
- (a) North (b) North-west
(c) east (d) North-east
16. Arun walks 10 metres in front and 10 metres to his right. Then every time turning to his left, he walks 5 m, 15 m and 15 m respectively. How far is he from his starting point?
- (a) 5 m (b) 10 m
(c) 15 m (d) 20 m
17. A man walks 1 mile towards East and then he turns to South and walks 5 miles. After that, he turns to East and walks 2 miles further. Finally, he turns to his North and walks 9 miles. How far is he from his starting point (in miles)?
- (a) 2 (b) 3
(c) 4 (d) 5
18. Laxman went 15 km to the west from his house, then turned left and walked 20 km. He then turned East and walked 25 km and finally turning left covered 20 kms. How far was he from his house?
- (a) 5 km (b) 10 km
(c) 40 km (d) 80 km
19. Ramesh goes 50 m to the South of his house. Then he turns left and goes another 20 m. Then, turning to the North, he goes 30 m and then starts walking to his house. In which direction is he walking now?
- (a) North-west (b) North
(c) South-east (d) East
20. Door of Chumu's house faces the East. From the backside of his house, he walks 50 metres straight, then turns to the right and walks 50 metres again. Finally, he turns towards left and stops after walking 25 metres. Now, Chumu is in which direction from the starting point?
- (a) South-east (b) North-east
(c) South-west (d) North-west
21. There was a 4-direction pole situated at a crossroad—with arrows pointing towards four directions East, West, South and North. Due to an accident that damaged the pole, east pointer is now towards South. Unfortunately, a man who wanted to go actually northwards took the help of this direction pole and started moving towards north as per the pole. Which direction is this man actually moving towards?
- (a) West (b) North
(c) South (d) East
22. In the above question, if the north direction pointer starts showing south direction, then how many direction pointers are still showing the right direction?
- (a) 0 (b) 1
(c) 2 (d) 3

ANSWER KEYS

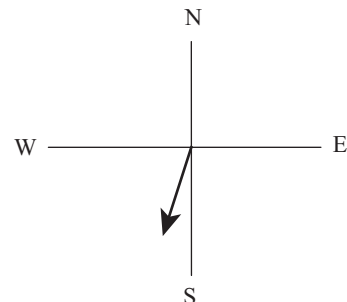
1. (b) 2. (a) 3. (d) 4. (a) 5. (a) 6. (b) 7. (d) 8. (c) 9. (c) 10. (b)
11. (a) 12. (d) 13. (d) 14. (b) 15. (d) 16. (a) 17. (d) 18. (b) 19. (a) 20. (d)
21. (d) 22. (a)

HINTS AND EXPLANATIONS

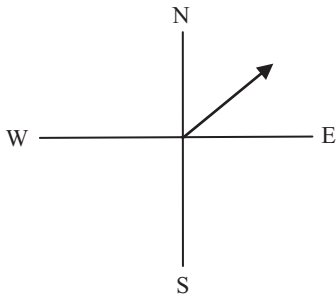
1. Step 1: facing east



- Step 2: turns 100° in clockwise direction.

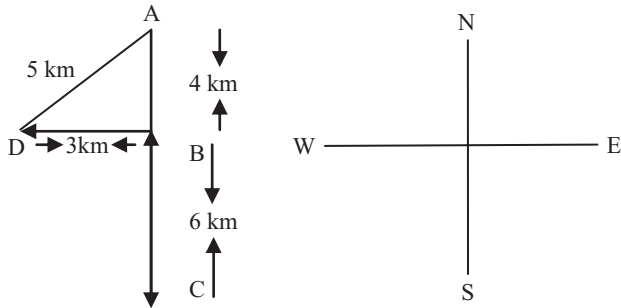


Step 3: then turns 145° in anticlockwise direction.



As can be seen from the diagram, I am facing North-East direction. Hence option (b) is the right answer.

2.

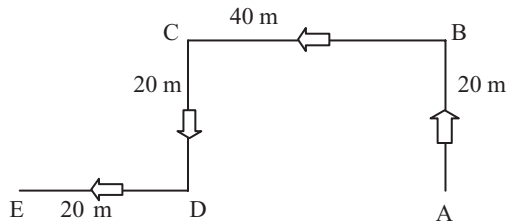


$$AD^2 = AB^2 + BD^2 = 3^2 + 4^2$$

$$\text{Or, } AD = 5 \text{ km}$$

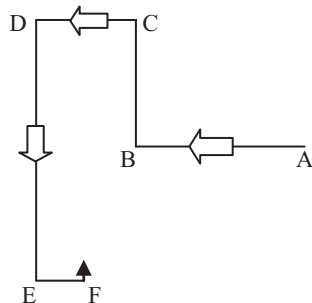
Thus, Amit is 5 km in north-west direction with reference to his starting point.

3.



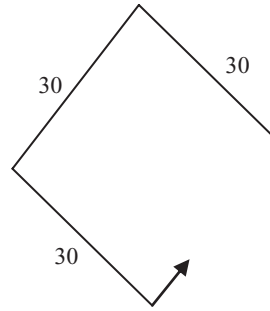
Thus, Mudit is 60m away from starting point.

4.



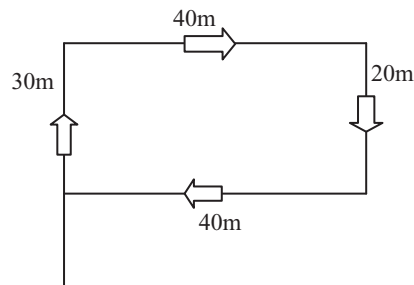
Thus, Rajat is walking in north direction.

5.



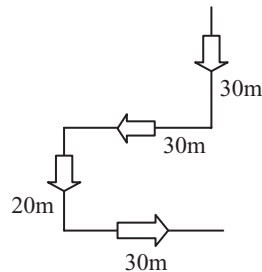
Thus, Priyanka is moving in north-east direction.

6.



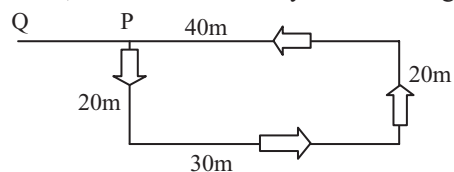
Thus, Surendra is 10m away from starting point.

7.



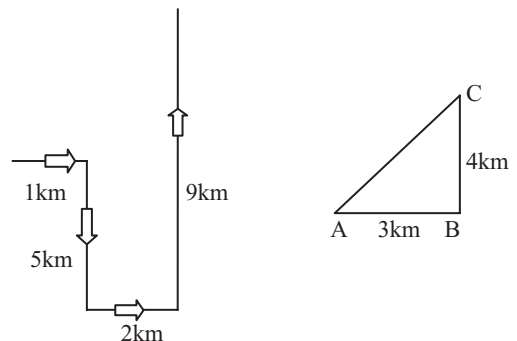
Thus, Vineet is 50 m away from starting point.

8.



Thus, Q is 10m in west direction.

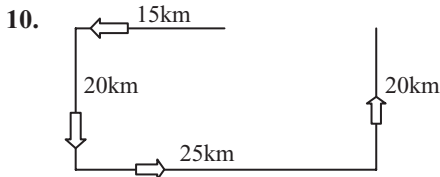
9.



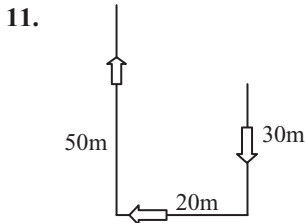
$$AC^2 = AB^2 + BC^2 = 3^2 + 4^2$$

$$\text{Or, } AC = 5 \text{ km.}$$

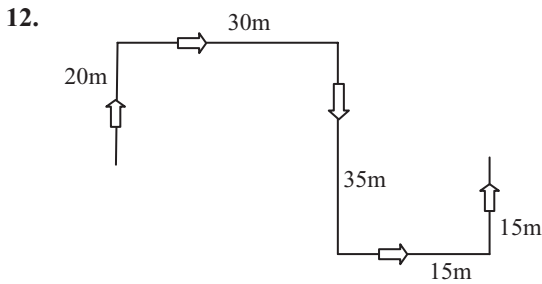
Thus, Vijendra is 5km away from starting point.



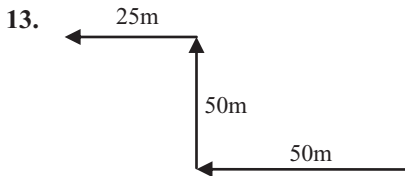
Thus, Munu is 10km away from her home.



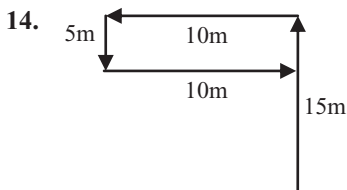
Thus, Ruchi is walking in north-west direction.



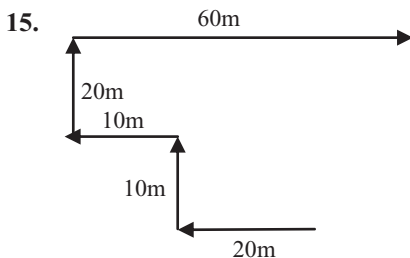
Thus, Maulik is 45m towards east from starting point.



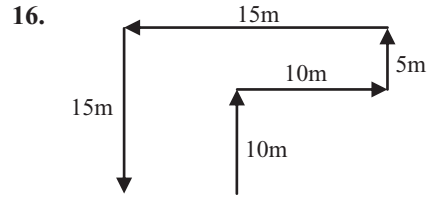
Thus, Anjali is in south-west direction from starting point.



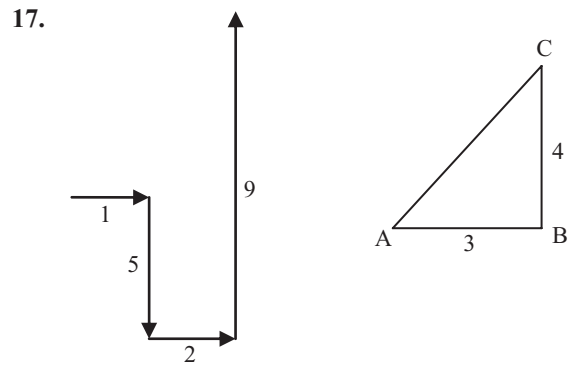
Thus, Vikash is in North direction from his house.



Thus, I am in North-East direction from starting point.



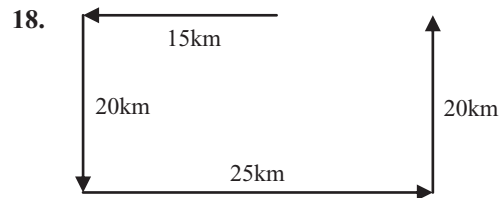
Thus, Arun is 5m from the starting point.



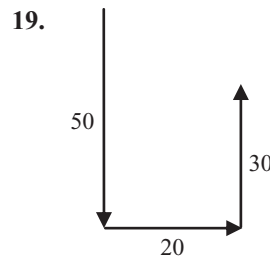
$$AC^2 = AB^2 + BC^2 = 3^2 + 4^2$$

Or, $AC = 5$ miles.

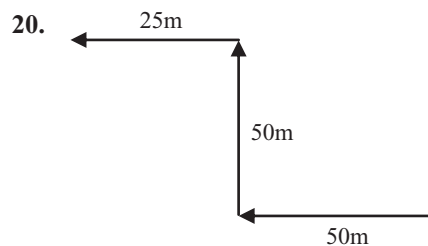
Thus, the man is 5 miles from the starting point.



Thus, Laxman is 10km away from his house.

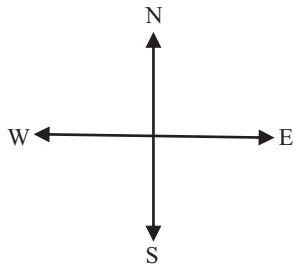


Thus, to reach his house, Ramesh is walking in North-West direction.

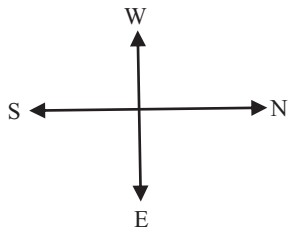


Thus, Chumu is in North-West direction from starting point.

21. Originally,

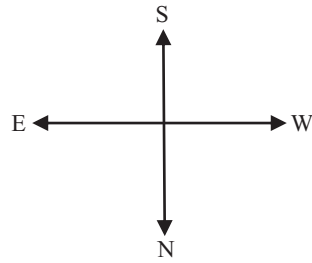


After Accident the position of pointers



Thus, the man is actually moving in East direction.

22. After accident, the position of pointers,



Thus, none of the pointer is showing the right direction after accident.

Chapter

9

SYLLOGISM

LEARNING Objectives

In this chapter, you will learn:

- ☐ Different Types of statements
 - ☐ Interpretations and conclusions of those statements
 - ☐ Conclusions derived through joining the statements
 - ☐ Methods to solve the questions
-

In Syllogism, we study the given statements in order to substantiate the derived conclusions.

The evidence provided to substantiate the conclusions are known as premises and that which is drawn on the basis of the premises is a conclusion. Thus Syllogism can be understood to be a piece of reasoning providing ‘relational arrangement’ between premises and conclusions.

Let us first understand the various terms involved:

Statement 1: Some of the Indians are men.

Statement 2: All men have the potential to be good.

Conclusion: Some Indians have the potential to be good.

In the above given statements, statement 1 and statement 2 are premises and conclusion is to be verified on the basis of the premises given. It is also to be noted that:

- Propositions and statements are not the same thing.
- While finding out the conclusion, we should not be concerned with the vocabulary of the terms involved in the statements. Rather, we should treat them in isolation, without taking their literal meaning into account. To understand it better, if it is given that ‘All boys are good’, we cannot derive any relationship

between boys and bad (opposite of good), unless some association between bad and good is given in the original question.

Types of Statements and the ways to Represent them

Famous European philosopher Aristotle and other classical logicians divided the categorical statements into four types:

Universally Affirmative Statement

Whenever we say that “All girls are good”, we are simply accepting the relationship between the two entities ‘girls’ and ‘good’ in such a way that anything or anybody who is a girl, has to be good. We may assume that there is such a thing called girls. But the meaning of the above premise does not depend upon the assumption that girls exist.

These kinds of statements are known as Universally Affirmative Statements because they give the impression of the statement being universally true.

Like all the girls present anywhere can be anything else, but simultaneously have to be good also. And there cannot be any exception to this rule.

Examples—

All goats are animals.

All actresses are beautiful.

All prime numbers are natural numbers.

Universally affirmative statements can be also rephrased using the word ‘only’.

‘All goats are animals’ can be written as – only animals are goats.

Or, ‘All actresses are beautiful’ can be written as – only the beautiful are actresses.

Or, ‘All prime numbers are natural numbers’ can be written as – only natural numbers are prime numbers.

Universally Negative Statement

Whenever we say that, “No man is perfect”, we are simply accepting the relationship between two entities ‘man’ and ‘perfect’ in such a way that anything or anybody who is a man cannot be perfect. We may assume that there is such a thing called a man. But the meaning of the above premise does not depend upon the assumption that man exists.

These kinds of statements are known as Universally Negative Statements because they give the impression of the statement being universally true. Like all the men present anywhere might not be anything else too, but simultaneously they cannot be perfect also. And there cannot be any exception to this rule.

Examples –

No Indian is a coward.

No prime number is a fraction.

No dream is unachievable.

Particular Affirmative Statement

Whenever we say that, “Some movies are boring”, we are simply accepting the relationship between two entities ‘movies’ and ‘boring’ in such a way that some of the movies have to be boring. It also means that all the movies cannot be not-boring. We may assume that there is such a thing called ‘movies’. But the meaning of the above premise does not depend upon the assumption that movies exist.

These kinds of statements are known as Particular Affirmative Statements because they give the impression of the statement being true in some particular cases and not in all the cases. Hence, it falls short of being a universal fact or a universally affirmative statement.

Example—

Some dogs are rich.

Some people are happy.

Some bosses are stupid.

Particular Negative Statement

Whenever we say that, “Some numbers are not integers”, we are simply accepting the relationship between two entities ‘numbers’ and ‘integers’ in such a way that some of the numbers have to be non-integers. We may assume that there is such a thing called ‘numbers’. But the meaning of the above premise does not depend upon the assumption that numbers exist.

These kinds of statements are known as Particular Negative Statements because they give the impression of the statement being true in some particular cases and not in all the cases.

Example—

Some scorpions are not honest.

Some managers are not effective.

Some relationships are not manageable.

Representing the Statements and Standard Deductions

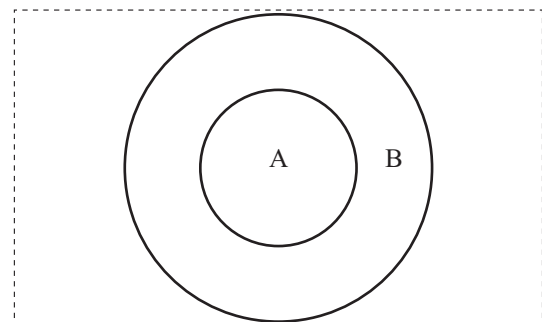
Normally, the statements given above construct a major part of any question in a syllogism. To represent these, we can either apply the subject-predicate form or the Venn-diagram method. We will see both these methods one by one:

Universally Affirmative Statement

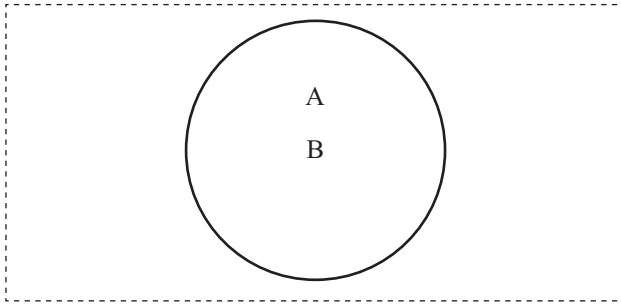
Consider the example—All A are B.

Subject-predicate form: These types of statements are known as ‘A-type’ statements.

Venn-Diagram form: In the Venn-diagram form, we can represent A-type statements in the following ways:



In the above form, A is included inside B. And obviously set B is bigger than set A.



In the above form, set A and set B are of the same size.

Following are the deductions which can be made from the above given statement:

- i. Some A are B.
- ii. Some B are A.

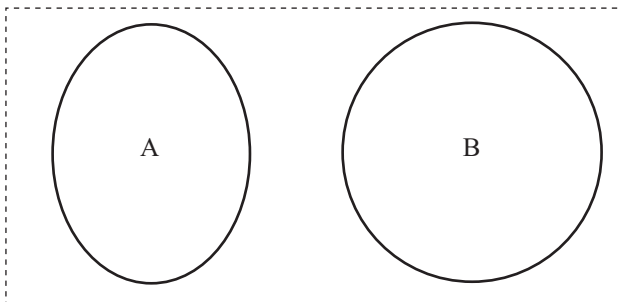
The given deductions are definitely true, however, we can derive some more 'probably true' deductions from the above statement. For example—'Some B are not A' is probably a true statement. And similarly 'some A are not B' is a definitely false statement.

Universally Negative Statement

Consider the example—No A are B.

Subject-predicate form: These types of statements are known as 'E-type' statements.

Venn-Diagram form:



Following are the deductions which can be made from the above given statement:

- i. No B are A.
- ii. Some A are not B.
- iii. Some B are not A.

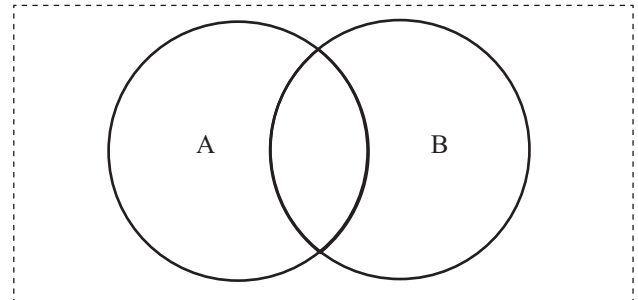
The above given deductions are definitely true.

Particular Affirmative Statement

Consider the example—Some A are B.

Subject–Predicate form: These types of statements are known as 'I-type' statements.

Venn-Diagram form:



Following are the deductions which can be made from the above given statement:

- i. Some B are A.

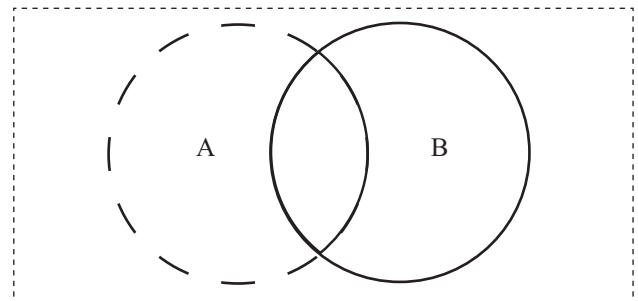
The above given deduction is definitely true, however we can derive some more 'probably true' deductions from the above statement. E.g., 'Some B are not A' is probably a true statement.

Particular Negative Statement

Consider the example—Some A are not B.

Subject–Predicate form: These types of statements are known as 'O-type' statements.

Venn-Diagram form:



The following are the deductions which can be made from the above given statement:

- i. All A are not B.

However, we cannot make any deduction of A, E, I or O format from this statement.

Summarizing the whole discussion till now, we can have the following conclusions drawn:

	Affirmative	Negative
Universal	All (A)	No (E)
Particular	Some or Many (I)	Some not or Many not (O)

We can see the summary of all the standard deductions in a table format also:

Given statement	Deduction	Truth-metre	Summary
All A are B	Some A are B	Definitely True	'All' can give only 'Some' as definitely true statement.
	Some B are A	Definitely True	
	Some B are not A	Probably True	
	Some A are not B	Definitely False	
Some A are B	Some B are A	Definitely True	'Some' can give only 'some' as definitely true statement.
	Some B are not A	Probably True	
	Some A are not B	Probably True	
Some A are not B	No 'Definitely True' deduction possible		'No' can give only 'No' or 'Some + Not' as definitely true statement.
	Some B are not A	Probably True	
No A are B	No B are A	Definitely True	
	Some A are not B	Definitely True	
	Some B are not A	Definitely True	

Remember that

- No positive statement can give rise to any negative definitely true conclusion.

- No negative statement can give rise to any positive definitely true conclusion.

Besides the standard AEIO statements, there are a few more statements which are used in Syllogism:

Given statement	Deduction	Truth-meter	Summary
Only A are B	All B are A	Definitely True	All the conclusions related to the Some format will be true.
	Some A are B	Definitely True	
	Some B are A	Definitely True	
All A is not B	Some A are not B	Definitely True	Probably True
	Some B are not A	Probably True	

Deductions of two or more than two statements of AEIO type together:

First Statement type	Second Statement type	Possible 'definitely true' conclusions	Not possible
All	Some	Some	No/Some Not
	All	All/Some	No/Some not
	No	Some not/No	Some All
	Some not	No conclusion is possible	
Some	All	Some	All/Some not/No
	Some	No such conclusion possible	
	No	Some not	All/No/Some
	Some not	No conclusion is possible	

First Statement type	Second Statement type	Possible 'definitely true' conclusions	Not possible
No	All	No/Some not	All/Some
	Some	Some not	All/No/ Some
	No	No/Some not	All Some
	Some not	No conclusion is possible	

First Statement type	Second Statement type	Possible 'definitely true' conclusions	Not possible
Some not	All	No conclusion is possible	
	Some		
	Some not		
	No		

PRACTICE EXERCISE 1

Directions for questions 1 to 20: *In each question given below are given three statements followed by four conclusions numbered (I), (II), (III), and (IV). You have to take the given statements to be true even if they seem to be at variance with commonly known facts and judge the conclusions on the basis of it. Choose the options based on the conclusions chosen.*

1. Statements: (i) All boys are pens.
(ii) Some toys are pens.
(iii) All pots are toys.
Conclusion: I. All pens are pots.
II. Some boys are toys.
III. Some pots are boys.
IV. Only pots are toys.
(a) Only I, II and IV follow
(b) Only II, III and IV follow
(c) Only II and III follow
(d) None of these
2. Statement: (i) Some books are intelligent.
(ii) No intelligent is wise.
(iii) Some wise are wind.
Conclusions: I. Some books are not wind.
II. Some books are not wise.
III. Some wind is not intelligent.
IV. Some wise are not books.
(a) Only I and either II or IV follow
(b) Only III follows
(c) Only II and III follow
(d) Only II, III and IV follow
3. Statements: (i) Some goats are cats.
(ii) Some pens are boxes.
(iii) Some cats are animals.
Conclusions: I. Some goats are pens.
II. Some goats are animals.
III. Some pens are animals.
IV. Some animals are either goats or pens.
(a) None follows
(b) Only IV follows
(c) Only I and II follow
(d) Only I, II and III follow
4. Statements: (i) All proverbs are sentences.
(ii) No men are proverbs.
(iii) Some women are sentences.
Conclusions: I. Some sentences are women.
II. No proverbs are men.

- III. Some proverbs are men.
IV. No proverbs are women.
(a) Only I follows
(b) Only II and either III or IV follow
(c) Only II follows
(d) None of these
5. Statements: (i) Some cars are jeeps.
(ii) All bikes are cycles.
(iii) Some jeeps are not bikes.
Conclusions: I. Some jeeps are not cycles.
II. Some cycles are not bikes.
III. Some jeeps are cars.
IV. No cycles are jeeps.
(a) Only III follows
(b) Only III and IV follow
(c) Only I and IV follow
(d) Only I and III follow
6. Statements: (i) All khiladis are spectators.
(ii) Some spectators are theatres.
(iii) Some theatres are movies.
Conclusions: I. Some movies are spectators.
II. Some khiladis are movies.
III. Some theatres are khiladis.
IV. All spectators are khiladis.
(a) Only II follows
(b) None follows
(c) Only II and IV follow
(d) Only I and III follow
7. Statements: (i) Some buckets are salts.
(ii) All salts are ipods.
(iii) Some ipods are woods.
Conclusions: I. Some woods are salt.
II. Some buckets are woods.
III. Some ipods are buckets
IV. Some woods are buckets
(a) None follows (b) Only II follows
(c) Only III follows (d) Only IV follows
8. Statements: (i) Some channels are mobiles.
(ii) Some mobiles are computers.
(iii) Some computers are stations.
Conclusions: I. Some stations are channels.
II. Some mobiles are stations.
III. Some computers are channels.
IV. All channels are stations.
(a) None follows
(b) Only I and II follow
(c) Only I, II and III follow
(d) Only II and III follow

9. Statements: (i) All leaves are dim.
(ii) No dim is brush.
(iii) All tops are brushes.
Conclusions: I. Some tops are leaves
II. Some dim is top.
III. Some dim is leaf.
IV. Some tops are brushes.
(a) All follow
(b) Only I and II follow
(c) Only II and III follow
(d) Only III and IV follow
10. Statements: (i) All noodles are threads.
(ii) All threads are boxes.
(iii) All trees are boxes.
Conclusions: I. No noodle is a tree.
II. Some trees are threads.
III. Some boxes are noodles
IV. Some trees are noodles.
(a) Only either I or IV follows.
(b) Only either I or IV and II follow.
(c) Only III follows
(d) Only either I or IV and III follow.
11. Statements: (i) Some mountains are rivers.
(ii) Some rivers are deserts.
(iii) All deserts are roads.
Conclusions: I. Some roads are rivers.
II. Some roads are mountains.
III. Some deserts are mountains.
(a) None follows
(b) Only I follows
(c) Only II and III follow
(d) Only I and II follow
12. Statements: (i) Some cars are flowers.
(ii) All flowers are plants.
(iii) Some plants are leaves
Conclusions: I. Some plants are cars.
II. Some leaves are flowers.
III. No car is a leaf.
(a) None follows (b) Only I follows
(c) Only II follows (d) Only I and III follow
13. Statements: (i) All homes are mountains.
(ii) All glasses are mountains.
(iii) Some mountains are windows.
Conclusions: I. Some windows are glasses.
II. Some homes are windows.
III. Some mountains are glasses.
(a) Only I follows
(b) Only II follows
(c) Only III follows
(d) None follows
14. Statements: (i) Some homes are tables.
(ii) Some tables are gardens.
(iii) All lantern are gardens
Conclusions: I. Some lanterns are tables.
II. Some gardens are homes.
III. Some lanterns are homes.
(a) None follows
(b) Only I follows
(c) Only II follows
(d) Only III follows
15. Statements: (i) All ships are buses.
(ii) No room is a bus.
(iii) All boats are rooms.
Conclusions: I. No boat is a ship.
II. No bus is a boat.
III. No ship is a room
(a) Only I and II follow
(b) Only II and III follow
(c) Only I and III follow
(d) All follow
16. Statements: (i) All books are copies.
(ii) All copies are pencils
(iii) No pencils are erasers.
Conclusions: I. No erasers are books.
II. No copies are erasers.
III. Some pencils are copies.
IV. All books are pencils.
(a) Only I, II and III follow
(b) Only II, III and IV follow
(c) Only I, III and IV follow
(d) All follow
17. Statements: (i) All coats are shirts.
(ii) Some shirts are caps.
(iii) No caps are trousers.
Conclusions: I. Some coats are caps.
II. Some trousers are not shirts.
III. No coats are trousers.
IV. Some caps are shirts.
(a) Only IV follows
(b) Only I and IV follow
(c) Only I, II and IV follow
(d) None of these
18. Statements: (i) No toys are bats.
(ii) Some bats are boxes
(iii) All boxes are pots.
Conclusions: I. Some bats are not toys.
II. Some toys are not boxes.
III. Some pots are bats.
IV. Some pots are not toys.

- (a) Only I and III follow
- (b) Only I, III and IV follow
- (c) Only I, II and III follow
- (d) None of these

19. Statement: (i) No slates are pencils.
(ii) All pencils are dusters.
(iii) No pencils are chalks.
Conclusions: I. Some dusters are slates.
II. No dusters are slates
III. No slates are chalks.
IV. Some slates are chalks.
- (a) Only I and III follow
 - (b) Only either I or II and III follow
 - (c) Only I and either III or IV follow
 - (d) None of these
20. Statement: (i) Some phones are radios.
(ii) Some radios are recorders.
(iii) Some recorders are not televisions.
Conclusions: I. Some phones are recorders .
II. Some phones are not radio.
III. All phones are radios.
IV. Some radios are not televisions.
- (a) Only IV follows
 - (b) Only I and IV follow
 - (c) Only I, II and IV follow
 - (d) None of these

Directions for questions 21 to 27: Solve the following questions.

21. Statements: (i) All cars are trucks.
(ii) No truck is a mare.
(iii) All mares are animals.
Conclusions: I. No car is a mare.
II. Some animals are mares.
III. Some trucks are cars.
IV. Some cars are mares.
- (a) Only either I or IV and II follow
 - (b) Only either I or II and both III and IV follow
 - (c) Only either I or IV and both II and III follow
 - (d) Only I, II and III
22. Statements: (i) Some drums are vehicles.
(ii) Some vehicles are machines.
(iii) Some machines are mechanics
Conclusions: I. Some mechanics are machines.
II. Some vehicles are drums.
III. Some machines are drums.
IV. Some mechanics are vehicles.
- (a) Only I and II follow
 - (b) Only III and IV follow

- (c) Only I and IV follow
- (d) None follows

23. Statements: (i) Some opels are televisions.
(ii) Some televisions are bulbs.
(iii) All lanterns are bulbs.
Conclusions: I. Some opels are lanterns.
II. Some opels are bulbs.
III. No lantern is opel.
IV. All bulbs are lanterns.
- (a) IV follows
 - (b) Only II and III follow
 - (c) Only either II or III follows
 - (d) Only either I or III follows
24. Statements: (i) All cats are lions.
(ii) Some lions are mice.
(iii) All mice are giraffes.
Conclusions: I. Some mice are cats.
II. Some giraffes are lions.
III. Some giraffes are cats.
IV. All giraffes are mice.
- (a) Only I and II follow
 - (b) Only I and III follow
 - (c) Only II or III follows
 - (d) None of these
25. Statements: (i) Some apples are bees.
(ii) No bee is a papaya.
(iii) All papayas are boys.
Conclusions: I. Some apples are boys.
II. Some boys are papayas.
III. Some boys are apples.
IV. Some bees are apples.
- (a) None follows
 - (b) Only II and IV follow
 - (c) Only II and III follow
 - (d) None of these
26. Statements: (i) Some tables are apartments.
(ii) All apartments are cars.
(iii) Some cars are trucks.
Conclusions: I. Some tables are trucks.
II. Some tables are cars.
III. Some cars are apartments.
IV. No truck is a table.
- (a) Only II and III follow
 - (b) Either only I or II, III and IV follow
 - (c) Either only I or IV, and II and III follow
 - (d) All follow
27. Statements: (i) All tables are phones.
(ii) Some phones are gadgets.
(iii) All gadgets are tables.

Conclusions: I. Some gadgets are phones.
 II. Some gadgets are tables.
 III. Some gadgets are not tables.
 IV. Some tables are phones.

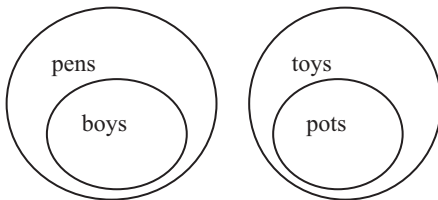
(a) Only I and II follow
 (b) Only I and III follow
 (c) Either II or IV follow
 (d) None of these

ANSWER KEYS

1. (d) 2. (c) 3. (a) 4. (d) 5. (a) 6. (b) 7. (c) 8. (a) 9. (d) 10. (d)
 11. (b) 12. (b) 13. (c) 14. (a) 15. (d) 16. (d) 17. (a) 18. (b) 19. (d) 20. (d)
 21. (d) 22. (d) 23. (d) 24. (d) 25. (b) 26. (c) 27. (a)

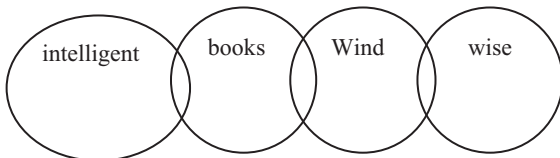
HINTS AND EXPLANATIONS

1.



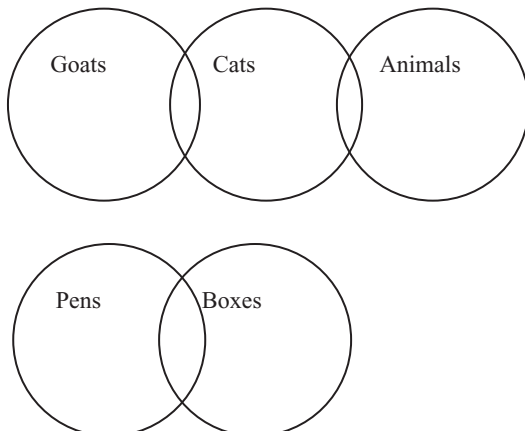
Therefore, from the above venn diagram, we can see that none of the conclusion follows.

2.



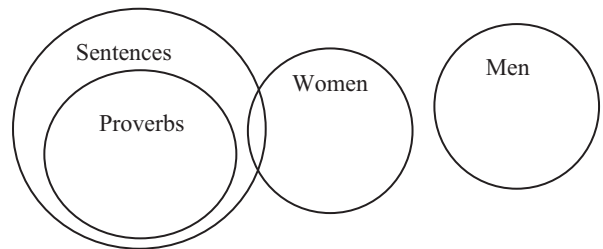
Therefore, from the above venn diagram, we can see that only II and III follows.

3.



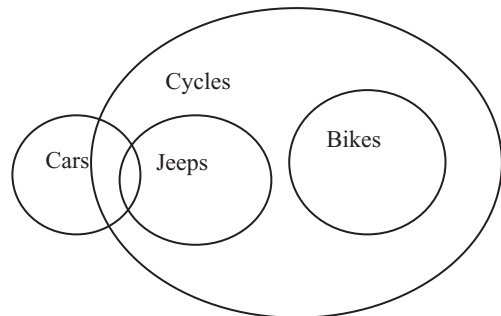
Therefore, from the above venn diagram, we can see that none of the conclusion follows.

4.

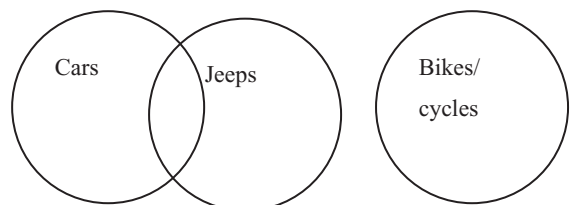


Therefore, from the above venn diagram, we can see that none of the conclusion follows.

5.

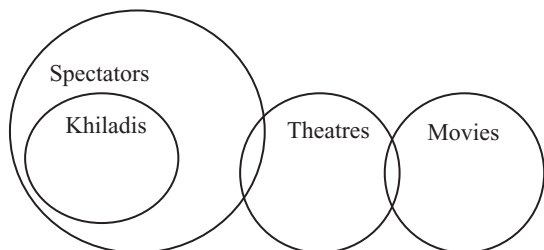


Or,



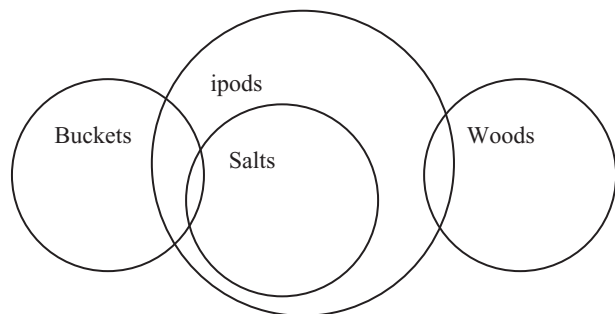
Therefore, from the above venn diagrams we can see that only conclusion III follows.

6.



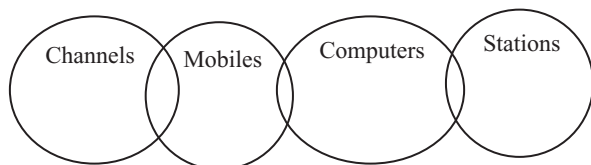
Therefore, from the above venn diagram we can see that none of the conclusion follows.

7.



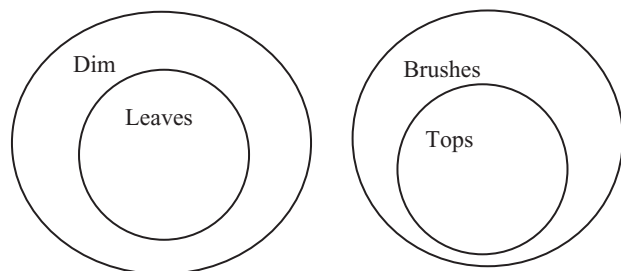
Therefore, we see that only conclusion III follows.

8.



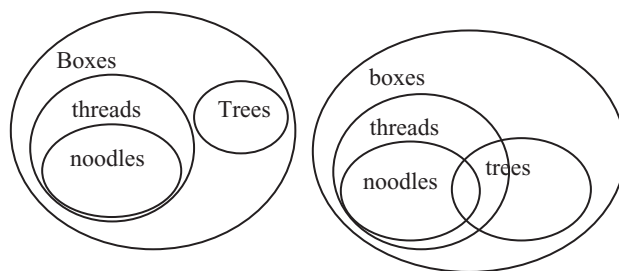
Therefore, from the above venn diagram we can see that none of the conclusion follows.

9.



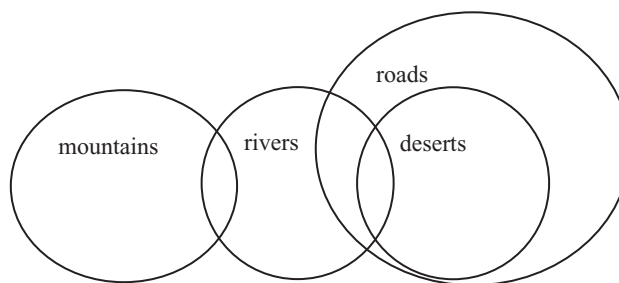
Therefore, from the above venn diagram, we can see that only conclusions III and IV follows.

10.



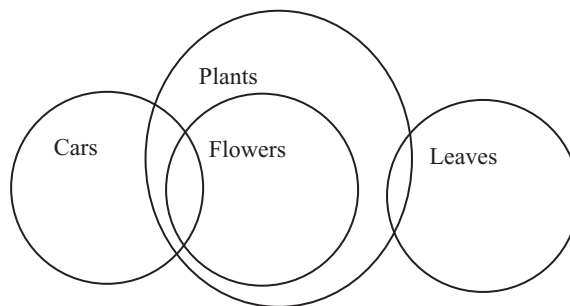
Therefore, from the above venn diagrams, we see that either conclusion I or conclusions III and IV follows.

11.



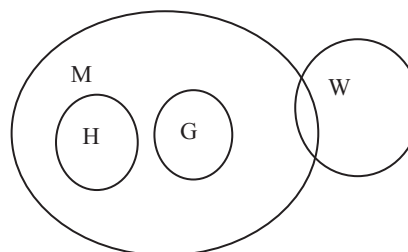
Therefore, from the above venn diagram, we see that only conclusion I follows.

12.



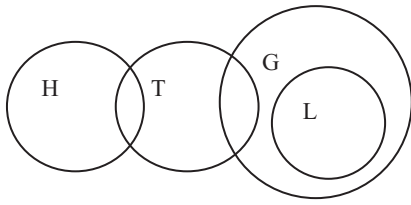
Therefore, from the above venn diagram, we see that only conclusion I follows.

13.



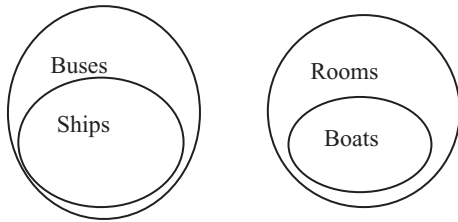
Therefore, from the above venn diagram, we see that only conclusion III follows.

14.



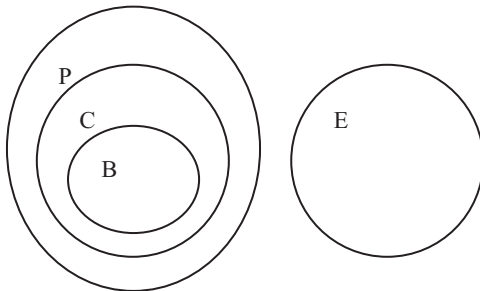
Therefore, from the above venn diagram, we see that none of the conclusion follows.

15.



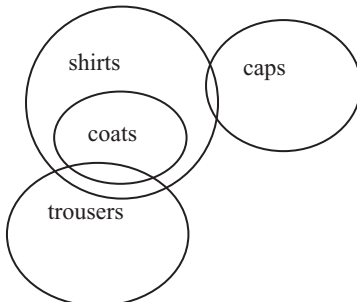
Therefore, from the above venn diagram, we see that all the conclusions follow.

16.



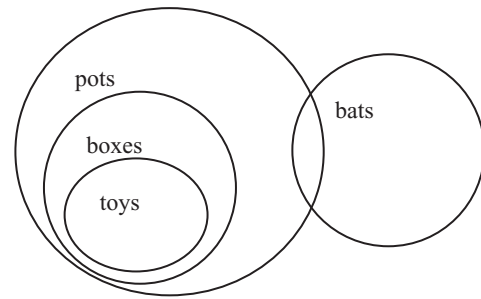
Therefore, from the above venn diagram, we see that all the conclusions follow.

17.



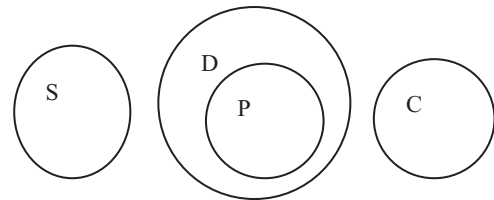
Therefore, from the above venn diagram, we see that only conclusion IV follows.

18.



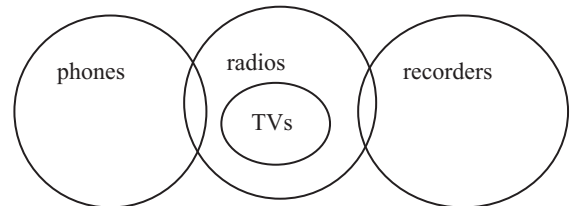
Therefore, from the above venn diagram, we see that only conclusions I, III and IV follow.

19.



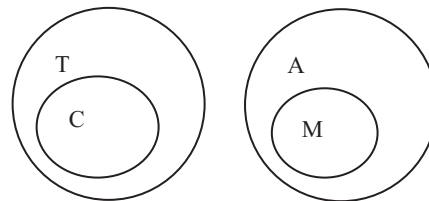
Therefore, from the above venn diagram, we see that none of the conclusions follow.

20.



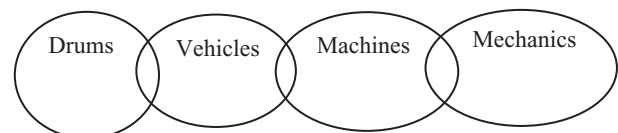
Therefore, from the above venn diagram, we see that none of the conclusions follow.

21.

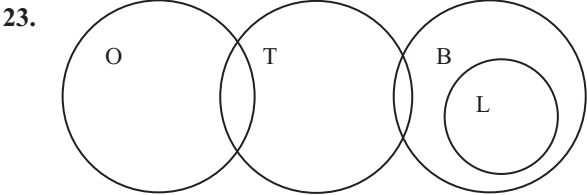


Therefore, from the above venn diagram, we see that none of the conclusions follow.

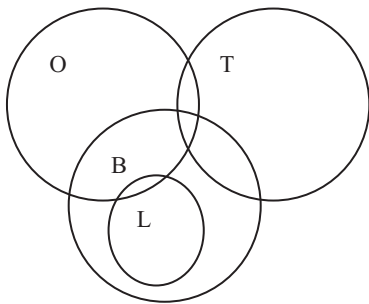
22.



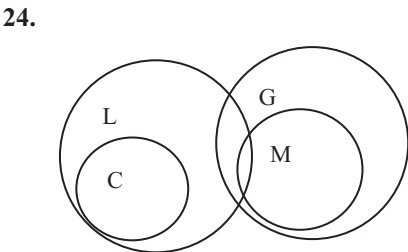
Therefore, from the above venn diagram, we see that none of the conclusions follow.



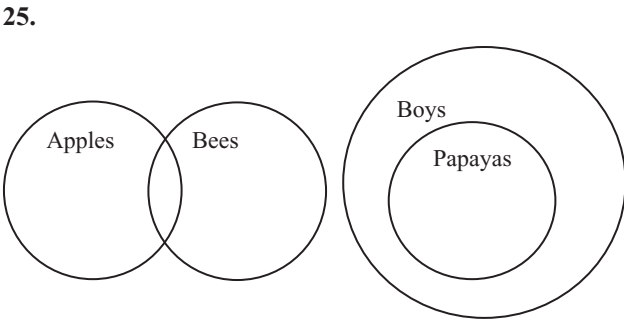
Or,



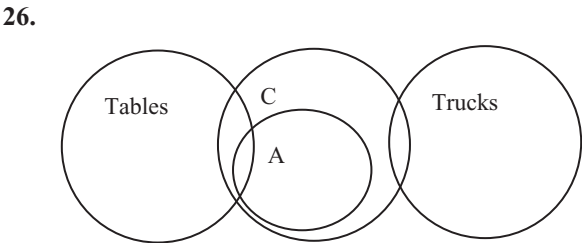
Therefore, from the above venn diagram, we see that either conclusion I or III follows.



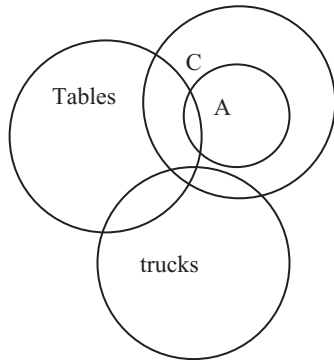
Therefore, from the above venn diagram, we see that none of the conclusions follow.



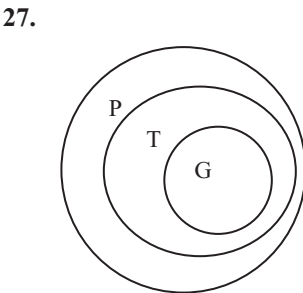
Therefore, from the above venn diagram, we see that only conclusion II and IV follows.



Or,



Therefore, from the above venn diagram, we see that either conclusion I or IV, and II and III follows.



Therefore, from the above venn diagram, we see that only conclusion I and II follows.

Chapter

10

INPUT–OUTPUT

LEARNING Objectives

In this chapter, you will learn:

- ☐ Different types of questions
 - ☐ Mapping the pattern
 - ☐ Methods to solve the questions
-

Input–Output questions test the student’s ability to understand the pattern given in the input and subsequent steps, and extrapolate that to answer the questions.

Generally, there are three types of Input–Output questions:

- (a) Based upon reasoning – In these questions, the words or the numbers are arranged as per some fixed order or reasoning. For example, elements may be arranged in steps as per alphabetical order in case of letters or it may be an ascending or descending order in case of numbers or steps may be given in the order of sum of digits of the number.
- (b) Based upon simple replacement algorithm – In these questions, elements given in the input are shifted according to a fixed pattern.
- (c) Based upon arithmetic operation – Typically, in these questions, input will be some number given and subsequent steps are obtained by performing different arithmetic operations on the numbers given in the input.

Structure of the Question

Every question will start with an Input – either numeric or words or a combination – followed by

Steps. Understand this with the help of following example:

1. An electronic device when fed with numbers rearranges them in a particular order following certain rules. Following is the data fed (input) and Steps obtained:
Input: 18, 12, 27, 11, 14, 25
Step I: 27, 18, 12, 11, 14, 25
Step II: 27, 25, 18, 12, 11, 14
Step III: 27, 25, 18, 14, 12, 11
Step III: is the last step for the given data (input).

How to Approach Problems

On the basis of the steps given, we are required to decide if it is based upon reasoning or based upon simple replacement algorithm.

For understanding the logic of arrangement you are advised to follow some steps:

Step I: Look at the last step and try to find out if there is a pattern or reasoning in the occurrence of the elements. If yes, it is reasoning based problem and if no, it is simple replacement algorithm.

This reasoning can be:

- i. Ascending/descending order of the numbers
- ii. Sum of the digits of the numbers
- iii. Prime numbers first, then composite numbers in ascending/descending order
- iv. Alphabetical order of the words
- v. Number of letters in the words
- vi. Combination of the rules iv and v.

Understand that these rules are not exhaustive, and you may get a question set that is using a rule beyond all that is mentioned here.

Step II: If there is no reasoning in the elements as given in the steps, then try to find out a possible replacement algorithm. Have a quick glance at every step to know how this is being carried out.

Coming back to the Q1 given earlier:

Taking a quick glance at the last step shows that numbers are in descending order. Analysing the previous steps also confirm that the numbers are rearranged in descending order.

Thumb rule:

1. If question mentions that step N is the last step, it is almost certain that there is a reasoning behind the steps generated using the elements given in the input.
2. In questions where some reasoning is used to generate the next steps, it is not possible to go to previous step or to the input using any step given ahead. For example, it will not be possible to go to step IV or to input using step V or step VI etc.

Directions for questions 2 to 5: Read the instruction given below and solve the questions based on it.

An electronic device when fed with the numbers, rearranges them in a particular order following certain rules. The following is a step-by-step process of rearrangement for the given input of numbers:

Input: 85, 16, 36, 04, 19, 97, 63, 09
 Step I: 97, 85, 16, 36, 04, 19, 63, 09
 Step II: 97, 85, 63, 16, 36, 04, 19, 09
 Step III: 97, 85, 63, 36, 16, 04, 19, 09
 Step IV: 97, 85, 63, 36, 19, 16, 04, 09
 Step V: 97, 85, 63, 36, 19, 16, 09, 04

(For the given input, step V is the last step). Now study the logic and rules followed in the above steps and find out appropriate step for the question given below for the given input.

Explanation

There are two things that can be observed: (a) Step V is the last step—it indicates that there is some reasoning used to formulate the steps, (b) Last step has the elements that are arranged perfectly in descending order.

2. Which of the following will be step v for the given input?

Input: 25, 08, 35, 11, 88, 67, 23

- (a) 88, 67, 35, 11, 88, 67, 23
- (b) 88, 67, 35, 25, 08, 11, 23
- (c) 88, 11, 23, 25, 35, 67, 23
- (d) 88, 67, 35, 25, 23, 08, 11

Solution

We are going to arrange the numbers in descending order taking numbers one by one.

Step 1 = 88, 25, 08, 35, 11, 67, 23

Step 2 = 88, 67, 25, 08, 35, 11, 23

Step 3 = 88, 67, 35, 25, 08, 11, 23

Step 4 = 88, 67, 35, 25, 23, 08, 11

Hence option (d) is the answer.

3. Which of the following will be step III for given input?

Input: 09, 25, 16, 30, 32, 18, 17, 06

- (a) 32, 09, 25, 16, 30, 18, 17, 06
- (b) 32, 30, 09, 25, 16, 18, 17, 06
- (c) 32, 30, 25, 09, 16, 18, 17, 06
- (d) 32, 25, 09, 16, 30, 18, 17, 06

Solution

We are going to arrange the numbers in descending order taking numbers one by one.

Step 1 = 32, 09, 25, 16, 30, 18, 17, 06

Step 2 = 32, 30, 09, 25, 16, 18, 17, 06

Step 3 = 32, 30, 25, 09, 16, 18, 17, 06

Hence option (c) is the answer.

4. Which of the following will be the last step for the given input?

Input: 16, 09, 25, 27, 06, 05

- (a) Step 1
- (b) Step 2
- (c) Step 3
- (d) Step 4

Solution

We are going to arrange the numbers in descending order taking numbers one by one.

Step 1 = 27, 16, 09, 25, 06, 05

Step 2 = 27, 25, 16, 09, 06, 05

Step 2 gives all the elements arranged in the descending order. Hence this is the last step. Hence option (b) is the answer.

5. If step IV is as given, then which of the following was the input?

Step IV: 92, 86, 71, 69, 15, 19, 06, 63, 58

- (a) 86, 92, 69, 71, 15, 19, 06, 63, 58
- (b) 15, 86, 19, 92, 06, 69, 63, 58, 71
- (c) 15, 19, 06, 63, 58, 86, 92, 69, 71
- (d) Cannot be determined

Solution

We cannot go back to previous step or to the input as we do not know which element came from which place. Hence option (d) cannot be determined is the answer.

Directions for questions 6 to 10: Read the instruction given below and solve the questions based on it.

A word arrangement machine, when given an input line of words, rearrange them following a particular rule. Following presents the input and steps generated as per this rule:

Input:	Go for to though by easy to access at
Step I:	Access go for to though by easy to at
Step II:	Access at go for to though by easy to
Step III:	Access at by go for to though easy to
Step IV:	Access at by go for to though easy to
Step V:	Access at by easy for go to though to
Step VI:	Access at by easy for go to though to
Step VII:	Access at by easy for go though to to
Step VIII:	Access at by easy for go though to to

(Step VIII is the last step for this input.) As per the rules followed in the above steps, find out in the given questions the appropriate step for the given input.

Explanation

A quick glance at the last step gives us an idea that words have been arranged alphabetically 1st and if the 1st letter is same, then 2nd letter decides the order of occurrence.

This sequencing is also known as sequencing based upon dictionary usage.

6. Input: Story for around on was he at”.

Which of the following will be Step IV for the given input?

- (a) Around at for he on was story
- (b) Around at for he on story was
- (c) Around at for he story on was
- (d) Around at he for story on was

Solution

Step 1 = Around Story for on was he at

Step 2 = Around at Story for on was he

Step 3 = Around at for Story on was he

Step 4 = Around at for he Story on was

Hence option (c) is the answer.

7. Input: “Every ant peer to an for”. Which of the following steps would the last step for this input?

- (a) II
- (b) III
- (c) IV
- (d) V

Solution

Step 1 = an every ant peer to for

Step 2 = an ant every peer to for

Step 3 = an ant every for peer to

This is the last step for this input as all the words are alphabetically arranged now. Hence option (b) is the answer.

8. Step II of an input is as follows: “Do and pet to on that”.

Which of the following would definitely be the input?

- (a) Do on pet to and that
- (b) Do pet to and that on
- (c) Do and pet to on that
- (d) Cannot be determined

Solution

We cannot go back to input from any step in any question set that is based upon some reasoning. Hence answer is option (d) cannot be determined.

PRACTICE EXERCISE 1

Directions for questions 1 to 5: Read the information given below and answer the questions that follow.

A word arrangement machine when given an input line of words, rearranges them following a particular rule in each step. The following is an illustration of input and the steps of rearrangement.

Input: Thus a the there would soon may good
 Step I: Good thus a the there would soon may
 Step II: Good may thus a the there would soon
 Step III: Good may soon thus a the there would
 Step IV: Good may soon would thus a the there
 Step V: Good may soon would there thus a the
 Step VI: Good may soon would there the thus a.
 Step VII: Good may soon would there the a thus

(And step VII is the last step for this input). As per the rules followed in the above steps, find out in the given questions the appropriate step for this input.

- Input: "Britain legal but for and law see other". Which of the following steps will be the last of the above input?
 (a) VI
 (b) VII
 (c) VIII
 (d) None of these
- Input: "Apart from about the baby suffers", which of the following steps would be "suffers baby the apart from about"?
 (a) II (b) III
 (c) IV (d) V
- Input: "No one know true can join kept". Which of the following is 2nd step?
 (a) Kept no one know true can join
 (b) Kept no join know true can one
 (c) Kept join no one know true can
 (d) Kept join can no one know true
- The step III is "one of the charms claimed that baby". Then which of the following would definitely be the input?
 (a) Charms claimed that baby one of the
 (b) Charms that claimed baby one of the
 (c) Charms that claimed one baby of the
 (d) None of these
- Input: "The commence of surgery some critics". Which will be the last step of the above input?
 (a) III (b) IV
 (c) V (d) VI

Directions for questions 6 to 10: Read the information given below and answer the question that follows.

A number arrangement machine, when given a particular input rearranges it following a particular rule. Following is the illustration of the input and the steps of arrangement.

Input: 17, 19, 23, 7, 32, 26, 13
 Step I: 24, 26, 30, 14, 39, 33, 20
 Step II: 196, 256, 400, 16, 841, 529, 100
 Step III: 55, 61, 73, 25, 100, 82, 43
 Step IV: 256, 324, 484, 36, 961, 625, 144
 Step V: 26, 28, 32, 16, 41, 35, 22

- The third step of a given input is 52, 58, 70, 19, 103, 85, 49. What will be step IV of the input?
 (a) 289, 361, 529, 25, 1027, 784, 196
 (b) 225, 289, 441, 16, 1024, 676, 196
 (c) 256, 324, 529, 25, 1027, 787, 196
 (d) 289, 361, 529, 1089, 729, 225
- What would be step III for the input – 11, 12, 16, 21, 31, 24, 18?
 (a) 36, 39, 51, 65, 95, 74, 56
 (b) 36, 39, 51, 66, 96, 75, 57
 (c) 37, 40, 52, 67, 97, 46, 58
 (d) 38, 41, 53, 69, 98, 77, 59
- Step IV of a given input is 25, 81, 100, 324, 441, 729, 256. What will be the given input?
 (a) 6, 10, 12, 19, 22, 28, 17
 (b) 5, 9, 11, 18, 21, 27, 16
 (c) 4, 8, 10, 17, 20, 26, 15
 (d) None of these
- In how many steps would the following arrangements be yielded by the given input?
 Input: 6, 10, 12, 19, 22, 28, 17
 Arrangement: 22, 34, 40, 61, 70, 88, 55
 (a) 2 (b) 5
 (c) 4 (d) 3
- What will be the fifth step of the input – 5, 9, 11, 18, 21, 27, 16
 (a) 13, 17, 20, 26, 27, 34, 25
 (b) 14, 18, 20, 27, 30, 36, 25
 (c) 15, 19, 21, 26, 29, 36, 25
 (d) 14, 18, 20, 27, 30, 36, 24

Directions for questions 11 to 15: Read the information given below and answer the question that follows.

Admission ticket for an exhibition bears a password which is changed after every clock hour based on set of words chosen for each day. The following is an

illustration of the code and steps of rearrangement for subsequent clock hours.

First Batch – 9am to 10am : is not ready cloth simple harmony burning

Second Batch – 10 am to 11am : ready not is cloth burning harmony simple

Third Batch – 11am to 12 noon : Cloth is not ready simple harmony burning

Fourth Batch – 12 noon to 1 pm : Not is cloth ready burning harmony simple

Fifth Batch – 1 pm to 2 pm : ready cloth is not simple harmony burning and so on.

11. If the password for the first batch was – “rate go long top we let have”, then which batch will have the password, “go rate top long have let we”?
 (a) Second
 (b) Third
 (c) Fourth
 (d) Fifth
12. Day’s first password – “camel road no toys say me not.” What will be the password for 4th batch, i.e., 12 to 1 pm?
 (a) Road camel toy no not me say
 (b) No road camel toy not me say
 (c) toy no road camel not me say
 (d) toy camel road no say me not
13. If the second batch of the day has the password – “came along net or else key lot”, then what would be the password for batch 4 (i.e., 12 noon to 1 pm)?
 (a) net or came along else key lot
 (b) came or net along lot key else
 (c) or net along came lot key else
 (d) along net or came else key lot
14. If the password for 11am to 12 noon was- “soap shy miss pen yet the she”, then what was the password for the first batch?
 (a) Pen miss shy soap she the yet
 (b) shy miss pen soap yet the she
 (c) Soap pen miss shy she the yet
 (d) None of these
15. If the password for 6th batch i.e., 2 pm to 3 pm is – “are trap cut he but say lap”, then what will be the password for 2nd batch i.e., 10–11am?
 (a) cut trap are he lap say but
 (b) cut he trap are lap say but
 (c) cut he are trap but say lap
 (d) are he trap lap say but cut

Directions for questions 16 to 19: Read the information given below and answer the questions that follow.

A number arrangement machine, when given a particular input, rearranges it following a particular rule. Illustrations of the input and the steps of arrangement is given below.

Input: 245, 316, 436, 519, 868, 710, 689

Step 1: 710, 316, 436, 519, 868, 245, 689

Step 2: 710, 316, 245, 519, 868, 436, 689

Step 3: 710, 316, 245, 436, 868, 519, 689

Step 4: 710, 316, 245, 436, 519, 868, 689

Step 4 is the last step for the given input

16. If the input is given as—655, 436, 764, 799, 977, 572, 333, which of the following step will be —333, 436, 572, 655, 977, 764, 799?
 (a) Step Third (b) Step Second
 (c) Step Fourth (d) None of these
17. How many steps will be required to get the final output from the following input?
 Input: 544, 653, 325, 688, 461, 231, 857
 (a) 6 (b) 5
 (c) 4 (d) None of these
18. Step third for an input is—432, 433, 542, 666, 734, 355, 574. What will be the first step for the input?
 (a) 666, 542, 432, 734, 433, 574, 355
 (b) 542, 666, 734, 432, 433, 574, 355
 (c) 355, 574, 433, 432, 734, 666, 542
 (d) Cannot be determined
19. What will be the third step for the following input?
 Input: 653, 963, 754, 345, 364, 861, 541
 (a) 541, 345, 754, 963, 364, 816, 653
 (b) 541, 345, 364, 653, 963, 754, 861
 (c) 541, 345, 364, 963, 754, 861, 653
 (d) 541, 345, 364, 653, 861, 754, 963

Directions for the questions 20 to 22: Answer the questions based on the following information.

A word arrangement machine, when given a particular input, rearranges it following a particular rule.

Following is the illustration of the input and the steps of arrangement:

Input: She was interested in doing art film

Step 1: art she was interested in doing film

Step 2: art was she interested in doing film

Step 3: art was in she interested doing film

Step 4: art was in film she interested doing

Step 5: art was in film doing she interested

Step 5 is the last step of the given input. Now study the logic and rules followed in the above steps and find out appropriate step for the question given below for the given input.

20. Which of the following will be the last step for the input given below?

Input: he is going out to search air

- (a) out is air to going search he
(b) out is air to search going he
(c) search he out is air to going
(d) None of the above

21. If step 2 of an input is—"not is the casino considering legal action", which step is—"not is casino action legal the considering"?

- (a) Step 3 (b) Step 6
(c) Step 4 (d) None of the above

22. How many steps will be required to get the final output from the following input?

Input: Father needs to check on the boy

- (a) Four (b) Five
(c) Six (d) None of the above

ANSWER KEYS

1. (b) 2. (b) 3. (c) 4. (d) 5. (c) 6. (b) 7. (c) 8. (d) 9. (d) 10. (b)
11. (c) 12. (a) 13. (d) 14. (b) 15. (c) 16. (a) 17. (b) 18. (d) 19. (c) 20. (b)
21. (d) 22. (d)

HINTS AND EXPLANATIONS

1. Input: Britain legal but for and law see others
Step I: others Britain legal but for and law see
Step II: others see Britain legal but for and law
Step III: others see law Britain legal but for and
Step IV: others see law and Britain legal but for
Step V: others see law and for Britain legal but
Step VI: others see law and for but Britain legal
Step VII: others see law and for but legal Britain.
Thus, step VII will be the last step.
Hence, option (b) is the answer.

2. Input: apart from about the baby suffers
Step I: suffers apart from about the baby
Step II: suffers baby apart from about the
Step III: suffers baby the apart from about
Hence, option (b) is the answer.

3. Input: no one know true can join kept
Step I: kept no one know true can join
Step II: kept join no one know true can
Hence, option (c) is the answer.

4. We cannot go back to previous step or to the input as we do not know which element came from which place. Hence, option (d) is the answer.

5. Input: the commerce of surgery some critics
Step I: critics the commerce of surgery some
Step II: critics some the commerce of surgery
Step III: critics some surgery the commerce of
Step IV: critics some surgery of the commerce
Step V: critics some surgery of commerce the

Thus, step V will be the last step.
Hence, option (c) is the answer.

6. Step III: 52, 58, 70, 19, 103, 85, 49
Step IV: 225, 289, 441, 16, 1024, 676, 196
Hence, option (b) is the answer.

7. Input: 11, 12, 16, 21, 31, 24, 18
Step I: 18, 19, 23, 28, 38, 31, 25
Step II: 64, 81, 169, 324, 784, 441, 225
Step III: 37, 40, 52, 67, 97, 46, 58
Hence, option (c) is the answer.

8. We cannot go back to previous step or to the input as we do not know which element came from which place. Hence, option (d) is the answer.

9. Input: 6, 10, 12, 19, 22, 28, 17
Step I: 13, 17, 19, 26, 29, 35, 24
Step II: 9, 49, 81, 256, 361, 625, 196
Step III: 22, 34, 40, 61, 70, 88, 55
Hence, option (d) is the answer.

10. Input: 5, 9, 11, 18, 21, 27, 16
Step I: 12, 16, 18, 25, 28, 34, 23
Step II: 4, 36, 64, 225, 324, 576, 169
Step III: 19, 31, 37, 58, 67, 85, 52
Step IV: 16, 64, 100, 289, 400, 676, 225
Step V: 14, 18, 20, 27, 30, 36, 25
Hence, option (b) is the answer.

11. 1st batch: rate go long top we let have
2nd batch: long go rate top have let we

- 3rd batch: top rate go long we let have
 4th batch: go rate top long have let we
 Hence, option (c) is the answer.
12. 1st batch: camel road no toy say me not
 2nd batch: no road camel toy not me say
 3rd batch: toy camel road no say me not
 4th batch: road camel toy no not me say
 Hence, option (a) is the answer.
13. 2nd batch: came along net or else key lot
 3rd batch: or net along came lot key else
 4th batch: along net or came else key lot.
 Hence, option (d) is the answer.
14. 3rd batch: soap shy miss pen yet the she
 2nd batch: pen miss shy soap she the yet
 1st batch: shy miss pen soap yet the she
 Hence, option (b) is the answer.
15. 6th batch: are trap cut he but say lap
 5th batch: cut trap are he lap say but
 4th batch: he are trap cut but say lap
 3rd batch: trap are he cut lap say but
 2nd batch: cut he are trap but say lap
 Hence, option (c) is the answer.
16. Input: 655, 436, 764, 799, 977, 572, 333
 Step I: 572, 436, 764, 799, 977, 655, 333
 Step II: 572, 436, 655, 799, 977, 764, 333
 Step III: 572, 436, 655, 764, 977, 799, 333
 Step IV: 572, 436, 655, 764, 799, 977, 333
 Hence, option (d) is the answer.
17. Input: 544, 653, 325, 688, 461, 231, 857
 Step I: 231, 653, 325, 688, 461, 544, 857
 Step II: 231, 653, 544, 688, 461, 325, 857
 Step III: 231, 653, 544, 325, 461, 688, 857
 Step IV: 231, 653, 544, 325, 688, 461, 857
18. We cannot go back to previous step or to the input as we do not know which element came from which place. Hence, option (d) is the answer.
19. Input: 653, 963, 754, 345, 364, 861, 541
 Step I: 861, 963, 754, 345, 364, 653, 541
 Step II: 861, 963, 653, 345, 364, 754, 541
 Step III: 861, 963, 653, 754, 364, 345, 541
 20 to 22: In the example shown we can observe that the output has the last letters arranged in reverse alphabetical order. So, the word at 1st place is one whose last word is at highest position in alphabetical series as compared to last letter of other words in the given Input
20. The Input is: 'he is going out to search air'
 As per the logic, the output must be the- 'out is air to search going he'. Correct option is (b)
21. If step 2 is 'not is the casino considering legal action'.
 Step 3: 'not is casino the considering legal action'
 Step 4: 'not is casino action the considering legal'
 Step 5: 'not is casino action legal the considering'
 Correct option is (d)
22. If Input is: 'father needs to check on the boy'
 Step 1: 'boy father needs to check on the'
 Step 2: 'boy needs father to check on the'
 Step 3: 'boy needs father to on check the'
 Step 3: will be the output
 Correct option is (d)

Chapter

11

CUBES

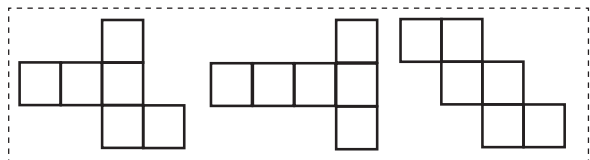
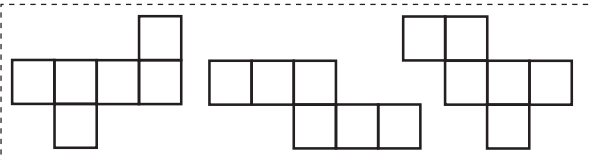
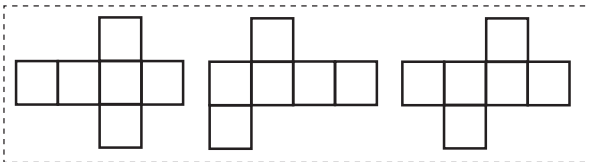
LEARNING Objectives

In this chapter, you will learn:

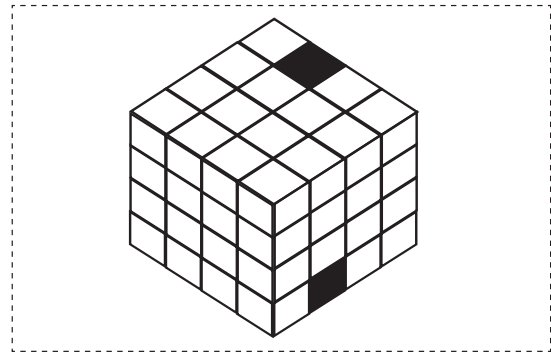
- ☐ Definitions of Edges, Faces and Corners
- ☐ Generation of new cubes through cutting the cube along different axis
- ☐ Questions based upon painting of the cubes
- ☐ Methods to solve the questions

A cube is a three-dimensional structure with the following features:

It has six faces, eight corners and twelve edges. Cube is composed of six square faces that meet each other at right angles. Let us see how the six different faces of a cube can be represented:



And finally the cube appears like:



Generally, the questions asked from Cubes in LR pertains to finding out the number of cubelets being formed from the original cube by cutting it into several pieces. However, sometimes we might be asked to find out the total number of cuts provided with the total cubelets being formed by cutting the original cube.

Cutting the Cubes

Before moving on to solve questions, we should be clear with the basics that what happens when we cut a cube:

- i. One cut divides the cube into two parts.
- ii. Second cut will divide the cube in either a total of 3 parts or 4 parts, depending upon the axis of cut.
- iii. Third cut will divide the cube in either a maximum of 8 parts or a minimum of 4 parts.

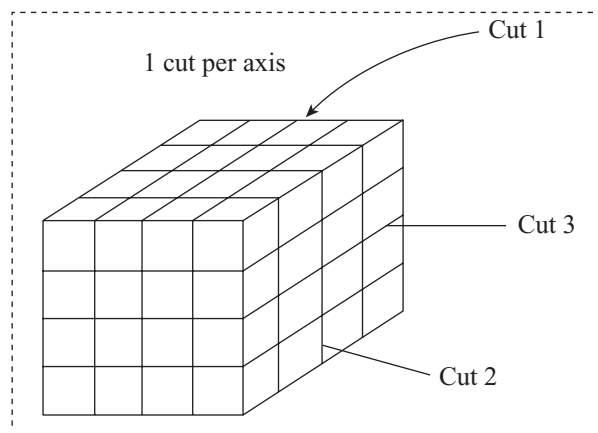
Example 1

A carpenter had a large wooden cube with side length 4 inches. He wanted to cut it into 64 smaller cubes with side length 1 inch. What is the least number of cuts required if (i) he can rearrange the pieces before each cut, (ii) the rearrangement of the pieces before/after making the cut is not allowed?

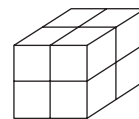
Solution

Let us understand the difference between the two questions first: (i) In first question, we are allowed to move the cube one over the other or we can stack the pieces of cube side by side or on top of each other, whereas (ii) in second question, we have to assume as if the cube is fixed on the horizontal surface and what we can do at best is to make cuts, along any of its surfaces.

- (i) When rearrangement is allowed, the minimum is found by cutting each edge as nearly in half as possible, putting the pieces together and cutting as nearly in half again until we obtain a solid with a unit dimension. We would start here with making a cut midway on all the axis.



And this is what we will obtain now:



Now restack the solids into the $4 \times 4 \times 4$ solid and repeat the procedure. After completing the three sides, we will have $1 \times 1 \times 1$ cubes. Therefore, the sum of the cuts is the answer, which is six.

- (ii) When rearrangement is not allowed:

We know that making n cuts along one axis divides the cube in $(n + 1)$ parts. To obtain 64 cubelets by making minimum number of cuts, we should be making the cuts along all the axis.

Assume we have made n , m , p cuts along three axes.

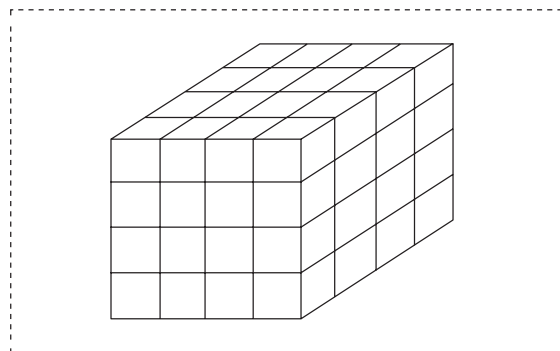
So, number of cubelets formed $= (n + 1)(m + 1)(p + 1) = 64$

To minimize the number of cuts, $(n + 1) = (m + 1) = (p + 1) = 4$

So, $n = m = p = 3$, hence a total of 9 cuts.

Alternatively, to make the number of cuts minimum, cuts should be made symmetrical.

Look at this figure:



It is having 64 cubelets of size $1 \times 1 \times 1$, and total number of cuts made $= 9$

Painting the cubes and then Cutting the Cubes

If we paint a cube of the dimension $n \times n \times n$ by any one colour, and then we cut it to have n^3 symmetric cubelets, then following is the number of cubelets with colour on different faces of it.

- i. Cubelets with only one face painted $= 6(n - 2)^2$
- ii. Cubelets with two faces painted $= 12(n - 2)$

- iii. Cubelets with three faces painted = 8
- iv. Cubelets with no face painted = $(n-2)^3$

So, if you add all the four types of cubelets given above (Cubelets with only one face painted + Cubelets with two faces painted + Cubelets with three faces painted + Cubelets with no face painted), it will be equal to total number of cubelets.

Formula wise:

$$6(n-2)^2 + 12(n-2) + 8 + (n-2)^3 = n^3$$

Examples

Directions for questions 2 to 5: Read the passage following and solve the questions based on it.

64 symmetrical small cubes are put together to form a big cube. This cube is now coloured on all its surfaces by green colour.

2. How many of the smaller cubes have none of its faces coloured?

Solution

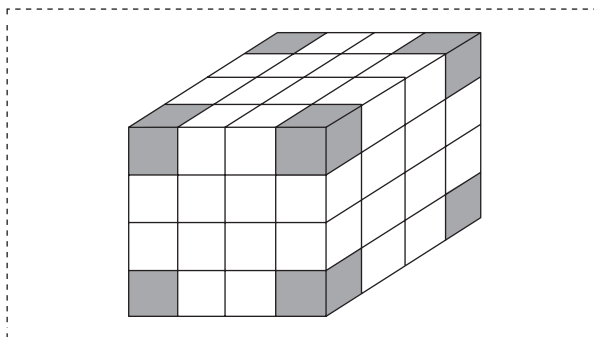
From the given $4 \times 4 \times 4$ cube, if we remove one layer from the top making it $2 \times 2 \times 2$ cube, it will not be coloured.

Hence 8 small cubes will not be coloured on any of its surfaces.

3. How many of the smaller cubes have exactly three faces coloured?

Solution

Look at the three faces coloured small cubes in the figure:



All the corner cubes (blackened) will be having exactly three faces coloured.

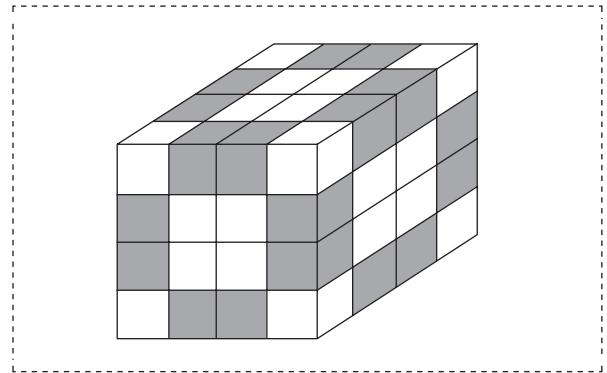
These are 8 in numbers.

Remember, for any $n \times n \times n$ dimension ($n \geq 2$), number of cubes having exactly three faces coloured = 8

4. How many of the smaller cubes have exactly two faces coloured?

Solution

Look at the two faces coloured small cubes in the figure:

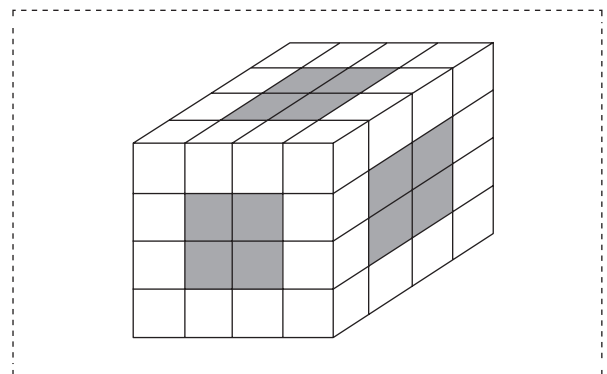


We can see that along every edge, there are two cubes painted with two colours.

So, total number of small cubes painted on exactly two of its faces = $2 \times 12 = 24$

5. How many of the smaller cubes have exactly one face coloured?

Solution



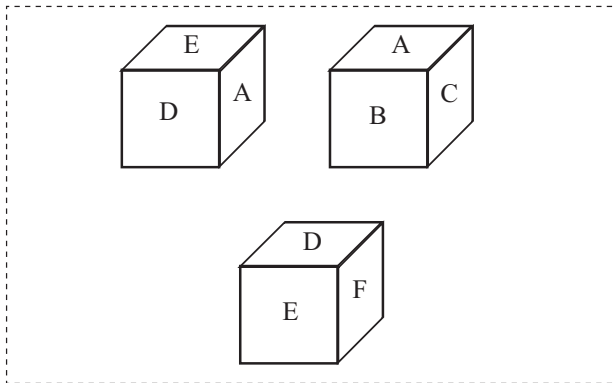
It can be seen from the above figure that total number of cubes coloured on only one of its faces = $4 \times 6 = 24$

Alternatively, total number of small cubes = Total no. of cubes painted on (one face + two faces + three faces + no face).

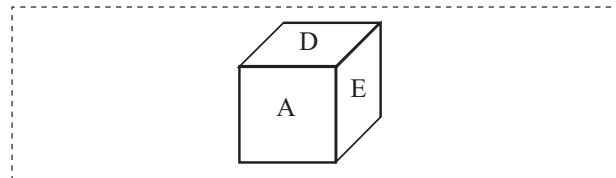
So, total number of cubes painted on only one of its faces = $64 - 8 - 8 - 24 = 24$

Example 6

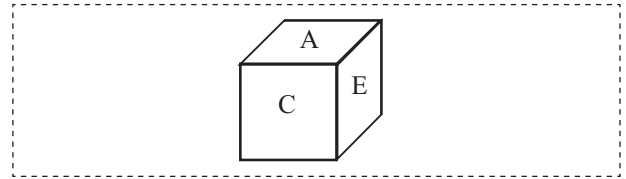
Directions for question 6: *In this question, three views of a cube are given. If the same cube is rotated in a particular way, it will give rise to different views. Four such views are given in the options. However, out of the four options given, one of the options does not confirm to the original cube. Mark that option as your answer. (The letters used are only to mark the different faces of the cube.)*



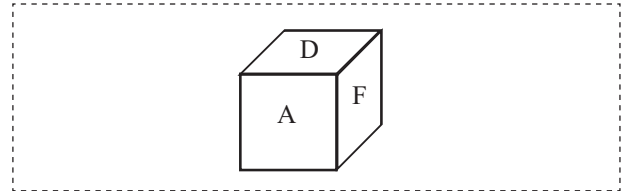
(a)



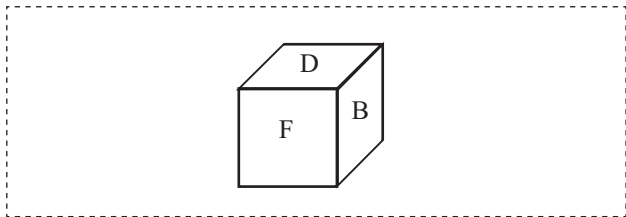
(b)



(c)



(d)

**Solution**

From the given figure, it can be inferred that the four faces adjacent to face A are—B, C, D and E. Hence face ‘F’ cannot be adjacent to face ‘A’.

Hence option c is wrong.

PRACTICE EXERCISE 1

Directions for questions 1 to 4: Read the passage below and solve the questions based on it.

A large cube is dipped into a tub filled with colour. Now the cube is taken out and it was observed that all its sides are painted. This large cube is now cut into 125 small but identical cubes.

- How many of the smaller cubes have no face painted all?
(a) 27 (b) 64
(c) 8 (d) None of these
- How many of the smaller cube have exactly one face painted?
(a) 49 (b) 54
(c) 64 (d) None of these
- How many of the smaller cubes have exactly two faces painted?
(a) 25 (b) 16
(c) 36 (d) None of these
- How many of the smaller cubes have exactly three faces painted?
(a) 4 (b) 8
(c) 9 (d) None of these

Directions for questions 5 to 9: Read the passage below and solve the questions based on it.

There is cube in which one pair of opposite faces is painted red; another pair of opposite faces is painted blue and the third pair of opposite faces is painted pink. This cube is now cut into 216 smaller but identical cubes.

- How many small cubes will be there with no red paint at all?
(a) 121 (b) 144
(c) 169 (d) None of these
- How many small cubes will be there with at least two different colours on their faces?
(a) 49 (b) 64
(c) 56 (d) 81
- How many small cubes will be there without any face painted?
(a) 64 (b) 49
(c) 36 (d) None of these
- How many small cubes will be there with only red and pink on their faces?
(a) 9 (b) 12
(c) 27 (d) 16

- How many small cubes will be there showing only pink or only blue on their faces?
(a) 64 (b) 81
(c) 125 (d) None of these

Directions for questions 10 to 14: Read the passage below and solve the questions based on it.

There is cube in which one pair of adjacent faces is painted black; the second pair of adjacent faces is painted blue and third pair of adjacent faces is painted green. This cube is now cut into 216 smaller and identical cubes.

- How many small cubes will be there with no black paint at all?
(a) 144 (b) 150
(c) 125 (d) None of these
- How many small cubes will be there with at least two different colours on their faces?
(a) 64 (b) 54
(c) 33 (d) 44
- How many small cubes will be there with one face painted black?
(a) 8 (b) 81
(c) 60 (d) 100
- How many small cubes will be with both black and green on their faces?
(a) 8 (b) 12
(c) 16 (d) None of these
- How many small cubes will be there showing only green or only blue on their faces?
(a) 64 (b) 72
(c) 81 (d) None of these

Directions for questions 15 to 18: Read the passage below and solve the questions based on it.

A large cube is painted on all its six faces. Now it is cut into a certain number of smaller identical cubes. It was found that among the smaller cubes, there were eight cubes which don't have any face painted.

- How many smaller cubes was the original large cube cut into?
(a) 27 (b) 24
(c) 64 (d) None of these
- How many small cubes have exactly one face painted?
(a) 12 (b) 24
(c) 16 (d) 32

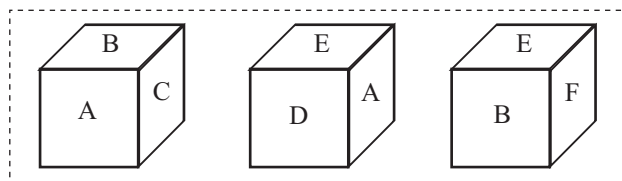
17. How many small cubes have exactly two face painted?
 (a) 6 (b) 12
 (c) 18 (d) 24
18. How many small cubes have exactly three face painted?
 (a) 0 (b) 8
 (c) 27 (d) None of these

Directions for questions 19 to 25: Read the passage below and solve the questions based on it.

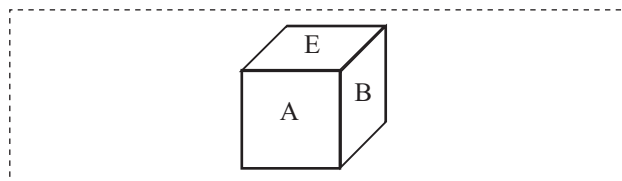
Three different faces of a cube are coloured in three different colours—black, green and blue. This cube is now cut into 216 smaller but identical cubes.

19. What is the least number of the smaller cubes that will have exactly three faces coloured?
 (a) 0 (b) 6
 (c) 2 (d) 12
20. How many smaller cubes have exactly two face coloured?
 (a) 12 (b) 15
 (c) 16 (d) cannot be determined
21. What is the least numbers of small cubes that have only one face coloured?
 (a) 86 (b) 81
 (c) 64 (d) 75
22. What is the largest number of small cubes that have only one face coloured?
 (a) 86 (b) 64
 (c) 72 (d) 84
23. What is the least number of small cubes that have exactly one face coloured black and no other face coloured?
 (a) 12
 (b) 18
 (c) 24
 (d) None of these
24. What is the maximum number of small cubes that have one face coloured green and one face blue and no other face coloured?
 (a) 0 (b) 2
 (c) 4 (d) 6
25. N is the number of cubes that is not coloured on any of its faces. Which of the following best describes the value of N?
 (a) $125 < N < 130$
 (b) $120 \leq N \leq 125$
 (c) $115 \leq N \leq 120$
 (d) $100 < N < 125$

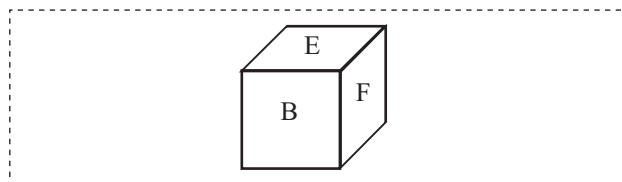
26. In this question, three views of a cube are given. If the same cube is rotated in a particular way, it will give rise to different views. Four such views are given in the options. However, out of the four options given, one of the options does not confirm to the original cube. Mark that option as your answer. (The letters used are only to mark the different faces of the cube.)



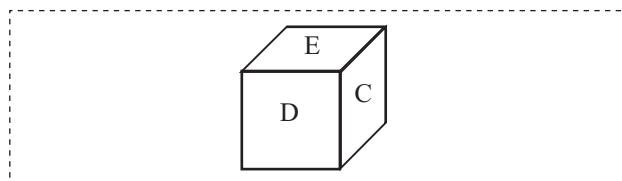
(a)



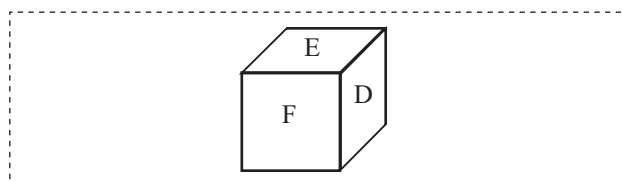
(b)



(c)



(d)



ANSWER KEYS

1. (a)	2. (b)	3. (c)	4. (b)	5. (b)	6. (c)	7. (a)	8. (d)	9. (a)	10. (b)
11. (d)	12. (c)	13. (c)	14. (d)	15. (c)	16. (b)	17. (d)	18. (b)	19. (a)	20. (d)
21. (d)	22. (d)	23. (c)	24. (d)	25. (b)	26. (c)				

HINTS AND EXPLANATIONS

1 to 4

There are 125 small identical cubes. So, $n^3 = 125$.
Therefore $n = 5$.

- The number of small cube with no painted face = $(n - 2)^3 = (5 - 2)^3 = 3^3 = 27$.
- The number of small cube with exactly 1 painted face = $6(n - 2)^2 = 6(5 - 2)^2 = 6(9) = 54$.
- The number of small cube with exactly 2 painted faces = $12(n - 2) = 12(5 - 2) = 12(3) = 36$.
- The number of small cube with exactly 3 painted faces = 8.

5 to 9

There are 216 smaller identical cubes. So, $n^3 = 216$.
Therefore $n = 6$. Now, the original cube has 2 opposite faces painted Red, Blue & Pink.

- There are 2 faces which are painted red, so all the small cubes which are formed on these 2 opposite faces will have red colour at 1 of their faces. On each face there are $n^2 = 6^2 = 36$ small cubes. So, there must be total $2 \times 36 = 72$ small cubes with red colour in 1 of its face. There are total 216 small cubes. Therefore, the small cubes with no red colour at all = $216 - 72 = 144$.
- The small cubes with at least 2 different colours on their faces = the small cubes with 2 coloured faces + small cubes with 3 coloured faces = $12(n - 2) + 8 = 12(6 - 2) + 8 = 56$.
- The number of small cube with no painted face = $(n - 2)^3 = (6 - 2)^3 = 64$.
- The small cubes with only red & pink on their faces = the small cubes with 1 face painted red & 1 (other) face painted pink = the small cubes with exactly 2 coloured faces with 1 face coloured as pink & other red + small cubes with 3 coloured faces (1 is coloured red, other is pink & 3rd face is blue).

The small cubes with exactly 2 coloured faces with red & pink colours are those cubes which are

formed on 2 edges which are common to red & pink faces. There are such $2(n - 2)$ cubes.

So, the small cubes with only red & pink on their faces = $2(n - 2) + 8 = 16$.

- The small cubes with only pink or only blue colour on their face = Small cubes with only pink colour + small cube with only blue colour.

There are 2 opposite faces which are coloured blue & 2 opposite faces are coloured pink. The cubes with only 1 coloured face on each face are $(n - 2)^2$. We have 4 such faces (2 which are coloured pink & 2 are blue coloured). So, there are total $4(n - 2)^2$ such faces.

Required number of small cubes = $4(n - 2)^2 = 4(6 - 2)^2 = 64$.

10 to 14

There are 216 smaller identical cubes. So, $n^3 = 216$.
Therefore $n = 6$. Now, the original cube has 3 pairs of 2 adjacent faces painted Black, Blue & Green.

- There are 2 adjacent faces which are painted black, so all the small cubes which are formed on these 2 adjacent faces will have black colour at 1 face or 2 faces (which are formed on edge where these adjacent black faces intersect). On each face there are $n^2 = 6^2 = 36$ small cubes. So, there must be total $2 \times 36 = 72$ small cubes with black colour in 1 face or 2 faces. But, 6 cubes (which are having 2 black coloured faces are counted twice). So, there are such $72 - 6 = 66$ small cubes. There are total 216 small cubes. Therefore, the small cubes with no black colour at all = $216 - 66 = 150$.
- The small cubes with at least 2 different colours on their faces = the small cubes with 2 coloured faces + small cubes with 3 coloured faces – small cubes which have exactly 2 coloured faces & both have same colour = $12(n - 2) + 8 - 3(n - 2) = 12(6 - 2) + 8 - 3(6 - 2) = 44$.

12. The small cubes with 1 face painted black = All cube with at least 1 face coloured black- all cubes with 2 black coloured faces (as the cubes which have 2 black coloured faces are those which are formed on the edge where the adjacent black faces intersect, so we need to remove them from all possible cubes with black colour irrespective of fact whether or not it has any other coloured face).

There are 2 faces (which are adjacent) which are coloured black, so the cubes which are formed on any of these faces are n^2 . But from these n^2 cubes there are n cubes which have both faces coloured black. So, there are total cubes with exactly 1 black coloured face = $2(n^2 - n) = 2(6^2 - 6) = 60$.

13. The small cubes with both black & green colours on their faces = Cubes with exactly 2 coloured faces which are black 7 green + cubes with 3 coloured faces (each face is black, blue & green coloured).

Each face intersects with 3 other faces. The 1st face must be of same colour, as adjacent faces are of same colour. The other 2 faces touching each face must be of other 2 colours. The 8 cubes which are formed at corner of original big cube must be cubes with 3 coloured face with 3 different colours. There will be 2 edges where black & green coloured faces will intersect, these cubes will have exactly 2 colours which are black & green.

So, required number of cubes = $2(n - 2) + 8 = 2(6 - 2) + 8 = 16$.

14. The small cubes with only green or only blue colour on their face = Small cubes with only green colour + small cube with only blue colour.

There are 2 adjacent faces which are coloured blue & 2 adjacent faces are coloured pink. The cubes with only 1 coloured face on each face are $(n - 2)^2$. We have 4 such faces (2 which are coloured green & 2 are blue coloured). So, there are total $4(n - 2)^2$ such faces. Further there are $n - 2$ cubes which have exactly 2 faces coloured such that both have green colour. Similarly there are $n - 2$ cubes with exactly 2 coloured faces such that both faces are of blue colour. We know that 2 adjacent faces have same colour, so the cubes formed at common edge will have both faces of same colour, but we removed 2 as there 2 are formed at corner which has 3 coloured faces, so these will have 3 coloured faces with 3rd face coloured with other colour. From these 4 cubes 1 cube has 2 faces coloured blue & 3rd face coloured green & 1 cube has 2 faces coloured green & 3rd face is coloured blue.

$$\text{Required number of small cubes} = 4(n - 2)^2 + 2(n - 2) + 2 = 4(6 - 2)^2 + 2(6 - 2) + 2 = 74$$

15 to 18

A large cube which was painted on all 6 faces is cut into certain number of identical smaller cubes. There are 8 smaller cubes which don't have any face painted. Let there are n^3 total number of smaller cubes.

15. The number of smaller cube is n^3 . The number of cubes with no face painted = $(n - 2)^3 = 8$.

So, $n - 2 = 4$ & hence $n = 4$. So, total number of smaller cubes = $4^3 = 64$.

16. The number of small cube with exactly 1 painted face = $6(n - 2)^2 = 6(4 - 2)^2 = 24$.

17. The number of small cube with exactly 2 painted faces = $12(n - 2) = 12(4 - 2) = 24$.

18. The number of small cube with exactly 3 painted faces = 8.

19 to 25

There are 216 smaller identical cubes. So, $n^3 = 216$. Therefore $n = 6$. Now, the original cube has 3 different faces painted with different colours viz. black, green & Blue.

19. We can choose the 3 different coloured faces in such a way that no 3 intersect at any corner. So, it is possible to have no 3 face coloured for the smaller cubes. So, the required least value is 0.

20. We can choose 3 coloured faces in 2 different ways. 1st is such a way in which these 3 coloured faces won't intersect at any corner. In 2nd way all 3 coloured faces may intersect at a corner. We won't get the same answer by both ways. So, as it can have 2 possible answers, it cannot be determined.

21. We can get the least number of small cubes with just 1 coloured face if we choose 3 coloured faces such that all 3 coloured faces intersect at a corner as then we get more number of cubes with 2 coloured faces.

There are total $n^2 = 6^2 = 36$ faces on each face. But, among them we need to remove 1 on 2 sides as those cubes are having 2 coloured faces. So, for each face we will have $(n - 1)^2$ cubes with exactly 1 coloured face. So, there are total $3(n - 1)^2$ cubes required number of cubes. So, required number of cubes = $3(n - 1)^2 = 3(6 - 1)^2 = 75$.

22. We can get the largest number of small cubes with just 1 coloured face if we choose 3 coloured faces

such that all 3 coloured faces do not intersect at a corner as then we get minimum number of cubes with 2 coloured faces.

There are total $n^2 = 6^2 = 36$ faces on each face. There are total 3 such faces. But, among them we need to remove the cubes which are formed on 2 edges where 2 faces intersect (there are 2 such faces). There will be $2n$ cubes on each edge (n for each of 2 faces which intersected on the edge).

Thus, required number of cubes = $3(n^2) - 2(2n) = 3(6^2) - 4(6) = 84$.

23. We need to assume the 3 coloured faces do not intersect at a corner & the black coloured face is adjacent to both green coloured face & blue coloured face (but blue & green coloured faces are not adjacent to each other). So, the smaller cubes formed at the 2 edges where black coloured face meet other coloured face will have 2 coloured faces & so these cubes must be removed. We get total n^2 small cubes

in each face. So, the required number of cubes = $n^2 - 2n = 6^2 - 2(6) = 24$.

24. We need to assume the 3 coloured faces do not intersect at a corner & the green & blue coloured faces are adjacent to each other. So, the smaller cubes formed at the edge where these faces intersect will have exactly 2 coloured faces with 1 face coloured green & other coloured blue. In each edge 6 small cubes are formed. So, required number of cubes is 6.
25. The number of smaller cubes with no coloured face must be $(n - 1)^3$ as we need to subtract 1 due to each face. So, required number of cubes = $(n - 1)^3 = (6 - 1)^3 = 125$. Only option (b) includes 125.
26. This can be solved by visual inspection. By observing the given figures we can conclude that E & C must be opposite faces. In option (c), E & C are shown as adjacent faces. So it does not confirm to the original cube.

Chapter

12

BOOLEAN LOGIC

LEARNING Objectives

In this chapter, you will learn:

- ☐ What is Boolean Logic?
 - ☐ Solving questions through decision tree analysis
 - ☐ Approach to solve the questions
-

Boolean logic is a form of algebra in which all values are reduced to either true or false. It was developed by English mathematician George Boole in the mid-19th century. Its rules govern logical functions (true/false) and are the foundation of all electronic circuits in the computer. As add, subtract, multiply and divide are the primary operations of arithmetic, AND, OR and NOT are the primary operations of Boolean logic. Boolean logic is turned into logic gates on the chip, and the logic gates make up logic circuits that perform functions such as how to add two numbers together.

However, we would be concerned here with the logical application of Boolean logic in True/False situations only. Boolean logic is, sometimes, also referred as Binary Logic.

Let us see a Boolean Logic situation:

On a fictional island, all inhabitants are either knights, who always tell the truth, or knaves, who always lie. The question set involves a stranger to the island who meets small groups of inhabitants there. Usually, the aim is for the visitor to conclude the inhabitants' type from their statements, but some questions of this type ask for other facts to be deduced. The question may also be to determine a Yes/No question which the visitor can ask in order to discover what he needs to know.

Basic Question Type

There are three inhabitants referred as A, B and C. The visitor asks A what type he is, but does not hear A's answer. B then says "A said that he is a knave" and C says "Don't believe B: he is lying!"

To solve the puzzle, understand that no inhabitant can say that he is a knave. Reason for this can be given as—If somebody is a Knight, then he speaks truth always and of course he cannot say that 'I am knave.' Similarly, if somebody is a knave, then he speaks false always. Now, if somebody speaks false only, he cannot say that I always speak false as this amounts to contradiction.

Coming back to the original question, hence B's statement must be untrue, so he is a knave, and C's statement must be true, so he is a knight. Since B is a knave, he will always lie. Therefore B was lying when he said that A said he was a knave. Therefore A must have said he was a Knight.

More Examples

A large number of elementary Boolean Logic questions can be solved by using the simple logic or elementary

Boolean Algebra (or, logic truth tables). To increase the familiarity with Boolean logic and its simplification process, let us see some more basic questions.

Jain and Baid are residents of the island of knights and knaves.

Question 1

Jain says: We are both knaves.
Who is who?

Solution

This is what Jain is saying in a more extended form:

“Jain is a knave and Baid is a knave.”

If Jain was a knight, he would not be able to say that he was a knave since he would be lying. Therefore the statement “Jain is a knave” must be true.

Since knaves lie, and one statement is true, hence to make the statement given by Jain false, the other statement must be false. Therefore the statement “Baid is a knave” must be false which leads to the conclusion that Baid is a knight.

The solution is that Jain is a knave and Baid is a knight.

Alternatively, we can use Boolean algebra to find out who’s who as follows:

Let J be true if Jain is a knight and let B be true if Baid is a knight. Now, either Jain is a knight and what he said was true, or Jain is not a knight and what he said was false. Translating that into Boolean algebra, we get:

Therefore Jain is a knave and Baid is a knight. Although we can do this question without using Boolean algebra very easily.

Here is one of the most famous Boolean Logic questions:

Question 2

A prince visits an island inhabited by Knights and Knaves. Knights always tell the truth, and knaves always lie.

The prince comes to a fork in the road. He needs to know which road leads to the jungle so as to rescue the princess. (Although the prince doesn’t know it, the south road leads to the jungle and the north road leads to the monster.)

Standing at this fork in the road is a knight and a knave, but the prince can’t tell who is who. What question should he ask to find the road to the jungle so that he can save the princess?

Solution

Simply asking which road leads to the jungle won’t help. The answer won’t tell us who is lying and who is telling the truth. However, we really only need to talk to *one* of them. The trick is to ask a question where the response will be the same from both of them: a question that incorporates how a knight or a knave *not* answering would respond to the same question.

For example, what if we say to one of them, “If I asked a member of the type you *don’t* belong to which road I should take to get to the jungle, what would he say?”

1. If we ask a truth-teller, the response will be: “He would say to take the north road.” The road to the castle is the south road so the liar will tell us to take the north road, and the truth teller will faithfully report this to us.
2. If we ask a liar, the response will be: “He would say to take the north road.” The road to the jungle is the south road and the truth teller will tell us to take the south road, but the liar will *not* report this faithfully to us - he will say the opposite.

In both cases we’ll get the same response. We should do the opposite of what we have been told because, regardless of whether we are speaking to a liar or a truth teller, our question will always produce the wrong answer to which road we should take.

Variations in Problems

In some variants, inhabitants may also be alternators, who alternate between lying and telling the truth, or normal person, who can say whatever they want (as we can see in the case of Knight/Knave/Spy puzzles). A further complication can be brought by bringing the situation where the inhabitants may answer yes/no questions in their own language, and the visitor knows that “bal” and “da” mean “yes” and “no” but does not know which is which. So, this question will now lead to two Y-junctions.

Knights always tell the truth.

Knaves always lie.

Spies can either lie or tell the truth.

Normally, we encounter a group of three people, A, B and C and one of them is a Knight, one of them is a Knave and the left one is a spy, but we don’t know who is which. However, they all know the identity of each other.

Example

A says: I am a knight.
 B says: That is true.
 C says: I am the spy.

Solution

We can understand that neither B nor C can be the knight. (B is saying that somebody else is knight and C says that he is a spy). Hence A is a knight. What B is saying is true so he cannot be the knave. Hence he is a spy. So, C is knave.

A says: B is the spy.

B says: No, C is the spy.

C says: No, B is definitely the spy.

Solution: B cannot be the spy, as in that case both a knave and a knight would be accusing him of being the spy. And if B is not the spy, then in that case neither A

nor C can be the knights since they would not be telling the truth. Hence B is a knight, as a result A and C are knave and spy respectively.

There can be only six possibilities of Knights, knaves and spy that we can have for any particular set:

Knight Knave Spy, or, Knight Spy Knave, Knave Spy Knight, Spy Knight Knave, Knave Knight Spy, Spy Knave Knight.

Any statement made by any person in a question can be classified into various possibilities. For example – the statement that ‘I am a knave’ cannot be said made by i. Knight, ii. Knave. Hence anybody making this statement has to be a spy. Similarly, the statement ‘I am a spy’ cannot be made by a knight. Hence anybody making this statement has to be either a knave or a spy.

However, there can be some useless statements too like ‘I am a knight’. It can be seen that this statement can be made by anybody—a knight or a knave or a spy.

PRACTICE EXERCISE 1

Directions for questions 1 to 5: Read the following paragraph and answer the questions that follow:

There are two types of people living in what is land—X type and Y type. The X type of inhabitants always speak the truth and the Y type of inhabitants always lie.

- Munu says, “I always lie”. Which type of an inhabitant is she?
 - X
 - Y
 - Either X or Y
 - given statement is infeasible
- Chunmun says, “According to Munu, I always speak the truth.” Which of the following is a correct conclusion?
 - Chunmun has to be of type X
 - Chunmun has to be of type Y
 - Munu has to be of type X
 - Munu has to be of type Y
- Bhasker says, “Sharma and I are of the same type.” Which of the following is a correct conclusion?
 - Bhasker and Sharma are necessarily of the same type.
 - Sharma has to be of type X.
 - Bhasker and Sharma cannot be of the same type.
 - The given statement is infeasible
- Rahul says “Pallavi and I are of different types.” Which of the following is a correct conclusion?
 - Rahul and Pallavi are of type Y and type X respectively.
 - Rahul and Pallavi cannot be of the same type.
 - Pallavi has to be of Type Y.
 - None of these
- Booker says, “At least one person among Shane and I always lie.” What types are Booker and Shane respectively?
 - Y, X
 - Y, Y
 - X, Y
 - It is not possible to deduce

Directions for questions 6 to 8: Read the passage below and solve the questions based on it.

On the Island of who went where, there are only two kinds of people. Type NO are those who, when they ask a question, must always get a ‘No’ for an answer

and type Yes are those who must always get a Yes for an answer to every question they ask.

- Victor and Trish are married. Victor asks you: “Are both of us of the type No?” You can conclude that
 - It is impossible for him to have asked such a question
 - Victor is a No
 - Trish is a No
 - His type cannot be identified
- Jay, Ajay and Vijay all approach you. Jay asks, “Are at least two of us of the type No?” You can infer that
 - Jay is a No
 - Jay is a Yes
 - None of them is No
 - Cannot be determined.
- Abhay, Lokesh and Rituraj approach you. Abhay asks, “Is it true that neither Lokesh nor Rituraj can be yes?” you can infer that
 - Both Lokesh and Rituraj are Nos.
 - Abhay is a No
 - Abhay is a yes
 - None of the above

Directions for questions 9 to 11: Read the information given below and solve the questions based on it.

There are four members in a family—Kitto, Litto, Mitto and Nitto. Among these four persons, there is one couple, their son and their daughter. When asked about their relationships, the following were their replies:

Kitto – Nitto is my husband. Mitto is my daughter.

Litto – Kitto is my mother. Mitto is my son.

Mitto – Kitto and Litto are of the same gender.

Litto is my sister.

Nitto – Litto is of the same gender as I. Mitto is my son.

If it was known that only one of them always speaks the truth.

- Among them, if there are two persons who always lie then who always speaks truth?
 - Kitto
 - Mitto
 - Nitto
 - cannot be determined
- Among the four, who cannot be the truth teller?
 - Litto
 - Mitto
 - Nitto
 - cannot be determined

11. Among them if there are two persons who always alternate between truth and lie, then who speaks the truth always?
 (a) Kitto (b) Mitto
 (c) Nitto (d) cannot be determined

Directions for questions 12 to 16: Read the information given below and solve the questions based on it.

There are three friends—A, R and U—in a group. Out of these three friends, one always speaks truth, one always lies and another one alternates between truth and lies. Exactly one of them is the owner of facebook.com, the other one is the owner of orkut.com and the third one is the owner of terrificmail.com, in no particular order.

In a recent interview, each of them was asked—Which website do you own? Following is their reply pertaining to the above given question:

A – I own facebook.com. U owns orkut.com.
 U – I own facebook.com. R owns terrificmail.com.
 R – A owns orkut.com. U owns facebook.com.

12. Who among the three is a liar?
 (a) A (b) R
 (c) U (d) cannot be determined
13. Who among the following owns terrificmail.com?
 (a) A (b) R
 (c) U (d) cannot be determined
14. Which website is owned by U?
 (a) facebook.com
 (b) orkut.com
 (c) terrificmail.com
 (d) cannot be determined
15. Who among the three is a truth teller?
 (a) A (b) R
 (c) U (d) cannot be determined
16. Who among the three is an alternator?
 (a) A (b) R
 (c) U (d) cannot be determined
17. A puzzle is defined by the statements of three people. Out of those three people, one is a knight who always tells the truth, one is a knave who always lies, and one is a spy who can either lie or tell the truth. If there is no assignment of 'knight knave spy' which is valid, the puzzle is a paradox. How many of the given sets will end up in paradox?

- I. A: I am a Knight
 B: I am a Knave
 C: I am a Knave
 II. A: I am a Knight
 B: I am a Knave
 C: A is a Knight
 III. A: I am a Knight
 B: A is not a Knave
 C: A is not a Knave
 (a) 0 (b) 1
 (c) 2 (d) 3

Directions for questions 18 to 20: Read the passage below and solve the questions based on it.

Nobody has ever imagined that the level of politics in India will stoop so low that people will become indifferent and totally uninterested in Indian Politics. And as a result, they will forget even the name of their Prime Minister. And even the situation of the parliamentarians was no better. To hide the fact that they are unaware of the name of their Prime Minister, whenever they are asked the name of Prime Minister, they make two statements - one of which is true and the other one is false (If you cannot convince, then confuse them). Following is the recorded transcript of the interview of three parliamentarians:

Rakhi – The Prime Minister(PM) claims that he is the PM. I am the PM.

Sameera – I am the PM. Rakhi is the PM.

Mallika – I am the PM. Sameera knows who is the PM.

18. Using the statements of whom of the three, can we determine the PM?
 (a) Sameera's + Rakhi's
 (b) Sameera's + Mallika's
 (c) Mallika's + Rakhi's
 (d) Cannot be determined
19. Who is the PM?
 (a) Sameera
 (b) Mallika
 (c) Rakhi
 (d) None of these three
20. Whose first statement is false?
 (a) Sameera
 (b) Mallika
 (c) Rakhi
 (d) None of these three

ANSWER KEYS

1. (d)	2. (c)	3. (b)	4. (c)	5. (c)	6. (b)	7. (d)	8. (d)	9. (c)	10. (a)
11. (a)	12. (b)	13. (b)	14. (b)	15. (a)	16. (c)	17. (d)	18. (a)	19. (a)	20. (b)

HINTS AND EXPLANATIONS

1 to 5

- Munu cannot be X type person, as then her given statement would contradict it. If she is type Y person, then her statement is true which will prove that she is not type Y person. So, the given statement is infeasible
- We are given what Munu said about Chunmun. So, we should analyse it according to Chunmun being type X or type Y person. If Chunmun is type X person, then the statement given by Chunmun must be correct & so Munu is also type X person. If Chunmun is type Y person then the statement given by Chunmun must be wrong, so it means then Munu must have said that Chunmun lies which again shows that Munu is type X person. So, in either case Munu must be type X person. So, we can conclude that Munu has to be of type X
- We do not know whether Bhaskar is saying truth or he is lying. If we assume that Bhaskar is type X person, then he must be true & it proves that Sharma is also type X person. If Bhaskar is type Y person, then the statement must be false & so Bhaskar & Sharma must be of different type. So, in that case, Sharma must be type X person. So, in either case, Sharma is type X person. So, we can conclude that Sharma has to be of type X
- We do not know whether Rahul is saying truth or he is lying. If we assume that Rahul is type X person, then he must be true & it proves that Pallavi is type Y person. If Rahul is type Y person, then the statement must be false & so Rahul & Pallavi must be of same type. So, in that case, Pallavi must be type Y person. So, in either case, Pallavi is type Y person. So, we can conclude that Pallavi has to be of type Y
- We do not know whether Booker is saying truth or he is lying. If we assume that Booker is type X person, then he must be true & it proves that Shane is type Y person, as only Shane could lie among Booker & Shane. If Booker is type Y person, then the statement must be infeasible as the statement must be true but it

cannot go along the fact that Booker is type Y person. So, only possibility is that Booker is type X & Shane is type Y person

6 to 8

- We do not know that whether Victor is type Yes or type No person. If we assume him to be type Yes person, then the answer must be no (as at least he won't be type No person then) but if answer No is given, he will become type No person. So, he must not be type Yes person. If he is type No person then the answer he receive must be no & it is possible in Trish is type Yes person (Victor still being type No person). So, we can conclude that Victor must be type No & Trish must be type Yes person
- We do not know that whether Jay is type Yes or type No person. If we assume Jay to be type Yes person, then the answer may be yes (if he is type Yes person, then Ajay & Vijay may be type No person) or no (if either Ajay or Vijay or both are type Yes person). So, it is feasible as it can give Yes as answer if Jay is also yes person.
If we assume Jay to be type No person, then the answer may be yes (if Ajay or Vijay or both are type No person) or no (if both Ajay & Vijay are type Yes person). So, it is feasible as it can give No as answer if Jay is also No person. So, we cannot conclude whether Jay is Yes type person or No type person. So, it cannot be determined
- We do not know that whether Abhay is type Yes or type No person. If we assume Abhay to be type Yes person, then the answer will be yes, then Lokesh & Rituraj are type No person. If we assume Abhay to be type No person, then the answer will be no, then at least one among Lokesh & Rituraj is type Yes person (there will be 3 possibilities- Lokesh is type Yes & Rituraj is type No, Lokesh is type No & Rituraj is type Yes or both are type Yes). So, we

cannot conclude anything about Abhay, Lokesh & Rituraj. So, it cannot be determined

9 to 11

We know there are 4 people- Kitto, Litto, Mitto & Nitto. Among these people there is a couple, their son & their daughter. We also know only 1 of them always speak truth (i.e. both the statements must be true only for 1 person)

If we check the statements by Litto, it is clear that at least 1 of his/her statement must be false as there are 2 generation & not 3 generations of this family.

If we assume both the statement of Kitto is correct. Then, Nitto & Kitto are husband-wife. Mitto & Litto are their daughter & son respectively.

If we assume both the statement of Mitto is correct. Then, Nitto & Kitto are husband-wife. Litto & Mitto are their daughter & son respectively.

If we assume both the statement of Nitto is correct. Then, Kitto & Nitto are husband-wife. Litto & Mitto are their daughter & son respectively.

9. We are given that 2 person always lie. We cannot choose any 2 from Kitto, Mitto & Nitto to be those 2 who always lie (say both Kitto & Mitto always lie or both Kitto & Nitto always lie or both Nitto & Mitto always lie). As then the 3rd person cannot be the truth teller (whose both statements will be correct) & we also know that 1 from these 3 must be the truth teller as Litto cannot be the truth teller.

So, 1 person who always speak lie is Litto. Other person is 1 from Kitto, Mitto & Nitto. The truth teller is 1 from Kitto, Mitto & Nitto. One of the people who always lie is Litto, so both statements by him/her must be false. So, neither Mitto is his/her son nor his/her mother is Kitto. We can conclude that Litto & Mitto are siblings & their parents are Nitto & Kitto. So, if Kitto is not mother he must be the father. So, Kitto is the husband & his wife is Nitto

Among Kitto, Mitto & Nitto only Nitto said that Kitto & Nitto are husband wife. So, only Nitto can be the truth teller. Option (c) is correct

10. It is observed in general solution of 9-11, that at least 1 statement of Litto must be false. So, Litto cannot be the truth teller. Option (a) is correct
11. We are given that 2 persons always alternate between truth & lie, so 1 of the statement must be true & other must be false. Litto cannot be the truth teller, but he/she may be the person who alternate between truth & lie. The truth teller is still 1 among the

Kitto, Mitto & Nitto. So, we can assume any one from these 3 to be the truth teller & check if we can find 2 people such that both are having 1 statement correct & one statement false. If we assume both the statement of Kitto is correct. Then, Nitto & Kitto are husband-wife. Mitto & Litto are their daughter & son respectively. Litto's 1st statement is correct but 2nd is false. Mitto's both statements are false. Nitto's 1st statement is correct & 2nd is false. So, we can conclude that Kitto must be the truth teller. Correct option is (a)

Note: students must check it by assuming Mitto & Nitto as truth teller too. It must not give exactly 2 persons who always alternate between truth & lie.

12 to 16

We know there are 3 friends- A, R & U. Among these friends, one is truth teller (always speak truth, so both statements by that person must be correct), one always lie (so both statements by that person must be false) & one always alternate between truth & lie (so this person's one statement must be correct & one statement must be false). Exactly one of them is owner of facebook.com, other one is owner of orkut.com & 3rd one is owner of terrificmail.com.

Case 1: If we assume that A is truth teller, then A is owner of facebook.com, U is owner of orkut.com & R is owner of terrificmail.com.

Further, 1st statement by U is false & the 2nd statement is correct. Similarly, both statements of R are false.

So, A is truth teller, R always lie & U alternate between truth & lie.

Case 2: If we assume that U is truth teller, then U is owner of facebook.com, A is owner of orkut.com & R is owner of terrificmail.com.

Further, both statements of R are correct. Similarly, both statements of A are false.

So, both U & R are truth tellers & A always lie.

Case 3: If we assume that R is truth teller, then U is owner of facebook.com, A is owner of orkut.com & R is owner of terrificmail.com.

Further, both statements of U are correct. Similarly, both statements of A are false.

So, both U & R are truth tellers & A always lie.

We are given exactly 1 is truth teller (always speak truth), one always lie & 3rd one alternate between truth & lie.

So, only case 1 is feasible. Therefore A is truth teller, R always lie & U alternate between truth & lie.

12. R is a liar
13. R is the owner of terrificmail.com
14. The website orkut.com is owned by U
15. A is a truth teller
16. U is an alternator
17. If we check I, Knave will not say he is Knave & so B or C must not be Knave. Further any 1 of them is spy. If A is Knave then B or C cannot be Knight too as Knight must say he is Knight. So, this does not give valid assignment of Knight, Knave & Spy
If we check II, Knave will not say he is Knave & so B must not be Knave & he cannot be Knight too, so he is spy. Knight must say he is Knight. So, A is spy. Now, C cannot be Knave. So, this does not give valid assignment of Knight, Knave & Spy
If we check III, if A is Knight then there cannot be any Knave (as both B & C are also correct). If A is Knave, then there cannot be any Knight (as both B & C will be wrong). If A is spy then there is no Knave (as both B & C are correct). So, this does not give valid assignment of Knight, Knave & Spy.

So, all 3 sets end up in a paradox. Correct option is (d)

18 to 20

We are given 3 parliamentarians Rakhi, Sameera & Mallika. They all are alternators (each of them gave 2 statements, out of which 1 is correct & other is false).

If we check all 3 of them claimed to be PM. So, it means PM must have claimed that he/she is PM. So, Rakhi's 1st statement is correct. So, 2nd statement must be false & so Rakhi is not PM. Now, Sameera's 2nd statement is false (as Rakhi is not PM). So, Sameera's 1st statement is correct. So, Sameera is PM. Mallika's 1st statement is false & 2nd statement is correct

18. Sameera's + Rakhi's statements are sufficient to decide that Sameera is PM. (we have to start with 1st statement of Rakhi as shown above)
19. Sameera is the PM
20. Mallika's 1st statement is false

PART 1

LOGICAL REASONING

SECTION 2

PRACTISING LOGICAL REASONING

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Chapter

13

FOUNDATION EXERCISES

PRACTICE EXERCISE 1

Directions for questions 1 to 3: *Read the following passage and solve the questions based on it.*

Ten coins are distributed among four people P, Q, R and S such that one of them gets one coin, another gets two coins, the third gets three coins and the fourth gets four coins. It is known that Q gets more coins than P, and S gets fewer coins than R.

1. If the number of coins distributed to Q is twice the number distributed to P, then which one of the following is necessarily true?
 - (a) R gets an even number of coins
 - (b) R gets an odd number of coins
 - (c) S gets an even number of coins
 - (d) S gets an odd number of coins
2. If R gets at least two more coins than S, then which one of the following is necessarily true?
 - (a) Q gets at least two more coins than P.
 - (b) Q gets more coins than S
 - (c) P gets more coins than S
 - (d) P and Q together get at least five coins
3. If Q gets fewer coins than R, then which one of the following is not necessarily true?
 - (a) P and Q together get at least four coins than P
 - (b) Q and S together get at least four coins
 - (c) R and S together get at least five coins
 - (d) P and R together get at least five coins

Directions for questions 4 to 7: *Read the following passage and solve the questions based on it.*

To make the non-technical background new joiners understand the process of manufacturing colour TVs better, LG has hired the services of Due North Inc. consultants. Due North is a consultancy firm which provides technical training of all the household equipment to the non- tech background new joiners at LG. To facilitate the training process, it has been decided that there will be six groups of new joiners namely A, B, C, D, E and F and each of the groups is scheduled at least once a week. All the groups will start their training on the same day and will also end their training on the same day.

Following points are to be taken into consideration while making the training schedule:

- (i) Sunday is a holiday.
- (ii) B group is scheduled all days except Friday and Saturday.
- (iii) C group meets four days in succession.
- (iv) F group meets only from Monday to Thursday.
- (v) E group is scheduled everyday, but not on Thursday and Saturday.
- (vi) A group is scheduled on alternate days.
- (vii) C group does not meet on Monday and Tuesday only.
- (viii) A and D groups never meet on the same days.
- (ix) D group is scheduled only once a week on either Wednesday or Friday.

4. Which groups are scheduled for the same number of classes during the week?
 - (a) B, A, F only
 - (b) E, B, C only
 - (c) E, F, A only
 - (d) None of these
5. If a certain class of D is scheduled on the same day as that of the B group, then how many groups are scheduled on Friday?
 - (a) 2
 - (b) 3
 - (c) 4
 - (d) 5
6. For how many groups do we have a definite training schedule, for the whole week?
 - (a) 4
 - (b) 2
 - (c) 3
 - (d) 5
7. Which two groups can never be scheduled on the same day?
 - (a) C and D
 - (b) C and E
 - (c) A and D
 - (d) None of these

Directions for questions 8 to 11: Read the following passage below and solve the questions based on it.

There are five identical looking boxes containing different objects in each of them and every box has a label indicating its contents. The following is the correct description of the contents and the label of each box:

Contents	Label
Two Pins	PP
Two Balls	BB
Two Clips	CC
One Pin and one Clip	PC
One Ball and one Clip	BC

Somebody has mischievously interchanged these labels in such a way that no box carries the label describing its contents correctly.

8. The first box which was opened contained the label PP and the second box opened contained the label PC. It is also known that out of the four items in the two boxes, one item was definitely a ball. Then which of the following has to be true?
 - (a) Other three items will not contain two balls
 - (b) Other three items will not contain any clip

- (c) Other three items will contain at least one clip
 - (d) None of these
9. Box PP contained two clips, box CC contained two pins and the box BB contained one ball. Then which of the following will definitely be false?
 - (a) The box BC contains one pin and one clip
 - (b) The box BB contains one ball and one clip
 - (c) The box BC contains two balls
 - (d) The box PC contains two balls
10. If the first box containing the label BC was opened and it was found that one item is a ball, then which of the following is definitely true?
 - (a) The other item may be either a ball or a clip
 - (b) The other box with the BB label contains one ball and one clip
 - (c) The other item will not be a ball
 - (d) The other item will also be a ball
11. If the information is available that the box PC does not contain either any pin or any clip, box PP does not contain any pin and box CC contains one clip and one ball. Which of the following will definitely be true if only one of the remaining boxes is opened?
 - (a) The box will have one pin and one clip
 - (b) The box will have at least one clip
 - (c) The box will have at least one pin
 - (d) None of these

Directions for questions 12 to 16: Read the following passage and solve the questions based on it.

There are various rides available at the annual *Lucknow Mahotsav*. One of the rides that is available is the roller coaster ride, comprising five cars, numbered 1 through 5 from the front to back. Each car can accommodate up to two riders, seated side by side. Six persons—T, G, L, M, P and J, are taking the ride simultaneously. The Following information is available regarding their seating pattern:

- (i) L is sharing a car.
 - (ii) M is not sharing a car and is seated immediately behind an empty car.
 - (iii) T is not sharing a car with either G or P.
 - (iv) G is in either the third or the fourth car.
12. Which of the following people definitely occupy the second car?
 - (a) L only
 - (b) T and G
 - (c) L and M
 - (d) None of these

13. If G is immediately behind L's car and immediately ahead of T's car, all of the following must be true except
 (a) G is in the fourth car
 (b) P is in the third car
 (c) T is in the fifth car
 (d) L is in the third car
14. Which one of the following statements cannot be true?
 (a) Neither T nor G is sharing a car with anybody else
 (b) Neither M nor J is sharing a car with anybody else
 (c) T is sharing a car and J is sharing a car
 (d) G is sharing a car and P is sharing a car
15. If P is in the second car, how many different combinations of riders are possible for the third car?
 (a) 1 (b) 2
 (c) 4 (d) None of these
16. Assume that a 7th person is in with J in the first car and all the other conditions remain the same. Which of the following is a complete list of persons who might be in the fifth car?
 (a) M (b) G, P
 (c) T, L, P (d) T, L, M

Directions for questions 17 to 20: Read the following passage and solve the questions based on it.

'Vaastu-shastra' says that the dining table should not be rectangular, rather it should be hexagonal, as it helps in reducing the conflict. Accordingly, Mr Verma bought a hexagonal dining table for his six office employees A, B, C, D, E and F.

One day while taking lunch they were sitting along the sides of the hexagonal table. The following information is given regarding their seating positions:

- (i) F, who is sitting exactly opposite A, is to the immediate right of B.
 - (ii) D is between A and B and is exactly opposite C.
17. A is sitting between which of the following pairs of persons?
 (a) D and E (b) B and E
 (c) B and C (d) E and C

18. Four of the following pairs are alike on the basis of sitting positions and so form a group. Which is the one that does not belong to the group?
 (a) A, D (b) B, C
 (c) B, F (d) C, E
19. Who is sitting opposite B?
 (a) C
 (b) A
 (c) E
 (d) Cannot be determined
20. Who is sitting to the left of F?
 (a) B
 (b) C
 (c) A
 (d) None of these

Directions for questions 21 to 23: Read the following passage and solve the questions based on it.

There are nine judges—G, H, I, K, L, M, N and O, who have to appear on a series of three benches. Each bench will consist of three judges and each judge will appear in exactly one bench. The benches must be arranged according to the following conditions:

- (i) I and N must be on the same bench.
 - (ii) K and L must be on the same bench.
 - (iii) O and J cannot be on the same bench.
 - (iv) M must appear on the second bench.
 - (v) Either J or M or both must appear on the bench with H.
21. Which of the following judges could appear on a bench together?
 (a) G L O (b) G J M
 (c) K I M (d) N I J
22. Which of the following cannot be true?
 (a) I appears on the second bench
 (b) H appears on the third bench
 (c) O appears on the third bench
 (d) J appears on the first bench, and H appears on the third
23. The third bench could consist of all of the following except
 (a) K, L, O (b) K, I, J
 (c) G, H, J (d) G, I, N

ANSWER KEYS

1. (d) 2. (b) 3. (a) 4. (b) 5. (a) 6. (d) 7. (c) 8. (d). 9. (c). 10. (d)
 11. (c) 12. (d) 13. (b) 14. (a) 15. (d) 16. (d) 17. (a) 18. (b) 19. (c) 20. (a)
 21. (d) 22. (d) 23. (b)

HINTS AND EXPLANATIONS

1 to 3

1. It is given that $Q > P$ and $R > S$.

Q	P	R	S
4	2	3	1
2	1	4	3

The distribution of coins can be of two types; in both the cases, S gets an odd number.

2. The possible arrangements are:

R	S	Q	P
3	1	4	2
4	1	3	2
4	2	3	1

3.

R	S	Q	P
4	2	3	1
4	1	3	2
4	3	2	1

Looking at the possible distribution of coins, we find that option (a) is not always true.

4 to 7

Using the statements given above, we have the following diagram for the training schedule:

Group	Mon	Tue	Wed	Thu	Fri	Sat
A	X	√	X	√	X	√
B	√	√	√	√	X	X
C	X	X	√	√	√	√
D	X	X		X		X
E	√	√	√	X	√	X
F	3	3	√	√	X	X

Here, group D meets either on Wednesday or on Friday.

8 to 11

8. Content combinations PP in 1st box and PC in the 2nd box are eliminated as no label indicates the contents of the boxes correctly. Now if one of the four items is a ball then one of the combinations is either BC or BB.

Option (a) is wrong when the combinations are BC and BB.

Option (b) is wrong when the combinations are (i) BC along with PC or CC, (ii) BB along with CC, PC or BC.

Option (c) is wrong because the combination in box PP is BB and in box PC is PP.

Option (d) is obviously the answer.

9. Label PP – CC
 Label CC – PP
 Label PP – BC

Now if the box with the label BC has contents BB, then the box with the label PC will have the contents PC and this is not allowed. Hence option (c) is definitely wrong.

10. The box containing the label BC has one ball and one clip. After the interchange, it will not contain the same combination. Now, there are only two boxes which have the ball as one of the items, so the other item will also be a ball.
11. The box with the label PC contains two balls; the box with the label PP contains two clips and the box with the label CC contains one ball and one clip. The remaining two boxes contain two pins and one pin and one clip. Hence if only one of the remaining boxes is opened, it will have at least one pin.

12 to 16

12. G is either in 3rd or 4th car. So, option (b) is not possible. L is sharing a car. So, (a) is not correct. M is not sharing a car. So (c) is not correct.

Correct option is (d)

13. Let us take two possible scenarios:

Scenario 1: L, G and T would occupy the second, third and fourth cars, respectively. But this arrangement would not accommodate M, seated alone, immediately behind an empty car. Hence this scenario is eliminated.

Scenario 2: Given the additional information, L must occupy the third car while T occupies the fifth car. Accordingly, M must occupy the second car and the first car must be empty.

However, P may occupy either the third or the fourth car. Thus, statement (b) is not necessarily true.

14. Total number of persons = 6
Total number of seats = 10

Number of vacant seats = 4. Out of these 4 seats, 3 seats are vacant because of M. So, only one out of remaining people can sit alone.

15. If P is in 2nd car, then we have 2 possibilities:

G is in 3rd or 4th car. If G is in 4th car, we cannot accommodate M in any car. So, G must be in 3rd car. T is not sharing car with G. So, there are 3 possibilities for 3rd car, which are:

- (1) G alone
- (2) G & J
- (3) G & P

Correct option is (d)

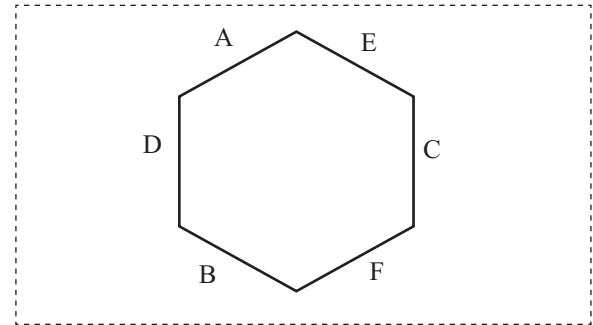
16. Again, consider two basic scenarios.

In Scenario 1: G is in the 3rd car, Given that J and the 7th person occupy the first car, M must occupy the fifth car alone.

Scenario 2: G is in the 4th car. It is given that J and the 7th person occupy the 1st car, M must occupy the 3rd car (while the 2nd car is empty). Since T cannot share a car with G, T must occupy the 5th car. Again T cannot share a car with P, hence P must share the 4th car with G.

Accordingly, L should share the 5th car with T.

17 to 20



18. The rest are sitting adjacent to each other

21 to 23

21. Eliminating the options. I must appear with N so, we can eliminate option (c). Also K must appear with L so, we can eliminate option (a). Finally, J or M must be with H, so we can eliminate option (b).

Hence option (d) is the answer.

22. The last condition requires that either J or M or both appear with H. M is on bench two. If J is assigned to bench one and H to bench three, then neither J nor M appears with H.

23. I cannot be assigned to a bench without N so, option (b) violates one of the initial conditions.

PRACTICE EXERCISE 2

Directions for questions 1 to 4: Read the following passage and solve the questions based on it.

Under a special arrangement at FBI, telephone numbers of the employees are to be coded in the following way:

Digit	7	3	5	0	2	1	6	4	9	8
Code	N	H	L	T	F	D	R	Q	G	P

Following conditions are to be maintained:

- If the first digit is even and the last digit is odd, then they are to be coded as \$ and @ respectively.
- If the first digit is odd and the last digit is even, then they are to be coded as # and γ respectively.
- If 0 is preceded as well as followed by an odd digit, then 0 is to be coded as *.
- If 0 is preceded as well as followed by an even digit, then 0 is to be coded as ↑.
- Zero (0) is considered neither even nor odd.

- What is the code for 1375490?
 - DHNLQGT
 - #HNLQGE
 - DHNLQG*
 - γHNLQG#
- Which of the following numbers will be coded as \$ Q R L * H @?
 - 8456037
 - 8465032
 - 6475031
 - cannot be determined
- Which of the following numbers will be coded like—Q L P ↑ R N T?
 - 4570680
 - 4780650
 - 6580470
 - None of these
- What will be the code for 36250084?
 - #RFL**Gγ
 - #RFLG**γ
 - #RF**LG*
 - none of these

Directions for questions 5 to 7: Read the following passage and solve the questions based on it.

“Lets be God” is an organization imparting training to people to touch the different dimensions of life and be like God. It was planning to organize series of eight lectures A, B, C, D, E, F, G and H (not necessarily in the same order) for three subjects ‘Purpose of God’, ‘Alignment of Purpose’ and ‘Touching Lives’ on three successive days.

For the sake of convenience, these three subjects are coded as X, Y and Z respectively. Subject X was to

be covered first in three lectures followed by Z and then subject Y in two lectures.

- Lectures A, C and D have to be on separate days.
 - Lectures B and F have to be kept on separate days. Lecture B cannot be clubbed with A or G or D.
 - Lectures G and H should happen on one day.
 - Only one lecture will happen everyday.
- Which of the following pairs of lectures can go along with lecture A on subject X?
 - B, C
 - G, H
 - D, E
 - data inadequate
 - Which combination of lecturers was arranged on the second day of the series?
 - C, G, H
 - B, D, E
 - C, A, G
 - data inadequate
 - Which of the following lectures were for subject Y?
 - D, F
 - G, H
 - B, C
 - data inadequate

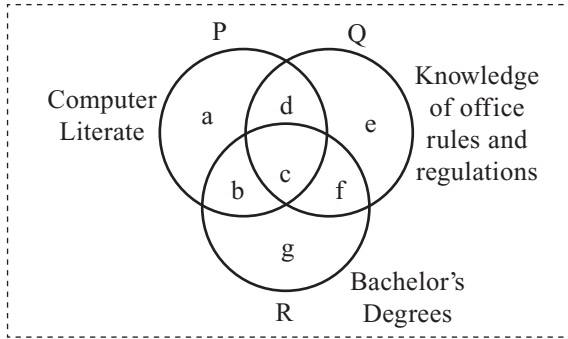
Directions for questions 8 to 12: Read the following passage and solve the questions based on it.

Pankaj, Qureshi, Rajesh and Sudhir live together in a house.

- Pankaj lives with his (or her) parents.
 - Qureshi lives with at least three persons younger than him (or her).
 - Sudhir lives with his mother, and is older than at least two persons living with him.
 - Rajesh lives with his (or her) son and is not older than Sudhir.
- The total number of persons in that house is _____.
 - 3
 - 4
 - 5
 - 6
 - Qureshi is Pankaj’s _____.
 - father
 - mother
 - son
 - grandmother
 - Sudhir is Pankaj’s _____.
 - brother
 - father
 - mother
 - sister
 - Rajesh is Qureshi’s _____.
 - daughter
 - son
 - grandson
 - daughter-in-law
 - Rajesh is Sudhir’s _____.
 - wife
 - husband
 - son
 - daughter

Directions for questions 13 to 17: Read the following passage and solve the questions based on it.

The figure given below consists of three intersecting circles which represent the applicants for the post of PA who are computer literate; who have knowledge of office rules and regulations; and who have a bachelor's degree.



13. Find the letter that represents all the applicants who are computer literate and have knowledge of office, rules and regulations but do not have a bachelor's degree.

(a) b	(b) c
(c) d	(d) f
14. Find the letter that represents all the applicants who are computer literate but do not have a bachelor's degree or any knowledge of office, rules and regulations.

(a) a	(b) b
(c) c	(d) d
15. Find the letter that represents the applicants who are computer literate and have a bachelor's degree but do not have knowledge of office, rules and regulations.

(a) g	(b) e
(c) c	(d) b
16. Find the letter that represents the applicants who are computer literate, know office, rules and regulations and have bachelor's degree.

(a) b	(b) c
(c) f	(d) g
17. Find the letter that represents the maximum number of applicants?

(a) b	(b) c
(c) f	(d) Cannot be determined

Directions for questions 18 to 22: Read the following passage and solve the questions based on it.

Mr Manoj is a medical representative and he is supposed to visit six doctors—M, N, P, Q, R and S, exactly once

every week. To visit the doctors, Mr Manoj has set up a schedule to visit each of the six doctors during the course of one week according to the following conditions:

- (i) He must visit Dr M before Dr N and Dr R.
- (ii) He must visit Dr N before Dr Q.
- (iii) The third doctor he visits must be Dr P.

18. Which of the following must be true of Mr Manoj's schedule?

(a) He visits Dr M before Dr Q
(b) He visits Dr N before Dr R
(c) He visits Dr P before Dr M
(d) He visits Dr P before Dr S
19. If he visits Dr S first, which doctor must he visit second?

(a) Dr M	(b) Dr N
(c) Dr P	(d) Dr Q
20. Mr Manoj could visit any of the following doctors immediately after Dr P except

(a) Dr S	(b) Dr R
(c) Dr Q	(d) Dr M
21. If he visits Dr Q immediately before Dr R and immediately after Dr S he must visit Dr Q

(a) First	(b) Second
(c) Fourth	(d) Fifth
22. Which of the following could be the order in which he visits the six doctors?

(a) Dr M, Dr S, Dr P, Dr N, Dr R, Dr Q
(b) Dr Q, Dr N, Dr P, Dr R, Dr S, Dr M
(c) Dr M, Dr R, Dr N, Dr Q, Dr P, Dr S
(d) Dr P, Dr S, Dr M, Dr R, Dr Q, Dr N

Directions for questions 23 and 24: Read the following passage and solve the questions based on it.

In the famous movie—*Hum Saat Aath Hain* there were six persons A, B, C, D, E and F in the family. C is the sister of F. B is the brother of E's husband. D is the father of A and grandfather of F. There are 2 fathers, 3 brothers and a mother in the family and only these six people were the members of the family.

23. What is the name of husband of E?

(a) B
(b) C
(c) D
(d) None of these
24. Who is the mother?

(a) A	(b) B
(c) E	(d) D

ANSWER KEYS

1. (a) 2. (d) 3. (d) 4. (d) 5. (b) 6. (d) 7. (d) 8. (b) 9. (b) 10. (d)
 11. (d) 12. (a) 13. (c) 14. (a) 15. (d) 16. (b) 17. (d) 18. (a) 19. (a) 20. (d)
 21. (d) 22. (a) 23. (d) 24. (c)

HINTS AND EXPLANATIONS

1 to 4

1. 1 3 7 5 4 9 0
 D H N L Q G T
2. From (i) \$ and @ can be replaced by the combination of 2,4,6,8 and 1,3,5,7,9 respectively.
3. Using (iv)
 Q L P ↑ R N T
 4 5 8 0 6 7 0
4. Obviously, the answer is (d) None of these
5. There are 3 possibilities:
 Day 1: X AGH AGH AEF
 Day 2: Z CBE DEF DGH
 Day 3: Y DF CB CB
6. There are multiple possibilities, so data is inadequate to give answer.
7. There are multiple possibilities, so data is inadequate to give answer.

8 to 12

The given information can be analysed as follows:

- Qureshi — Mother of Sudhir (ii) and (iii)
 Sudhir — Son of Qureshi (ii) and (iii)
 Rajesh — Wife of Sudhir (iv)
 Pankaj — Son of Rajesh and Sudhir (i)

13 to 17

- 13–16. These can be solved by directly observing the figure.
17. The provided figure do not give any numerical data. So, we cannot solve the given question.

18 to 22

18. He visits Dr M before Dr N and Dr N before Dr Q. Hence, he must visit Dr M before Dr Q.
19. Out of the six doctors if Dr S is first, Dr P is third and the order Dr M, Dr N, Dr Q and Dr M, Dr R is followed. Hence, Dr M must be visited second.
20. Since Dr P is at the third place and order Dr M, Dr N, Dr Q and Dr M, Dr R is to be followed, so, immediately after Dr P he can visit any doctor except Dr M and which may occupy first or second place because Dr Q, Dr R and Dr N cannot precede him/her.
21. The order is M, N, P, S, Q, R.
22. According to the given conditions, Dr P must be in third place and the order Dr M, Dr N, Dr Q must not be violated.

23 and 24 *D has 2 sons A & B. E is wife of A. C & F are daughter and son of E & A.*

23. A is E's husband.
24. E is the mother of F and C.

PRACTICE EXERCISE 3

Directions for questions 1 to 4: Read the following passage and solve the questions based on it.

Five friends—Umesh, Vishnu, Xinhua, Yogesh and Zeta collected pebbles on the sea shore. They collected a total of 100 pebbles.

None of them collected less than 10 pebbles each. No two among them collected the same number of pebbles. Following information is given regarding the number of pebbles with each one of them:

- (i) Umesh collected the same number of pebbles as Vishnu and Xinhua put together.
 - (ii) Xinhua collected 3 more pebbles than the cube of an integer.
 - (iii) The number of pebbles collected by Umesh was the square of an integer.
 - (iv) The number of pebbles collected by Vishnu was either the square or the cube of an integer.
 - (v) The number of pebbles collected by Yogesh and Zeta are in the ratio 4 : 3.
1. What was the number of pebbles collected by Umesh?
(a) 19 (b) 36
(c) 52 (d) 64
 2. What was the number of pebbles collected by Vishnu?
(a) 16 (b) 25
(c) 46 (d) 64
 3. What was the difference in the number of pebbles collected by Xinhua and Yogesh?
(a) 5 (b) 7
(c) 9 (d) 11
 4. How many of the individual collection(s) of pebbles was/were prime numbers?
(a) 0 (b) 1
(c) 2 (d) 3

Directions for questions 5 to 9: Read the following passage and solve the questions based on it.

Each of the alphabets given below represents a digit (from 1–9). No digit is represented by more than one alphabet and vice versa.

$$\begin{array}{rcccccc}
 & & A & B & C & D \\
 + & C & A & B & E & B \\
 \hline
 & B & F & D & F & C
 \end{array}$$

5. Find the value of $B + C + D$.
(a) 12 (b) 14
(c) 16 (d) 19
6. What is the value of $A \times B \times C$?
(a) 72 (b) 108
(c) 24 (d) 36
7. What is the value of $(BF) \times (FC)$?
(a) 966 (b) 865
(c) 826 (d) 735
8. How many digits from A to F is/are prime numbers?
(a) 1 (b) 2
(c) 3 (d) 4
9. What is the sum of the three largest digits out of the given digits from A to F?
(a) 24 (b) 23
(c) 21 (d) 22

Directions for questions 10 to 13: Read the following passage and solve the questions based on it.

- (i) A group of five boys A, B, C, D and E and a group of five girls P, Q, R, S and T are standing in a row facing each other (not necessarily in the same order). The group of girls is facing north.
 - (ii) E is not at any of the ends. C is to the immediate right of B and D is to the immediate left of A, who is facing P. There are as many girls between P and Q as between R and S. A is second to the left of B, S and R are not facing either B or D.
10. Which of the following indicates the pair of students standing at the ends of the row?
(a) CB (b) DB
(c) CD (d) Cannot be determined
 11. Which of the following is definitely true on the basis of the given information?
(a) C is second to the right of D
(b) P is third to the right of Q
(c) S is to the immediate right of P
(d) None of these
 12. Who is standing to the immediate right of A?
(a) E (b) C
(c) B (d) Cannot be determined
 13. Who is facing A?
(a) R (b) S
(c) P (d) none of these

Directions for questions 14 to 17: Read the following passage and solve the questions based on it.

There are six students—A, B, C, D, E and F, participating in an evaluation test for Language and Science.

- (i) A's total marks in language were just above C and in Science just above F.
 - (ii) B was just above C in Science but scored less than D in Language.
 - (iii) F got more marks than D and E in science, but didn't perform as well as D in Language.
 - (iv) No one scored in between C and D in Language and C and A in Science.
14. Who got the highest marks in Science?
 - (a) A
 - (b) B
 - (c) C
 - (d) Cannot be determined
 15. Which of the following students has scored the least in Science?
 - (a) only D
 - (b) only E
 - (c) either D or E
 - (d) A
 16. Who scored just below D in Language?
 - (a) B
 - (b) F
 - (c) C
 - (d) Cannot be determined
 17. Which of the given statements is not necessary to answer the questions?
 - (a) ii
 - (b) iii
 - (c) iv
 - (d) All are necessary

Directions for questions 18 to 22: Read the following passage and solve the questions based on it.

In the annual performance appraisal, all employees were placed in three categories—average, good and excellent. To execute the appraisal plan more effectively, a software called 'Appraise Well' is being used. But somehow the computer got infected with a virus and some information was lost.

While trying to recover the data, only the following could be recovered:

	Average	Good	Excellent	Total
Male			12	
Female				36
Total		33		

- (i) An employee can be placed in only one category.
- (ii) Half the employees are either excellent or good.
- (iii) 40% of the employees were females.
- (iv) One-third of the males were average.

18. How many employees are both females and excellent?
 - (a) 2
 - (b) 4
 - (c) 8
 - (d) 0
19. What proportion of the good employees are males?
 - (a) 0.4
 - (b) 0.5
 - (c) 0.6
 - (d) None of these
20. What proportion of the good employees are females?
 - (a) 0.4
 - (b) 0.5
 - (c) 0.6
 - (d) 0.27
21. What proportion of the females are good employees?
 - (a) 0.4
 - (b) 0.5
 - (c) 0.6
 - (d) None of these
22. How many employees are neither excellent nor males?
 - (a) 36
 - (b) 12
 - (c) 24
 - (d) 0

Directions for questions 23 to 25: Read the following passage and solve the questions based on it.

A quiz has three rounds of two questions each. However, the scoring scheme is different in all the three rounds as per the following:

In the first round, each correct answer carries 20 points and each incorrect answer carries a penalty of 10 points. If both the questions in the 1st round are answered correctly a bonus of 10 points is awarded.

In the second round, each correct and incorrect answer gets the same points as in the first round. However, an additional penalty of 10 points is awarded if both the questions are answered incorrectly.

In the third round, each right answer fetches 40 points and an incorrect one fetches a penalty of 20 points.

23. In how many ways can a score of 40 be achieved?
 - (a) 0
 - (b) 1
 - (c) 2
 - (d) 3
24. If only two answers are incorrect in the whole quiz, what is the minimum possible score that a contestant can achieve?
 - (a) 20
 - (b) 30
 - (c) 40
 - (d) None of these
25. If only two answers are incorrect in the whole quiz, what is the maximum possible score that a contestant can achieve?
 - (a) 100
 - (b) 130
 - (c) 120
 - (d) None of these

ANSWER KEYS

1. (b) 2. (b) 3. (a) 4. (b) 5. (c) 6. (a) 7. (a) 8. (b) 9. (b) 10. (c)
 11. (d) 12. (a) 13. (c) 14. (b) 15. (c) 16. (d) 17. (d) 18. (d) 19. (d) 20. (d)
 21. (d) 22. (a) 23. (c) 24. (d) 25. (a)

HINTS AND EXPLANATIONS

1 to 4

U – Umesh V – Vishnu
 X – Xinhua Y – Yogesh
 Z – Zeta

We have

$$U + V + X + Y + Z = 100$$

 and each one of U, V, W, X, Z ≥ 10

$$U = V + X \text{ and } 3Y = 4Z$$

Now,

$$X = 8 + 3 = 11 \text{ or } X = 27 + 3 = 30 \text{ and}$$

$$U = 16, 25, 36, 49 \text{ and}$$

$$V = 16, 25, 27, 36$$

Observing the values of U, V and X, we can easily get that

$$X(11) + V(25) = U(36)$$

 So, $X = 11$, $V = 25$ and $U = 36$

 Now, $Y + Z = 100 - (U + V + X)$

$$= 100 - (11 + 36 + 25) = 28.$$

 now put $Y = \frac{4}{3}Z$ in the above equation to get

$$Z = 12 \text{ and then } Y = 16.$$

5 to 9

$$\begin{array}{rcccc}
 & & A & B & C & D \\
 + & C & A & B & E & B \\
 \hline
 & B & F & D & F & C
 \end{array}$$

Start with the last column. We can infer that there has to be a carry over in the previous column so that $C + 1 = B$, or $B - C = 1$

From the first column, $D + B = C$ or $D + B = C + 10$; $D + B = B - 1$ or $D + B = B + 9$. Hence, D is equal to either -1 or 9 . Since -1 is not possible, so $D = 9$. Now there is a carry over to the next column i.e., $C + E + 1 = F$ or $C + E + 1 = F + 10$.

Moreover, $B + B = D$ is not possible as $B + B = 2B$ which is always an even number. Thus, $B + B + 1 = D$ or $B + B + 1 = D + 10 = 19$ i.e., $B = 4$ or $B = 9$. But B cannot be equal to 9 as $D = 9$. Hence, $B = 4$,

$$C = B - 1, \text{ so, } C = 3$$

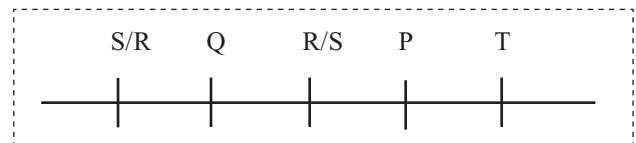
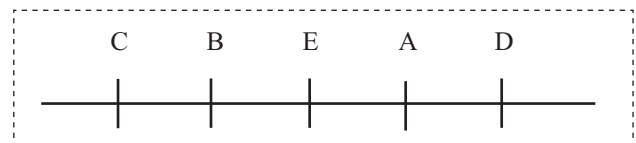
$$A + A = F + 10 \text{ and } C + E + 1 = F + 10.$$

A	F	E	
6	2	8	possible
7	4		not possible as $B = 4$
8	6	12	not possible

Finally,

A	B	C	D	E	F
6	4	3	9	8	2

10 to 13



14 to 17

Order in Language: EACDFB or EACDBF or ACDBFE or ACDBEF or ACDEBF or ACDEFB or ACDFEB or ACDFBE

Order in Science: BCAFDE or BCAFED

17. To answer the question, all four statements (i), (ii), (iii) & (iv) are needed.

18 to 22

	Average	Good	Excellent	Total
Male	18	24	12	54
Female	27	9	0	36
Total	45	33	12	90

24. For minimum possible score with only 2 incorrect answer, the last 2 answers must be incorrect & first 4 answers must be correct. So, required sequence is TTTTFF $\rightarrow 50 + 40 - 40 = 50$.
Correct option is (d).
25. Maximum score can be obtained through TTFFTT sequence = 100 points or FFTTTT = $-20 + 40 + 80 = 100$ points.

PRACTICE EXERCISE 4

Directions for questions 1 to 3: Read the following passage and solve the questions based on it.

A, B, C, D and E are five cities out of which two are hill stations and the rest are in the plains. Two cities, which are in the plains, are ports. Four cities out of five are state capitals and two are industrial cities. The Population of two cities is less than 5 lacs. The population of one city is 20 lacs and the more than 50 lacs of. Two cities are situated on the same latitudes and other two are on same longitude and the other two are on the same longitude. Latitudes and longitudes of both ports are different and out of these one is an industrial town. The population of both the industrial cities is more than 50 lacs. The longitude of one hill station and one of the industrial cities is the same. The latitudes and longitudes of the other hill station and the other port are different. One industrial town is neither a hill station nor a port. None of the hill stations is an industrial town. The hill station has the which same longitude as the port, is a capital. B is a hill station while the longitudes of A and E are the same. E is a port. The latitudes of D and C are the same and the population of D is 20 lacs. Both the ports are capitals and one of them is an industrial town.

1. Which of the following two cities have a population less than 5 lacs?
(a) B and C (b) A and B
(c) A and D (d) D and B
2. Which of the following cities is not a capital?
(a) A (b) C
(c) B (d) E
3. Which one of the following cities is a hill station as well as a capital?
(a) A (b) B
(c) C (d) D

Directions for questions 4 to 5: Read the following passage and solve the questions based on it.

To smoothen the procedure of grievances reprisal, a team of five members is being constituted by the top management. As per the procedures established, it has to provide representation to both the workers and the middle management. The team must have two representatives of the middle management, two representatives of the workers and one representative of the top management.

As per the availability of persons, we know that

- (i) The middle management's representatives must be chosen from X, Y and Z.

- (ii) The workers' representatives must be chosen from A, B and C.
 - (iii) The top management's representative must be chosen from either J or K.
Owing to some geographical constraints, we know that
 - (iv) A cannot serve with C.
 - (v) Z cannot serve together with A.
 - (vi) Y cannot serve unless K is also in the team.
4. Which of the following persons must be chosen?
(a) J (b) X
(c) Y (d) B
 5. If A and B are chosen to be the workers representatives, then which of the following statement(s) is/are true?
I. K is chosen
II. Both X and Y are chosen to represent middle managers
III. J is chosen
(a) I only (b) II only
(c) III only (d) Both I and II

Directions for questions 6 to 9: Read the following passage and solve the questions based on it.

There are five islands A, B, C, D and E in Nicobar. Two of these have post offices, three have schools and three are accessible by bridge. Two have a population of more than 5000 each, two have a population between 2000 and 5000 each, and one has a population of less than 2000. Two of these islands have electricity in addition to certain other facilities such as a school and accessibility by bridge. The island with a population of less than 2000 has a school but does not have a post office nor is it accessible by bridge; while each of the islands with a population of more than 5000 has a school. Of the two islands having a population between 2000 and 5000, only one has a post office and is accessible by bridge. Island A is accessible by bridge. Island B has a population of more than 5000, island D has a school and is accessible by bridge but does not have a post office, while island E has a school but is not accessible by bridge.

6. Which island has a school and a post office?
(a) A (b) B
(c) C (d) D
7. Which island does not have any of the facilities available to other islands?
(a) A (b) B
(c) C (d) D

8. Which two islands have electricity?
 (a) A, B (b) B, C
 (c) B, D (d) C, D
9. Which three islands can be accessed by bridge?
 (a) A, B, D (b) A, B, E
 (c) A, D, E (d) B, D, E

Directions for questions 10 to 13: Read the following passage and solve the questions based on it.

P, Q, R, S, T and U are six lecturers in a college each teaching a different subject Mathematics, Physics, Sociology, Biology, Geography and History not necessarily in the same order. There are only four female lecturers. Following is the information regarding who teaches what:

- (i) Q teaches History.
 - (ii) No female lecturer teaches Biology or Mathematics.
 - (iii) S, who teaches Sociology, is the oldest.
 - (iv) P is older than R and teaches Physics.
 - (v) The youngest teaches Biology and U is not the youngest.
 - (vi) T teaches Mathematics and is older than P but younger than Q and U.
10. Which of the following group comprises only of females?
 (a) RPSU
 (b) RSTQ
 (c) PQTU
 (d) PQSU
11. Which subject does U teach?
 (a) Geography
 (b) Sociology
 (c) Geography or Sociology
 (d) Cannot be determined
12. Who teaches Biology?
 (a) P (b) S
 (c) R (d) None of these
13. If all the lecturers are arranged in descending order of their ages, what will be the position of the two male lecturers?
 (a) 2nd and 6th
 (b) 4th and 6th
 (c) 3rd and 6th
 (d) Cannot be determined
14. Who is the youngest out of the six lecturers?
 (a) Q (b) T
 (c) P (d) None of these

Directions for questions 15 to 19: Read the following passage and solve the questions based on it.

- (i) Five students S, R, N, M and V have a total of five books on various subjects like—Physics, Chemistry, Maths, Biology and English written by authors Gupta, Khanna, Harish, D'Souza and Edgar. Each student has only one book on any one of the five subjects.
- (ii) Gupta is the author of the physics book, which is not owned by V or S.
- (iii) M owns the book written by Edgar.
- (iv) N owns the Maths book. V has the English book which is not written by Khanna. The Biology book is written by D'Souza.

15. Which of the following is the correct combination of subject, student and author?
 (a) Maths – N – Harish
 (b) Physics – M – Gupta
 (c) English – V – Edgar
 (d) Biology – S – D'Souza
16. Who is the author of the Chemistry book?
 (a) Harish
 (b) Edgar
 (c) Khanna or Harish
 (d) Edgar or Khanna
17. Who is the owner of the book written by Harish?
 (a) V (b) S
 (c) R (d) Cannot be determined
18. For how many authors, is it possible to uniquely determine the subject on which they have written a book?
 (a) 2 (b) 3
 (c) 4 (d) 5
19. For how many students is it possible to uniquely determine the books owned by them?
 (a) 2 (b) 3
 (c) 4 (d) 5

Directions for questions 20 to 24: Read the following passage and solve the questions based on it.

There are seven students—A, B, C, D, E, F and G – in a batch at Prep-Well Coaching institute. All these students sit on three benches 1st, 2nd and 3rd in such way that:

- (i) There are at least two students sitting on each bench
- (ii) There is at least one girl on each bench.
- (iii) C, a girl student, does not sit with A, E and D.

- (iv) F, a boy student sits with only B. A sits with his best friend on bench I.
 (v) G sits on the 3rd bench. E is the brother of C.

20. How many girl students are there?

- (a) 3 (b) 4
 (c) 2 (d) Data inadequate

21. Who sits with C?

- (a) B (b) G
 (c) D (d) E

22. Which of the following is a group of girls?

- (a) BAC (b) BFC
 (c) CDF (d) BCD

23. On which bench do three students sit?

- (a) 2nd (b) 3rd
 (c) 1st (d) 1st or 2nd

24. The sex of how many students is known?

- (a) 4 (b) 5
 (c) 6 (d) 7

ANSWER KEYS

1. (b) 2. (c) 3. (a) 4. (d) 5. (d) 6. (b) 7. (c) 8. (c) 9. (a) 10. (d)
 11. (a) 12. (c) 13. (b) 14. (d) 15. (d) 16. (b) 17. (a) 18. (d) 19. (d) 20. (d)
 21. (b) 22. (d) 23. (c) 24. (c)

HINTS AND EXPLANATIONS

4 to 5

The possible groups are XYABK, XYBCK, XZBCJ and YZBCK.

4. B must be chosen.
 5. A and B are chosen, then Z cannot be in the team. So, X and Y will be in the team and therefore so will K. Both I and II only are true.

6 to 9

Villages	Post office	School	Accessibility By bridge	Electricity	Population		
					>5000	2000 to 5000	<2000
A	√		√				√
B	√	√	√	√	√		
C							√
D		√	√	√	√		
E		√					√
Total		3	3	2	2	2	1

10 to 14

Lecturer	Sex	Subject	Relative Age
Q	F	History	4/5
R	M	Biology	1
T	M	Mathematics	3
S	F	Sociology	6
P	F	Physics	2
U	F	Geography	5/4

The smaller the number., the lesser the age.

15 to 19

Student	Subject	Author
R	Physics	Gupta
M	Chemistry	Edgar
N	Maths	Khanna
V	English	Harish
S	Biology	D'souza

20 to 24

It is given that A and G sit on the 1st and the 3rd bench respectively.

Now, since F is a boy who sits with only B, B has to be a female. F and B sit on the 2nd bench .

On the basis of the above information, we can summarize the details as follows:

1st Bench	A	—
2nd Bench	F(+)	B(–)
3rd Bench	G	—

(+) Indicates male; (–) indicates female

Now, since C (a girl) does not sit with A, E and D, it means that C sits on the 3rd bench (on the 2nd bench only two students sit). This by eliminating, E and D sit on the 1st bench.

Now, using the statement, “A sits with his best friend”, hence A is a male. Again, E is a male as he is the brother of C. Eliminating the choices, D is a female but the sex of G is not known.

PRACTICE EXERCISE 5

Directions for questions 1 to 4: *Read the following passage and solve the questions based on it.*

In a state, there are seven cities—A, B, C, D, E, F and G. The following cities have a two way connection between them: D and F, E and H, A and B, B and C, G and E, C and E and G and F. There is a one-way connection from F to B. (Two way connection means people can move in both the Directions whereas in a one way connection, people can move only in one way.)

- If the connection between E and C is cut, then which route is not possible?
(a) B to E (b) A to G
(c) F to B (d) D to G
- If a person wishes to travel from D to E, then what is the minimum number of cities that he needs to cross enroute?
(a) 2 (b) 4
(c) 3 (d) 5
- If a person wants to go to city F from city A, how many cities will he be required to cross (excluding A and F)?
(a) 2 (b) 4
(c) 3 (d) 5
- In the above question, which of the following will minimize the number of cities?
(a) make F – B a two way connection
(b) connect F – C with a two way connection
(c) connect A – D with a one way connection from D to A
(d) connect C – G with a two-way connection

Directions for questions 5 to 7: *Read the following passage and solve the questions based on it.*

There are two groups namely Left and Right. Persons A, B, C and D are in the Left group and E, F and G are in the Right group. A committee is to be formed of 3 persons, at least one from each group. B and C will never be together. If G is there in the committee then E will also be there. F and C will be always together. The co-ordinator has to be from the minority group.

- Which one of them cannot be a valid committee?
(a) BDE (b) FGB
(c) AGC (d) EFG
- Which one of them cannot be a coordinator?
(a) F (b) B
(c) G (d) D

- Which one is a false statement?
(a) FBA is a possible group
(b) FCD is a possible group
(c) FCE is a possible group
(d) GEA is a possible group

Directions for questions 8 to 12: *Read the following passage and solve the questions based on it.*

P, Q, R, S, T, V and W are seven friends who left for seven different places—Delhi, Chennai, Hyderabad, Bangalore, Kolkata, Chandigarh and Patna—each one on a different day of the week. R left for Patna on Monday. On the last day of the week one person left for Bangalore. T left the next day after P, who left for Chandigarh and a day previous to W's departure. S left for Kolkata on Friday. Q did not leave for either Hyderabad or Bangalore and W left for Delhi.

It is also given that the week starts on Sunday and ends on Saturday.

- On which day of the week did Q leave?
(a) Sunday (b) Saturday
(c) Wednesday (d) Cannot be determined
- Who left for Bangalore?
(a) T (b) P
(c) V (d) Cannot be determined
- On which day of the week did T leave?
(a) Tuesday (b) Thursday
(c) Sunday (d) Wednesday
- Which of the following combinations of person-place is not correct?
(a) R—Patna (b) P—Chandigarh
(c) T—Hyderabad (d) All are correct
- Who left on Tuesday?
(a) P (b) W
(c) Q (d) V

Directions for questions 13 to 16: *Read the following passage and solve the questions based on it.*

Manoj is a medical representative (M R) with Nicholas Piramal. He has to meet seven doctors M, N, O, P, Q, R and S on a particular day between 9 a.m. and 4 p.m. Following details are available regarding his schedule:

- He takes 30 minutes with each doctor and keeps a gap of 25 minutes between two appointments for travel and preparation except after the 5th visit, when

he takes a 50 minutes break for lunch, travel and preparation.

- (ii) He has to meet doctor M immediately before Q but immediately after R, who is the third doctor to be met.
- (iii) Dr S does not give any time for a meeting before 9.30 a.m. and after 10.30 a.m. Dr P and Dr N meet Manoj between 2 p.m. and 3.30 p.m. only.
13. Who among the following is likely to be the first doctor that day?
 (a) S (b) O
 (c) R (d) Q
14. Who will be the last doctor to be visited by him that day?
 (a) N
 (b) P
 (c) R
 (d) Cannot be determined
15. At what time is he likely to meet Dr S?
 (a) 9.55 a.m. (b) 9:30 a.m.
 (c) 9 a.m. (d) None of these
16. If Dr R asks him to visit again 25 minutes after his scheduled seventh visit is over, then at what time is Dr R asking him to meet?
 (a) 3.55 P.M.
 (b) 3.40 P.M.
 (c) 3.25 P.M.
 (d) None of these

Directions for questions 17 to 21: Read the following passage and solve the questions based on it.

B, C, D, F, G, H and J are seven students studying in three colleges P, Q and R. Among them are three boys and four girls. There is at least one boy and one girl in each college. Three of them are in the Commerce discipline and two each in Arts and Science. B and her sister G are in the Science discipline but in different colleges. F studies Arts in college Q and he does not study with either J or C. D is not in the Commerce discipline and he studies in college R, only with B. All the three from the Commerce discipline do not study in the same college. H studies in the same college with her friend G.

17. In which college do only the Commerce students (from the given seven) study?
 (a) P (b) Q
 (c) R (d) P or Q
18. If B and C can interchange their colleges satisfying all other conditions, which of the following will definitely represent the girls?
 (a) BCHD (b) BCHG
 (c) BFHG (d) DCHF
19. Which of the following represents the three students in the Commerce discipline?
 (a) HJC (b) HDC
 (c) HFG (d) Cannot be determined
20. In which college do three of the students study?
 (a) P (b) R
 (c) Q (d) None of these
21. Which of the following represents the three boys?
 (a) DFJ (b) DFC
 (c) JFC (d) Cannot be determined
22. Pointing towards a man in the photograph, a woman said, "He is the father of the brother of my father". How is the man related to the woman?
 (a) father (b) uncle
 (c) grandfather (d) uncle or father
23. To number the pages of a large book, the printer used a total of 1890 digits. How many pages are there in the book?
 (a) 655 (b) 667
 (c) 666 (d) 668
24. Five men A, B, C, D and E read a novel. The one who reads it first gives it to C. The one who reads it last had taken it from A. E was not the first or the last to read the novel. Also, it is known that there were two readers between B and A. Who read the novel last?
 (a) E (b) B
 (c) D (d) C
25. In the above question, who read the novel in the middle?
 (a) E (b) B
 (c) D (d) C

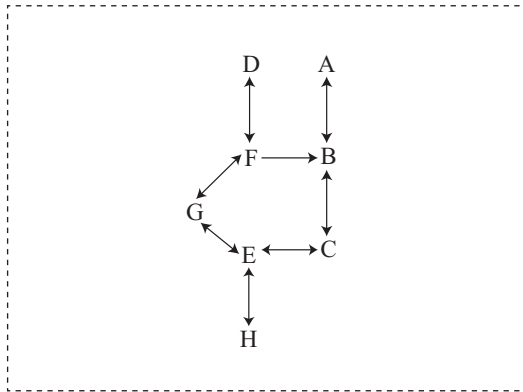
ANSWER KEYS

1. (a) 2. (a) 3. (b) 4. (a) 5. (a) 6. (c) 7. (a) 8. (b) 9. (c) 10. (d)
 11. (d) 12. (a) 13. (b) 14. (d) 15. (a) 16. (d) 17. (a) 18. (b) 19. (a) 20. (c)
 21. (d) 22. (c) 23. (c) 24. (c) 25. (a)

HINTS AND EXPLANATIONS

1 to 4

Let us first make the network of connections:



- Obviously, B – E is not possible.
- The path with the minimum possible cities in between will be D – F – G – E.
- The route will be A – B – C – E – F – G
- Making F – B a two way connection will give us the route A – B – F. In this case, only one city will need to be crossed.

5 to 7

- Option (b) & (c) are not possible as there is G but not E. Option (d) is not possible as all members are from right group. Option (a) is a valid committee.
- If G is there in committee, E will be also there. So, there are 2 members from the right group. So, coordinator must be from the left group.
- As F & C must be together, so only F is not possible. So, FBA is not a possible group.

8 to 12

Let us prepare the scenario first:

Seven friends are P, Q, R, S, T, V and W. Seven destinations: Delhi, Chennai, Hyderabad, Bangalore, Kolkata, Chandigarh and Patna.

Let us proceed with the following concrete information:

R-Patna – Monday; Bangalore – Saturday

P-Chandigarh; S-Kolkata – Friday, W-Delhi

With the help of the above information we get the following table:

Table 1

No.	Person	Destination	Day
1.	R	Patna	Monday
2.		Banglore	Saturday
3.	P	Chandigarh	
4.	S	Kolkata	Friday
5.	W	Delhi	

Using the indirect information—Since Q did not leave for either Hyderabad or Bangalore, the above table helps us conclude that Q left for Chennai.

Now, T left the next day of P's departure and a day previous to W's departure. Using the above table, P and W did not depart on Monday, Saturday or Friday. T did not depart on Monday or Friday.

Now P can't depart on Sunday or Thursday because T did not depart on Monday or Friday respectively. P can't depart on Wednesday because he did not depart on Friday. So, by elimination, P left for Chandigarh on Tuesday.

Let us tabulate the information received till now:

Table 2

No.	Person	Designation	Day
1.	R	Patna	Monday
2.		Bangalore	Saturday
3.	P	Chandigarh	Tuesday
4.	S	Kolkata	Friday
5.	W	Delhi	Thursday
No.	Person	Designation	Day
6.		Hyderabad	
7.	Q	Chennai	

Finally, since T left for his destination on Wednesday, it is obvious that T's destination is Hyderabad.

Hence, V is going to Bangalore and Q left for Chennai. The person left for Bangalore, left on the left day of week. So, V and Q left on Sunday & Saturday respectively.

So, the final table will look like:

Table 3

No.	Person	Designation	Day
1.	R	Patna	Monday
2.	V	Bangalore	Sunday
3.	P	Chandigarh	Tuesday
4.	S	Kolkata	Friday
5.	W	Delhi	Thursday
6.	T	Hyderabad	Wednesday
7.	Q	Chennai	Saturday

13 to 16

Order	Doctor	Duration of meeting	Gap (in minutes)
1.	O	9 a.m. – 9.30 a.m.	25
2.	S	9.55 a.m. – 10.25 a.m.	25
3.	R	10.50 a.m. – 11.20 p.m.	25
4.	M	11.45 a.m. – 12.15 p.m.	25
5.	Q	12.40 p.m. – 1.10 p.m.	50
6.	P/N	2 p.m. – 2.30 p.m.	25
7.	N/P	2.55 p.m. – 3.25 p.m.	-

17 to 21

Let us first find out the scenario – There are three colleges, three disciplines and seven students. Further, we know that three of them are in the Commerce discipline and two each in Arts and Science.

We have been given that B and G are in Science, F in Arts and D is not in Commerce. This implies that D is in Arts. By elimination, the remaining (C, J and H) are in Commerce.

Thus we get the following table:

Table 1

Discipline	Students
Science	B and G
Arts	F and D
Commerce	C, J and H

Now, let us proceed to make a table which correctly matches the colleges and the students/discipline.

It is given that D (a male student) studies in college R only with B. This implies that only two students study in college R and B is a female. (Note that there are at least one boy and one girl in each college).

Further, it is known that B's sister G, and H (a female student) study in the same college. Now, this

college can't be P because in that case there will be only a single student (among the given students) in college Q. Hence, H and G study in college Q.

Still we do not know about the sex of J and C. Hence, the above information can be tabulated as follows:

Table 2

College	Students
P	J and C
Q	F (male), H (female) and G(female)
R	D (male) and B (female)

18. If B & C are interchanged, C must be female as B is male. J must be a boy as B is female & there must be

1 boy & 1 girl in each college. So, C, G, H & B are girls.

21. D & F are males. Any 1 from J & C is a male & other is female. So, the 3 boys cannot be identified.
22. 'Father of the brother of my father' is also the father of my father and hence is my (woman's) grandfather.
23. For page 1 to 9, there are 9 digits. From 10 to 99 there are 180 digits from 100 to 999 there are 2700 digits. As, $1890 = 9 + 180 + 1701$. So, the number of pages must be between 100 & 999. As, $1701/3 = 567$. Now, counting from 100, the 567th member is 666. So, there are 666 pages in book.

24 to 25

Order of novel reading is as follows:

B – C – E – A – D.

PRACTICE EXERCISE 6

Directions for questions 1 to 4: Read the passage given below and solve the questions based on it.

Five persons—Yamini, Nitika, Monica, Rehana and Pragya are students of five different areas Medical, Engineering, Architecture, Arts and Management in no particular order. Each of them plays a different musical instrument from Sitar, Tabla, Sarod, Guitar and Violin, not given respectively.

Monica, a medical student, does not play Sarod or Sitar or Guitar.

Pragya is neither a student of Engineering nor of Management.

Rehana, who plays tabla, is an Arts student.

Neither Pragya nor Yamini plays Sarod.

- Who among the following plays Sarod?
(a) Yamini (b) Nitika
(c) Pragya (d) Data inadequate
(e) None of these
- The guitarist is a student of which of the following disciplines?
(a) Engineering
(b) Either Engineering or Management
(c) Architecture
(d) Data inadequate
(e) None of these
- Who among the following plays Sitar?
(a) Yamini
(b) Nitika
(c) Pragya
(d) Data inadequate
(e) None of these
- For how many of the given five students is it possible to find the exact discipline and the musical instrument the person plays?
(a) 0 (b) 1
(c) 2 (d) 3
(e) 4

Directions for questions 5 to 10: Read the passage given below and solve the questions based on it.

During their stint at IIM Shillong, ten students have opted for various electives named from A to F. In these electives, students are given the points on a scale of 1 to 5 points. Points obtained by the students can be integral points only.

It is also known that not all the electives are taken by all the students and not all the students are taking at least an elective.

The range of scores indicates the maximum and minimum scores in that elective by the students who have chosen that elective. However, if the range of the scores is 1–4, then at least one of students must have got 1 point and at least one student must have got 4 points in that elective.

The number of elective takers out of the 10 students is given in the last column.

Elective	Range of scores of all the elective takers (Minimum and maximum scored)	Average score of the elective takers	Number of elective takers
A	1–4	3.5	6
B	2–4	3	3
C	1–5	4	7
D	1–2	4/3	3
E	2–5	4	4
F	3–5	11/3	6

- How many students have scored more than 4 points in at least 2 electives?
(a) 4 (b) 7
(c) 2 (d) 3
(e) Cannot be determined
- What is the minimum number of students who must have scored less than 2 points in at least one elective?
(a) 3 (b) 4
(c) 2 (d) 3
(e) Cannot be determined
- What is the maximum number of students who have scored more than 3 points in at least one elective?
(a) 5 (b) 6
(c) 7 (d) 3
(e) Cannot be determined
- What is the minimum number of students who have scored more than 3 points in at least one elective?
(a) 5 (b) 6
(c) 7 (d) 0
(e) None of these
- Elective A and elective B are merged to form a new elective H. This new elective H will be

having all those students who have opted elective A and elective B and the scores of each of these electives have been taken into consideration while finding the average of elective H. If none of the students of elective A and elective B are common, then what will be the average score of elective H?

- (a) 10/3
- (b) 3
- (c) 3.5
- (d) None of these
- (e) Cannot be determined

10. Elective C and elective E are merged to form a new elective N. This new elective N will be having all those students who have opted elective C and elective E and the scores of each of these electives have been taken into consideration while finding the average of elective N. What is the average score of elective N?
- (a) 4
 - (b) 3
 - (c) 3.5
 - (d) 2
 - (e) Cannot be determined

Directions for questions 11 to 13: Read the passage given below and solve the questions based on it.

There are six movies—A, B, C, D, E and F—to be showed in a film festival. B, C and E are art movies and others are commercial movies. Only F and D are Hindi movies and the remaining movies are English movies. Movies A, C and D are made by Jagmohan Mundhra and movies B, E and F are made by Steven Spielberg.

11. Which English movie is a commercial movie?
- (a) A
 - (b) B
 - (c) C
 - (d) D
 - (e) None of these
12. Which Hindi movie is made by Jagmohan Mundhra?
- (a) A
 - (b) B
 - (c) C
 - (d) D
 - (e) None of these
13. Which of the English movies is/are art movies made by Steven Spielberg?
- (a) B
 - (b) B and C
 - (c) C
 - (d) B and E
 - (e) None of these

Directions for questions 14 to 18: Read the passage given below and solve the questions based on it.

Bus route no. 761 has exactly six stops on its route. Any bus plying on this route starts from the initial position, then stops first at stop one and then at stops two, three, four, five, and six respectively. After the bus reaches stop six, the bus turns and returns to its initial position and repeats the cycle. Buses are not allowed to carry people on its return journey.

Following are the six stops—L, M, N, O, P, and Q in no particular order. Further, following observations have been made regarding the stops on this route:

Observation 1 – P is the third stop.

Observation 2 – M is the sixth stop.

Observation 3 – The stop Q is the stop immediately after O.

Observation 4 – N is the stop immediately before L.

14. If N is the fourth stop on this route, which among the following must be the stop immediately before stop P?
- (a) N
 - (b) Q
 - (c) O
 - (d) M
 - (e) L
15. If L is the second stop on this route, which among the following must be the stop immediately before M?
- (a) N
 - (b) Q
 - (c) O
 - (d) P
 - (e) L
16. A passenger boards a bus on this route at O, rides past one of the stops, and alights at P. Which of the following must be true?
- (a) O is stop one
 - (b) P is stop four.
 - (c) N is stop five
 - (d) L is stop six
 - (e) None of these
17. In how many different ways the stops can be fixed on this route?
- (a) 1
 - (b) 2
 - (c) 3
 - (d) 4
 - (e) None of these
18. If we relax the observation 3, then in how many different ways the stops can be fixed on this route?
- (a) 1
 - (b) 2
 - (c) 3
 - (d) 4
 - (e) None of these

Directions for questions 19 to 20: Read the passage given below and solve the questions based on it.

During the Indian film festival at Goa, movies from five countries—Austria, Bhutan, China, Denmark, and England are to be shown. Movies from these countries have to follow a particular order as given follows:

Movie from Austria must be shown before the movie from China.

Movie from England should be the fifth movie to be shown.

Movie from Bhutan must be shown before the movie from Denmark.

19. Which of the following is the correct order for showing all the movies?
- (a) Austria, China, Bhutan, Denmark, England
(b) Austria, China, Denmark, England, Bhutan

- (c) Bhutan, Denmark, China, Austria, England
(d) Bhutan, Denmark, England, Austria, China
(e) England, Bhutan, China, Austria, Denmark

20. Movies from Denmark and England are shown at the farthest gap possible. Which among the following would be true?
- (a) Movie from Austria is shown earlier than Movie from Bhutan.
(b) Movie from England is shown earlier than Movie from China.
(c) Movie from Denmark is shown earlier than Movie from Austria.
(d) Movie from England is shown earlier than Movie from Bhutan.
(e) Movie from China is shown earlier than Movie from Denmark.

ANSWER KEYS

1. (b) 2. (d) 3. (d) 4. (c) 5. (e) 6. (c) 7. (e) 8. (e) 9. (a) 10. (e)
11. (a) 12. (d) 13. (d) 14. (b) 15. (b) 16. (a) 17. (b) 18. (d) 19. (a) 20. (c)

HINTS AND EXPLANATIONS

1 to 4

We can arrange the 5 students in following table with each column shows names; Area & musical instruments respectively.

Name	Area	Musical Instrument
Monica	Medical	Violin
Pragya	Architecture	
Rehana	Arts	Tabla
Yamini		
Nikita		Sarod

1. Nikita plays sarod.
2. It may be engineering or architecture or management.
3. Either Pragya or Yamini plays sitar.

4. We can find the exact discipline & musical instrument for only 2 students Monica & Rehana.

5 to 10

5. We cannot find a definitive answer to this question because the solution give rise to multiple overlapping.
6. Looking at the elective D, total number of points scored = 4 points and the number of students = 3. Since the range of the points obtained is 1–2, hence the maximum 2 points can be obtained by only one student and remaining two students are getting one mark each. In A & C too any 1 student may get 1 mark. But we may assume they are same as 2 who get 1 mark in D.
7. Same as that of Q5. Hence, cannot be determined.

8. To find the minimum number of students with more than 3 points, we should try to accommodate as much students as possible at 3 points each. And after we have accommodated enough students at 3 points each, remaining students will be accommodated at more than 3 points.

In case of elective A, maximum number of students who can get 3 points = 3. Hence, remaining 3 students are getting a total of 12 points. And in no way these 3 students are getting 3 points or less than 3 points to satisfy the conditions given.

In case of elective C, the minimum number of students that can be accommodated at 3 points each = 3. Hence, total points = 9. Now remaining 19 points are to be accommodated among 4 students and none of these five students can get 3 points or less than 3 points [Otherwise then 16 points will be required to be accommodated among 3 students and in that case at least one student will get more than 5 points and that is a contradiction].

We can further see that each of these students will get more than 3 points now to satisfy the given conditions.

Hence, minimum number of the students who have scored more than 3 points in at least one elective = 4.

9. Total points obtained by the students of elective A = 21

Total points obtained by the students of elective B = 9

Total points obtained by the students of elective A + B = 30

Total number of students = 9

Hence, average = 30/9

10. In this question, at least one student is going to be overlapped. And without knowing the score of this student (or other overlapped students if any), we cannot find the average score of the elective N.

Hence cannot be determined.

11 to 13

Jagmohan Mundra

1. A – English – Commercial
2. C – English – Arts
3. D – Hindi – Commercial

Steven Spielberg

1. B – English – Arts
2. E – English – Arts
3. F – Hindi – Commercial

14 to 18

Following is the structure of the stops on this route:

N	L	P	O	Q	M
Step 1	Step 2	Step 3	Step 4	Step 5	Step 6

or

O	Q	P	N	L	M
Step 1	Step 2	Step 3	Step 4	Step 5	Step 6

Now all the questions can be answered.

18. NLPOQM
NLPQOM
OQPNLM
QOPNLM

These are 4 possibilities for fixing the stops & routes by relaxing third observation.

19 to 20

19. We can eliminate options (b), (d) & (e) as movie from England must be last to be played. Option (c) can be eliminated as movie from China can be shown after movie from Austria.

So, correct Option is (a).

20. The movie from England must be shown at last. So, movie from Denmark must be shown as early as possible. But it can be shown after movie from Bhutan. So, the first & second movies must be from Bhutan & Denmark. Movies from Austria & China are shown at third & fourth place.

PRACTICE EXERCISE 7

Directions for questions 1 to 3: Read the passage given below and solve the questions based on it.

Six sides of a cube are painted by six different colours—Black, blue, brown, green, red and white—one colour on one side. Following observations are made regarding the sides and the colour on it:

- The side coloured red is opposite the side coloured black.
 - The green side is between the red side and the black side.
 - The blue side is adjacent to the white side.
 - The brown side is adjacent to the blue side.
 - The red side is the bottom face.
- The four colours adjacent to the green side are
 - Black, blue, brown, red
 - Black, blue, brown, white
 - Black, blue, red, white
 - Black, white, brown, red
 - Which of the following can be deduced using the observation 1 and observation 5?
 - Black is on the top
 - Brown is on the top
 - Blue is on the top
 - Brown is opposite to black.
 - If the red side is exchanged for the green side and the blue is swapped for black, then which of the following is false?
 - Red side is opposite to black side.
 - White side is adjacent to the brown side.
 - Green side is opposite to the blue side.
 - White side is adjacent to the blue side.

Directions for questions 4 to 8: Read the passage given below and solve the questions based on it.

In the latest *Rajshri* films *Hum aapke hain saath saath*, there are six generations in a family however total members in this family is 5. Names of the members of this family are Atul, Binod, Charu, Deepak and Faisal.

Following observations have been made regarding them:

- Charu is the only unmarried child whose grand parents have passed away.
- Deepak, a widow, is the daughter of Faisal who is a widower.
- None of the family members is an adopted son or an adopted daughter.

- One generation has at most one family member.
- Every couple has only one child and the first generation did not have any siblings.
- If Atul is the grandson of Binod, then which member is in the second last generation?
 - a male
 - Atul
 - Either (a) or (b)
 - Both (a) and (b)
- If Binod is the eldest member in the family, then how is Deepak related to Atul?
 - Grandmother
 - Grandfather
 - Either (a) or (b)
 - None of these
- If Binod is the eldest member in the family, then how is Atul related to Charu?
 - Father
 - Mother
 - Uncle
 - Cannot be determined
- If Atul is Charu's father and Binod's grandson, then how many possible combinations of the family exist?
 - 1
 - 2
 - 3
 - 4
- If grandfather of Charu were alive, he would have definitely belonged to which generation?
 - 4th last
 - 3rd
 - 2nd last
 - 3rd last

Directions for questions 9 to 12: Read the passage given below and solve the questions based on it.

There are six classes to be held everyday by six different teachers—A, B, C, D, E, and F in a school. Three of these classes will take place in the morning session before the lunch break whereas the other three classes will be held in the afternoon session after the lunch break.

The scheme of the classes should follow the following restrictions

Class by B should be immediately before the class by C and their presentations cannot be separated by the lunch break.

Class by D must be either the first or the last class.

- If class by C is the fifth class of the day, then class by B is the class of the day.
 - first
 - second
 - third
 - fourth

10. Class by B can be placed at any of the following places in the order of presenters EXCEPT
 (a) first (b) second
 (c) third (d) fifth
11. Class by F is to be scheduled immediately after the class by D, then class by C could be slated for which class of the day?
 (a) First (b) Third
 (c) Fourth (d) Fifth
12. In case class by F and class by E are the fifth and sixth classes of the day respectively, then which of the following must be true?
 (a) Class by A is first class of the day
 (b) Class by A is third class of the day
 (c) Class by A is fourth class of the day
 (d) None of these

Directions for questions 13 to 20: Read the passage given below and solve the questions based on it.

There are three projects—P1, P2 and P3. A student can select either one project or two projects or all the three projects subject to the conditions given below:

- Condition 1: Both P1 and P2 have to be selected.
 Condition 2: Either P1 or P3, but not both, has to be selected.
 Condition 3: P2 can be selected only if P3 has been selected.
 Condition 4: P1 is selected only if P3 is selected.
13. How many different selections can be made if no conditions are imposed?
 (a) 5 (b) 6
 (c) 7 (d) 8
14. How many selections can be made to meet condition 1 as given above?
 (a) 1 (b) 2
 (c) 3 (d) 4
15. How many selections can be made to meet condition 2 as given above?
 (a) 2 (b) 3
 (c) 4 (d) 5
16. How many selections can be made to meet condition 3 as given above?
 (a) 5 (b) 6
 (c) 7 (d) 8
17. How many selections can be made to meet condition 4 as given above?
 (a) 5 (b) 6
 (c) 7 (d) 8

18. How many selections can be made meeting both the conditions 1 and 2 as given above?
 (a) 0 (b) 1
 (c) 2 (d) None of these
19. How many selections can be made meeting both the conditions 2 and 3 as given above?
 (a) 0 (b) 1
 (c) 2 (d) None of these
20. How many selections can be made meeting the conditions 1, 2 and 3 as given above?
 (a) 0 (b) 1
 (c) 2 (d) None of these

Directions for questions 21 to 26: Read the passage given below and solve the questions based on it.

Five universities—A, B, C, L and K participated in the last year inter-university athlete event. Each of the universities were represented by three members. According to the rules, the race-track maker gets wild card entry making the total number of athletes participating in the race equal to 16. The rank obtained by the individual will be the points obtained. And similarly the points obtained by an individual university will be equal to the sum of the ranks of the member athletes of the team. Lower the points, better the team and the best team wins the trophy.

The five universities tied for the trophy, their sum being equal, however no two athletes tied for the same position. In order to determine the order in which the universities will hold the trophy (they agreed to hold it for 73 days each), they multiplied the athletes positions together in each university. The university with the smallest product – K – will hold the trophy first and so on the university with the largest product – A – will hold the cup last. Unfortunately, universities B and C were still tied and had to be separated by a toss of coin.

It was also found that the no two athletes of a university finish at the consecutive positions. Had the race-track maker did not come in between two athletes of university B, university B would have achieved this feat of two athletes being at consecutive positions.

21. Which of the following is the position of the race-track maker?
 (a) 6 (b) 11
 (c) Either 6 or 11 (d) Neither 6 nor 11
 (e) Cannot be determined
22. What is the product of the university A?
 (a) 360 (b) 455
 (c) 450 (d) 390
 (e) None of these

23. What is the smallest point obtained by an individual of university L?

(a) 1 (b) 2
(c) 3 (d) 4
(e) 5
24. What is the product of the ranks obtained by all the athletes of university K?

(a) 120 (b) 150
(c) 128 (d) 144
(e) None of these
25. Which of the following is not a rank obtained by the athletes of university C?

(a) 15 (b) 6
(c) 4 (d) 2
(e) 4 and 2
26. Which of the following is a rank obtained by the athletes of university B?

(a) 14 (b) 6
(c) 4 (d) 5
(e) 3

ANSWER KEYS

1. (d) 2. (a) 3. (b) 4. (d) 5. (a) 6. (d) 7. (a) 8. (d) 9. (d) 10. (c)
11. (d) 12. (c) 13. (c) 14. (b) 15. (c) 16. (a) 17. (a) 18. (b) 19. (d) 20. (a)
21. (b) 22. (b) 23. (b) 24. (c) 25. (d) 26. (e)

HINTS AND EXPLANATIONS

1 to 3

1. As green side is between red & black sides so, 2 of the 4 adjoining sides of green side must be of red & black colours. As, blue side is adjacent to both brown & white side. So, it must be opposite to green side. So, the 4 colours adjacent to green side are black, white, brown & red.
2. As red colour is on bottom face & it is opposite to black coloured face. So, the top face must be of black colour.
3. From 1st & 2nd answer, we know red & black colour are on opposite sides. Similarly green & blue colour are on opposite faces. So, brown & white must also be colour on opposite faces. So, brown & white cannot be the adjacent sides.

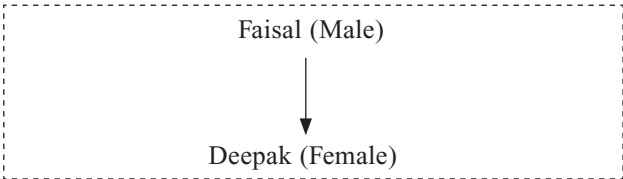
4 to 8

We get the following information using the statements given:

Statement 1:	
1st Generation	
2nd Generation	
3rd Generation	
4th Generation	XX

5th Generation	
6th Generation	Charu

Statement 2:



Faisal and Deepak will be in consecutive generations.

4. If Atul is the grandson of Binod, then the only possibility for this family is:

1st Generation	Faisal
2nd Generation	Deepak
3rd Generation	Binod
4th Generation	XX
5th Generation	Atul
6th Generation	Charu

Hence, Atul is in the second last generation. Since Atul is the grandson, so Atul is a male.

5. If Binod is the eldest member in the family, then following is the arrangement of the people in this family:

1st Generation	Binod
2nd Generation	Faisal
3rd Generation	Deepak (F)
4th Generation	XX
5th Generation	Atul
6th Generation	Charu

Hence, Deepak is grandmother of Atul.

6. Using the arrangement given in Q 5, we can see that Atul can be mother or father of Charu. Hence, cannot be determined.
7. 1. Faisal (Male)
2. Deepak (Female)
3. Binod
4. X
5. Atul (Male)
6. Charu
- So, there is just 1 combination of family which is possible.
8. Grandfather of Charu must have been in the fourth generation = 3rd last generation.
9. If C is fifth then B must be fourth as it is just before C.
10. B cannot be 3rd as then C must be 4th & both C & D will be separated by lunch break which is not possible.
11. D must be 1st as he cannot be last as per statement of question. So, there are 2 possibilities. D, F, _, B, C, _ or D, F, _, _, B, C.
12. D must be 1st, B & C can be 2nd & 3rd. So, A must be 4th.

13 to 20

13. Total number of selections = $2^3 = 8$
Total selections possible = $8 - 1 = 7$
14. (P1, P2), (P1, P2, P3)
15. P1, P3, (P1, P2), (P2, P3)
16. P1, P3, (P1, P3), (P2, P3), (P1, P2, P3),

17. P2, P3, (P1, P3), (P2, P3), (P1, P2, P3)

18. (P1, P2)

19. P1, P3, (P3, P2)

20. None of the selections can be done.

21 to 26

Sum of ranks of all the 16 players = 136.

Sum of the ranks of all the universities is same, hence, their sum should be divisible by 5. So, their sum should be either 135, or 130, or 125 or 120. In turn, the rank of the race-track maker will be either 1, or 6, or 11 or 16 respectively.

Since race-track maker comes in between the two athletes of university B, hence rank cannot be 1 or 16.

Case 1 – If the rank of race-track maker = 6

Hence, the sum of the ranks obtained of all the universities = 130, and so the sum of ranks of all the athletes of each of the universities = 26.

Since the race track maker comes in between two athletes of university B, hence the ranks obtained by two of the athletes of university B are 5 and 7. Hence the rank of the third athlete of university B = $26 - (5 + 7) = 14$

Now the product of ranks of all the athletes of university B = Product of ranks of all the athletes of university C.

Product of ranks of university B contains 72 inter alia, and no other exponent of 7 is possible in the whole series of 1 to 16 for university C.

Hence, we can conclude that rank of race-track maker cannot be 6.

Now the only possible rank of race-track maker = 11.

Case 2 – If the rank of race-track maker = 11

Hence, the sum of the ranks obtained of all the universities = 125, and so the sum of ranks of all the athletes of each of the universities = 25.

Since the race track maker comes in between two athletes of university B, hence, the ranks obtained by two of the athletes of university B are 10 and 12. Hence the rank of the third athlete of university B = $25 - (10 + 12) = 3$

Hence the ranks of athletes of university B = 3, 10, 12

Now the product of ranks of all the athletes of university B = Product of ranks of all the athletes of university C.

Hence, the ranks of athletes of university C= 4, 6, 15

We can observe that the product and sum of the ranks of athletes of university B and C are same.

From the remaining ranks now, for the smallest product of the ranks of athletes such that their sum is equal to 25, the ranks should be 1, 8, 16 (University K).

Similarly, for the maximum product of the ranks of the athletes for the university A, ranks should be 13,7,5.

Hence the ranks for the athletes of the university L = 2, 9,14.

A	B	C	L	K
13 7 5	3 12 10	4 6 15	2 9 14	1 8 16

Chapter

14

MODERATE EXERCISES

PRACTICE EXERCISE 1

Direction for questions 1 to 4: *Go through the information given below and solve the questions based on it.*

Captain of a cricket team has to allot five middle batting positions to five batsmen. The average runs scored by each batsman at these positions are as follows:

Batsman	Batting Positions				
	I	II	III	IV	V
P	40	40	35	25	50
Q	42	30	16	25	27
R	50	48	40	60	50
S	20	19	20	18	25
T	58	60	59	55	53

As per the rules, a batsman can come to bat only at one position. Objective is to maximize the total number of runs scored.

- What is the maximum possible runs scored by the five batsmen together?
(a) 212 (b) 232
(c) 252 (d) 262
- What is the position of batsman P in the batting line up?

- (a) II (b) III
(c) IV (d) V

- How many different batting order are possible so that the five batsmen score the maximum?
(a) 1
(b) 2
(c) More than 1 but finite
(d) Infinite
- To satisfy the maximum possible runs scored by them together, what is the runs scored by Q?
(a) 20 (b) 25
(c) 19 (d) 18

Directions for questions 5 to 9: *Read the following passage and solve the questions based on it.*

Amit, Bharat, Chandan, Dinesh, Eeshwar and Ferguson are cousins. None of them are of the same age, but all of them have birthdays on the same date. The youngest of them is 17 years old and Eeshwar, who is the eldest, is 22 years old. Ferguson is somewhere between Bharat and Dinesh in age. Amit is elder to Bharat and Chandan is older than Dinesh.

- Which of the following is not possible?
(a) Dinesh is 20 years old
(b) Ferguson is 18 years old
(c) Ferguson is 19 years old
(d) Ferguson is 20 years old

6. If Bharat is 17 years old, then which of the following could be the ages of Dinesh and Chandan respectively?
 (a) 18 and 19 (b) 19 and 21
 (c) 18 and 20 (d) 18 and 21
7. If two of the cousins are between Chandan and Ferguson in age, then which of the following must be true?
 (a) Amit is between Ferguson and Dinesh in age
 (b) Bharat is 17 years old
 (c) Bharat is younger than Dinesh
 (d) Ferguson is 18 years old
8. If Amit is one year elder to Chandan, the number of logically possible orders of all six cousins by increasing age is
 (a) 2 (b) 3
 (c) 4 (d) 5
9. If Chandan is 19 years old, which of the following must be true?
 (a) Amit is 20 years old and Dinesh is 21 years old
 (b) Bharat is 18 years old and Amit is 20 years old
 (c) Bharat is 20 years old and Amit is 21 years old
 (d) Dinesh is 17 years old and Bharat is 21 years old

Directions for questions 10 to 11: Read the following passage and solve the questions based on it.

There are five rooms in my house in Patna—a hall, kitchen, study room, bedroom and dining room. There is one light in each room. The following clever arrangements are planned in the house:

- (i) Whenever the kitchen light is 'on', the study room light is 'off'.
 - (ii) Whenever the dining room light is 'on', the kitchen light is also 'on'.
 - (iii) Whenever the study room light is 'on', the hall light has to be 'on'.
10. Which one of the following combinations cannot be 'on' at the same time?
 (a) dining room and kitchen
 (b) hall and bedroom
 (c) dining room and study room
 (d) kitchen and hall
11. How many lights, at the most, can be 'on' simultaneously?
 (a) 5 (b) 4
 (c) 3 (d) 2

Directions for questions 12 to 15: Read the following passage and solve the questions based on it.

Guru Nanak Institute of Management will organize six once-a-month lecture series for young entrepreneurs as per the following schedule, with no dates conflicting for any two different programmes:

- (i) Marketing – August through January
 - (ii) Entrepreneurship – April through October
 - (iii) Law – January through September
 - (iv) Finance – March through June
 - (v) Accounts – October through April
 - (vi) HR – October through December
12. During which month are the fewest lectures scheduled?
 (a) January (b) February
 (c) June (d) September
13. What is the maximum number of lectures that can be attended in a single month?
 (a) 7 (b) 6
 (c) 5 (d) 4
14. How many months of the year must a student attend to hear all the lectures on Marketing, Entrepreneurship and Finance?
 (a) 11 (b) 10
 (c) 9 (d) 8
15. How many different lectures can be attended during the months of January, February and March?
 (a) 11 (b) 10
 (c) 8 (d) 6

Directions for questions 16 to 19: Read the following passage and solve the questions based on it.

Two ants start climbing a slippery wall together, from the bottom of the wall. Ant A climbs at the rate of 3 inches per minute. Ant B climbs at the rate of 4 inches per minute. However, owing to the fact that the wall is slippery, ant A slips back 1 inch for every 2 inches climbed and ant B slips back 1.5 inches for every 2 inches climbed. Besides this, ant A takes a rest of 1 minute after every 2 minutes and ant B takes a rest of 1 minute after every 3 minutes. (Assume that both ant A and ant B slip continuously while climbing.)

16. At what height on the wall do the two ants meet each other?
 (a) never (b) 3 inches
 (c) 5 inches (d) 12 inches
17. If the widest gap achieved between the two ants, within the first 10 minutes, is N inches, then find the value of N?

- (a) 1 inch (b) 3 inches
(c) 2.5 inches (d) 1.5 inches
18. If ant B does not have any periods of rest, then how many times do the ants meet in the first 10 minutes?
(a) 0 (b) 1
(c) 2 (d) 3
19. When ant A reaches a height of 12 inches on the wall, how far is ant B behind ant A?
(a) 3.5 inches (b) 2 inches
(c) 2.5 inches (d) 3 inches

Directions for questions 20 to 22: Read the following passage and solve the questions based on it.

KK, an aspiring entrepreneur wanted to set up a pen drive manufacturing unit. Since technology was changing very fast, he wanted to carefully gauge the demand and the likely profits before investing. Market survey indicated that he would be able to sell 1 lac units before customers shifted to different gadgets. KK realized that he had to incur two kinds of costs – fixed costs (the costs which do not change, irrespective of numbers of units of pen drives produced) and variable costs (= variable cost per unit multiplied by number of units). KK expected fixed cost to be ₹40 lacs and variable cost to be ₹100 per unit. He expected each pen drive to be sold at ₹200.

20. What would be the break-even point (defined as no profit, no loss situation) for KK's factory, in term of sales?
(a) ₹80 lacs (b) ₹100 lacs
(c) ₹120 lacs (d) ₹140 lacs
21. KK was doubtful that per unit variable might increase by 10% though the demand might remain same. What will be the expected changes in profit in such a case?
(a) Profit would decrease by 10.33%
(b) Profit will increase will by 15.75%
(c) Profit would decrease by 15.75%
(d) Profit will decrease by 16.67%
22. He discussed his business with a chartered accountant. KK informed that he was contemplating a loan of ₹20 lacs at simple interest of 10% per annum for starting the business. The chartered accountant informed him that in such a case KK has to pay interest, followed by 30% tax.
By how much does KK's earnings change with 20% growth in sales vis-à-vis the original sales volume, in both cases considering same tax and interest on loan?
(a) 20% (b) 16.7%
(c) 25.6% (d) 34.5%

ANSWER KEYS

1. (b) 2. (d) 3. (a) 4. (a) 5. (d) 6. (b) 7. (d) 8. (a) 9. (c) 10. (c)
11. (b) 12. (b) 13. (d) 14. (a) 15. (c) 16. (b) 17. (b) 18. (d) 19. (d) 20. (a)
21. (d) 22. (d)

HINTS AND EXPLANATIONS

1 to 4

Following scheduling can be done:

Maximum runs

Batsman	Position	Runs
P	V	50
Q	I	42
R	IV	60
S	III	20
T	II	60
Total		232

1. Maximum possible runs scored = 232.
Hence option (b) is the answer.
2. P will play at position V.
Hence option (d) is the answer.
3. There is only one scheduling possible for maximum runs to be scored.
Hence option (a) is the answer.
4. S will score 20 runs.
Hence option (a) is the answer.

5 to 9

The given information can be sequenced as:

Eeshwar is the eldest;
 Amit > Bharat;
 Chandan > Dinesh and
 Dinesh < Ferguson < Bharat or
 Bharat < Ferguson < Dinesh

Now, the following possible arrangement can be attained:

	22	21	20	19	18	17
(1)	Eeshwar	Amit	Bharat	Ferguson	Chandan	Dinesh
(2)	Eeshwar	Amit	Bharat	Chandan	Ferguson	Dinesh
(3)	Eeshwar	Amit	Chandan	Bharat	Ferguson	Dinesh
(4)	Eeshwar	Chandan	Amit	Bharat	Ferguson	Dinesh
(5)	Eeshwar	Chandan	Dinesh	Ferguson	Amit	Bharat
(6)	Eeshwar	Chandan	Dinesh	Amit	Ferguson	Bharat
(7)	Eeshwar	Chandan	Amit	Dinesh	Ferguson	Bharat
(8)	Eeshwar	Amit	Chandan	Dinesh	Ferguson	Bharat

5. From the above arrangement, we see that Dinesh can be 20 years of age [(5), (6)], Ferguson can be 18 years old [(2), (3), (4)] and Ferguson can also be 19 years old [(1), (5)]. However, Ferguson can never be 20 years old.
6. If Bharat is 17 years old, the possible arrangements are (5), (6), (7) and (8).
 From the options, we can see that the only possible answer is (b).
7. There are two cousins between Chandan and Ferguson in age reference [(4); (6) and (7).] In all the cases, we have Ferguson's age as 18 years.
8. Amit is one year older than Chandan in only two arrangements. [(3) and (8)].
9. If Chandan is 19 years old, the only possible arrangement is (2) Clearly, Amit is 21 years old and Bharat is 20 years old.

10 and 11

10. Let us go through the various options to

Option (a): The dining room and kitchen lights can certainly be 'on' at the same time [reference (ii)].

Option (b) There is nothing given in the data to indicate that the hall and bedroom lights cannot be 'on' at the same time.

Option (c) Whenever the dining room light is 'on', the kitchen light is 'on' reference [(ii)] and whenever the latter is 'on', the study room is 'off' [reference (i)]. Hence, the dining room and the study room lights cannot be 'on' at the same time. Hence, the answer is (c).

Regarding option (d), note that the hall and kitchen lights can be 'on' at the same time. When the kitchen light is 'on', the study room light is 'off' [reference (i)]. Whenever the study room light is 'on' the hall light is also 'on' [reference (iii)]. But this does not mean that the hall light is 'off' when the study room light is 'off'. That would be true, only if statement (iii) says, "The hall light is 'on' only if the study room light is 'on'," but that is not so. Hence there is no restriction on the hall light being 'on' when the kitchen light is 'on'.

11. The bedroom, kitchen, dining room and the hall lights can all be 'on' simultaneously. Hence, the maximum number of lights that can be on simultaneously is 4.

12 to 15

Following diagram can be made:

	Marketing	Ent	Law	Finance	Acc	HR
Jan						
Feb						
Mar						
Apr						
May						
June						
July						
Aug						

Sep						
Oct						
Nov						
Dec						

Now all the questions can be answered.

15. The number of different lectures which can be attended in January, February & March are 3, 2 & 3 respectively. So, total 8 different lectures can be attended.

16 to 19

- 16, 17 & 19. As per the question the following data is available to us:

Ant A climbs 3 inches per minute; ant B climbs 4 inches per minute; ant A slips back 1 inch for every 2 inches climbed; ant B slips back 1.5 inches for every 2 inches climbed.

Ant A takes a rest break of 1 minute after every 2 minutes.

Ant B takes a rest break of 1 minute after every 3 minutes.

After min				
1	2	3	4	
5	6	7	8	
9	10	11	12	
Ant A				
2"	3"	3"	5"	
6"	6"	8"	9"	
9"	11"	12"	12"	
Ant B				
1"	2"	3"	3"	
4"	5"	6"	6"	
7"	8"	9"	9"	

18. If ant B do not take rest, we will get the following table:

After minutes				
1	2	3	4	
5	6	7	8	
9	10	11	12	
Ant A				
2"	3"	3"	5"	
6"	6"	8"	9"	
9"	11"	12"	12"	
Ant B				
1"	2"	3"	4"	
5"	6"	7"	8"	
9"	10"	11"	12"	

20 to 22

20. Expected profit margin (known as contribution) per unit = ₹200 – ₹100 = ₹100

Hence break even sales units

$$= \frac{\text{Fixed Cost}}{\text{Profit margin per unit}}$$

$$\frac{\text{₹40 lacs}}{\text{₹40 lacs}} = 40,000 \text{ units}$$

Hence net sales = 40,000 × 200 = ₹80 lacs

21. Original profit = Total sales – Total cost (fixed cost + variable cost) = (₹200 × 1 lac) – (40 lacs + ₹100 × 1 lac) = ₹60 lacs

Now, new variable cost = ₹110 / unit, and everything else remains same.

So new profit = (₹200 × 1 lac) – (40 lacs + ₹110 × 1 lac) = ₹50 lacs

So, percentage decrease in profit

$$= \frac{\text{₹10 lacs}}{\text{₹60 lacs}} \times 100 = 16.67$$

22. Original profit = ₹60 lacs (see above question)

Interest payment = ₹2 lacs

Profit after interest = ₹58 lacs

Profit after interest after tax = ₹58 lacs – 30% of ₹58 lacs = ₹40.6 lacs

In the new case, there is 20% growth in sales.

So, new profit = (₹200 × 1.2 lac) – (40 lacs + ₹100 × 1.2 lac) = ₹80 lacs

Profit after interest payment = ₹78 lacs

Profit after interest after tax = ₹78 lacs – 30% of ₹78 lacs = ₹54.6 lacs

Percentage increase in earning = $\frac{54.6 - 40.6}{40.6} \times 100$
= 34.5% increase

PRACTICE EXERCISE 2

Directions for questions 1 to 2: *Read the following statement and solve the questions based on them.*

- (i) Seema is Raju's grandmother
 - (ii) Ganesh is Raju's father
 - (iii) Arun is Seema's sister
 - (iv) Pratibha is Ganesh's wife
 - (v) Arun is not Ganesh's aunt
1. What is Seema's daughter Devaki to Raju?
 - (a) mother (b) paternal aunt
 - (c) maternal aunt (d) father's aunt
 2. Pratibha is Arun's
 - (a) sister (b) sister-in-law
 - (c) maternal uncle (d) niece

Directions for questions 3 to 7: *Read the following passage and solve the questions based on it.*

There are six persons in a family, viz., A, B, C, D, E and F—three males and three females, not necessarily in the same order. Out of these, there are two married couples and two persons who are unmarried. Each one of them likes a different newspaper, viz. Times, Express, Hindustan Times, Financial Times, Bharat Times and Business Standard.

E, who likes the Express, is A's mother-in-law and A is C's wife. D is F's father and he does not like the Times or the Business Standard. B likes the Bharat Times and is F's sister, who likes the Hindustan Times. C does not read the Business Standard.

3. Who among the following likes the Times?
 - (a) C (b) D
 - (c) A (d) Cannot be determined
4. How is F related to E?
 - (a) Daughter (b) Brother
 - (c) Son (d) None of these
5. Which of the following is one of the married couples?
 - (a) D-B (b) D-E
 - (c) B-F (d) E-F
6. Which of the following newspapers is read by A?
 - (a) Times
 - (b) Bharat Times
 - (c) Business Standard
 - (d) Data Inadequate
7. How many sons does E have?
 - (a) four (b) three
 - (c) two (d) one

Directions for questions 8 to 11: *Read the following passage and solve the questions based on it.*

- (i) There are five types of cards, viz., A, B, C, D and E, and three cards of each type. These are to be kept in envelopes of three colours—violet, yellow and black and there are five envelopes of each colour.
 - (ii) B, D and E type cards are to be kept in the violet envelopes. A, B and C type cards are to be kept in the yellow envelopes; and C, D and E type cards are to be kept in the black envelopes.
 - (iii) Two cards each of B and D type are to be kept in the violet envelopes.
8. How many E type cards are kept in the black envelopes?
 - (a) nil (b) one
 - (c) two (d) three
 9. Which of the following combinations of regarding the type of cards and the number of cards is definitely correct with respect to the yellow coloured envelopes?
 - (a) A-2, B-1, C-2 (b) B-1, C-2, D-2
 - (c) A-2, E-1, D-2 (d) None of these
 10. Which of the following combinations regarding the type of cards, the number of cards and the colour of envelopes is definitely correct?
 - (a) C-2, D-1, E-2, black
 - (b) C-1, D-2, E-2, black
 - (c) B-2, D-2, A-1, violet
 - (d) None of these
 11. Which of the following combinations regarding the colour of envelopes and the number of cards is definitely correct with respect to the E type cards?
 - (a) Violet – 2, black – 1
 - (b) Violet – 1, yellow – 2
 - (c) Violet – 2, yellow – 1
 - (d) None of these

Directions for questions 12 to 15: *Read the following passage and solve the questions based on it.*

- (i) There are six picture cards—A, B, C, D, E and F, each bearing the picture of a king, a priest, a queen, a palace, a joker and a prince. These are printed in six different coloured inks—blue, red,

green, grey, yellow and black—and are arranged from left to right (not necessarily in the same order and colour)

- (ii) The picture of the palace was in blue colour but it was not printed on card D.
 - (iii) Card A, which had the queen's picture printed in black ink, was at the extreme right.
 - (iv) The picture of the priest was neither on card D nor on card E and was not printed in either green or yellow coloured ink. Card C had a picture of the king on it in grey coloured ink. It was fifth from the right and next to card B which had the picture of the prince.
12. If the priest's card is between the cards of the palace and the prince, then at what number from the left is the joker's card placed?
 - (a) first (b) fourth
 - (c) fifth (d) second
 13. Which of the following combinations of card and colour is true for the picture of the priest?
 - (a) E-yellow (b) F-red
 - (c) B-green (d) Data inadequate
 14. In which colour was the picture of the joker printed?
 - (a) yellow (b) red
 - (c) green (d) data inadequate
 15. The picture of the palace was printed on which of the following cards?
 - (a) E (b) F
 - (c) D (d) Either D or E

Directions for questions 16 to 18: Read the following passage and solve the questions based on it.

To smoothen the process of issuing of passports, MEA has devised a 'Single office-Three windows' system. Under this system, the windows are named W1, W2 and W3. To ease the pressure upon the employees, the windows operate at different time slots on different days.

- (i) W1 is open between 10 a.m. and 2 p.m. on Monday, Wednesday and Thursday and between 2.30 p.m. and 4.30 p.m. on Tuesday, Friday and Saturday.
- (ii) W2 is open between 9 a.m. and 12 noon on Tuesday, Thursday and Friday and between 1 p.m. and 3 p.m. on Monday, Wednesday and Saturday.
- (iii) W3 is open between 8 a.m. and 11 a.m. on Monday, Tuesday, Thursday and Friday and between 1 p.m. and 3 p.m. on Monday, Wednesday and Saturday.

16. On which of the following days are all the three windows simultaneously open any time before noon?
 - (a) Saturday (b) Thursday
 - (c) Wednesday (d) Monday
17. On which day not more than one window is open simultaneously at any given time?
 - (a) Tuesday (b) Wednesday
 - (c) Friday (d) Saturday
18. On which day's afternoon slots are W1 and W2 open simultaneously for some time?
 - (a) Friday (b) Thursday
 - (c) Monday (d) Tuesday

Directions for questions 19 to 23: Read the following passage and solve the questions based on it.

- (i) Two wooden cubes A and B are placed adjacent to each other in front of you in such a way that A is to your left and B is to your right.
 - (ii) One pair of the opposite faces of cube A is painted the same colour i.e., red colour. Another pair of opposite faces is painted blue and the other two remaining pairs of faces are painted Yellow and violet.
 - (iii) Only two opposite faces of cube B are painted blue in colour. The remaining pairs of opposite faces are painted in such a way that brown opposite to is green and one of the other two opposite faces is black and the other is white.
19. If the red surface of cube A and the blue surface of cube B are touching the table; and the yellow surface of cube A and the black surface of cube B are facing you; then which coloured side of cube B is facing the blue side of cube A?
 - (a) Brown
 - (b) Green
 - (c) White
 - (d) Either brown or green
 20. If the black surface of cube B is kept on top of the red surface of cube A, which coloured side of cube B will face the sky?
 - (a) White (b) Blue
 - (c) Brown (d) Data inadequate
 21. If the cubes are re-arranged one above the other in such a way that the white face of cube B is facing the sky and the yellow face of cube A is kept above it; then which coloured surface of cube A will be facing you?

From (iii) and using the above table, we get

Table 2

Violet Envelope	Yellow Envelope	Black Envelope
B(2)	A	C
D(2)	B(1)	D(1)
E(1)	C	E(2)

Digits given in the brackets show the number of cards. From statement (i), it is clear that each coloured envelope contains five cards. So, there are two C-type cards in the black envelope. Therefore, the remaining one C-type card is in the yellow envelope. So, all the three A-type cards are in the yellow envelope.

12 to 15

Starting with the definite information in statements (iii) and (iv) we get the following table (say Table I);

Table 1

Card	Colour	Picture	Position
A	black	queen	6
B		prince	
C	grey	king	2
D			
E			
F			

The cards have been assigned the positions 1 to 6 from left to right.

Using the information given in the other statements:

Palace – blue – D (x)(i)

Prince – D, E (x) (ii)

Priest – green, yellow (x) (iii)

B – 2 or 4

From (i), (ii), (iii) and Table I, we get

Prince – red (v)

From (ii), (v) and Table I, we get

Prince – red – F (vi)

Using (i), (vi) and Table I, we get

Palace – blue – E (vii)

Using (iv), (vi), (vii) and Table I, and then filling up the remaining information, we get the following table:

Table 2

Card	Colour	Picture	Position
A	black	queen	6
B	green/yellow	prince	
C	grey	king	2
D	yellow/green	joker	
E	blue	palace	
F	red	priest	

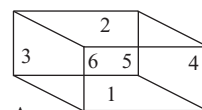
12 The vacant positions are 1, 3, 4 and 5. The given conditions require that the three consecutive cards – 3, 4 and 5 – be assigned to these. So, the joker will be at the number 1 position from the left.

16 to 18

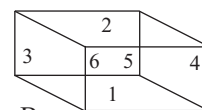
	Mon	Tue	Wed	Thu	Fri	Sat
W1	10 a.m. – 2 p.m.	2.30 p.m. – 4.30 p.m.	10 a.m. – 2 p.m.	10 a.m. 2 p.m.	2.30 p.m. – 4.30 p.m.	2.30 p.m. – 4.30 p.m.
W2	1 p.m. – 3 p.m.	9 a.m. – 12 noon	1 p.m. – 3 p.m.	9 a.m. – 2 noon	9 a.m. – 12 noon	1 p.m. – 3 p.m.
W3	8 a.m. – 11 a.m.	8 a.m. – 11 a.m.	12 noon – 2 p.m.	8 a.m. – 11 a.m.	12 noon – 2 p.m.	12 noon – 2 p.m.

19 to 23

We need to visualize it.

**A**

1 = Bottom face
2 = Top face
5 = Front face
6 = Back face

**B**

1 = Bottom face
2 = Top face
5 = Front face
6 = Back face

19. As per figure we need to find colour of face 3 of cube B. For cube B, face 1 is of blue colour & face 2 must also be of blue colour. Colour of face 5 & 6 must be black & white respectively. So, the colour of face 3 which is facing cube A must be either brown or green.

20. As for cube B, the face opposite to black colour face must be of white colour. So, white coloured side will face the sky. 21. As the colour of the face of cube A which is facing sky is yellow. So, the face facing us can be either of red or blue colour.	22. In this case multiple possible combinations of colour of the faces of cubes A & B facing each other are possible. So, data is inadequate. 23. The colour of face of cube B facing us may be blue or black or white. So, data is inadequate.

PRACTICE EXERCISE 3

Directions for questions 1 to 4: *Read the following passage and solve the questions based on it.*

Six people—P, Q, R, S, T and U are X's husband, sister, son, daughter, mother and aunt, though not necessarily in that order. They satisfy the following conditions:

- (i) R and S are either both males or both females.
 - (ii) Either P or Q, or both are male.
 - (iii) Either T or U, or both are female.
1. Any of the following could be X's son except
(a) P (b) Q
(c) S (d) T
 2. Which of the following statements must be false?
(a) P is S's grandson
(b) S is P's niece
(c) P is Q's nephew
(d) U is T's son
 3. If Q is U's daughter, then which of the following statements could be true?
(a) P is X's sister (b) U is R's aunt
(c) T is S's nephew (d) Q is S's niece
 4. If P is T's sister, then U could be any of the following except
(a) X's sister (b) X's daughter
(c) X's aunt (d) X's husband

Directions for questions 5 to 9: *Read the following passage and solve the questions based on it.*

A business school with six professors, viz., L, M, N, O, P and Q, has decided to implement a new scheme of course management. Each professor has to coordinate one course and support another course. This semester, O's support course is Finance, while three other professors are its coordinator's. P and Q have Marketing as one of their subjects. Q coordinates Operations, which is a support course for both N and P. Finance and IT are L's subjects. Both L and O have the same subjects. Strategy is a support course for only one of the professors.

5. Who coordinates the Strategy course?
(a) M (b) N
(c) O (d) None of the professors
6. Which course is supported by M?
(a) Finance (b) Strategy
(c) IT (d) Operations
7. Who coordinates the IT course?
(a) L (b) N
(c) O (d) None of the professors

8. Who all are coordinating the Finance course?
(a) L, M and N (b) M, N and O
(c) N and O (d) L and N
9. Which course has only one coordinator and only one support professor?
(a) Marketing (b) Operations
(c) Finance (d) Strategy

Directions for questions 10 to 12: *Read the following passage and solve the questions based on it.*

During the Independence day celebrations at A R Academy last year, six different items, viz., drama, singing, mimicry, speech, story-telling and dance, were performed by six children viz., Abha, Binita, Sophiya, Devika, Esha and Ferguson, not necessarily in the same order. The programme began with the song which was not sung by Binita and ended with the dance item. Sophiya performed the mimicry item immediately after the speech. Esha performed the drama just before the dance sequence. Devika or Ferguson were not available for the last performance. The speech was not given by Abha and an interval of 30 minutes was given immediately after the mimicry item with three more items remaining to be performed. Devika performed immediately after the interval.

10. Which item was performed by Ferguson?
(a) Drama (b) Song
(c) Speech (d) Cannot be determined
11. Who performed the dance item?
(a) Abha (b) Binita
(c) Ferguson (d) Cannot be determined
12. Who was the first performer?
(a) Abha (b) Binita
(c) Ferguson (d) Cannot be determined

Directions for questions 13 to 15: *Read the following passage and solve the questions based on it.*

Next year in the Auto-Expo at Pragati Maidan, six cars, namely Uno, Verna, Wind, X-tra, Yale and Zen, are to be displayed. There will be six display stalls numbered 1, 2, 3, 4, 5 and 6 from the left to the right in such a way that only one car is showcased in each stall. However, the car Uno cannot be placed adjacent to the Verna and the Car Wind must be showcased to the left of X-tra. The Zen cannot be displayed in stall number 6.

Note: The direction (left or right) should be determined with respect to the observer/shopper.

13. Which of the following cars cannot be placed in stall number 1?
 (a) Uno (b) Verna
 (c) Wind (d) X-tra
14. If the X-tra is placed in stall number 3, in which stall can the Wind be placed?
 (a) 1 (b) 2
 (c) 4 (d) 5
15. If the Uno is placed in stall number 5, which of the following cars must be placed in stall number 6?
 (a) Verna
 (b) Wind
 (c) Yale
 (d) X-tra

Directions for questions 16 to 17: Read the following passage and solve the questions based on it.

- (i) Six men, viz., Rajesh, Dinesh, Lokesh, Nilesh, Shailesh and Himesh work for different companies, namely P, Q, R, S, T and U. Each one wears a different coloured company-sponsored tie, i.e., brown, green, pink, yellow, purple and red, though not necessarily in the same order.
- (ii) The one wearing the brown tie works for the company S and the one wearing the green tie works for the company P.
- (iii) Himesh does not work for either R nor T.
- (iv) Rajesh wears a pink tie and works for the company Q.
- (v) Nilesh does not work for the company T and a purple coloured tie is not given by the company R.
- (vi) Shailesh works for the company U and neither Nilesh nor Dinesh work for the company S.
- (vii) The company T does not sponsor a purple or a yellow coloured tie and Lokesh works for the company P.
16. Which of the following is true?
 (a) The company U sponsors a green coloured tie
 (b) Shailesh wears a red coloured tie
 (c) Nilesh works for the company T
 (d) The red coloured tie is sponsored by the company T
17. Which of the following sequence of companies represent Rajesh, Dinesh, Lokesh, Nilesh, Shailesh and Himesh in the same order?
 (a) Q, P, T, R, U, S
 (b) Q, T, P, R, U, S
 (c) Q, P, T, S, U, R
 (d) Q, T, S, U, R, P

Directions for questions 18 to 21: Read the following passage and solve the questions based on it.

- (i) The length, breadth and height of a rectangular piece of wood are 4 cm, 3 cm and 5 cm respectively.
- (ii) Opposite sides of the 5 cm $\times$ 4 cm piece are coloured red.
- (iii) Opposite sides of the 4 cm $\times$ 3 cm piece are coloured blue.
- (iv) Rest of the sides of size 5 cm $\times$ 3 cm are coloured green on both sides.
- (v) Now the rectangular piece is cut in such a way so that cubes of size 1 cm $\times$ 1 cm $\times$ 1 cm can be made.
18. How many cubes will have all the three colours?
 (a) 8 (b) 10
 (c) 12 (d) 14
19. How many cubes will not have any colour?
 (a) 0 (b) 2
 (c) 4 (d) 6
20. How many cubes will have only two colours (red and green) on their two sides?
 (a) 8 (b) 12
 (c) 16 (d) 20
21. How many cubes will have only one colour?
 (a) 8 (b) 12
 (c) 16 (d) 22

Directions for questions 22 to 26: Read the following passage and solve the questions based on it.

Out of a stock of five essences, viz., L, M, N, O and P, two or more essences are used by a manufacturer in making all the perfumes. He has learned that for a blend of essences to be agreeable, they should comply with all the rules listed below.

- (i) A perfume containing the essence L should also contain the essence N and the quantity of N should be twice as that of L.
- (ii) A perfume containing the essence M must also have the essence O as one of its components and they should both be in equal proportions.
- (iii) No perfume should contain the essence N as well as the essence O.
- (iv) The essence O and P the essence should not be used together.
- (v) A perfume containing the essence P should contain it in such a proportion that the total amount of the essence P present should be greater than the total amount of the other essence or essences used.

22. Which is an agreeable formula for a perfume from among the following?
 (a) one part L, one part P
 (b) two parts M, two parts L
 (c) three parts N, three parts L
 (d) four parts O, four parts M
23. Adding more amounts of the essence N, which of the following perfumes will become agreeable?
 (a) one part L, two part N, five parts P
 (b) two parts M, two parts N, two parts P
 (c) one part M, one part N, one part P
 (d) two parts M, one part N, four parts P
24. The addition of which combination among the following would make an unagreeable perfume containing two parts N and one part P agreeable?
- (a) one part L (b) one part M
 (c) two parts N (d) two parts P
25. Which among the following combinations cannot be used together in an agreeable perfume containing two or more essences?
 (a) L and M (b) L and N
 (c) L and P (d) P and N
26. Among the below mentioned formulae, which can be made agreeable by eliminating some or all of one essence?
 (a) one part L, one part M, one part N, four parts P
 (b) one part L, two parts N, one part O, four parts P
 (c) one part L, one part M, one part O, one part P
 (d) two parts M, one part N, two parts O, three parts P

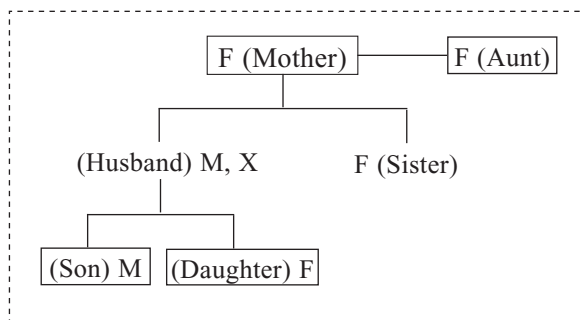
ANSWER KEYS

1. (c) 2. (d) 3. (d) 4. (b) 5. (d) 6. (b) 7. (c) 8. (a) 9. (a) 10. (d)
 11. (d) 12. (d) 13. (d) 14. (b) 15. (c) 16. (d) 17. (b) 18. (a) 19. (d) 20. (b)
 21. (d) 22. (d) 23. (a) 24. (d) 25. (a) 26. (b)

HINTS AND EXPLANATIONS

1 to 4

Let us first make a diagram from the given facts:



Two (husband and son) of X's six relatives are males and four are females. Since R is of the same sex as S, so both must be females, otherwise neither P nor Q could be males. The family relationship can be drawn around X like:

F – female and M – male

1. Since both R and S must both be females, so, S cannot be X's son.
2. The only son among the six relatives is X's son. If U were T's son, then U would also be X's son. Accordingly, T would be X's husband. However, T and U cannot both be males. Thus statement (d) is false.
3. If Q is U's daughter, then Q and U must either be X's daughter and husband respectively or X's sister and mother respectively. If P is X's sister, P and Q would both be females, which is impossible so option (a) must be false. Since none of the six relatives could be U's niece, so option (b) must be false. T and S would have to be X's son and sister respectively. Accordingly, U and Q would have to be X's husband and daughter but T and U cannot both be males. So, option (c) must be false. Option (d) could be true because U would be X's mother, S would be U's sister and Q would be X's sister.
4. If P is T's sister, then P and T must either be X's daughter and son respectively or X's mother and aunt

(in either order). But P, T and U cannot all three be females, so U cannot be X's daughter.

5 to 9

O Supports Finance
Q Coordinates Operations
N Supports Operations
P Supports Operations

Professor	Coordinator	Support
L		
M		
N		Operations
O		Finance
P		Operations
Q	Operations	

P and Q have Marketing as one of their subjects

Professor	Coordinator	Support
L		
M		
N		Operations
O		Finance
P		Operations
Q	Operations	

P and Q have marketing as one of their subjects

Professor	Coordinator	Support
L		
M		
N		Operations
O	IT	Finance
P	Marketing	Operations
Q	Operations	Marketing

3 people coordinate Finance and

Professor	Coordinator	Support
L	Finance	
M	Finance	
N	Finance	Operations
O	IT	Finance
P	Marketing	Operations
Q	Operations	Marketing

IT is L's subject

Strategy is supported by one of the professors.

Professor	Coordinator	Support
L	Finance	IT
M	Finance	Strategy
N	Finance	Operations
O	IT	Finance
P	Marketing	Operations
Q	Operations	Marketing

10 to 12

For the sake of convenience, let us take the first letter of the names of all the children.

Table 1

Item	Order	Performer	
Song	1	B(x)	... (i)
Dance	6		... (ii)
Mimicry	$x = 3$	S	... (iii)
Speech	$(x-1) = 2$	A(x)	... (iv)
Drama	5	E	... (v)

(order can be determined with the help of Table II)

Table 2

6	D/F (x)	...(vi)
4	D	...(vii)

'x = 3' is known by the second last line of the given information.

Table 3

Story telling	4	D
Drama	5	E
Mimicry	3	S
Speech	2	B/F
Song	1	A/F
Dance	6	A/B

13 to 15

13. In any arrangement the Wind must be to the left of X-tra so, the X-tra cannot be placed in stall number 1.
14. If the X-tra is placed in stall number 3, then the Wind has to be immediately to the left of X-tra. So the Wind must be placed in stall number 2.
15. If the Uno is placed in stall number 5, neither the Wind nor the X-tra can be placed in stall number 6 as they must be placed next to each other. Also the Verna cannot be placed adjacent to the Uno. Hence, only the Yale can be placed in stall number 6.

16 to 17

Tie	Company	Name
brown	S	Himesh
green	P	Lokesh
pink	Q	Rajesh
purple	U	Shailesh

yellow	R	Nilesh
red	T	Dinesh

18 to 21

18. 8 cubes will have 3 colored faces.
19. No surface coloured = $(1 - 2)(b - 2)(h - 2)$
 $3 \times 1 \times 2 = 6$
20. There are three cubes on each red – green interface (barring corner cubes) So, $4 \times 3 = 12$ cubes.
21. Single coloured cube =
 $2(1 - 2)(b - 2) + 2(1 - 2)(h - 2) + 2(b - 2)(h - 2) = 22$

22 to 26

22. Using condition (i) if we have L, then we must also have N in double quantity. So, option (a), (b) & (c) are eliminated.
23. Using condition (ii), option (b), (c) & (d) are not possible as O is not there, but M is present.
24. P must be more than all other essences combined. We have 2 part of N & 1 part of P. So, 2 part of P must be added.
25. If we use L, we must also use N. Similarly if we use M, we must also use O. But N & O cannot be used together. So, L & M cannot be used together.
26. We have 1 part of L & 1 part of N, while there must be 2 part of N if 1 part of L is used. So, 1 part of L should be removed. Similarly we have M, but no O. So, M should also be removed. So, we need to remove 2 essence from option (a). So, option (a) is eliminated.

In option (c), P is less than other essences, so it should be removed. But, L should also be removed as N is not present. So, option (c) is also eliminated.

In option (d), we have to remove N & P both, so it is also eliminated.

In option (b), we need to remove only O. So, (b) is correct option.

PRACTICE EXERCISE 4

Directions for questions 1 to 4: Read the following passage and solve the questions based on it.

A total of six teams participated in the PHL held at Chennai last year. The schedule of the tournament was such that each team had to play against every other team six times. Points were awarded for wins (W), losses (L) and draws (D). The following table gives the details of the various teams:

	Sikkim	Goa	Gujarat	Bihar	MP	Chandigarh
W	13	7	12	X	10	9
L	15	18	15	Y	16	15
D	2	5	3	Z	4	6

- How many W, L and D combinations were possible for the Bihar team?
(a) 1 (b) 2
(c) 3 (d) None of these
- If we gave 5 points for a win, -3 points for a loss and 2 points for a draw, then what could be the maximum possible difference between the points of two teams?
(a) 123 (b) 153
(c) 163 (d) None of these
- If Gujarat lost all the matches to only three teams with a point distribution of 5, 5 and 5 and Bihar scored the first rank with the maximum possible wins; then which team did Bihar lose its match against?
(a) Sikkim
(b) Gujarat
(c) MP
(d) Cannot be determined
- The team which got the maximum number of points won the PHL. Which team was that?
(a) Sikkim (b) Gujarat
(c) Bihar (d) Cannot be determined

Directions for questions 5 to 9: Read the following passage and solve the questions based on it.

P, Q, R, S, T, U and V are sitting in a circle facing the centre. Following are the details of their order of sitting:

- S, who is second to the right hand side of R, is not to the immediate right of V.
- U is not between V and T.
- P is between R and Q.

- Which of the following statement is wrong?
(i) T is to the immediate left of R.
(ii) Q is to the immediate left of U.
(iii) U, S and T are in a sequence, one after the other.
(a) only I (b) only II
(c) only III (d) I and II
- Which of the following are the two pairs of adjacent members?
(a) VS and TR (b) SU and PQ
(c) PR and TQ (d) None of these
- What is the position of T?
(a) To the immediate left of R
(b) Second to the left of P
(c) Fourth to the left of U
(d) None of these
- Which of the following statement is correct?
(i) V is third to the left of R
(ii) U is between S and V
(iii) Q is to the immediate left of P
(a) only I
(b) only II
(c) only III
(d) II and III
- If Q and R interchange places so as to be like T and V, then which of the following is true?
(a) S is third to the right of R
(b) T is second to the left of R
(c) Q is fourth to the right of T
(d) None of these

Directions for questions 10 and 11: Read the following passage and solve the questions based on it.

- Five boys are standing in a line facing the wall. Each boy is either wearing red, green, yellow, white or blue dress.
- The boy dressed in yellow is not standing at any end of the line.
- The boy dressed in red is not standing at any end of the line.

- What colour dress is the boy in the middle wearing?
(a) Green
(b) Blue
(c) Red
(d) Cannot be determined

11. What colour dress has been worn by the boy who is standing to the right side of the boy dressed in yellow?
- (a) White (b) Green
(c) Blue (d) Cannot be determined

Directions for question 12 to 17: Read the following passage and solve the questions based on it.

There are five specializations—Marketing, Finance, Production, Personnel and Systems—available at the IIM. It is necessary for all students to take up a combination of at least two of the above specializations.

Based on common preferences, pre-set combinations called modules are offered, which are coded S001, S002, S003, S004 and S005. Each of these modules has two specializations, so that every specialization is assigned to two modules. Further, to allow for uncommon preferences a student is allowed to take up more than one combination in such a way that the specialization common to the two modules is dropped.

However, a student can specialize in more than two subjects by manipulating the combination of modules.

Additional information is as follows:

S001 has not been assigned to Production. S003 has not been assigned to Marketing. S004 has not been assigned to Finance. By choosing S001 and S003, one may specialize in Marketing and Systems. By choosing S001 and S002 one may specialize in Marketing, Production, Finance and Personnel. By choosing S001 and S004 one may specialize in Finance and Personnel.

12. What specializations are possible by choosing S001, S002 and S003?
- (a) Marketing, Finance and Personnel
(b) Marketing, Production and Personnel
(c) Finance, Personnel and Production
(d) Marketing, Production, Personnel and Systems
13. Which of the following number of modules give the minimum number of specializations?
- (a) S003 and S004
(b) S002 and S004
(c) S002 and S003
(d) S004 and S005
14. What is the maximum number of modules that a student can take to specialize in at least two areas?
- (a) 2 (b) 3
(c) 4 (d) 5
15. Which of the following number of specializations is impossible for any student to take?
- (a) 2 (b) 3
(c) 4 (d) None of these
16. Personnel is available in modules
- (a) S002 and S003
(b) S001 and S003
(c) S002 and S004
(d) S003 and S005
17. Finance is available in modules
- (a) S001 and S003
(b) S003 and S004
(c) S002 and S003
(d) S001 and S004

Directions for questions 18 to 22: Read the following passage and solve the questions based on it.

For a motorist, there are three ways of going from city A to city C by a 20 km long, toll highway the toll for which is ₹25 per entry; a 10 km long tunnel between the two cities, the toll for which is ₹40 per entry; and a two-lane, toll-free highway which goes 30 km east to city B and then 20 km north-west to city C.

The running cost of the motorist = ₹1/km.

18. Which of the following is the costliest way of going from city A to city C?
- (a) tunnel
(b) toll highway
(c) toll-free highway
(d) tunnel or toll-free highway
19. To connect the cities better, a master plan has been devised. According to this plan, a new toll-highway is to be built from the mid point of the highway connecting cities A and B to city C. The toll for this new highway is ₹30 per entry. Which of the following is the cheapest route between city A to city C?
- (a) tunnel
(b) toll highway
(c) toll-free highway
(d) new proposed highway
20. Due to CNG, the cost of the motorist has reduced to ₹0.5/km. Which of the following is the cheapest way to go from city A to city C?
- (a) tunnel
(b) toll highway
(c) toll-free highway
(d) tunnel or toll-free highway

21. If we combine the data of question 2 and question 3, then which of the following is the cheapest way to go to city C from city A?
 (a) tunnel
 (b) toll highway
 (c) toll-free highway
 (d) new proposed highway
22. According to a new system, motorists are supposed to pay a bribe at the starting of their journey. This bribe has to be a one-time bribe only and no other bribe is to be paid during the earlier journey. What should be the bribe amount at the toll highway such that the total expenses on the toll highway become equal to the total expenses on the toll-free highway?
 (a) ₹5 (b) ₹10
 (c) ₹15 (d) None of these

Directions for questions 23 to 25: Read the following passage and solve the questions based on it.

Two out of Anil, Balraj and Chandan are fighting each other. The given statements are

- (i) The shorter one out of Anil and Balraj is the older of the two fighters.
 (ii) The younger one out of Balraj and Chandan is the shorter of the two fighters.
 (iii) The taller one out of Anil and Chandan is the younger of the two fighters.
23. Who is not fighting?
 (a) Anil (b) Balraj
 (c) Chandan (d) Data inconsistent
24. Who is the tallest?
 (a) Anil (b) Balraj
 (c) Chandan (d) Data inconsistent
25. Who is the youngest?
 (a) Anil (b) Balraj
 (c) Chandan (d) Data inconsistent

ANSWER KEYS

1. (b)	2. (b)	3. (b)	4. (d)	5. (d)	6. (d)	7. (d)	8. (c)	9. (d)	10. (d)
11. (d)	12. (d)	13. (b)	14. (c)	15. (b)	16. (c)	17. (a)	18. (d)	19. (b)	20. (c)
21. (c)	22. (a)	23. (c)	24. (a)	25. (a)					

HINTS AND EXPLANATIONS

1 to 4

1. Total number of matches = $15 \times 6 = 90$
 Number of matches played by each team = 30. The score table given in the question considers a total of 180 matches.
 Let total number of wins = x , so total loss = x
 So, total number of draws on the score table
 $D = 180 - 2x$
 $D = 2(90 - x)$
 We can conclude that the number of matches drawn must be a multiple of 2 i.e., an even number and we know that the total number of matches for each team should be = 30
 Or, $51 + P = 79 + Q$
 Or, $P - Q = 28$

We know that

$$P + Q \leq 30 \quad \text{and} \\ P + Q + R = 30.$$

From the given equations, we can find the following possibilities:

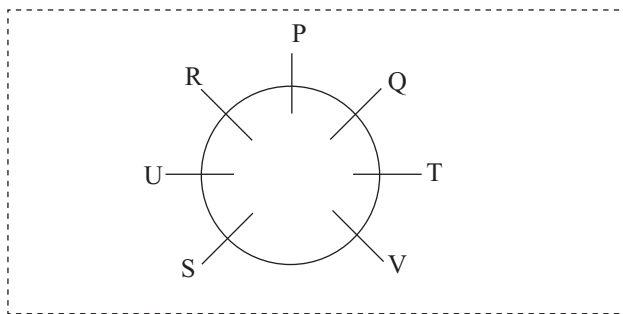
$P = 29$	$Q = 1$	$R = 0$
$P = 28$	$Q = 0$	$R = 2$

Therefore 2 W, L and D combinations were possible for the Bihar team.

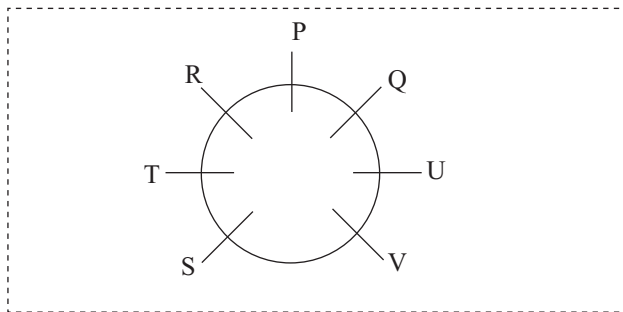
- 2 The lowest score possible was
 for Goa = -9
 The highest score possible was
 for Bihar = 144 (See question 1)
 So, the maximum possible
 difference = 153

3. Bihar is maximum possible wins and losses were 29 and 1 respectively. It means Bihar has won all six matches against any 4 teams but it could win only 5 matches. Since Gujarat didn't lose any of its 6 matches against the other teams, it is definitely not the team which lost all its matches against Bihar. Hence, it must be the team which won the match against Bihar. Therefore, Bihar lost the match against Gujarat.
4. Since the scoring pattern for the wins (w), losses (l) and draws (d) of the match was not given, therefore it cannot be determined as to which team won the PHL.

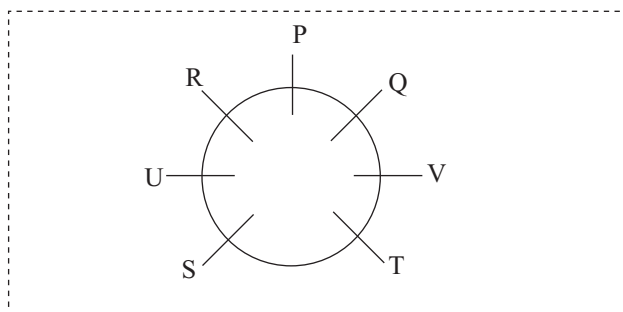
5 to 9



Case I



Case II



Case III

5. We cannot say that statement (iii) is wrong because case III (as shown above) makes the statement true. While case I and case II make the statement wrong.

Since we are not certain about the positions of U, V and T, therefore, only statement (i) and (ii) are wrong.

6. There are 3 possible cases & none of the given pairs are possible in all 3 cases.
7. Position of T is not fixed & it changes in the given possible diagrams.
8. Position of V & U are not fixed. But position of Q & P are fixed & Q is immediate left of P. So, only (iii) is correct.
9. We can check in all 3 possible cases that options (a), (b) & (c) are not correct.

10 to 11

1	2	3	4	5
X Red				X Red
X Yellow				X Yellow

10. The colour of dress of buy in middle cannot be determined.
11. This cannot be determined.

12 to 17

Module S001 does not have Production and module S003 does not have Marketing. But their combination gives us Marketing and Systems. Hence, 5 module S001 must have Marketing. Since modules S001 and S002 have four different specializations, there must be no common specialization and module S002 will not have Marketing but will have Production. Module S003 will have Systems included because it is not a part of module S001. So, S001 will have Finance or Personnel and it will be common to module S003.

Now, since the S001 and S004 module combination does not have Marketing as a specialization, it means that they both have Marketing as common. Since they have Finance and Personnel common, therefore module S001 has Finance and module S004 has Personnel. Thus, module S002 also has Personnel and module S003 must also have Finance. This leaves module S005 with Production and Systems.

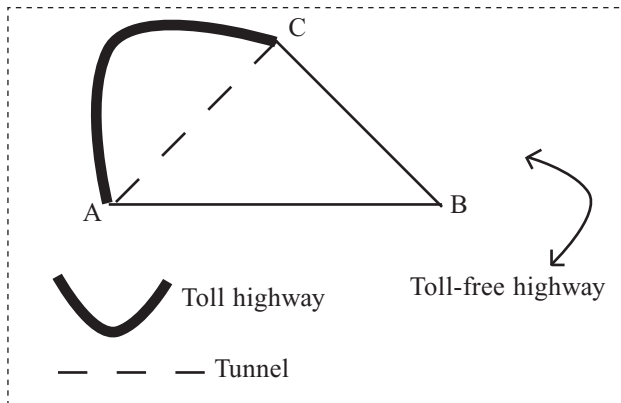
12. The combination of S001, S002 & S003 will give Marketing, Production, personnel & System. Finance is common in S001 & S003 & so it is dropped.
13. In option (b), there are 3 subjects as Personnel is common & so cancelled. All other options give 4 subjects.
14. If a student takes all the modules, then there will be no available subject as all subjects are common in 2 modules. If a student takes 4 modules (by leaving any 1 of 5 modules) then at least 2 areas will be covered

as the 2 areas covered in the module which was not taken. So, the maximum number of modules that a student can take to specialize in 2 areas is 4.

15. If a student takes 1 module only, there will be 2 areas of specialization. If a student takes 2 modules, there will be 4 (if no subject is common) or 2 (if 1 subject is common) areas of specialization. If a student takes 3 modules, there can be 4 or 2 areas of specialization depending on 1 or 2 common subjects. So, in any case 3 areas of specialization is not possible.
16. S002 & S004
17. S001 & S003.

18 to 22

Let us first see the arrangement of cities:



18. Total cost through the toll highway
 $= ₹20 + ₹25 = ₹45$
 Total cost through tunnel
 $= ₹10 + ₹40 = ₹50$
 Total cost through the toll-free highway = ₹50
 Therefore the costliest way of going from city A to city C is by the tunnel or the toll-free highway.
19. By using the data in the above answer we can see that the cheapest route between city A to city C is through the toll highway.
20. Total cost through the toll highway
 $= ₹10 + ₹25 = ₹35$
 Total cost through the tunnel
 $= ₹5 + ₹40 = ₹45$
 Total cost through the toll-free highway
 $= ₹25$
 Therefore the cheapest way to go from city A to city C using the CNG fuel option is through the toll-free highway.

21. By using the data in the above answer we can see that the cheapest way to go to city C from city A is through the toll-free highway.
22. Using the data from the solution of question 1, the difference = ₹5. Hence if ₹5 is the bribe amount, then the costs will be equal.

23 to 25

Using statement (i), Chandan is not the older fighter. From statement (iii): Balraj is not the younger fighter. So, either:

Case 1. Anil is the older fighter and Chandan is the younger fighter.

Case 2. Balraj is the older fighter and Anil is the younger fighter.

Case 3. Balraj is the older fighter and Chandan is the younger fighter.

From statement (iii):

Chandan is the taller fighter for case 1 and Chandan is taller than Anil for case 3.

From statement (i):

Balraj is the shorter fighter for case 2 and Balraj is shorter than Anil for case 3.

From statement (i) and (iii):

Chandan is taller than Balraj for Case 3.

Summarizing the whole discussion we get the following:

	Older fighter	Younger fighter	Taller fighter	Shorter fighter
Case 1	Anil	Chandan	Chandan	Anil
Case 2	Balraj	Anil	Anil	Balraj
Case 3	Balraj	Chandan	Chandan	Balraj

From statement (ii):

Anil is not the shorter fighter; so case 1 is eliminated.

From statement (ii):

Balraj cannot be both older and shorter than Chandan, so case 3 is eliminated. Then case 2 is the correct one and Chandan is not fighting.

Then, from statement (ii): Balraj is younger than Chandan (so Chandan is the eldest out of the three and Anil is the youngest) and, from statement (iii): Anil is taller than Chandan (so Anil is the tallest out of the three).

PRACTICE EXERCISE 5

Directions for questions 1 to 4: Read the following passage and solve the questions based on it.

A chess tournament is taking place at the college club and the players on all the four tables are engaged in their fourth game against their respective opponents. The players with the white pieces are: Sharukh, Sanjay, Saif and Shakti. The players with the black pieces are: Salman, Sunny, Sunil and Sohail. The scores are 3:0, 2.5:0.5, 2:1 and 1.5:1.5 (Note: Tied games result in a score of 0.5 for each player).

- The player using the white pieces at table 4 is Shakti; however, the current score at the table is not 2:1.
- Saif is playing at the table on the right hand side of Sohail, who has lost all his games upto now.
- Sunil, who is not in the lead against his opponent, has not been in a tied game.
- Salman is leading his match after his last three games.
- Sanjay is playing against Sunny.

(One win gets point for the winner whereas a player gets no point for losing the game).

- What table is Sohail playing at, and what is the score at that table?
(a) table 1:2.5–1.5 (b) table 2:3–0
(c) table 2:2.5–1.5 (d) table 3:2–1
- Which player has the highest score?
(a) Salman (b) Saif
(c) Sunny (d) Sunil
- Which player had the black pieces alongwith and the lowest score?
(a) Salman (b) Sunny
(c) Sunil (d) Sohail
- Who is the winning player at table 4?
(a) Salman (b) Shakti
(c) Sharukh (d) Sanjay

Directions for questions 5 and 6: Read the following passage and solve the questions based on it.

If the sum of the rows, columns and the diagonals are equal in the following table, then:

y	x	y – 2
y – 1	y + 1	—
—	—	—

- If $x = 10$, then what is the value of y ?
(a) 5 (b) 10
(c) 6 (d) 15
- If the sum of any of the rows, columns or diagonals is 21, then what is the value of x ?
(a) 5 (b) 11
(c) 15 (d) Cannot be determined

Directions for questions 7 and 8: Read the following passage and solve the questions based on it.

In a multiplex, nine shops are connected by corridors. Anyone visiting these shops must begin at the reception which is a part of shop number 1. From there, the other shops may be visited via the different corridors connecting them. The details of the corridors connecting the various shops are as under:

- Corridors connect the reception to shops number 2, 3 and 6.
 - A corridor connects the reception to shop number 2 and then to shop number 4.
 - Corridors connect the shops number 2 and 3 to shop number 7.
 - Shop number 6 is connected to shops number 1, 5 and 9.
 - Shop number 7 is connected to shop number 9.
 - Shops number 7 and 9 are connected to shop number 8.
- Without visiting any shop more than once, what is the maximum number of shops that a person can visit?
(a) 5 (b) 6
(c) 7 (d) 8
 - If a visitor wants to travel to shops number 4 and 5, which one of the following options must be False?
(a) The visitor will go to every shop except shop 3.
(b) The visitor will go to shop 2 only once.
(c) The visitor will not visit any shop more than once.
(d) The visitor will visit at least six different shops.

Directions for questions 9 to 11: Read the following passage and solve the questions based on it.

(Any additional information provided with a particular question pertains to that individual question only.)

The placement office of a management school has to schedule seven companies viz., P, Q, R, S, T, U and V for the placement week (the week starts on a Sunday) but not necessarily in that order. This group of seven companies is divided into three categories, viz., finance, manufacturing and sales. There are three companies in the final category and two each in one manufacturing and sales categories. The placement schedule is such that the same category companies have to be scheduled consecutively. It has also been decided that:

- (i) Company S, which is a manufacturing company, cannot be scheduled on the sixth day of the week.
 - (ii) Companies Q and U are scheduled consecutively but not necessarily in that order.
 - (iii) Company T can be scheduled on any day of the week except on a Saturday.
 - (iv) Company R, which is in the same category as the companies Q and U, has to be scheduled on the third day of the week.
9. If P is scheduled on Wednesday, which one of the following options has to be True?
- (a) U has to be scheduled on Thursday
 - (b) V has to be scheduled either on Friday or on Saturday
 - (c) T has to be scheduled on either Thursday or Friday
 - (d) S is always scheduled before Q
10. If S is scheduled on Monday, which one of the following options is definitely False?
- (a) P and T are sales companies
 - (b) The maximum number of days in between the schedules of T and U is three
 - (c) R is always scheduled before Q
 - (d) There are three schedules for P being slotted on a Sunday
11. If T is a sales company and S is scheduled for Saturday, then which of the following schedules are possible?
- | | |
|--------------|---------------|
| Schedule I | U-Q-R-T-P-V-S |
| Schedule II | P-T-R-U-Q-V-S |
| Schedule III | T-V-R-Q-U-P-S |
| Schedule IV | Q-U-R-P-V-T-S |
- (a) I, III and IV
 - (b) II, III and IV
 - (c) I, II and IV
 - (d) I, II and III

Directions for question 12: Read the following passage and solve the questions based on it.

There are five boxes—T, U, W, X and Z—that are to be delivered on five consecutive days, Monday through

Friday, one box per day. The following conditions are to be kept in mind while formulating the delivery schedule of the boxes:

- (i) Box X is not to be delivered on Monday
 - (ii) If box T is delivered on Monday, then box X must be delivered on Friday
 - (iii) If box X is delivered on Tuesday, box U is delivered on Monday
 - (iv) Box W is delivered the next day following the delivery of box Z
12. If box W is delivered on Friday, which of the following must be false?
- (a) Box Z is delivered on Thursday
 - (b) Box X is delivered on Wednesday
 - (c) Box T is delivered on Tuesday
 - (d) Box U is delivered on Tuesday

Directions for questions 13 to 17: Read the following passage and solve the questions based on it.

Tetraicosa is a game which is played by rolling six dices simultaneously. While playing the game—

If rolling six dices were rolled, then the following was observed:

- (i) Three of the dices showed the same number. The rest showed different numbers.
 - (ii) Only one dice showed 6.
 - (iii) Not more than three dice showed 4 or more.
13. Find the minimum possible total of numbers on the faces of all the six dice if three dice show the same number 2.
- (a) 14
 - (b) 21
 - (c) 18
 - (d) None of these
14. Find the maximum total if four of the dice show less than 4.
- (a) 29
 - (b) 32
 - (c) 22
 - (d) None of these
15. If the third observation is waived, then what would be the maximum total if three dice were faulty and had only 5 on all the faces?
- (a) 31
 - (b) 28
 - (c) 34
 - (d) None of these
16. If only one dice shows 1, what is the maximum number of dice with numbers greater than 4?
- (a) 3
 - (b) 1
 - (c) 2
 - (d) 4
17. What is the maximum number that can be on the faces of the three dices which show the same number?
- (a) 2
 - (b) 4
 - (c) 3
 - (d) 5

Directions for questions 18 to 21: Read the following passage and solve the questions based on it.

Seven persons A, B, C, D, E, F and G contested in a game show that had a total prize money of ₹14 lakhs. Every contestant won some prize money and the highest prize money was ₹3.5 lakhs. No two contestants won the same amount of prize money. For every person the difference with the next highest and the next lowest contestant was the same.

- (i) E won ₹2 lakhs.
 - (ii) B won more money than A.
 - (iii) The difference in prize money between B and A was the least.
 - (iv) The difference in prize money between D and F was not the least.
 - (v) There was at least one person whose prize money was between that of E and G.
18. Which of the following is a proper list of persons in an increasing order of prize money won?
- (a) G, C, F, B, E, D, A
 - (b) D, F, C, E, A, B, G
 - (c) F, C, D, E, A, B, G
 - (d) A, B, G, C, F, E, D
19. If D won more than E, and B and G together won ₹3.5 lakhs, which of the following must be true?
- (a) D won ₹3.5 lakhs
 - (b) A won ₹1.5 lakhs
 - (c) B won ₹1.5 lakhs
 - (d) C won ₹50,000
20. If the difference in prize money between A and C is the least; which of the following pairs must not have won prize money that differs by the minimal amount?
- (a) B and E
 - (b) C and G
 - (c) D and G
 - (d) A and E

21. If the total money won by A and D is equal to that of G and the difference between E and D is at least 1 lakh, then which of the following must be True?
- (a) A and B together won ₹3 lakhs
 - (b) B and F together won ₹3.5 lakhs
 - (c) C and E together won ₹3 lakhs
 - (d) B and C together won ₹3.5 lakhs

Directions for questions 22 to 25: Read the following passage and solve the questions based on it.

Abhishek, Bhushan, Chandan, Dayal, Eklavya and Franklin are friends married to Rekha, Stuti, Urmila, Varsha, Trupti and Wanda, not necessarily in the same order.

Following facts are also given:

- (i) Rekha and Stuti are Abhishek's sisters
 - (ii) Neither Rekha nor Trupti is Chandan's wife
 - (iii) Wanda is Eklavya's wife and Varsha is Bhushan's wife
 - (iv) Dayal is not married to Rekha, Stuti or Trupti.
22. Who is Abhishek's wife?
- (a) Rekha
 - (b) Urmila
 - (c) Trupti
 - (d) Cannot be determined
23. Who is Rekha's husband?
- (a) Chandan
 - (b) Franklin
 - (c) Bhushan
 - (d) Dayal
24. Who is Dayal married to?
- (a) Urmila
 - (b) Varsha
 - (c) Trupti
 - (d) Rekha
25. Who is Stuti married to?
- (a) Abhishek
 - (b) Dayal
 - (c) Franklin
 - (d) Chandan

ANSWER KEYS

1. (b)	2. (a)	3. (d)	4. (a)	5. (a)	6. (b)	7. (d)	8. (c)	9. (c)	10. (d)
11. (d)	12. (d)	13. (c)	14. (d)	15. (a)	16. (c)	17. (c)	18. (c)	19. (a)	20. (d)
21. (d)	22. (c)	23. (b)	24. (a)	25. (d)					

HINTS AND EXPLANATIONS

1 to 4

- Condition (ii) says Sohail lost all 3 games, hence his score should be 0–3.
- The highest score could be that of Shahrukh or Salman. However, Salman is at the winning table 4, hence option (a) is the correct answer.
- As the sum of rows, columns and diagonals are equal, we can fill in the blanks in terms of “x and y” as below:

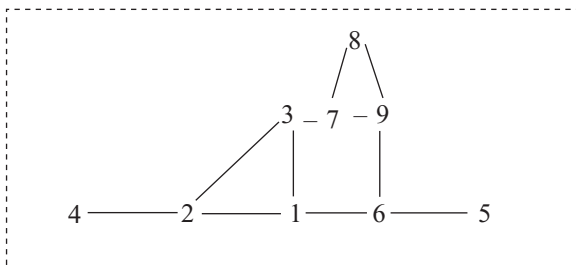
y	x	y – 2
y – 1	y + 1	x – 2
x – 1	y – 3	y + 2

Further $(y + x + y - 2) = y - 2 + x - 2 + y + 2$
Hence $x = y + 5$
So, if $x = 10$; $y = 5$

- From Q. 5; we have one equation $x = y + 5$ and as sum of a row (= sum of column = sum of diagonal) is given 21; then
 $x + 2y = 23$
Solving these two equations we get,
 $y = 6$ and $x = 11$

7 to 8

The diagram of the given arrangement can be shown as follows:



- By observing the diagram we can say that the maximum number of shops a person can visit without visiting any shop more than once is 8.
Hence, the answer is option (d).
- By observing the diagram we can say that option (c) must be false, which is the correct answer.

9 to 11

The information that we have from the question is:

Q, U and R are finance companies

Now the 1st day is Sunday and the 7th day would be Saturday

S is a manufacturing company

R is scheduled on 3rd day of the week

S can't be scheduled on 6th day of the week

T can be scheduled on any day of the week except on a Saturday.

- If P is scheduled on Wednesday and R is on the third day of the week then the possible arrangements are

1(Sun)	2(Mon)	3	4	5	6	7(Sat)
Q/U	U/Q	R	P	S	T	V

or,

1(Sun)	2(Mon)	3	4	5	6	7(Sat)
Q/U	U/Q	R	P	T/V	V/T	S

Now look at the answer options. The condition which has to be true is that T has to be scheduled on either Thursday or Friday.

Hence the answer is option (c).

- If S is scheduled on Monday then possible arrangements are:

1(Sun)	2(Mon)	3	4	5	6(xS)	7(Sat)(xT)
P/V	S	R	Q/U	U/Q	T	V/P
T	S	R	O/U	U/O	P/V	V/P

Now look at the answer options to be definitely false.

- P and T can be sales companies when V and S are manufacturing companies and Q and U are finance companies. So it is not false.
- Maximum number of days between the schedules of T and U is 3. This is also possible when U is on the 5th day and T is on the 1st day. So this case is not definitely false

- (c) R is always scheduled before Q is definitely true as the arrangement can be either RUQ or RQU.
- (d) This statement is false as only two cases are possible. The possible arrangements are:

1(Sun)	2	3	4	5	6(xS)	7(Sat)	(xT)
	P	S	R	O/U	U/O	T	V

i.e., 2 only.

11. Look at schedule IV. Since T is a sales company and S is a manufacturing company they cannot be together as the same category companies have to be scheduled consecutively. So except for schedule IV all the combinations are possible.

Hence, the answer is option (d).

12. Let us see the diagram:

Monday	Tuesday	Wednesday	Thursday	Friday
			Z	W

Now, there are three days and three boxes to be delivered.

Both X and T cannot be delivered on Monday [(condition (i) and condition (ii) given in the question)]. So, U has to be delivered on Monday. Let us see the diagram now:

Monday	Tuesday	Wednesday	Thursday	Friday
U			Z	W

Box T and box X can interchangeably be delivered on either Tuesday or Wednesday.

Go through the options now.

Answer is option (d).

13 to 17

Based on observation (i) and (ii), we can say that the three dice with the same number either show 1 or 2 or 3.

13. $2 + 2 + 2 + 6 + 5 + 4 = 21$

14. $3 + 3 + 3 + 6 + 2 + 5 = 22$

15. $5 + 5 + 5 + 6 + 5 + 5 = 31$

16. 2 because one dice shows 6, one shows 1 and three are ≤ 3 . Hence, only one more can be > 4 .

17. One dice should show 6. But there cannot be more than three dice showing 4 or more than 4. The maximum number that the three dice can show is 3.

18 to 21

The amount 14 lac is distributed in 7 people with 3.5 lac as highest & same consecutive differences. So, the amounts must be 0.5, 1, 1.5, 2, 2.5, 3 & 3.5 respectively.

18. Note that all the options except (c) violate some condition or the other.

19. If $B + G = 3.5$ lakh, then only possibility for G is ₹0.5 lakh & $B = ₹3.0$ lakh. Also, $A = ₹2.5$ lakh. As D won more than E & E get ₹2.0 lakh. So, D can have only 1 possible value that is ₹3.5 lakh.

20. As per given condition we must be having C-A-B in immediate increasing order (difference between C & A is minimum & we know that difference between A & B is minimum & B get more than A). So, difference between A & E must be at least ₹1 lakh. So, correct option must be (d).

21. We know A & B have minimum difference & $B > A$. So, A & B have 4 possible values of 0.5 lakh & 1 lakh; 1 lakh & 1.5 lakh; 2.5 lakh & 3 lakh & 3 lakh & 3.5 lakh as $E = ₹2$ lakh is already known. Further $A + D = G$ & minimum difference between E & D is ₹1 lakh. Using this we get only 1 possibility where, A, B, F, E, C, D & G have ₹0.5 lakh, ₹1 lakh, ₹1.5 lakh, ₹2.0 lakh, ₹2.5 lakh, ₹3.0 lakh & ₹3.5 lakh respectively. Correct option is (d)

22 to 25

By using the given information we can find the couples as: Abhisek–Tripti; Bhushan–Varsha; Chandan–Stuti; Dayal–Urmila; Eklavya–Wanda & Franklin–Rekha.

Chapter

15

ADVANCED EXERCISES

PRACTICE EXERCISE 1

Directions for questions 1 to 4: *Read the following passage and solve the questions based on it.*

The Hotel Leela in Goa has two wings, the East wing and the West wing. Some East wing rooms, but not all, have an ocean view. All the West wing rooms have a harbor view. The charges for all the rooms are the same, except:

- (i) There is an extra charge for all harbour view rooms on or above the third floor.
 - (ii) There is an extra charge for all ocean view rooms, except those without a balcony.
 - (iii) Some harbour view rooms on the first two floors and some East wing rooms without an ocean view have kitchen facilities, for which there is an extra charge.
 - (iv) Only the ocean view and the harbour view rooms have balconies.
1. A guest can avoid an extra charge by requesting:
 - (a) a West wing room on one of the first two floors
 - (b) a West wing room on the fourth floor without a balcony
 - (c) an East wing room without an ocean view
 - (d) an East wing room without a balcony
 2. Which of the following must be true if all the conditions are as stated?
 - (a) all rooms above the third floor involve an extra charge
 - (b) no room without an ocean or a harbour view or kitchen facilities involves an extra charge.
 - (c) there is no extra charge for any East wing room without an ocean view
 - (d) there is no extra charge for any room without kitchen facilities.
 3. Which of the following must be false if all the conditions are applied?
 - (a) some ocean view rooms do not involve an extra charge
 - (b) all rooms with kitchen facilities involve an extra charge
 - (c) some West wing rooms above the second floor do not involve an extra charge
 - (d) some harbour view rooms do not involve an extra charge
 4. Which of the following cannot be determined on the basis of the information given?
 - I. whether there are any rooms without a balcony for which an extra charge is imposed
 - II. whether any room without a kitchen or a view involves an extra charge
 - III. whether two extra charges are imposed for any room
 - (a) I only
 - (b) II only
 - (c) I and III only
 - (d) II and III only

Directions for questions 5 to 6: Read the following passage and solve the questions based on it.

Eight sets A, B, C, D, E, F, G and H are such that

- (i) A is a superset of B, but a subset of C
- (ii) B is a subset of D, but a superset of E
- (iii) F is a subset of A, but a superset of B
- (iv) G is a superset of D, but a subset of F
- (v) H is a subset of B

$N(A)$, $N(B)$, $N(C)$, $N(D)$, $N(E)$, $N(F)$, $N(G)$ and $N(H)$ are the number of elements in the sets A, B, C, D, E, F, G and H respectively.

5. Which one of the following could be false, but not necessarily false?
 - (a) E is a subset of D
 - (b) E is a subset of C
 - (c) E is a subset of A
 - (d) E is a subset of H
6. If P is a new set and it is a superset of A and $N(P)$ is the number of elements in P; then which of the following must be true?
 - (a) $N(G)$ is smaller than only four numbers
 - (b) $N(C)$ is the greatest
 - (c) $N(B)$ is the smallest
 - (d) $N(P)$ is the greatest

Directions for questions 7 to 13: Read the following passage and solve the questions based on it.

The only people to attend a conference were four ship captains and their first assistants. The captains were L, M, N and O; the first assistants were A, D and G. Each person in turn delivered a report as follows:

- (i) Each of the first assistants delivered his report exactly after his or her captain.
 - (ii) The first captain to speak was M, and captain N spoke after him.
7. Among the following which is not an appropriate order of the reports delivered?
 - (a) M, A, N, G, O, L, D
 - (b) M, D, N, G, L, O, A
 - (c) M, N, A, L, D, O, G
 - (d) M, N, G, D, O, L, A
 8. In case L speaks after A and A is the third first assistant to speak, then among the following statements which would be untrue?
 - (a) O spoke immediately after G
 - (b) the order of the first four speakers was M, G, N and D
 - (c) O's first assistant was present
 - (d) A was the fourth speaker after M

9. Among the following statements which statement must be true?
 - (a) in case the second speaker was a captain, the seventh speaker was a first assistant
 - (b) in case the second speaker was a first assistant, the seventh speaker was a captain
 - (c) in case the third speaker was a first assistant, the seventh speaker was a captain
 - (d) in case the third speaker was a captain, the seventh speaker was a first assistant.
10. In case A spoke immediately after L and immediately before O; and O was not the last speaker then L spoke:
 - (a) 2nd
 - (b) 3rd
 - (c) 4th
 - (d) 5th
11. In case G is M's first assistant, D could be the person who spoke immediately
 - (a) before T
 - (b) before L
 - (c) before V
 - (d) after T
12. A is the third first assistant to speak and L is the captain whose first assistant was not present. Which among the following statements must be true?
 - (a) A spoke sometime before L
 - (b) D spoke sometime before O
 - (c) L spoke sometime before O
 - (d) O spoke sometime before L
13. Among the following statements, which would make M, D, N, G, L, O and A the only possible sequence of speakers?
 - (a) D is M's first assistant; G is N's first assistant and A is O's first assistant
 - (b) D is M's first assistant; G is N's first assistant and A was the second person to speak after L
 - (c) the order of the first four speakers was M, D, N and G
 - (d) the order of the last three speakers was L, O and A

Directions for questions 14 to 17: Read the following passage and solve the questions based on it.

An employee has been assigned the task of allotting offices to six of the staff members. The offices are numbered from 1 to 6. The offices are arranged in a row and a 6-foot high divider separates them from each other. Hence, voices, sounds and cigarette smoke flow easily from one office to the other.

Ms Robert needs to use the telephone quite often throughout the day. Mr Mike and Mr Brown need adjacent offices as they need to consult each other often while working. Ms Hardy is a senior employee and has

to be allotted the office number 5 which has the biggest window.

Mr Donald requires silence in the offices next to his. Mr Tim, Mr Mike and Mr Donald are all smokers. Ms Hardy is allergic to tobacco smoke and consequently the offices next to her are to be occupied by non-smokers.

Unless specifically stated, all the employees maintain an atmosphere of silence during the office hours.

14. Who would be the ideal candidate to occupy the office farthest from Mr Brown?
 - (a) Ms Hardy
 - (b) Mr Mike
 - (c) Mr Tim
 - (d) Mr Donald
15. The three employees who are smokers should be seated in which offices?
 - (a) 1, 2 and 4
 - (b) 2, 3 and 6
 - (c) 1, 2 and 6
 - (d) 1, 2 and 3
16. Which would be the ideal office for Mr Mike?
 - (a) 2
 - (b) 6
 - (c) 1
 - (d) 3
17. In the event of what occurrence, within the period of one month since the assignment of the offices, would a request for a change in office be put forth by one or more employees?
 - (a) Mr Donald quitting smoking
 - (b) the installation of a noisy machine by Ms Hardy in her office
 - (c) Ms Robert needing silence in the office(s) next to her own
 - (d) Mr Tim taking over the duties formerly taken care of by Ms Robert.

Directions for questions 18 to 23: Read the following passage and solve the questions based on it.

Nine individuals—Z, Y, X, W, V, U, T, S and R are the only candidates who can serve on three committees—A, B and C: and each candidate can serve on only one of the committees. The following conditions are given

- (i) Committee A should consist of exactly one member more than committee B.
- (ii) It is possible that there are no members of committee C
- (iii) Z, Y and X cannot serve on committee A
- (iv) W, V and U cannot serve on committee B
- (v) T, S and R cannot serve on committee C

18. In case T and Z are the individuals serving on committee B, how many of the nine individuals should serve on committee C?
 - (a) 3
 - (b) 4
 - (c) 5
 - (d) 6
19. Out of the nine individuals, the largest number that can serve together on committee C is
 - (a) 9
 - (b) 8
 - (c) 7
 - (d) 6
20. In case R is the only individual serving on committee B, which among the following should serve on committee A?
 - (a) W and S
 - (b) V and U
 - (c) V and T
 - (d) T and S
21. In case any of the nine individuals serve on committee C, then which among the following should be the candidate to serve on committee A?
 - (a) Z
 - (b) Y
 - (c) W
 - (d) T
22. In case T, S and X are the only individuals serving on committee B, the total members of committee C would be:
 - (a) Z and Y
 - (b) Z and W
 - (c) Y and V
 - (d) Y and U
23. Among the following combinations, which could constitute the membership of committee C?
 - (a) Y and T
 - (b) X and U
 - (c) Y, X and W
 - (d) W, V and U

Directions for question 24 and 25: Read the following passage and solve the questions based on it.

24. A TV programme coordinator is planning a schedule which has 8 slots numbered A to H. The programme must consist of the following: One video of Yannie, two ads, one video of Ricky Martin and four videos of Jennifer Lopez, but not necessarily in the same order. Each of these must be shown only once during the program according to the following conditions:

- (i) Two ads cannot be shown continuously.
- (ii) The programme must begin with either an ad or a video of Yannie and must end with either an ad or a video of Yannie. If the video of Yannie is aired in slot D and if exactly two out of the four videos of Jennifer Lopez are played consecutively then the Ricky Martin video must be aired in which slot number

- (a) E (b) F
(c) D (d) B

25. The CEO of a company must appoint a committee of 5 persons from different fields to serve as committee members. He must select two MBAs from A, B and C and three Engineers from D, E, F, G and H.

- (i) Both B and H, cannot be appointed in the committee.

- (ii) Both G and F, cannot be appointed in the committee.
(iii) Both E and H, cannot be appointed in the committee.

If C is not selected in the committee then any of the following could be in the committee except

- (a) D (b) H
(c) E (d) G

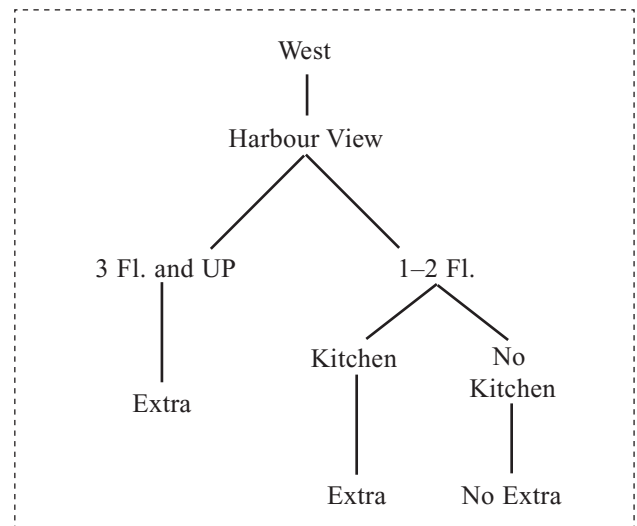
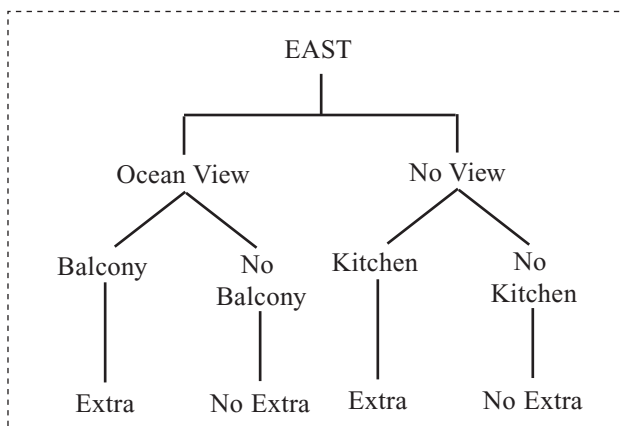
ANSWER KEYS

1. (d) 2. (b) 3. (c) 4. (a) 5. (d) 6. (d) 7. (d) 8. (d) 9. (a) 10. (c)
11. (b) 12. (d) 13. (a) 14. (d) 15. (d) 16. (d) 17. (b) 18. (b) 19. (d) 20. (d)
21. (c) 22. (a) 23. (b) 24. (b) 25. (b)

HINTS AND EXPLANATIONS

1 to 4

Let us have a schematic presentation of the given conditions:



1. Simply read the information from the diagram. Some rooms described in options (a) and (c) have

kitchen facilities; the rooms described in option (b) all involve an extra charge. Therefore only option (d) will not have an extra charge.

2. The only extra charges are for an ocean view with a balcony, a harbor view, The third floor and up and the rooms with kitchen facilities, no matter where. But some ocean view rooms without a balcony and some no-view, no-kitchen East wing rooms may be above the third floor Therefore options (a), (b) and (d) are all false.
3. The statement of option (c) directly contradicts the first extra-charge condition. The other choices are all definitely true.
4. We don't know whether any West wing rooms above the second floor or with kitchen facilities have balconies (I). But we do know that the East wing rooms without a view or a kitchen have no extra charge attached (II) and that all kitchen facilities are in rooms not otherwise subject to an extra charge (III). Therefore statement (I) is the correct answer.

5 and 6

5. Given $B < A < C$, $E < B < D < G < F$
 $B < F < A$
 $H < B$
 From this information,
 $H < B < F < A < C$... (1)
 $(< Q, Z) (A < P)$
 and $E < B < D < G < F$... (2)
 A is false from (2), B from (1), C from (1 and 2)
 D "may be " true
6. Visual inspection

7 to 13

7. Reports by G followed by D cannot be in appropriate order because both are first assistants. According to the conditions given in the question, each of the first assistants delivered their report exactly after his or her captain.
8. The order of delivery of the reports would be: MGNDOLAL or MDNGOAL
9. If the second speaker was a captain, he must be N and the first speaker was M because the first captain to speak was M and captain N spoke after him. In this case the seventh speaker was a first assistant because each of the first assistants delivered their report exactly after his or her captain.
10. The order of delivery of the reports would be: MNGLAOD or MNDLAOG

11. The order of delivery of the reports would be: MGNAODL or MGNALDO or MGNDOLAL or MGNDLAO
12. The correct order would be: MDNGOAL or MGNDOLAL or MDOGNAL or MGODNAL
13. Since O speaks immediately after L, L has no first assistant. In this case D, G and A must be first assistants of M, N and O respectively.

14 to 17

14. Mr Donald required silence in the offices next to his Mr Mike and Mr Brown need to consult each other while working. So, Mr Donald should occupy the office farthest from Mr Brown.
15. Ms Hardy has to be allotted the office number 5 and she is allergic to tobacco smoke, so the offices next to her are to be occupied by non-smokers. Hence, smokers should be seated in the offices 1, 2 and 3.
16. Mr Mike and Mr Brown need adjacent offices. So, Mr Mike cannot be seated in the office numbers 1 and 6. Ms. Hardy is in office number 5 & offices next to her i.e. 2 & 4 must be occupied by non-smokers. So, Mr. Mike being a smoker cannot have office no. 2 or 4. The only possible office number for him is office number 3.
17. There will be no request for change of office for options (a), (c) & (d). But if Ms. Hardy installs a noisy machine than Ms. Robert may have problem in using telephone as she is next to her. Also, Mr. Brown who is also next to Ms. Hardy may have problem with Mr. Mike.

18 to 23

18. If two individuals serve on committee B then three individuals should serve on committee A, because committee A should consist of exactly one member more than committee B. Hence, four individuals should serve on committee C.
19. The minimum number of individuals on committee A and B could be 2 and 1 respectively. Hence, the largest number that can serve together on committee C is 6.
20. In case R is the only individual serving on committee B then T and S should serve on committee A, because they don't serve on committee C.

22. If three individuals are serving on committee B, four individuals should serve on committee A. So, the total number of members of committee C should be two. Z and Y don't serve on committee A. Hence, they work on committee C.
23. Committee C can't have three members. So, option (c) and option (d) cannot be the answers. Again T doesn't serve on committee C. So option (a) is also ruled out.
24. If video of Yannie is played at slot D, then both the advt. must be aired in slot A & H. Now, 2 of

consecutive videos of Jennifer Lopez must be in B & C, else there will be more than 2 videos consecutively. Now, video of Ricky Martin must be in slot F.

A	B	C	D	E	F	G	H
Advt.	J Lo.	J Lo.	Yannie	J Lo.	R.M.	J. Lo.	Advt.

25. If C is not selected, then A & B must be selected. As B & H cannot be selected together, so H could not be in the committee.

PRACTICE EXERCISE 2

Directions for questions 1 to 4: Read the following passage and solve the questions based on it.

Each group of questions in this section is based on a set of conditions. In while answering some questions, it may be useful to draw a rough diagram. Choose the response that most accurately and completely answers each question.

A company wants to select a team of four call center executives from its centre based in South India for a transfer to their newly set up centre in north India. The company is managed by professional managers and is very particular about human resources and Personal relations. There are seven team members of equal ability: X, Y and Z (who are senior), and A, B, C and D (who are junior). The company requires two senior executives and two junior in the team. It is necessary that all the executives in a particular team are friendly with each other, in order to maintain team spirit and avoid any personal relation problems in the new centre. The relationship between the seven executives is as follows:

- (i) Y and A are not friendly
 - (ii) Z and C are not friendly
 - (iii) A and B are not friendly
1. If A is on the team, then which other executives must be on the team as well?
 - (a) X, Y and D (b) X, Z And D
 - (c) X, Z and B (d) X, Z and C
 2. Which statement(s) must be false?
 - I. Y and C are never selected together
 - II. Z and B are never selected together
 - III. Z and D are never selected together
 - (a) I only (b) I and II only
 - (c) I and III only (d) I, II and III
 3. If both Y and Z are selected, which of the executives must be on the team with them?
 - (a) Both C and D (b) Only D
 - (c) Both B and A (d) Both B and D
 4. Which of the following statements are true for X?
 - I X must be selected as one of the senior executives on the team
 - II X must be selected, if C is selected
 - III X cannot be selected, if both A and C are rejected.
 - (a) I only (b) II only
 - (c) II and III (d) I, II and III

Directions for questions 5 to 9: Read the following passage and solve the questions based on it.

Five different kinds of sweets to be given to the children: Halwa, Burfi, Laddu, Kaala jamun, Rasgulla. The children, Joginder, Kedarnath, Girish, Trilochan and Rameshwar went to see K. C. Das, who gave sweets to each one of them as per the following details.

- (i) Kedarnath got either *burfi* or *rasgulla*.
 - (ii) Trilochan did not receive *laddu* or *kaala-jamun*.
 - (iii) Among the five children, one received *laddu* and one *burfi*.
 - (iv) No other child received the same treat as Kedarnath.
 - (v) Neither Joginder nor Girish got *kaala-jamun*.
 - (vi) At least one child received *kaala-jamun*.
5. What sweet did Rameshwar receive?
 - (a) *Halwa*
 - (b) *Burfi*
 - (c) *Laddu*
 - (d) *Kaala-Jamun*
 6. If Kedarnath received *Rasgulla*, which of the following must be true?
 - (a) If Joginder received *laddu*, Girish received *halwa*.
 - (b) If Joginder received *burfi*, Girish received *halwa*.
 - (c) If Joginder received *halwa*, Trilochan received *burfi*.
 - (d) If Girish received *laddu*, Trilochan received *rasgulla*.
 7. If Trilochan received *halwa*, which of the following is a complete and accurate list of the children who could have also received *halwa*?
 - (a) Joginder and Kedarnath
 - (b) Kedarnath and Girish
 - (c) Rameshwar and Girish
 - (d) Joginder and Girish.
 8. If Kedarnath received *burfi*, which of the following must be false?
 - (a) If Joginder received *laddu*, Girish received *halwa*.
 - (b) If Joginder received *halwa*, Trilochan received *rasgulla*.
 - (c) If Joginder received *rasgulla*, Girish received *halwa*.
 - (d) If Girish received *laddu*, Trilochan received *rasgulla*.

9. If Girish received *burfi*, which of the following what must be false?
- Joginder received *laddu*
 - Trilochan received *halwa*
 - Kedarnath received *rasgulla*
 - Trilochan received *rasgulla*

Directions for questions 10 to 12: Read the following passage and solve the questions based on it.

Shiva spent 14 days exclusive of travel in a total of six cities.

Each cities that he visited was in either one of the three states: Gujarat, Uttar Pradesh, Maharashtra. Each of the states has many city. Shiva visited at least one city in each of the three states. He spent at least two days in each city. He spent the whole day in each of the cities that he visited.

10. If Shiva spent exactly eight days in the various cities of Gujarat, then which one of the following cannot be true?
- He visited exactly two cities in Maharashtra.
 - He visited exactly two cities in Uttar Pradesh.
 - He visited exactly two cities in Gujarat.
 - He visited more cities in Uttar Pradesh than in Maharashtra.
11. If the city of Ahmedabad is in Gujarat and Shiva spent as many days as possible in Ahmedabad and as few days as possible in each of the other cities that he visited, then which one of the following must be true?
- Shiva could not visit any other city in Gujarat.
 - Shiva could visit four cities in Uttar Pradesh.
 - Shiva could spend six days in Ahmedabad.
 - Shiva could not spend more than four days in Maharashtra.
12. If Shiva spent three days in the cities of Uttar Pradesh and seven days in the cities of Maharashtra, then which one of the following must be false?
- He visited more cities in Gujarat than in Uttar Pradesh.
 - He visited exactly three cities in Maharashtra
 - He visited more cities in Maharashtra than in Gujarat.
 - He visited exactly two cities in Maharashtra.

Directions for questions 13 to 17: Read the following passage and solve the questions based on it.

There are six teachers, viz., A, B, C, D, E and F in a school. Each of the teachers teaches two subjects, one compulsory and one optional subject. D's optional

subject was History while three of the other teachers have it as their compulsory subject. E and F have Physics as one of their subjects. F's compulsory subject is Mathematics which is an optional subject for both C and E. History and English are A's subjects but in terms of compulsory and optional subjects, they are just the reverse of D's subjects. Chemistry is an optional subject for only one of them. The only female teacher in the school has English as her compulsory subject.

13. What is C's compulsory subject?
- History
 - Physics
 - Chemistry
 - English
14. Who is the female member in the group?
- A
 - B
 - C
 - D
15. Which of the following has the same compulsory and optional subjects as F?
- D
 - B
 - A
 - None of these
16. Disregarding which is the compulsory and which is the optional subject, who has the same two subject combinations as F?
- A
 - B
 - E
 - D
17. Which of the following groups has History as their compulsory subject?
- A, C, D
 - B, C, D
 - C, D
 - A, B, C
18. Eight books are kept one over the other. Counting from the top the second, fifth and the sixth books are on plays. Two books on plays are kept between two books on compositions. One book of plays is between two books on poetry while the book kept at the top of the book of Literature is a book of composition. Which book is fourth from the top?
- Plays
 - Poetry
 - Composition
 - Literature

Directions for questions 19 to 21: Read the following passage and solve the questions based on it.

The after sales service manager of White Goods Appliances Ltd is making an assignment roster for the three technician teams in the city of Indraprastha. Each team will be assigned one of the sectors of the city: sector Pratham, sector Dwitiya and sector Tritiya. Each team will consist of two out of the following technicians: Nagabhushanam, Phaneesh, Ramaswamy, Swaminathan, Tirthankar and Visheshwar. Each technician will be assigned to exactly one team. Ramaswamy, Tirthankar and Visheshwar have each completed a special

electro-mechanical appliances maintenance training programme; whereas Nagabhushanam, Phaneesh and Ramaswamy each has at least five years of work experience; Swaminathan, Tirthankar and Visheshwar do not. The service manager must observe the following restrictions while making the assignment roster:

- (i) Each team must include at least one technician who has completed the special training.
 - (ii) Each team must include at least one technician who has at least five years of work experience.
 - (iii) Nagabhushanam must be assigned to sector Pratham or sector Dwitiya.
19. If Phaneesh is assigned to sector Dwitiya, which of the following must be true?
- (a) Tirthankar is assigned to sector pratham
 - (b) Swaminathan is assigned to sector Tritiya
 - (c) Visheshwar is assigned to sector Dwitiya
 - (d) Visheshwar is assigned to sector Tritiya
20. The service manager cannot make an acceptable roster that assigns:
- (a) Phaneesh to sector Pratham and Visheshwar to sector Tritiya
 - (b) Ramaswamy to sector Pratham and Tirthankar to sector Dwitiya
 - (c) Swaminathan to sector Pratham and Nagabhushanam to sector Dwitiya
 - (d) Nagabhushanam to sector Dwitiya and Phaneesh to sector Tritiya
21. If Tirthankar is assigned to sector Tritiya, which of the following must be true?
- (a) Phaneesh is assigned to sector Pratham
 - (b) Ramaswamy is assigned to sector Dwitiya
 - (c) Tirthankar is Nagabhushanam's partner
 - (d) Nagabhushanam is Visheshwar's partner

Directions for questions 22 to 25: Read the following passage and solve the questions based on it.

An inexperienced Yoga teacher, posing as an expert on yogic exercises (*asanas*) prescribed a schedule of exercises for a pupil. Choosing from exercises *Anubittasana*, *Bhujangasana*, *Chakrasana*, *Dhanurasana*, *Sukhasana*, *Tadasana*, *Ushtrasana* and *Vyagrasana*, the pupil must perform a routine of exactly

five different *asanas* each day. In any day's routine, except the first day, exactly three of the exercises must be the ones that were included in the routine of the previous day, and any permissible routine must also satisfy the following conditions:

- (i) If *Anubittasana* is in routine. *Ushtrasana* cannot be done in that routine.
 - (ii) If *Bhujangasana* is in a routine, *Sukhasana* must be one of the exercises done after *Bhujangasana* in that routine.
 - (iii) If *Chakrasana* is in a routine, *Ushtrasana* must be one of the exercises done after *Chakrasana* in that routine.
 - (iv) The fifth exercise of any routine must be either *Dhanurasana* or *Tadasana*.
22. If one day's routine is *anubittasana*, *bhujangasna*, *vyagrasna*, *sukhasana* and *tadasana*, each of the following could be the next day's routine, except:
- (a) *Bhujangasna*, *Chakrasana*, *Vyagrasana*, *Sukhasana*, *Tadasana*
 - (b) *Bhujangasna*, *sukhasana*, *Ushtrasana*, *Vyagrasana*, *Dhanurasana*
 - (c) *Vyagsana*, *Sukhasana*, *Tadasana*, *Ushtrasana*, *Dhanurasana*
 - (d) *Vyagsana*, *Sukhasana*, *Dhanurasana*, *Anubittasana*, *Tadasana*
23. Which of the following is true for any permissible routine?
- (a) *Anubittasana* cannot be the third exercise
 - (b) *Bhujangasana* cannot be the third exercise
 - (c) *Chakrasana* cannot be the fourth exercise
 - (d) *Tadasana* cannot be the fourth exercise
24. If the pupil chooses *Chakrasana* and *Vyagrasana* for the first day's routine, which of the following could be the other three exercises chosen?
- (a) *Anubiittasana*, *Sukhasana*, *Tadasana*
 - (b) *Bhujangasana*, *Dhanurasana*, *Ushtrasanas*
 - (c) *Bhujangasna*, *Sukhasana*, *Ushtrasana*.
 - (d) *Sukhasana*, *Dhanusarana*, *Vyagrasana*.
25. If *Chakrasana* is the third exercise in a routine, which of the following cannot be the second exercise?
- (a) *Bhujangasna* (b) *Dhanurasna*
 - (c) *Sukhasana* (d) *Tadasana*

ANSWER KEYS

1. (b) 2. (d) 3. (d) 4. (d) 5. (d) 6. (c) 7. (d) 8. (c) 9. (d) 10. (c)
 11. (b) 12. (d) 13. (d) 14. (d) 15. (d) 16. (c) 17. (d) 18. (c) 19. (b) 20. (a)
 21. (d) 22. (a) 23. (c) 24. (b) 25. (a)

HINTS AND EXPLANATIONS

1 to 4

- If A is on the team, Y and B cannot be selected. Hence, other members are X, Z and D because Z and C cannot be selected together.
- Y and C can be selected along with X and B or D. Z and B can be selected along with X or Y and D. Z and D can be selected along with X and Y and A or B.
- If Y and Z are selected, A and C cannot be selected. Hence, two junior members are B and D only.
- If C is selected, Z cannot be selected. Hence, X must be there as one of the two senior members.

5 to 9

5.

	Rasgulla	Halwa	Burfi	Laddu	Kaala-jamun
Joginder		-			x
Kedarnath	x	-		x	x
Girish	x				x
Trilochan		x	x		
Rameshwar	x	x	x	√	x

10 to 12

Shiva spent 14 days in 6 cities with at least 2 days in each city. So, he could either spend 2 days in 5 cities & 4 days in 6th city or he can spend 2 days in 4 cities & 3 days in 2 cities.

- Shiva must visit at least 3 cities of Gujrat in 8 days. So, correct option is (c).
- Shiva must have spend 4 days in Ahmedabad & 2 days in other 5 cities. Clearly option (c) is incorrect. It is possible for him to spend 4, 2 & 8 days in Gujrat, U.P. & Maharastra. So, option (d) is also incorrect. He can also spend 2 days each in Maharastra & U.P. & all remaining days in Gujrat. So, option (a) is also incorrect. So, correct option is (b).
- He must have visited 1 city of U.P. & 3 cities of Maharastra with 3, 2 & 2 days in those cities. So, option (d) must be false.

13 to 17

- We get the following table: A-H-E; B-H-C; C-H-M; D-E-H; E-P-M; F-M-P. Now all the questions can be answered.
- The female member is the person who teaches English.
- None of the teachers have the same compulsory and optional subjects.
- E and F have Physics and Mathematics.
- A, B and C have History as compulsory subject, from the above table.
- The books on plays are the fifth and sixth, also the other two books on plays are between the two books on composition, Hence, the book on composition is fourth from the top.

19 to 21

19. If Phaneesh is assigned to sector Dwitiya, then Naghbhushanam must be assigned to sector Pratham & Ramaswamy must be assigned to sector Tritiya. Now, the 2nd member assigned to Tritiya must be Swaminathan as Tirthankar & Visheshwar, both have completed the training programme like Ramaswamy. So, only Swaminathan can be the other person in Tritiya
20. If Phaneesh is assigned to sector Prathama, then Naghbhushanam must be assigned to sector Dwitiya & Ramaswamy must be assigned to sector Tritiya. Now, the 2nd member assigned to Tritiya cannot be Visheshwar, as both have completed the training programme & we need just 1 such person. So, option (a) is not acceptable arrangement. Rest options are acceptable
21. If Tirthankar is assigned to sector Tritiya, then Ramaswamy must be assigned to sector Pratham or Dwitiya as both of them cannot be assigned to same sector. Now, Naghbhushanam must be assigned to sector Pratham or Dwitiya as it is given condition. Now the partner with Naghbhushanam cannot be Tirthankar as both must be assigned to different sectors. Also, both Naghbhushanam & Ramaswamy cannot be kept in same sector. So, the partner with Naghbhushanam must be Visheshwar. So, option (d) must be true

22 to 25

For simplicity, let us denote each yogic exercise (Asanas) by 1st letter only

22. If C is in routine, then U must be 1 of the exercises done after it. In option (a), we have C but not U. So, option (a) could not be the next day's routine
23. If C is the 4th exercise for any schedule, then 5th exercise must be U (condition iii). But, the last (i.e. 5th) exercise for any schedule can be D or T (condition iv). So, option (c) cannot be true for any permissible schedule
24. We have chosen C & V for the schedule of 1st day. As U must follow C, so 1 of the other 3 exercises must be U. As the 5th exercise for any schedule can be D or T. So, we must have either D or T as 1 of the 3 other exercises. From given options, only (b) have U & D (from D & T). Rest options are not feasible.
25. We know that U must follow C in any schedule. So, if C is 3rd exercise, U must be either 4th or 5th. But, the 5th exercise can be D or T. So, if C is 3rd exercise, U must be the 4th & D or T is the 5th exercise. But, S must follow B in any schedule. So, if B is 2nd exercise then we have no position after 2nd (i.e. 3rd or 4th or 5th) for S. So, B cannot be the 2nd exercise. Correct option is (a)

PRACTICE EXERCISE 3

Each group of questions in this section is based on a set of conditions. While answering some of the questions, it may be useful to draw a rough diagram. Choose the response that most accurately and completely answers each question.

Directions for questions 1 to 5: Read the following passage and solve the questions based on it.

Seven instructors—J, K, L, M, N, P and Q, teach management courses at a premier institute in east India. Each instructor teaches during only one term; either the first term, or the second term, or the third term. The following conditions apply:

- (i) K teaches during the third term.
 - (ii) L and M teach during the same term.
 - (iii) Q teaches during either the first term or the second term.
 - (iv) Exactly twice as many instructors teach during the third term as compared to the first term.
 - (v) N and Q teach during different terms.
 - (vi) J and P teach during different terms.
1. Which one of the following could be an accurate matching of the instructors to their respective terms?
 - (a) M: the first term; P: the second term; Q: the first term
 - (b) J: the third term; L: the third term; P: the third term
 - (c) L: the first term; N: the second term; P: the third term
 - (d) J: the first term; M: the third term; N: the second term
 2. Which one of the following cannot be true?
 - (a) L teaches during the first term
 - (b) M teaches during the second term
 - (c) M teaches during the third term
 - (d) N teaches during the second term
 3. If exactly one instructor teaches during the second term, which one of the following must be true?
 - (a) J teaches during the third term
 - (b) L teaches during the first term
 - (c) M teaches during the third term
 - (d) P teaches during the second term
 4. Each of the following contains a list of instructors who can all teach during the same term except
 - (a) J, K, M
 - (b) J, L, M
 - (c) K, L, P
 - (d) K, P, Q

5. If more instructors teach during the second term as compared to the first term, then which one of the following instructors must teach during the second term?

- (a) J
- (b) M
- (c) N
- (d) P

Directions for questions 6 to 10: Read the following passage and solve the questions based on it.

Sourav's Fish Salon serves a special Friday night seafood banquet consisting of seven courses: hilsa, pomfret, Indian shrimp, rahu, kingfish, lobster, and bhetki. Diners are free to select the order of the seven courses, according to the following conditions:

- (i) The kingfish is served sometimes after rahu.
 - (ii) Exactly one course should be served between the pomfret and the Indian shrimp.
 - (iii) The lobster is served some time before the pomfret.
 - (iv) The kingfish is either the fifth or the course to be reserved sixth. The hilsa is the second course to be served.
6. Which one of the following sequences would make for an acceptable banquet?
 - (a) Rahu, hilsa, lobster, bhetki, pomfret, kingfish, Indian shrimp
 - (b) Rahu, hilsa, bhetki, pomfret, kingfish, Indian shrimp, lobster
 - (c) Lobster, hilsa, pomfret, rahu, kingfish, Indian shrimp, bhetki
 - (d) Lobster, hilsa, rahu, kingfish, pomfret, bhetki, Indian shrimp
 7. If the kingfish is the fifth course served, then which one of the following must be true?
 - (a) Pomfret is the third course served
 - (b) Indian shrimp is the fourth course served
 - (c) Bhetki is the seventh course served
 - (d) Lobster is the first course served
 8. Which one of the following would make it possible to determine the exact order of the course?
 - (a) Pomfret is the fourth course served
 - (b) Indian shrimp is the fifth course served
 - (c) Kingfish is the sixth course served
 - (d) Lobster is the first course served
 9. If kingfish is the sixth course served, then which one of the following cannot be true?
 - (a) Rahu is the fifth course served
 - (b) Indian shrimp is the seventh course served

- (c) Pomfret is the fifth course served
 - (d) Lobster is the third course served
10. If bhetki is the third course served, which one of the following must be true?
- (a) Pomfret is the fourth course served
 - (b) Kingfish is the fifth course served
 - (c) Rahu is the first course served
 - (d) Indian shrimp is the seventh course served

Directions for questions 11 to 16: *Read the following passage and solve the questions based on it.*

During one week, a human resource director conducts five interviews for a new job; one interview per day, Monday through Friday. There are six candidates for the job: Ram, Shyam, Trilochan, Usha, Veena and Kishore. Not more than two candidates are interviewed more than once. Neither Shyam nor Usha nor Veena is interviewed more than once, and no other candidate is interviewed more than twice. The schedule of interviews is subject to the following conditions:

- (i) If Trilochan is interviewed, then he must be interviewed on Monday and Friday.
 - (ii) If Shyam is interviewed, then Usha is also interviewed; with Shyam's interview taking place earlier than Usha's interview.
 - (iii) If Ram is interviewed twice, then Ram's second interview takes place exactly two days after his first interview.
 - (iv) If Veena is interviewed, then Kishore is interviewed twice; with Veena's interview taking place after Kishore's first interview and before his second interview.
 - (v) If Usha is interviewed, then Ram is also interviewed; with Usha's interview taking place on a day either immediately before or immediately after a day on which Ram is interviewed.
11. Which of the following could be a complete and accurate list of candidates that the human resources director interviews and the days on which those interviews take place?
- (a) Monday: Shyam; Tuesday: Usha; Wednesday: Ram; Thursday: Kishore; Friday: Ram
 - (b) Monday: Shyam; Tuesday: Kishore; Wednesday: Ram; Thursday: Kishore; Friday: Usha
 - (c) Monday: Trilochan; Tuesday: Ram; Wednesday: Shyam; Thursday: Ram; Friday: Trilochan
 - (d) Monday: Trilochan; Tuesday: Ram; Wednesday: Kishore; Thursday: Veena; Friday: Trilochan
12. If Veena is interviewed on Tuesday, then which one of the following must be true?
- (a) Trilochan is interviewed on Friday
 - (b) Usha is interviewed on Thursday
 - (c) Ram is not interviewed
 - (d) Shyam is not interviewed
13. If Kishore is not interviewed, then which one of the following must be true?
- (a) Ram is interviewed on Thursday
 - (b) Shyam is interviewed on Tuesday
 - (c) Trilochan is interviewed on Monday
 - (d) Usha is interviewed on Wednesday
14. If Shyam is interviewed, then which one of the following could be true?
- (a) Kishore is interviewed on both Tuesday and Wednesday
 - (b) Usha is interviewed on Monday
 - (c) Veena is interviewed on Tuesday
 - (d) Shyam is interviewed on Thursday
15. If neither Usha nor Trilochan are interviewed, then each of the following must be true except:
- (a) Ram is interviewed on Monday
 - (b) Ram is interviewed on Thursday
 - (c) Veena is interviewed on Tuesday
 - (d) Kishore is interviewed on Wednesday
16. If both Usha and Veena are interviewed, then which one of the following is a complete and accurate list of the days on which Kishore could be interviewed?
- (a) Monday, Friday
 - (b) Tuesday, Thursday
 - (c) Monday, Wednesday, Friday
 - (d) Tuesday, Wednesday, Thursday

Directions for questions 17 to 21: *Read the following passage and solve the questions based on it.*

K. C. Das is preparing special for the sweet packages *Puja*. Different sweet packages are numbered 1 through 5 from left to right, and K. C. Das fills them with different sweets. Each package will contain at least one, but not more than two of the following types of sweets: *Gulabjamun*, *Kaju Barfi*, *Petha*, *Rasgulla*, *Sohan Halwa* and *Cham Cham*. Each type of sweet will be placed in at least one sweet package. These sweets will be packed either in a bucket, a carton or a tin. K. C. Das fills the package according to the following conditions:

- (i) At least two packages must contain *Rasgulla*.
- (ii) Exactly two packages must contain *Kaju Barfi*, and these packages cannot be adjacent to each other.

- (iii) Both packages that contain *Kaju Barfi* must be to the left of any package that contains *Gulabjamun*.
 - (iv) Package 2, 3 and 4 cannot contain *Sohan Halwa*
 - (v) Any package that contains *Rasgulla* must be packed in a carton.
 - (vi) Any package that contains *Kaju Barfi* must be packed in a bucket.
 - (vii) Package 2 is packed in a carton.
17. Which one of the following cannot be true?
- (a) Package 1 is packed in a tin
 - (b) Package 2 contains *Cham Cham*
 - (c) Package 3 is packed in a tin
 - (d) Package 4 contains *Kaju Barfi*
18. If a package containing sweets packed in a tin is not adjacent to a package packed in a bucket, then which one of the following must be true?
- (a) Package 1 contains *Petha*
 - (b) Package 4 contains *Kaju Barfi*
 - (c) Package 4 contain *Rasgulla*
 - (d) Package 5 contains *Gulabjamun*
19. If *Rasgullas* are contained in the maximum number of packages, which one of the following must be true?
- (a) Package 3 is packed in a bucket
 - (b) Package 4 is packed in a bucket
 - (c) A package containing *Sohan Halwa* is packed in a bucket
 - (d) A package containing *Gulabjamun* is packed in a carton.
20. If package 4 contains *Petha* and *Cham Cham*, which one of the following pairs of sweets must be contained in the same package?
- (a) *Kaju Barfi* and *Sohan Halwa*
 - (b) *Gulabjamun* and *Petha*
 - (c) *Rasgulla* and *Cham Cham*
 - (d) *Gulabjamun* and *Sohan Halwa*
21. If package 3 is packed in a tin, which one of the following could be false?
- (a) Package 1 contains *Sohan Halwa*
 - (b) Package 2 contains *Rasgulla*
 - (c) Package 3 contains *Cham Cham*
 - (d) Package 4 is packed in a bucket

Directions for questions 22 to 25: Read the following passage and solve the questions based on it.

Six horses named Aparajit, Bahadur, Chetak, Dhundumar, Pakshiraj, and Vijay are entered in a race. The big starting gate is divided into exactly seven

positions numbered consecutively 1 to 7. Seven jockeys, also numbered from 1 to 7 are eligible to ride the horses in the race. Each jockey's number corresponds to the numbered position on the starting gate from which that jockey, if assigned to a horse, will ride. Exactly one jockey will not be assigned to any of the horses and the starting gate position corresponding to that jockey's number will remain vacant for the race. Jockeys will be assigned horses and the horses will run from the starting gate position in accordance with the following restrictions:

- (i) Either Aparajit or Chetak must be ridden by Jockey 1.
 - (ii) Pakshiraj must be ridden by Jockey 4 or else by Jockey 5.
 - (iii) Bahadur and Pakshiraj must have at least one horse separating the two of them at starting gate.
 - (iv) Chetak must run from a starting gate position which has a lower number than the starting gate position from which Vijay runs.
22. If the horses complete the race, from the first to the last, in exactly the order 6, 5, 4, 3, 2 and 1 (corresponding to the number of their jockeys); and if Bahadur is the horse that wins the race, then each of the following horses could have been among the top three in the race except:
- (a) Chetak
 - (b) Dhundumar
 - (c) Pakshiraj
 - (d) Vijay
23. If Jockey 5 is the one not assigned to any horse, which of the following could be true?
- (a) Aparajit is ridden by Jockey 4
 - (b) Vijay is ridden by Jockey 6
 - (c) Bahadur is ridden by Jockey 6
 - (d) Chetak is ridden by Jockey 7
24. If Dhundumar is incapable of running the race and no replacement horse is found; and if the horses that run, finish the race from the first to the last, in the order 1, 2, 4, 6 and 7 (corresponding to the numbers of their jockeys) then which of the following must have finished last in the race?
- (a) Aparajit
 - (b) Bahadur
 - (c) Chetak
 - (d) Pakshiraj
25. If Chetak runs from the starting gate position 5 and the starting gate position 6 is vacant, then which of the following must be true?
- (a) Vijay starts from the starting gate position 2
 - (b) Aparajit starts from the starting gate position 1
 - (c) Pakshiraj starts from the starting gate position 3
 - (d) Dhundumar starts from the starting gate position 3

ANSWER KEYS

1. (d) 2. (a) 3. (c) 4. (d) 5. (b) 6. (a) 7. (c) 8. (b) 9. (a) 10. (d)
 11. (a) 12. (d) 13. (c) 14. (a) 15. (d) 16. (c) 17. (a) 18. (c) 19. (a) 20. (a)
 21. (c) 22. (a) 23. (c) 24. (a) 25. (b)

HINTS AND EXPLANATIONS

1 to 5

1. Note that all other choices violate some condition or the other. Only in option (d), we get

J	K	L	M	N	P	Q
1	3	3	3	2	3	1

Hence, all the conditions are fulfilled.

2. If L teaches during the first term, M also teaches during the first term, which means that four teachers should teach during the third term. But in the given conditions this is not possible.
3. If M = 3, L is also 3, there are two teachers for the first term and four for the third term.
4. KPQ can be two only, which leaves J and N same, which is not possible.
5. The only possibility is that 1, 4 & 2 instructors must be teaching in 1st, 2nd & 3rd term respectively. K teaches in 3rd term. L & M must teach in same term & they cannot teach in 1st or 3rd term as it will result in more number of teachers than required. So, both L & M must teach in 2nd term. So, (b) is correct option.

6 to 10

6. Note that all the choices violate some condition or the other, except (a).
7. If K = 5, L = 1/3, P = 4 and S = 6. Hence, B = 7.
8. If S = 5, H = 2, P has to be 4 and K = 6. Hence, all positions can be determined.
9. If K = 6, H = 2, then P must be 5 as there is no position left for it. Hence, R cannot be 5.
10. If S = 7, H = 2, B = 3, then all conditions can be determined.

11 to 16

11. Note that all conditions except the first, violate some condition or the other.

12. If V = Tuesday, then K must come twice and S cannot be interviewed since S, U and R come together and there is no place for all three.
13. If K is not interviewed, then V is also not interviewed. Hence, T gets interviewed on Monday and Friday.
14. If S is interviewed, then U and R must be interviewed and in the balance days V, K and K must be interviewed. Note that all other choices violate some conditions of the other.
15. If U and T are not interviewed, S is also not interviewed. So R is interviewed twice and K cannot be interviewed on Wednesday.
16. We get SURVKK; Hence, K can be interviewed on Monday, Wednesday or Friday.

17 to 21

17. Package 2 is packed in a carton, so KB is not in 2. If package 1 is in tin, KB is only in 3 or 4 and they cannot be adjacent.
18. If package 4 contains R, it is in a carton, packages 3 and 1 contain KB and are in bucket. All conditions are fulfilled.
19. If R is in the maximum number of packages, then K is in package 1 and 3.
20. If package 4 contains P and C, then KB is in package 1 and 3, package 2 and 5 contain R, hence package 1 must contain SH.
21. If package 3 is in a tin, it contains P or G/J as well.

22 to 25

22. If B = 6, then P = 4 or 5. Since C < V, then C cannot occupy 4 or 5, hence C cannot be in the top three positions.
23. Since 5 is closed, P = 4. Then B must have one horse separating them, hence he must be at 6.
24. We can have C = 1, then P = 4 and B = 6. In this case, both A = 7.
25. If C = 5, A has to be at 1.

PRACTICE EXERCISE 4

Directions for questions 1 to 3: Read the following passage and solve the questions based on it.

The National Museum Curator must group nine sculptures—Q, R, S, T, V, W, X, Y and Z in tables numbered consecutively from 1–12. The sculptures will be placed in three groups, each group representing a different period of the Indian civilization. The groups must be separated from each other by at least one unused table, but unused tables cannot occur within any group. Three of the sculptures are from the Indus Valley Civilization period (3000 BC–1500 BC), two are from the Mauryan period (322 BC–185 BC) and four are from the Gupta empire period (AD 320–AD 540).

The following table gives the period details of the different sculptures:

- (i) T, V, W are all sculptures from the same period
 - (ii) R and T are sculptures from different periods
 - (iii) Q and X are the Indus Valley Civilization period sculptures
 - (iv) Y is the Mauryan period Sculpture
 - (v) table 5 is always empty
1. If the sculptures are placed in a reverse chronological order by their periods, the unused table spaces could be:
 - (a) 1, 6 and 9 (b) 1, 5 and 10
 - (c) 5, 8 and 12 (d) 5, 9 and 10
 2. If the Gupta Dynasty sculptures are placed on tables 1–4, which of the following cannot be true?
 - (a) X is placed on table 12
 - (b) Y is placed on table 9
 - (c) table 8 is unused
 - (d) Q is placed on table 6
 3. If the first five sculptures, in the numerical order of their tables are Q, Z, X, Y and R, which of the following must be true?
 - (a) Two unused tables separate the Harappan period and the Maurya period sculptures
 - (b) Two unused tables separate the Mauryan period and the Gupta period sculptures
 - (c) S is placed on table 2
 - (d) Either table 1 or table 4 is unused

Directions for questions 4 to 6: Read the following passage and solve the questions based on it.

A business school publishes three issues of their research Journal in a year. The editor decided that the upcoming three issues 1/m April, August and

December 1/m would carry articles written by seven of the most reputed professors of the school. Each of the seven authors (T, U, V, W, X, Y and Z) will have at least one article published but some may have more than one article published. The following restrictions apply to the publication of the articles:

- (i) Each of the issues being prepared must contain at least two articles.
 - (ii) Only these seven professors' articles can appear in the upcoming April, August and December issues.
 - (iii) No author may publish in each of the two consecutively published issues or twice in the same issue.
 - (iv) If an article written by T appears in an issue, then an article written by U must also appear in that issue.
 - (v) If an article written by W appears in an issue, then an article written by Y must appear in the immediately preceding issue.
 - (vi) An article written by Y cannot be published in an issue that contains an article written by Z.
4. If the April issue consists exclusively of articles written by T and U, then the August issue can consist exclusively of articles written by which of the following group of authors?
 - (a) V and X (b) V and Y
 - (c) W and Z (d) V, Y and Z
 5. If the April issue consists exclusively of articles written by U, V and Z, then the August issue must contain an article written by which of the following authors?
 - (a) W (b) X
 - (c) Y (d) Z
 6. If the December issue consists exclusively of articles written by U, V and W, then the August issue must have consisted of articles written by which of the following groups of authors?
 - (a) T and Z (b) U and Y
 - (c) X and Y (d) X and Z

Directions for questions 7 to 9: Read the following passage and solve the questions based on it.

The CBI was keeping an eye on four suspected lady criminals—Meenakshi, Razia, Sharmila and Theresa while monitoring their movements in and out of a multi-storey building they discovered a pattern and made the following observations:

- (i) No suspect ever entered or left the building together with another suspect.

- (ii) Each of the suspects entered and later left the building, only once every day.
- (iii) No suspect ever left the building in the same order (first, second, third and fourth) in which she entered the building
- (iv) Both while entering the building and leaving, Razia was always earlier than Sharmila.
7. On a certain day, the two suspects who entered the building first were also the first to leave. Then the last two suspects to enter the building could be
- Meenakshi and Razia
 - Meenakshi and Theresa
 - Razia and Sharmila
 - Razia and Theresa
8. On a certain day, Meenakshi and Theresa were the second and the third suspected enter the building and Meenakshi also left the building before Theresa did, Then the order in which the suspects left the building, from the first to the fourth, must be

- Meenakshi, Razia, Sharmila, Theresa
- Meenakshi, Razia, Thersa, Sharmila
- Razia, Meenakshi, Sharmila, Theresa
- Razia, Sharmila, Meenakshi, Theresa

9. On a day when Razia was the second suspect to enter the building and Theresa was the third, which of the following must be true?
- Razia leaves the building first
 - Meenakshi leaves the building first
 - Meenakshi leaves the building third
 - Theresa leaves the building second

Directions for questions 10 to 13: Read the following passage and solve the questions based on it.

On the occasion of the New Year celebrations, eight families went to Goa. Each member of the various families spent a particular amount during the carnival, but the total amount spent by any family was always an integer. Given below is the average amount spent by each member of the various families:

Name of the family	Average amount spent per person	Name of the family	Average amount spent per person	Name of the family	Average amount spent per person	Name of the family	Average amount spent per person
Gagan	2.125	Lapa	3.1428	Rio	2.111	Apang	3.25
Kumar	3.166	Zora	4.5	Chaman	5.20	Sarkar	4.33

- The number of members in the Gagan family was four more than that of the Chaman family.
 - The number of members of the Apang family was half of that of the Sarkar family.
 - The number of members in the Chaman family was less than the sum of that of the Lapa and the Zora.
 - Sum of the number of members of the Lapa family and the Zora family was 28.
 - The sum of the members of the Sarkar family and the Apang family was equal to the number of the members of the Rio family as well as the Kumar family.
 - The number of persons in any family varied between 12 and 36.
10. What was the total sum of the amount spent by the Lapa and the Zora families?
- 107
 - 111
 - 134
 - 136

11. What was the total amount spent by all the families?
- 595
 - 677
 - 744
 - 750
12. If $\frac{1}{6}$ th of the number of members of the Apang, Gagan and Kumar families were adults and the rest were children, then what was the total number of children in all the three families?
- 60
 - 70
 - 80
 - 90
13. What was the total number of members who visited Goa?
- 210
 - 200
 - 190
 - 180

Directions for questions 14 to 17: Read the following passage and solve the questions based on it.

A, B, C, D and E are members of a detective agency. To maintain impersonification, they operate under the

code names P, Q, R, S and T, not necessarily in the same order. Following are the details pertaining to their impersonification:

- (i) If B is R, then D is S
- (ii) If A is Q, then C is S
- (iii) If D is not T, then E is S
- (iv) A is Q if and only if B is S or P
- (v) If C is not T then, B is not P
- (vi) D is R, and E is not S if and only if B is Q
- (vii) If A is R, then C is T

14. Who operates under the name of R?

- (a) A (b) B
- (c) C (d) D

15. Who operates under the name of Q?

- (a) A (b) D
- (c) C (d) E

16. Who operates under the name of S?

- (a) E (b) A
- (c) C (d) D

17. Under what name does C operate?

- (a) P (b) Q
- (c) R (d) S

Directions for questions 18 to 19: Read the following passage and solve the questions based on it.

A, B, C, D and E competed at the Delhi half marathon, and ranked first through fifth.

The following is the conversation recorded after the marathon:

- A: "I was not last"
- B: "C got the bronze"
- C: "A ended behind E"
- D: "E got silver"
- E: "D didn't get gold"

It is also given that the 1st, 2nd and the 3rd rankers won the Gold, Silver and the Bronze Medals respectively.

The gold and silver medalists lied, but the other three told the truth.

18. Who among the following won the gold medal?

- (a) A (b) B
- (c) E (d) Cannot be determined

19. Which of the following statements are not true?

- I. A won the bronze medal.
- II. E won the silver medal.
- III. C ended behind A, who ended behind E.
- IV. D ended behind B.
- (a) I and II (b) II and III
- (c) III and IV (d) I and IV

Directions for questions 20 to 22: Read the following passage and solve the questions based on it.

A professor gave five projects—1, 2, 3, 4 and 5 to five students—S, C, L, M and R as a part of the internal group assessment programme. He gave it to them at 7 p.m. The following table gives the time taken by each of them in finishing the different assignments and the time at which each of them goes to sleep.

Student	Time taken to complete projects (in hour's)					Time of going to sleep
	1	2	3	4	5	
S	2	5	1.5	3	5	10 p.m
C	4	2	3	1	4	11 p.m
L	1	3	4	2	1.5	9 p.m
M	1.5	2.5	3.5	3	3	10 p.m
R	5	4	3.5	2	4	12 Midnight

In case of an internal group assessment programme, all the assignments are needed to be done but not necessarily by each one of them. Hence, the group decides that each one of them will do exactly one project out of the given five projects.

20. What is the least time in which the group assignment will be done?

- (a) 1.5 hours (b) 2 hours
- (c) 2.5 hours (d) 3 hours

21. What is the cumulative time spent by all of them if they finish it in the minimum possible time?

- (a) 7.5 hours (b) 8.5 hours
- (c) 9 hours (d) 10 hours

22. The assignment has to be finished on that particular calendar day only. What is the maximum possible time in which this assignment will be done?

- (a) 3.5 hours (b) 4 hours
- (c) 4.5 hours (d) 5 hours

Directions for questions 23 to 25: Read the following passage and solve the questions based on it.

Mohan went to the market and bought a few oranges, mangoes and bananas. He bought a total of 42 fruits. The details of the fruits purchased is as follows:

- (i) The number of bananas is less than half the number of oranges

- (ii) The number of mangoes is more than $\frac{1}{3}$ rd the number of oranges
 (iii) The number of mangoes is less than $\frac{3}{4}$ th the number of bananas.
23. How many oranges did Mohan buy?
 (a) 17 (b) 21
 (c) 23 (d) 26
24. How many bananas did Mohan buy?
 (a) 6 (b) 9
 (c) 11 (d) 13
25. How many mangoes did Mohan buy?
 (a) 6 (b) 9
 (c) 8 (d) 14

ANSWER KEYS

1. (c) 2. (b) 3. (d) 4. (b) 5. (c) 6. (c) 7. (b) 8. (a) 9. (a) 10. (a)
 11. (a) 12. (a) 13. (d) 14. (c) 15. (b) 16. (a) 17. (c) 18. (b) 19. (a) 20. (b)
 21. (b) 22. (d) 23. (c) 24. (c) 25. (c)

HINTS AND EXPLANATIONS

1 to 3

1. The positions are: Gupta(1–4), vacant = 5, Maurya (6–7) vacant = 8, Indus (9–11), vacant = 12. Therefore the unused table spares are 5, 8 and 12.
2. Y cannot be on table 9 as there would be no place to fix three objects.
3. QZX have to be together. They can start from table 1 or 2.

4 to 6

4. Y must be published in August, otherwise there would be no place for W. Y & Z cannot be published together. So, only possible option is (b).
5. Same as the last question.
6. Since U, V and W cannot be repeated and Y must be in the selection. Hence, option (c)

7 to 9

7. R cannot be later than S. Therefore only option (b) satisfies this condition.
8. The order for entry is: RMTS. Then the order for leaving can only be MRST.
9. The order for entry is MRTS. For leaving, S cannot be the fourth so she must be the second or the third. In that case, R must be the first.

10 to 13

The total amount spent by the different families was in integers. The average amount spent by the members of the Apang family was 3.25. So the number of members of this family should be either 4 or a multiple of 4, to make the total amount spent by the family an integer. Similarly, the number of members of the Gagan family should be either 8 or a multiple of 8. The table below shows the probable number of family members:

Table

Family	Average expenditure of family members	Probable number of members	Exact members	Amount spent by the whole family
Apang	$3.25 = 3 + \frac{1}{4}$	4,8,12,16,20,24,...	12	39
Gagan	$2.125 = 2 + \frac{1}{8}$	8,16,24,32,...	24	51
Kumar	$3.166 = 3 + \frac{1}{6}$	6,12,18,24,...	36	114
Lapa	$3.1428 = 3 + \frac{1}{7}$	7,14,21,28,...	14	44
Zora	$4.5 = 4 + \frac{1}{2}$	2,4,6,8,10,12,14...	14	63
Rio	$2.111 = 2 + \frac{1}{9}$	9,18,27,36, ...	36	76
Chaman	$5.20 = 5 + \frac{1}{5}$	5,10,15,20,25, ...	20	104
Sarkar	$4.33 = 4 + \frac{1}{3}$	3,6,9,12,15,18, ...	24	104
Total			180	595

10. From the above table, it can be determined that the sum of the amount spent by both the families = $44 + 63 = 107$. Hence, the correct option answer is (a).
11. From the table we can see that the correct answer is option (a).
12. One sixth of the total members of the Apang, Gagan and Kumar families = $(1/6)(12 + 24 + 36) = 12$.
So, the number of children = $72 - 12 = 60$.
Hence, the answer is (a)
13. The answer is option (d).

14 to 17

Using (i)—If B is R, then D is S. However, we cannot conclude that if D is S, then B is R. If B is R, then D is S [from (i)]. Let us assume that B is R, then D is S. From (iii), as D is not T, E is S. But Both D and E cannot be S. So, our assumption (namely B is R) itself is not valid. Hence we can conclude that B is not R.

Using (ii), (iv), and (v)—If B is S, then A is Q [from (iv)]. In such case, C is S [from (iii)]. Once again it is not acceptable, as B and C both cannot be S. Hence

the assumption made is invalid in this case too (that B is S). So, B is not S. If B is P, then A is Q [from (iv)]. In that case, C is S [from (ii)]. As C is not T, B is not P [from (iv)]. This contradicts the assumption that (B is P) with which we started off. So this is also invalid. Hence, B is not P.

As B is neither S nor P, we also get from (iv) that A is not Q. Looking at (iii) again we get from this that D is not S. (If D is S, D is not T and hence E is S. This is not possible, as both D and E cannot be S.)

Let us summarize the findings till now:

A	B	C	D	E
Not Q	Not R	Not S	Not S	Not P

Hence, B can only be Q or T. Now, if B is Q, D is R and E is not S [from 4].

But if D is R, E must be S, according to (iii). We cannot have a situation where one given statement is contradicted by another given statement. Hence, B cannot be Q. So, the only possibility is that B is T. So we are sure now that B is T.

Looking at (vi) again, D is R and E is not S, if and only if B is Q. Now, as B is not Q, it follows that D is not R. It also follows that E is S. If A is R, then C is T (vii) But we know that B is T, so C is not T. It follows that A is not R. Thus, A is not R, A is not Q, A is not T (as B is T), and A is not S (as E is S). Hence A is P.

Coming to D, D is not P or S or T (as A is P, E is S and B is T). We have also seen above that D is not R. Hence, D is Q.

The person left out till now, namely C, has to be R in that case. So, A, B, C, D and E operate under the names of P, T, R, Q and S respectively.

18 to 19

A couldn't be the 1st or 2nd, for he would be telling the truth; or the 5th, for he would be lying; so he was 3rd or 4th.

If D was telling the truth, then E would be lying. Thus D would be the 1st, and lying at the same line which is contradictory. Thus, D is lying, and he is the 1st or 2nd.

If E was lying, D would be the 1st, so E would have to be the 2nd, then D would have been telling the truth. Thus, E is the 3rd, 4th or 5th and D must be 2nd.

Now, only B or C could be the 1st. If B isn't the 1st, as he couldn't be the 2nd, he would have to be the 4th or 5th because C would be the 3rd. But nobody would be the 1st; the only solution then is B, D, E, A and C.

20 to 22

20. We must assign 1st project to M as we need least time for 1st project. Similarly 4th project is given to R. Similarly 2nd, 3rd & 5th projects are given to C, S & L respectively. The time required is 2 hours.
21. The cumulative time (using answer 20) is $1.5 + 2 + 1.5 + 1.5 + 2 = 8.5$ hour. (The projects are allotted as were allotted in answer 20).
22. As each person is doing exactly 1 project, so the maximum time for the assignment is the maximum time by any person for any project. As, maximum required by any person for any project is shows. So, the correct option is (d).

23 to 25

Let us represent number of oranges, bananas & mangoes as O, B & M. We are given,

$$O + B + M = 42 \quad (1)$$

$$B < \frac{1}{2} O \quad (2)$$

$$M > \frac{1}{3} O \quad (3)$$

$$M < \frac{3}{4} B \quad (4)$$

So, from (4) B must be a multiple of 4 or near to it. So, by (2) O must be a multiple of 8 or near to it. Similarly by (3) O is a multiple of 3 or near to it. So, O must be a multiple of 24 or near to H. So, let $O = 24$, then $B < 12$ & $M > 8$ & < 9 (near about). To make M a possible number, we can make adjustments as $O = 23$; $B = 11$ & so, $M = 8$.

Chapter

16

MASTERING LOGICAL REASONING

PRACTICE EXERCISE 1

INSTRUCTIONS

- ☐ Directions for answering the questions are given before each group of questions. Read these directions carefully and answer the questions by darkening the appropriate circles Sheet. Each question has only one correct answer.
 - ☐ All questions carry three marks each. Each wrong answer will attract a penalty of one mark.
 - ☐ Do your rough work only on the Test Booklet and NOT on the Answer Sheet.
-

Directions for questions 1 to 4: *Read the information given below and solve the questions based on it.*

Six products – U, V, W, X, Y and Z – are to be placed in the display window of a vending machine with six compartments, numbered 1 through 6 from left to right. The products must be placed in the window, one product in each compartment, according to the following conditions:

U cannot be immediately to the left or immediately to the right of V,
W must be immediately to the left of X,
Z cannot be in compartment 6.

1. Which of the following products CANNOT be placed in compartment 1?
(a) U (b) V
(c) W (d) X
2. If X is placed in compartment 3, W must be placed in compartment
(a) 1 (b) 2
(c) 4 (d) 5

3. If U is placed in compartment 5, which of the following products must be placed in compartment 6?

(a) V	(b) W
(c) X	(d) Y
4. If Z is placed in compartment 3, immediately to the right of X, which of the following products must be placed in compartment 5?

(a) Y	(b) V
(c) W	(d) X

Directions for questions 5 to 8: *Read the information given below and solve the questions based on it.*

Some people – Tomas, Nadine, Pavel, Marta, Rachel, Fred, and Kurt – are planning to travel down a river on two rafts. The group will be assigned to the rafts according to the following conditions:

Tomas must be assigned to the same raft as Rachel,
 Fred cannot be on the same raft as Pavel unless Marta is also on that raft,
 The maximum number of persons on each raft is four,
 Neither Nadine nor Pavel can be assigned to the same raft as Kurt.

5. If Fred is assigned to the same raft as Nadine, which of the following must be true?
 - (a) Kurt is assigned to the other raft.
 - (b) Marta is assigned to the other raft.
 - (c) Pavel is assigned to the other raft.
 - (d) Rachel is assigned to the same raft as Fred and Nadine.
6. If Rachel is assigned to the same raft as Pavel, which of the following must be true?
 - (a) Kurt is assigned to the same raft as Rachel and Pavel.
 - (b) Nadine is assigned to the same raft as Kurt.
 - (c) Nadine is assigned to the raft other than the one to which Pavel is assigned.
 - (d) Rachel and Pavel are assigned to the raft carrying four people.
7. If Kurt is assigned to the same raft as Marta, which of the following must be true?
 - (a) Fred is assigned to the same raft as Nadine.
 - (b) Fred is assigned to the same raft as Tomas.
 - (c) Nadine is assigned to the same raft as Pavel.
 - (d) Nadine is assigned to the same raft as Kurt and Marta.
8. If Rachel is assigned to the same raft as Fred, which of the following is a complete and accurate list of the people who must then be assigned to the other raft?

(a) Fred, Pavel	(b) Marta, Nadine, Pavel
(c) Marta, Tomas	(d) Kurt, Marta, Nadine

Directions for questions 9 to 14: *Read the information given below and solve the questions based on it.*

A flat wilderness area has four widely separated shelters – F, G, W, and X – that are connected by exactly four straight trails – Q, R, S, and T – that are equal to each other in length and connect the shelters in the following ways:

Q connects F and W only.
 R connects G and W only.
 S connects F and G only.
 T connects G and X only.

The shelters are at the ends of the trails.

9. Which of the following is the order in which a hiker, starting with F, using only trails and using no trail more than once, must reach the other shelters?
(a) G, W, X (b) W, G, X
(c) W, X, G (d) X, W, G
10. If a hiker is at X and wants to reach F by a sequence of trails no longer than necessary, there are how many trail sequences of minimal length from which to choose?
(a) One (b) Two
(c) Three (d) Four
11. If a hiker restricts herself to the trails, any of the following is a possible sequence in which full lengths of trails are hiked EXCEPT
(a) Q, S, R, T, S (b) R, Q, S, R, Q
(c) S, T, T, R, Q (d) T, R, R, T, T
12. If a hiker walks the full length of each trail exactly once, which of the following lists all those shelters and only those shelters at which the hiker must be exactly twice?
(a) G (b) F and G
(c) G and W (d) G and X
13. If by taking shortcuts that stray from the trails, a hiker could travel from W to X over a shorter distance than the shortest distance between W and X by trail alone, which of the following must be true?
(a) The shortest distance by trail alone from F to X is less than the shortest distance by trail alone from W to X.
(b) The shortest sequence of trails between F and X is the shortest distance between F and X.
(c) The route composed of R and T is not a straight line.
(d) R meets T at a right angle.
14. If the straight-line distance between F and X is the same as the straight-line distance between W and X, which of the following can result if new straight trails are added between F and X and between W and X?
(a) The shortest distance by trail between any shelter and any other shelter is the same.
(b) The number of trails required for the shortest possible hike by trail between any shelter and any other shelter is one.
(c) The shortest distance by trail between F and X is less than the shortest distance between W and X.
(d) A hiker must travel fewer trails to travel the shortest distance between F and X than to travel the shortest distance between F and G.

Directions for questions 15 to 18: Read the information given below and solve the questions based on it.

A contractor will build five houses in a certain town on a street that currently has no houses on it. The contractor will select from seven different models of houses – T, U, V, W, X, Y, and Z. The town's planning board has placed the following restrictions on the contractor:

- No model can be selected for more than one house,
- Either model W must be selected or model Z must be selected, but both cannot be selected,
- If model Y is selected, then model V must also be selected,
- If model U is selected, then model W cannot be selected.

15. If model U is one of the models selected for the street, then which of the following models must also be selected?
 (a) T (b) W
 (c) X (d) Z
16. If T, U, and X are three of the models selected for the street, then which of the following must be the other two models selected?
 (a) V and W (b) V and Y
 (c) V and Z (d) W and Y
17. Which of the following is an acceptable combination of models that can be selected for the street?
 (a) V, W, X, Y, Z (b) T, U, X, Y, Z
 (c) T, V, X, Y, Z (d) U, V, W, X, Y
18. If the model Z is one model not selected for the street, then the other model NOT selected must be which of the following?
 (a) T (b) U
 (c) V (d) W

Directions for questions 19 to 22: *Read the information given below and solve the questions based on it.*

The owner of a computer store is planning a window display of five products. Three are to be hardware items selected from K, L, M, N, and O, and two are to be software manuals selected from R, S, T, and U. The display items are to be selected according to the following conditions:

If K is displayed, U must be displayed.

M cannot be displayed unless both L and R also displayed.

If N is displayed, O must be displayed, and if O is displayed, N must be displayed.

If S is displayed, neither T nor U can be displayed.

19. Which of the following is an acceptable display?
 (a) K, L, M, R, U (b) K, M, N, O, R
 (c) L, M, O, R, S (d) M, N, O, T, U
20. If K and T are the first two display items to be selected, how many acceptable groups of items are there would complete the display?
 (a) 1 (b) 2
 (c) 3 (d) 4
21. If T and U are displayed, which of the following must also be displayed?
 (a) R (b) K
 (c) M (d) N
22. If N and O are not displayed, all of the following must be displayed EXCEPT
 (a) K (b) M (c) R (d) T

ANSWER KEYS

1. (d) 2. (b) 3. (d) 4. (a) 5. (a) 6. (d) 7. (c)
 8. (b) 9. (b) 10. (a) 11. (a) 12. (a) 13. (c) 14. (b)
 15. (d) 16. (c) 17. (c) 18. (b) 19. (a) 20. (a) 21. (d)
 22. (d)

HINTS AND EXPLANATIONS

1. Following diagram can be drawn:

A)	U	Z	V	W	X	Y
	1	2	3	4	5	6
B)	V	Z	U	W	X	Y
	1	2	3	4	5	6
C)	W	X	V	Z	U	Y
	1	2	3	4	5	6
D)	X	~~W~~				
	1	2	3	4	5	6

Here option (d) is not true according to the conditions given that is W is immediate left of X which is violating. Whereas option (a), (b), (c) are all satisfying the conditions given. Hence the answer is option (d).

2. Following diagram can be drawn:

	W	X			
1	2	3	4	5	6

The answer is option B that is in 2nd compartment W must be placed according to the given condition – W is immediate left of X. Hence the answer is option (b).

3. Following diagram can be drawn:

A)					U	~~V~~
	1	2	3	4	5	6
B)					U	~~W~~
	1	2	3	4	5	6
C)					U	~~X~~
	1	2	3	4	5	6
D)	W	X	V	Z	U	Y
	1	2	3	4	5	6

According to the conditions given, we can see option (d) follows the conditions. Options (a), (b), (c) are not true as they are violating the conditions given. Hence the answer is option (d).

4. Following diagram can be drawn:

A)	W	X	Z	U/V	Y	U/V
	1	2	3	4	5	6
B)	W	X	Z	U	V	Y
	1	2	3	4	5	6
C)	W	X	Z	U	W	
	1	2	3	4	5	6
D)	W	X	Z	U	X	
	1	2	3	4	5	6

Here Y must be place in compartment 5 if Z is placed in compartment 3, immediately to the right of X which is option (a). If take option (b), V cannot be in compartment 5 as it is given that U cannot be immediately to the left or immediately to the right of V. Options (c) and (d) are not possible at all. Hence the answer is option (a).

5. It is given in the condition that **neither Nadine nor Pavel can be assigned to the same raft as Kurt**, so option (a) is true. Whereas option (b) is not true as Marta is not related to Nadine here at all, similarly options (c) and (d) don't have a connection with Nadine. Hence the answer is option (a).
6. The answer is option (d) is true whereas option (a) is not true as it is violating the condition given **that Kurt cant assigned the raft to neither Naple nor Pavel** also option (b) is not true with the same condition and option (c) is again not matching with the conditions given. Hence the answer is option (d).
7. Here options (a) and (d) are not true as they are violating the same condition that **Kurt cant assigned the raft to neither Naple nor Pavel**. Option (b) is also not true as it is given that **Tomas must be assigned to the same raft as Rachel** which is violating. Hence the answer is option (c).
8. Here option (a) cannot come to the list of other raft as **Fred is already in one list**. Option (c) is also not true as it is given that **Tomas must be assigned to the same raft as Rachel** which is violating the condition. Also option (d) is not true because it is given that **Nadine and Kurt cannot be on same raft**. In option (b) there seems to be accurate list of people without violating any condition. Hence the answer is option (b).
9. According to the given question:
Here shelter F starting from trail Q reaches to shelter X in a sequence – W, G, X using each trail only once that trails Q, R, S, T and sequence found to be in option (b) Hence the answer is option (b).
10. Here hiker is at X that is in trail T and want to reach shelter F in minimum length, then there is trail S which is connected with shelter F a point where hiker want to reach so there is only one length which is minimum. Hence the answer is option (a).
11. The answer is option (a) as it is not following the sequence in which full lengths of trails are hiked as per the given scenario. Other options are in the sequence. Hence the answer is option (a).
12. The answer is option (a) as when a hiker starts walking from Q to trail T he reaches twice with the shelter G as per given in the rule. Hence the answer is option (a).

13. Here option (a) is not true because it is violating the conditions of trails and shelters, similarly option (b) is not true and option (d) also violating the given scenario. In option (c) as the distance between W and X is to find the route composed of R and T is there. Hence the answer is option (c).
14. According to the given question option (b) is the answer because number of trails required for the shortest possible hike by trail between any shelter and any other shelter is one. Option (a) is not true as distance is not same. Similarly in options (c) and (d) are not matching with the given question. Hence the answer is option (b).
15. The answer is option (d) that is Z as it is given in the rule that is W is selected than Z cannot and vice-versa, also given that Y and V are selected together and if U is selected then W cannot be selected. So option (b) cannot be the answer as per the rule, and options (a) and (c) are not mentioned in the rule. Hence the answer is option (d).
16. Option (a) is not the answer as it is given in question that T, U, X are three models; so from V and W, model W cannot be selected as model U is there and it is given in rule that if U is selected then W cannot be selected. Same is the case in option (d) In option (b), model V and Y cannot be the answer as it is given that if V is selected then, Y must also be selected. Hence the answer is option (c).
17. In option (a), model W and model Z both are selected together which is not as per the rule given. Option (b) also violates the rule as model V and Y should be selected together so here only model Y is present and in option (d) again if model U is selected then model W cannot be selected. Hence the answer is option (c).
18. In option (b), model U cannot be selected because if model Z is not selected then model W must be selected as per the given rule and if model W is selected then model U cannot be selected as it is also given in the rule that if model U is selected then model W cannot be selected. Hence the answer is option (b).
19. An acceptable display is K, L, M, R, U that is option (a) as it is satisfying all the conditions. Option (b) is incorrect, as it is violating the condition – If K is displayed, U must be displayed. Similarly, options (c) and (d) are violating the conditions. Hence the answer is option (a).
20. Only one group is acceptable to complete the display, which is given in option (a) As it is given that – If K and T are the first two display items to be selected, that is K is from hardware and T is from software manual, so now 2 from hardware is left and 1 from software manual. Hence the answer is option (a).
21. Since, T and U displayed are from software manuals, so option (a), cannot be true as it is given that only two are selected from software manuals. Option (b) is incorrect as it is given in the condition that if K is displayed, U must also be displayed, not vice-versa. Similarly, option (c) is incorrect as it is stated that – M cannot be displayed unless both L and R also displayed. So, option (d) is left, which is satisfying the conditions. Hence the answer is option (d).
22. As per given conditions, T cannot be displayed if N and O are not displayed. Options (a), (b), and (c) must be displayed. Hence the answer is option (d).

PRACTICE EXERCISE 2

INSTRUCTIONS

- ☐ Directions for answering the questions are given before each group of questions. Read these directions carefully and answer the questions by darkening the appropriate circles Sheet. Each question has only one correct answer.
- ☐ All questions carry three marks each. Each wrong answer will attract a penalty of one mark.
- ☐ Do your rough work only on the Test Booklet and NOT on the Answer Sheet.

Directions for questions 1 to 6: *Read the information given below and solve the questions based on it.*

Three children live at houses with different colored doors. Following are the details of the children:

Child Name – Govind, Jai, Sama

Door – Blue, Green, Red

House Numbers – 1, 2, 3

Road – Bridge Street, Cherry Road,

Sandy Lane

Sama's house No. is 1 lower than Jai's. Govind does not live at House No.1, but does not have a green door. One child lives at No.2 at Cherry Road. House No.1 has a red door, but is not on Sandy lane.

1. Who lives at Bridge street?
 - (a) Govind (b) Jai
 - (c) Sama (d) More than one answer is possible
2. Which of the following is correctly matched door color and house number?
 - (a) Blue – House No. 1
 - (b) Blue – House No. 2
 - (c) Red – House No. 1
 - (d) Red – House No. 2
3. Which of the following is the correct combination for Govind?
 - (a) Govind – Green – 2 – Cherry Road
 - (b) Govind – Green – 3 – Sandy Lane
 - (c) Govind – Blue – 2 – Cherry Road
 - (d) Govind –Blue– 3 – Sandy Lane
4. For how many children, is it possible to exactly determine the house number, road and color of road?
 - (a) 0 (b) 1 (c) 2 (d) 3
5. The child who lives at Cherry Road has the following combination of door color and house number?
 - (a) Green color – House No. 3
 - (b) Blue color – House No. 2
 - (c) Red color – House No. 1
 - (d) None of these
6. What is the color of the door of Jai's house?
 - (a) Red (b) Green
 - (c) Blue (d) Either Blue or Red

Directions for questions 7 to 12: *Read the information given below and solve the questions based on it.*

Chef Sudhir is preparing orders of toast for three customers A, B and C. Assume that all the three customers ordered at exactly the same time, and the time to place bread in and remove toast from the toaster is negligible.

Sudhir has two toasters that can each toast 2 pieces of bread at the same time, and 1 knife to apply both butter and jam.

- (i) It takes 1 minute to lightly toast 2 pieces of bread.
- (ii) It takes 1 minute 30 seconds to moderately toast 2 pieces of bread.
- (iii) It takes 2 minutes to darkly toast 2 pieces of bread.
- (iv) It takes 10 seconds to apply butter to a piece of toast.
- (v) It takes 15 seconds to apply jam to a piece of toast.

Following are the orders:

Customer A wants 4 pieces of toast, moderately toasted, with butter on each piece.

Customer B wants 2 pieces of toast, lightly toasted, with butter and jam on each piece.

Customer C wants 3 pieces of toast, darkly toasted, with butter on 1 piece, nothing on the others.

Waiting time for any customer is the total time taken by Sudhir to serve that particular customer. For example, if A had to wait for 2 minutes, and after serving A, B is served in another 1 minute, then total waiting time for B will be 3 minutes.

Overall objective of Sudhir is to minimize the total combined waiting time. Total combined waiting time = Individual waiting time of A + individual waiting time of B + Individual waiting time of C.

- 7. Who will be served first?
 - (a) A
 - (b) B
 - (c) C
 - (d) A or B or C
- 8. Who will be served second?
 - (a) A
 - (b) B
 - (c) C
 - (d) A or B or C
- 9. Who will be served third?
 - (a) A
 - (b) B
 - (c) C
 - (d) A or B or C
- 10. What is the combined total waiting time?
 - (a) 9 minutes 20 seconds
 - (b) 8 minutes 55 seconds
 - (c) 8 minutes 40 seconds
 - (d) None of these
- 11. What is the individual waiting time of A?
 - (a) 4 minutes 20 seconds
 - (b) 4 minutes 10 seconds
 - (c) 4 minutes 40 seconds
 - (d) None of these
- 12. What is the waiting time of C?
 - (a) 2 minutes 10 seconds
 - (b) 4 minutes 20 seconds
 - (c) 2 minutes 30 seconds
 - (d) None of these

Directions for questions 13 to 16: *Go through the information given below and solve the questions based on it.*

You are the Quality Control manager at a restaurant. Go through the case facts given below and solve the questions based on it:

Restaurant produces chicken nugget box (1,000 boxes at a time in a batch). Restaurant has to ensure that it does not supply undercooked nuggets (known as defective) to the customers. If a customer receives a defective nugget box, company has to pay a penalty of ₹150 per nugget box. To check the level of preparedness of nuggets, any of the two tests can be used:

Test 1		Test 2	
Cost	₹6 per nugget box	Cost	₹9 per nugget box
Detection Rate	80%	Detection Rate	100%

Restaurant can re-cook undercooked nuggets at a cost of ₹75 per nugget box. This box can be now sold to customer as it is now certainly properly cooked. All the boxes which are detected as defective must be re-cooked and after that, these boxes are properly cooked now.

Let 'x' be the number of defective nugget boxes per batch.

13. Manager should not use any quality control test, if it is expected that
 - (a) $x < 100$
 - (b) $100 < x < 200$
 - (c) $x > 200$
 - (d) None of these
14. If $200 < x < 400$, then
 - (a) You should use Test 1
 - (b) You should use Test 2
 - (c) You can use Test 1 or Test 2
 - (d) None of these
15. If $x = 1000$, you should use
 - (a) Test 2
 - (b) Test 1 and Test 2
 - (c) Test 1 or No test
 - (d) None
16. Company should be indifferent between Test 1 and No Test if it finds that the number of defective boxes is equal to
 - (a) 50
 - (b) 100
 - (c) 200
 - (d) Not possible

Directions for questions 17 to 19: *Answer the questions based on the following information.*

Sixteen teams have been invited to participate in the ABC Gold Cup cricket tournament. The tournament is conducted in two stages. In the first stage, the teams are divided into two groups. Each group consists of eight teams, with each team playing every other team in its group exactly once. At the end of the first stage, the top four teams from each group advance to the second stage while the rest are eliminated. The second stage comprises of several rounds. A round involves one match for each team. The winner of a match in a round advances to the next round, while the loser is eliminated. The team that remains undefeated in the second stage is declared the winner and claims the Gold Cup.

The tournament rules are such that each match results in a winner and a loser with no possibility of a tie. In the first stage, a team earns one point for each win and no points for a loss. At the end of the first stage, teams in each group are ranked on the

basis of total points to determine the qualifiers advancing to the next stage. Ties are resolved by a series of complex tie-breaking rules so that exactly four teams from each group advance to the next stage.

17. What is the total number of matches played in the tournament?
 (a) 28 (b) 55
 (c) 63 (d) 35
18. The minimum number of wins needed for team in the first stage to guarantee its advancement to the next stage is
 (a) 5 (b) 6
 (c) 7 (d) 4
19. What is the number of rounds in the second stage of the tournament?
 (a) 1 (b) 2
 (c) 3 (d) 4
20. A shipping clerk has five boxes of different but unknown weights each weighing less than 100 kg. The clerk weighs the boxes in pairs. The pair wise weights obtained are 110, 112, 113, 114, 115, 116, 117, 118, 120 and 121 kg. What is the weight of the heaviest box?
 (a) 60 kg (b) 62 kg
 (c) 64 kg (d) Cannot be determined

ANSWER KEYS

1. (c)	2. (b)	3. (b)	4. (d)	5. (b)	6. (c)	7. (c)
8. (b)	9. (a)	10. (b)	11. (b)	12. (a)	13. (a)	14. (b)
15. (a)	16. (b)	17. (c)	18. (b)	19. (c)	20. (b)	

HINTS AND EXPLANATIONS

1 to 6

Following is the arrangement:

Child	Color of Door	House Number	Road
Govind	Green	3	Sandy lane
Jai	Blue	2	Cherry Road
Sama	Red	1	Bridge Street

1. Sama lives as Bridge Street. Hence option (c) is the answer.
2. House number 2 has blue colored door. Hence option (b) is the answer.
3. It can be seen from the table that option (b) is the answer.
4. As obvious from the above table, it can be determined for all three of them. Hence option (d) is the answer.
5. Child who lives at Cherry road (Jai) has his house number 2 and color of door is blue. Hence option (b) is the answer.
6. Jai's house color of door is blue. Hence option (c) is the answer.

7 to 12

Total Combined waiting time = 8 minutes 55 seconds

Customer (A) will have to wait 4 minutes 10 seconds; Customer (B) will wait 2 minutes 35 seconds; and customer (C) will wait 2 minutes 10 seconds. C's three slices plus one of B's will toast first. B's first slice will have butter and jam applied while the second slice of B's order is toasting. After 2 minutes, A's toast will begin. C's order will be buttered in 10 more seconds, for a total of 2 minutes 10 seconds. Then, B's last slice will be buttered and jam applied, for a total waiting time of 2 minutes 35 seconds. After A's order is toasted and 1 slice buttered, 4 minutes 10 seconds will have elapsed.

7. Customer C will be served 1st after 2 minutes 10 seconds. Hence option (c) is the answer.
8. Customer B will be served 2nd. Hence option (b) is the answer.
9. Customer A will be served 3rd. Hence option (a) is the answer.
10. Combined total waiting time = Waiting time of A + Waiting time of B + Waiting time of C = 4:10 + 2:35 + 2:10 = 8 minutes 55 seconds. Hence option (b) is the answer.
11. As obvious from the explanation above, A will wait for 4 minutes 10 seconds. Hence option (b) is the answer.
12. As obvious from the explanation above, C will wait for 2 minutes 10 seconds. Hence option (a) is the answer.

13 to 16:

Total cost = Cost of Testing + Re-cook charge + Penalty

It can be seen that if the number of defective nugget boxes per batch is very low, for example, 10, then it is better to pay the penalty on this, than to use any test.

13. Total cost = Cost of Testing + Re-cook charge + Penalty
 Using Test 1, total cost of testing = ₹6 × 1000 = ₹6000
 Using options, at x = 100, Cost of Test 1 = Penalty paid for x = 100.
 Using Test 1, Detection = 80 % of 100 = 80. These 80 will be reworked upon and for remaining 20, company will pay penalty.
 Total cost = Cost of Testing + Re-cook charge + Penalty = ₹6000 + 80 × ₹75 + 20 × ₹150 = ₹15,000.
 For x = 100, penalty = ₹150 × 100 = ₹15000. Hence option (a) is the answer.
14. Check for x = 300.
 Total cost using Test 1:
 Cost of testing = ₹6 × 1000 = ₹6000
 Out of total defective 300 boxes, 80% will be detected. So, total detected boxes = 80% of 300 = 240 boxes. These 240 boxes will be reworked upon and remaining 60 boxes will go undetected. As per the rule, restaurant will have to pay penalty on these 60 boxes.
 Re-cook charges = ₹75 × 240 = ₹18000
 Penalty = ₹150 × 60 = ₹9000
 So, total cost using Test 1 = Cost of Testing + Re-cook charge + Penalty = ₹6000 + ₹18000 + ₹9000 = ₹33,000.
 Total cost using Test 2:
 Cost of testing = ₹9 × 1000 = ₹9000

Out of total defective 300 boxes, 100% will be detected. So, total detected boxes = 100% of 300 = 300 boxes. These 300 boxes will be reworked upon.

Re-cook charges = ₹75 × 300 = ₹22500

So, total cost using Test 2 = Cost of Testing + Re-cook charge + Penalty
= ₹9000 + ₹22500 + ₹0 = ₹31,500.

It can be seen that Total cost of Test 1 < Total cost of Test 2. Hence test 2 should be used. Hence option (b) is the answer.

15. Option (a) is the answer.

16. Using solution to Q(13), Penalty for $x = 100$ is equal to Total cost of Test 1 for $x = 100$.

Hence answer is – No test or Test 1 if $x = 100$.

Hence option (b) is the answer.

17 to 19

17. There shall be 8 teams in each group. Each team in a group shall be playing with

every other team. Hence, total number of matches shall be $\left(\frac{7 \times 8}{2}\right) = 28$ in one

group. Hence, in both the groups, there shall be 56 matches. This is for the first stage. Thereafter, there are 8 teams in knockout rounds from which one winner emerges, or 7 losers are identified. Hence, 7 more matches, i.e. in all 63 matches. Hence option (c) is the answer.

18. Under extreme conditions, the following can be the maximum number of matches won.

Teams	A	B	C	D	E	F	G	H
A	NA	√	√	√	√	√	×	×
B	×	NA	√	√	√	√	√	×
C	×	×	NA	√	√	√	√	√
D	×	×	×	NA				
E	×	×	×		NA			
F	×	×	×			NA		
G	√	×	×	√	√	√	NA	√
H	√	√	×	√	√	√	×	NA

In the above table, √ represents win and × represents loss.

From the table, A, B, C, G and H can win five matches each. Hence, we cannot decide that which team will qualify for the second round. Therefore, the minimum number of wins that can assure a place in the second stage is 6. Hence option (b) is the answer.

19. There are 8 teams. Hence, there would be 7 matches in 3 rounds. In general, any knockout or elimination format of tournament will have $(n-1)$ matches if there are n teams. Hence option (c) is the answer.
20. 60 cannot be the answer because then to arrive at a total of 121, the other box will have to weigh 61 kg. 64 is wrong too, because then to add up to 121, the other weight will have to be 57 and to make up to a total of 120, the next box shall have a weight 63 which obviously makes the maximum possible total as $64 + 63 = 127$. 62 is the correct answer because the other boxes shall be 59, 54, 56. These will give all the totals given above. Hence option (b) is the answer.

PRACTICE EXERCISE 3

INSTRUCTIONS

- ☐ Directions for answering the questions are given before each group of questions. Read these directions carefully and answer the questions by darkening the appropriate circles Sheet. Each question has only one correct answer.
- ☐ All questions carry three marks each. Each wrong answer will attract a penalty of one mark.

1. Three children won prizes in the Tech India Quiz contest. They are from three schools: Lancer, Columbus and Leelavati, which are located in different states. One of the children is named Binod. Lancer school's contestant did not come first. Leelavati school's contestant's name is Rahman. Columbus school is not located in Andhra Pradesh. The contestant from Maharashtra got third place and is not from Leelavati School. The contestant from Karnataka did not secure first position. Columbus school's contestant's name is not Badal.

Which of the following statements is TRUE?

- (a) 1st prize: Rahman (Leelavati), 2nd prize: Binod (Columbus), 3rd prize: Badal (Lancer)
 - (b) 1st prize: Binod (Columbus), 2nd prize: Rahman (Leelavati), 3rd prize: Badal (Lancer)
 - (c) 1st prize: Rahman (Lancer), 2nd prize: Badal (Columbus), 3rd prize: Binod (Leelavati)
 - (d) 1st prize: Binod (Columbus), 2nd prize: Badal (Lancer), 3rd prize: Rahman (Leelavati)
2. Mother Dairy sells milk packets in boxes of different sizes to its vendors. The vendors are charged ₹20 per packet up to 2000 packets in a box. Additions can be made only in a lot size of 200 packets. Each addition of one lot to the box results in a discount of one rupee on all the packets in the box. What should be the maximum size of the box that would maximize the revenue per box for Mother Dairy?
- (a) 2400 packets (b) 3000 packets
 - (c) 4000 packets (d) None of these
3. All employees have to pass through three consecutive entrance doors to enter into the office and one security guard is deployed at each door. These security guards report to the manager about those who come to office after 10 AM. Ms Rani is an employee of this office and came late on the annual day. In order to avoid report to the manager she had to pay each security guard half of the money she had in her purse and 2 rupees more besides. She found only one rupee with her at the end. How much money Ms Rani had before entering the office on the annual day?
- (a) ₹40 (b) ₹36
 - (c) ₹25 (d) ₹42

Directions for questions 4 to 5: Answer the questions based on the following information. Director of an institute wants to distribute teaching assignments of HRM, Psychology, Development Studies, Trade policy and Finance to five of six newly appointed faculty members. Prof. Fotedar does not want any assignment if Prof. Das gets one of the five. Prof. Chaudhury desires either HRM or Finance

or no assignment. Prof. Banik opines that if Prof. Das gets either Psychology or Trade Policy then she must get the other one. Prof. Eswar insists on an assignment if Prof. Acharya gets one.

4. Which of the following is valid faculty – assignment combination if all the faculty preferences are considered?
 - (a) Prof. Acharya – HRM, Prof. Banik – Psychology, Prof. Chaudhury – Development studies, Prof. Das – Trade Policy, Prof. Eswar – Finance
 - (b) Prof. Chaudhury – HRM, Prof. Das – Psychology, Prof. Acharya – Development studies, Prof. Banik – Trade Policy, Prof. Eswar – Finance
 - (c) Prof. Acharya – HRM, Prof. Banik – Psychology, Prof. Eswar – Development studies, Prof. Das – Trade Policy, Prof. Fotedar – Finance
 - (d) Prof. Banik – HRM, Prof. Fotedar – Psychology, Prof. Eswar – Development studies, Prof. Chaudhuri – Trade Policy, Prof. Acharya – Finance
5. If Prof. Acharya gets HRM and Prof. Chaudhury gets Finance, then which of the following is not a correct faculty-assignment combination assuming all faculty preferences are considered?
 - (a) Prof. Das – Development Studies, Prof. Banik – Trade Policy
 - (b) Prof. Fotedar – Development Studies, Prof. Banik – Trade Policy
 - (c) Prof. Banik – Development Studies, Prof. Eswar – Trade Policy
 - (d) Prof. Banik – Development Studies, Prof. Das – Trade Policy

Directions for questions 6 to 8: *Answer the questions based on the following information. Five women decided to go for shopping to South Extension, New Delhi. They arrived at the designated meeting place in the following order: 1. Aradhana, 2. Chandrima, 3. Deepika, 4. Heena and 5. Sumitra. Each of them spent at least ₹1000. The woman who spent ₹2234 arrived before the woman who spent ₹1193. One of them spent ₹1340 and she was not Deepika. One woman spent ₹1378 more than Chandrima. One of them spent ₹2517 and she was not Aradhana. Heena spent more than Deepika. Sumitra spent the largest amount and Chandrima the smallest.*

6. What was the amount spent by Heena?
 - (a) ₹1193 (b) ₹1340
 - (c) ₹2234 (d) ₹2517
7. Which of the following amount is spent by one of the women?
 - (a) ₹1139 (b) ₹1378
 - (c) ₹2571 (d) ₹2518
8. The lady who spent ₹1193 is:
 - (a) Aradhana (b) Chandrima
 - (c) Deepika (d) Heena

Directions for questions 9 to 11: *Answer the questions based on the following information. In a motor race competition certain rules are given for the participants to follow. To control direction and speed of the motorists, guards are placed at different signal points with caps of different colour. Guard with red cap indicates the direction of participant's movement and guards with green cap indicates the speed of the participant's movement. At any signal point presence of three guards, two guards and one guard with red cap means the participant must stop, turn left and turn right respectively. Signal points with three guards, two guards and one guard with green cap means the participants must move at 10, 4 and 2 km/hour respectively. Kartikay,*

one of the participants, starts at a point where his car was heading towards north and he encountered signals as follows: at start point one guard with green cap; after half an hour two guards with red cap and two guards with green cap at first signal; after fifteen minutes one guard with red cap at second signal; after half an hour one guard with red cap and three guards with green caps at third signal; after 24 minutes two guard with red cap and two guards with green cap at fourth signal; after 15 minutes three guard with red cap at fifth signal. (Time mentioned in each case is applicable after crossing the previous signal).

9. Total distance travelled by Kartikay from starting point till last signal is:
(a) 9 km. (b) 10 km.
(c) 8 km. (d) 12 km.
10. What would be the final position of Kartikay if one guard with red cap and two guards with green caps were placed at the first signal point after the starting point?
(a) 3.0 km to the west and 2.0 km to the south
(b) 3.0 km to the west and 4.0 km to the north
(c) 5.0 km to the east and 4.0 km to the north
(d) 2.0 km to the west and 4.0 km to the south
11. If at the starting point Kartikay was heading towards south what would be his final position?
(a) 3.0 km to the east and 4.0 km to the south
(b) 5.0 km to the east and 4.0 km to the south
(c) 3.0 km to the west and 4.0 km to the south
(d) 5.0 km to the west and 2.0 km to the north

Directions for questions 12 to 15: *Answer the questions based on the following information. Mr Mansingh has five sons – Arun, Mahi, Rohit, Nilesh and Saurav, and three daughters – Tamanna, Kuntala and Janaki. Three sons of Mr Mansingh were born first followed by two daughters. Saurav is the eldest child and Janki is the youngest. Three of the children are studying at Trinity School and three are studying at St. Stefan. Tamanna and Rohit study at St. Stefan school. Kuntala, the eldest daughter, plays chess. Mansorover school offers cricket only, while Trinity school offers chess. Beside, these schools offer no other games. The children who are at Mansorover school have been born in succession. Mahi and Nilesh are cricketers while Arun plays football. Rohit who was born just before Janki, plays hockey.*

12. Arun is the _____ child of Mr Mansingh.
(a) 2nd (b) 3rd
(c) 6th (d) 5th
13. Saurav is a student of which school?
(a) Trinity (b) St. Stefan
(c) Mansorover (d) Cannot be determined
14. What game does Tamanna play?
(a) Cricket (b) Hockey
(c) Football (d) Cannot be determined
15. Which of the following pairs was not born in succession (ignore the order)?
(a) Mahi and Nilesh (b) Kuntala and Arun
(c) Rohit and Janki (d) Arun and Rohit

Directions for questions 16 to 20: *Read the information and solve the questions based on it.*

A museum curator must group nine paintings – F, G, H, J, K, L, M, N, and O – in twelve spaces numbered consecutively from 1-12. The paintings must be in three groups, each group representing a different century. The groups must be separated from each other by at least one unused wall space. Three of the paintings are from the eighteenth century, two from the nineteenth century, and four from the twentieth century.

Unused wall spaces cannot occur within groups.

G and J are paintings from different centuries.

J, K, and L are all paintings from same century.

Space number 5 is always empty.

F and M are eighteenth-century paintings

N is a nineteenth-century painting.

16. If the paintings are hung in reverse chronological order by century, the unused wall spaces could be
 - (a) 1, 5, and 10 (b) 1, 6, and 10
 - (c) 4, 7, and 8 (d) 5, 8, and 12
17. Which of the following is a space that CANNOT be occupied by a nineteenth-century painting?
 - (a) Space 1 (b) Space 6
 - (c) Space 8 (d) Space 11
18. If J hangs in space 11, which of the following is a possible arrangement for spaces 8 and 9?
 - (a) F in 8 and M in 9 (b) K in 8 and G in 9
 - (c) N in 8 and G in 9 (d) 8 unused and H in 9
19. If the twentieth-century paintings are hung in spaces 1-4, which of the following CANNOT be true?
 - (a) Space 8 is unused
 - (b) Space 9 is unused
 - (c) N is hung in space 9
 - (d) M is hung up in space 12
20. If the first five paintings, in numerical order of spaces, are F, O, M, N, G, which of the following must be true?
 - (a) Either space 1 or space 4 is unused
 - (b) Either space 7 or space 12 is unused
 - (c) H hangs in space 11
 - (d) Two unused spaces separate the eighteenth-century and nineteenth-century paintings

ANSWER KEYS

1. (a)	2. (b)	3. (b)	4. (d)	5. (d)	6. (b)	7. (a)
8. (c)	9. (a)	10. (a)	11. (c)	12. (c)	13. (a)	14. (d)
15. (b)	16. (d)	17. (a)	18. (d)	19. (c)	20. (a)	

HINTS AND EXPLANATIONS

1.

Name	School	State
Rehman	Leelavati	Andhra Pradesh
Binod/Badal	Lancer/Columbous	Karnakata
Badal/Binod	Lancer/Columbous	Maharashtra

So, correct option is (a)

2. For 2000 packets the price is ₹20.

$$\begin{aligned}\text{So, revenue} &= 2000 \times 20 \\ &= ₹40,000\end{aligned}$$

For 2200 packets the prices is ₹19.

For 2400 packets the prices is ₹18.

Calculating revenue in each case, we will get the maximum revenue for 3000 packets.

3. Money left to Ms. Rani

After 3rd door = ₹1

After 2nd (before 3rd) = ₹6

After 1st (before 2nd) = ₹16

Similarly, amount she was having in start is ₹36.

Option (b) is correct.

4. The faculty-assignment combination in option (d) do not violates any condition. Rest all option violates at least 1 condition.

5. If prof. Das gets psychology or trade policy then prof. Banik must get the other. So, if prof. Das got trade policy, then prof Banik must get psychology. So, the combination given in option (d) is not possible.

6 to 8

We know 4 exact values for amount spent which are ₹2234, ₹1193, ₹1340 & ₹2517. Further we know that 1 woman spent ₹1378 more than the chandrima who spent the smallest amount & we also know the smallest amount which can be spent is ₹1000.

So, the woman who spent ₹2517 must have spent ₹1378 more than Chandrima. So, amount spent by Chandrima is ₹1139.

Sumitra spent ₹2517. As Heena spent more than Deepika who did not spent ₹1340. So, the amount spent by Heena & Deepika are ₹1340 & ₹1193 respectively.

9. After 30 minutes Kartikay travelled 1 km & his position is (0, 1). For next 15 min the travelled 1 km & his position is (-1, 1). For next 30 min he travelled 2 km and his position is (-1, 3). For next 24 minutes, he travelled 4 km & his position is (3, 3). For next 15 min he travelled 1 km & his position is (3, 4).

$$\begin{aligned}\text{Total distance travelled} &= 1 + 1 + 2 + 4 + 1 \\ &= 9 \text{ km}\end{aligned}$$

Option (a) is correct.

10 to 11

Can be solved like 9.

12 to 15

We can solve this question as tabular arrangement with 8 rows & 5 columns, where each row shows each child. The 5 columns show, order (eldest to youngest), name, gender, school & game.

It is given that 3 sons were born first & then 2 daughters. So, gender for 1 to 3 is male & for 4 & 5, female. Saurav & Janaki are eldest & youngest & Janaki is daughter. So, gender for 8th child must be female & gender for 6th & 7th children must be male. Kuntala is eldest daughter & she plays chess. She must be from Trinity school as Trinity school offers only chess. So, she must be 4th child. Rohit was born just before Janaki & so he must be the 7th child. He plays hockey & his school is St. Stefan. The table will be as follows:

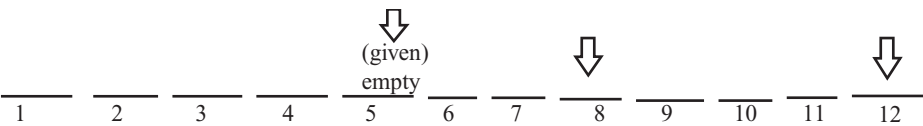
Order	Name	Gender	School	Game
1	Saurav	Male		
2		Male		
3		Male		
4	Kuntala	Female	Trinity	Chess
5		Female		
6		Male		
7	Rohit	Male	St. Stefan	Hockey
8	Janaki	Female		

Further, 3 children are studying in St. Stefan & 3 are studying in Trinity. So, remaining 2 must be studying in Mansorover. The children who are at Mansorover School have been born in succession. Mansorover school offers only cricket in games. Mahi & Nilesh are cricketers. So, the 2 children who are studying in Mansorover school must be Mahi & Nilesh who are both males & they must be 2nd & 3rd children of Mr. Mansingh. One of the 5 sons is Arun who plays football. So, Arun must be the 6th child & his school must be St. Stefan (as Trinity offers only chess as game). Tamanna, one of the 3 daughters, is studying in St. Stefan & she must be the 5th child. So, the school in which Saurav & Janaki are studying must be Trinity & so they must be playing chess (as Trinity offers only chess). The table will be as shown below:

Order	Name	Gender	School	Game
1	Saurav	Male	Trinity	Chess
2	Mahi/Nilesh	Male	Mansorover	Cricket
3	Nilesh/mahi	Male	Mansorover	Cricket
4	Kuntala	Female	Trinity	Chess
5	Tamanna	Female	St. Stefan	

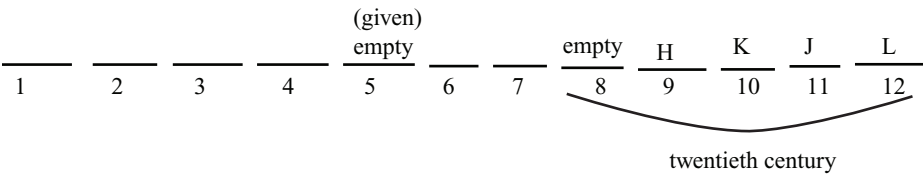
6	Arun	Male	St. Stefan	Football
7	Rohit	Male	St. Stefan	Hockey
8	Janaki	Female	Trinity	Chess

12. Arun is the 6th child of Mr. Mansingh
13. Saurav is a student of Trinity school
14. The game which is played by Tamanna cannot be determined
15. Kuntala & Arun is 4th & 6th child of Mr. Mansingh. So, they are not in succession
16. Following diagram can be drawn:



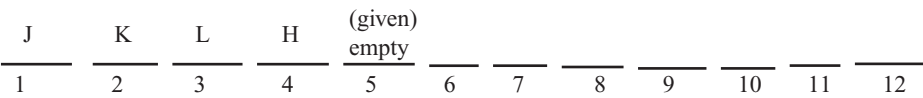
Options A, B, C are not the answers because they cannot be used as unused walls as per the given condition that unused wall spaces cannot occur within groups. Hence the answer is option (d).

17. The answer is option A as the centuries are in chronological order so according to that eighteenth century should come at space 1. Hence the answer is option (a).
18. Following diagram can be drawn:



According to the given rule J, K, L belong to same century and are at the end so we put it in twentieth century. Hence the answer is option (d).

19. Following diagram can be drawn:



Here option is not true as N is in nineteenth century which is given so it should come in space 6, 7 or 8 not in 9. Other options are true. Hence the answer is option (c).

20. According to the conditions given, F, O, M belong to eighteenth century and N, G belong to nineteenth century. Hence the answer is option (a).

PRACTICE EXERCISE 4

Directions for questions 1 to 6: *Read the following passage and solve the questions based on it.*

My brother Vinit while was planning to go home last year was confused about the clothes that he should carry with him. He had the following types of clothing: belts, hats, jackets, ties, vests, T-shirts and handkerchiefs. It was also known that he had with him several pieces of each of the seven types of clothing. Finally, he set up an algorithm to decide the clothes that he would be taking along with him.

- (i) If he packed ties, then he did not pack handkerchiefs.
 - (ii) If he packed belts, then he did not pack jackets.
 - (iii) If he packed belts, then he packed at least one handkerchief.
 - (iv) If he packed jackets, then he packed at least one vest.
 - (v) If he packed vests, then he packed at least one handkerchief.
 - (vi) If he packed handkerchiefs, then he packed at least two of them.
1. Which one of the following could be a complete list of the clothing that my brother packed?
 - (a) One belt, one T-shirt, one vest, two handkerchiefs.
 - (b) One belt, one tie, one T-shirt, three handkerchiefs.
 - (c) Two belts, one ties, three T-shirts.
 - (d) One jacket, one T-shirt, two vests and one handkerchief.
 2. If Vinit did not pack any handkerchiefs, what was the maximum number of the different types of clothing that he could pack?
 - (a) Two (b) Three
 - (c) Four (d) Five
 3. Which one of the following statements must be false?
 - (a) Vinit packed exactly three items of clothing, one of which was a vest.
 - (b) Vinit packed exactly four items of clothing, one of which was a hat.
 - (c) Vinit packed exactly three items of clothing, one of which was handkerchief.
 - (d) Vinit packed exactly three items of clothing, one of which was a belt.
 4. If Vinit packed as many items of clothing as possible, then it must be true that he did not pack one of the following types of clothing.
 - (a) Belts (b) Hats
 - (c) Ties (d) Jackets
 5. If Vinit packed at least one item, find out which one of the following are the minimum and the maximum numbers of the types of clothing that he could pack?
 - (a) 1,4 (b) 1,5
 - (c) 1,6 (d) 2,5
 6. If Vinit did not pack any vests, then it could be true that he packed one or more
 - (a) Ties and jackets
 - (b) T-shirts and belts
 - (c) Ties and belts
 - (d) T-shirts and ties

Directions for questions 7 to 9: *Read the following passage and solve the questions based on it.*

The production, marketing, human resource, finance and management information system managers of a particular company meet for a round table meeting to discuss

the strategy of the company. Out of the five, three are men and the other two are women. The following restrictions apply to their seating arrangement:

- (i) The two women will not be seated next to each other.
 - (ii) The production manager, a man, will always be seated as far as possible from the marketing manager.
 - (iii) The finance manager will always be seated next to a woman.
7. If the human resource manager is a man, which of the following is definitely not true?
 - (a) The marketing manager is sitting in between the two women
 - (b) The marketing manager is sitting in between two men
 - (c) The finance manager is a man
 - (d) The marketing manager is a woman
 8. If the finance manager always has a woman to his right, in how many different arrangements can the marketing manager be a woman?
 - (a) 2 (b) 3
 - (c) 4 (d) 5
 9. If the management information system manager is sitting just to the right of the production manager, which of the following statement(s) is/are definitely True?
 - I. The marketing manager and the finance manager sit next to each other.
 - II. The human resource manager has to be a woman.
 - III. The management information system manager has to be a man.
 - (a) I only (b) I and II
 - (c) I and III (d) II and III

Directions for questions 10 to 14: Read the following passage and solve the questions based on it.

The Snehans Apartment Welfare Association offers three activities to its members skating, soft ball and steam bath. To avail all these facilities the association has made separate activity centres, one each for all the three activities. The following table gives the details pertaining to the number of different types of members, the capacity of each type of activity centre and the time that must be invested in the individual activities (if used):

	In Time	Number of Members	Skating	Soft ball	Steam Bath
Males	7.30 a.m.	200	90 minutes	75 minutes	20 minutes
Females	8.30 a.m.	160	60 minutes	40 minutes	15 minutes
Children	9.00 a.m.	220	60 minutes	90 minutes	N.A
Capacity			250	120	30

All members are divided into three categories based on their age and sex as males, females and children. All members report at the In-time and all of them do skating first. Members are entitled to use the specialties via. skating, softball or steam bath according to the first-come, first-served basis and the availability of space in that particular activity centre.

For example: All males (200) whose in-time is time is 7.30 a.m. are allowed to skate as the capacity of the skating centre is 250. When the females report at their in-time (8.30 a.m.) there are only 50 places available in the skating centre. So, the rest of the 110 females wait till it becomes available.

The additional information is given as below:

- (i) No body can use the softball activity centre without going through the skating centre. If a member goes to the steam bath centre, he/she will have to go to the softball activity centre as well.
 - (ii) When members report to a particular centre, it is known as the reporting time for that centre; when they are allowed to enter the centre, it is known as their entry time for that centre. The difference between the reporting time and the entry time is known as the 'waiting time' for that centre.
 - (iii) 50% of the males who skate at a given time also play at the softball activity centre. Further, 50% of the males who go to the softball centre at a given time also visit the steam bath activity centre.
 - (iv) 60% of the females who skate at a given time also play at the softball activity centre. Further, 50% of the females who go to the softball activity centre at a given time also we the steam bath faritivity.
 - (v) 50% of the children who swim at a given time also play at the soft ball centre. No child takes a steam bath.
 - (vi) Members are served on the first-come, first-served basis. Further, if their reporting time at a particular centre is the same, then they are entertained on the basis of their in-time.
10. What is the number of children whose waiting time is 0, before entering the softball activity centre?
 - (a) 1.1 (b) 2.6
 - (c) 3.19 (d) 4.40
 11. What percentage of men out of the total number of men, went through all the three centres in the minimum possible time?
 - (a) 2.5% (b) 5%
 - (c) 7.5% (d) 10%
 12. What is the difference between the number of women who took the maximum time and those who took the minimum time, respectively, for going through all the three centres?
 - (a) 2 (b) 5
 - (c) 18 (d) 23
 13. What is the maximum time taken by any member who went through all the three centres?
 - (a) 110 minutes (b) 130 minutes
 - (c) 150 minutes (d) 170 minutes
 14. How many children are waiting at 9 a.m. for skating?
 - (a) 90 (b) 110
 - (c) 130 (d) 150

Directions for questions 15 to 16: Read the following passage and solve the questions based on it.

There are five identical looking boxes containing different objects in each of them and every box has a label indicating its contents. The following table shours the correct description of the contents and the label on each box:

Contents	Label
Two Pins	PP
Two Balls	BB
Two Clips	CC
One Pin and one Clip	PC
One Ball and one Clip	BC

15. Somebody has mischievously interchanged these labels in such a way that no box carries the correct label describing its contents.

How many of the following statement/s is/are definitely true?

- I. If two boxes are opened and it is found that there are three clips and one ball, then CC and BC are the actual labels on the boxes.
- II. If two boxes are opened and it is found that there are a total of two clips and one pin among the four items inside the boxes, then PC and BC are the actual labels on the boxes.
- III. If two boxes are opened and it is found that there are two pins among the four items inside the boxes, then BC has to be one of the actual labels on the boxes.
- IV. If two boxes are opened and it is found that there is at least one clip and one ball among the four items inside the boxes, then at least one pin has to be there as well.

- (a) 1 (b) 2
(c) 3 (d) None of these

16. Out of the five given boxes, three of the boxes have got their labels interchanged. It is also known that the boxes with the right labels contain at least one pin or at least one ball inside it. In how many ways can the labels be put on the five boxes satisfying the above given conditions?

- (a) 12 (b) 16
(c) 24 (d) None of these

Directions for questions 17 to 22: Read the following passage and solve the questions based on it.

Transparency International is UN watch-dog which gives ranks to all the member countries of the UN in terms of the corruption level in the government machinery. There are 190 member countries of the UN since its establishment in 1945 and all of them are awarded the ranks which are valid for a particular year. The lower the rank, the less corruption infested the country is. And the higher the rank, the more corrupt the country is.

In the following table, the ranks of ten countries for three consecutive years are given. A positive change shows that the ranking has improved over the previous year and a negative change shows that the ranking has worsened over the previous year.

Table 1

Rank in 2006	Change over 2005	Country	Change over 2004
51	+3	Sri Lanka	-5
52	+4	Zambia	-3
53	+6	New Zealand	-7
54	-2	Tango	-3
55	+2	Austria	-3
56	-1	Hungary	+4
57	A	Australia	D
58	B	Kenya	E
59	C	Mozambique	F
60	Zero	UAE	NA

Somehow the data for Australia, Kenya and Mozambique are missing from the table. NA indicated that the country was not in the list of the given ranks in that particular year.

17. What is the minimum value of $A + B + C$?
 (a) 11 (b) 12
 (c) 13 (d) 14
18. What is the maximum value of $D + E + F$?
 (a) 14 (b) 15
 (c) 16 (d) 17
19. What is the minimum value of $D + E + F$?
 (a) 8 (b) 9
 (c) 10 (d) 11
20. How many countries from the given countries in the table have definitely improved their ranking consistently every year during the given period?
 (a) 1 (b) 2
 (c) 3 (d) Cannot be determined
21. What can be the minimum change in the rank of any country in 2006 with respect to its rank in 2004?
 (a) 0 (b) 1
 (c) 2 (d) 3
22. For how many countries is it possible to have the same ranks in all the three years?
 (a) 0 (b) 1
 (c) 2 (d) 3

Directions for questions 23 to 25: Read the passage below and solve the questions based on it.

Five friends—Amar, Binit, Charu, Deeksha, Eshwar, went to a fair. At a shooting stall there are three things to be shot—balloons, coins and needles. The number of

balloons shot are 1, 4, 5, 6 and 8, while the number of coins shot are 0, 1, 2, 4 and 6. Following details are available:

- (i) The number of coins shot by Amar is three times the number of coins shot by the person who shot 4 balloons.
 - (ii) Three persons including the one who shot four coins, did not shoot any needle.
 - (iii) Binit did not shoot any needle.
 - (iv) The one who shot one balloon did not shoot any needle or coin. It is also known that he was not Charu.
 - (v) Deeksha shot balloons and coins but no needle.
 - (vi) Charu shot half as many coins as the person who shot twice as many balloons as he did.
 - (vii) Eshwar shot two more balloons than Amar, but Amar shot two more coins than Eshwar.
23. Which of the following is true?
- (a) Charu shot 8 balloons and 4 coins but no needle.
 - (b) The person who shot 5 balloons and one coin did not shoot any needle.
 - (c) The person who shot an equal number of balloons and coins also shot needles.
 - (d) The person who shot 4 balloons and 2 coins also shot needles.
24. Who shot an equal number of coins and balloons?
- (a) Amar (b) Binit
 - (c) Charu (d) Deeksha
25. Which of the following is true?
- (a) Deeksha shot 5 balloons
 - (b) Amar shot 8 balloons
 - (c) Eshwar shot 1 balloon
 - (d) Eshwar shot 6 balloons

ANSWER KEYS

1. (a)	2. (b)	3. (c)	4. (c)	5. (b)	6. (d)	7. (a)
8. (b)	9. (a)	10. (d)	11. (d)	12. (a)	13. (d)	14. (c)
15. (b)	16. (d)	17. (b)	18. (c)	19. (b)	20. (d)	21. (a)
22. (c)	23. (a)	24. (a)	25. (a)			

HINTS AND EXPLANATIONS

1 to 6

1. All option after than option (a) violates at least 1 condition.
2. If he did not pack handkerchief, he can take hat, tie & T-shirt with him. So, the maximum number of different types of clothing is 3.
3. If he packs handkerchief, then there must be at least 2 of them. So, the statement of option (c) must be false.

4. If he choose tie, he cannot choose hankerchief, so there will be loss of 2 item as hankerchief must be at least 2, if they are packed. So, he did not pack ties.
5. For minimum he can choose hat & then there will be only 1 type of clothing (as there is no condition for hat).
For maximum, there could be 2 hankerchiefs, 1 belt, 1 jacket, 1 vest, T-shirt & hats (no tie). So, for maximum there can be 6 different types of clothing.
So, correct answer is (1, 6).
6. As there is no vest, so there is possibility of no hankerchief & there cannot be any jacket. With belt, there must be hankerchiefs. So, we can choose option (d) only.

7 to 9

Five categories of the managers are:

- (1) Production (P) (2) Marketing (M) (3) Human (H)
(4) Finance (F) (5) Management Information System (MIS)

Number of men = 3 and number of women = 2.

F will always sit next to a woman hence he is a male. The production manager is a male.

7. If H is a male:

Male – H, F, P

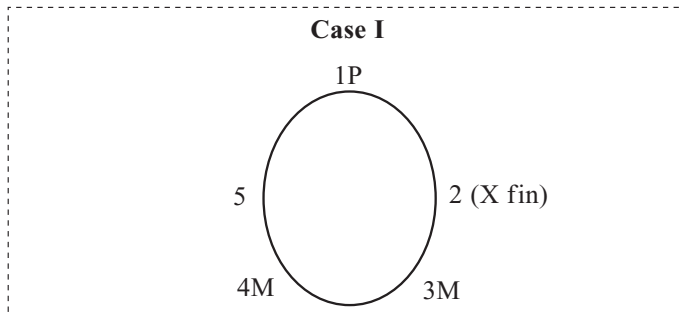
Female – M, MIS

As M herself is a woman so she cannot sit between the two women.

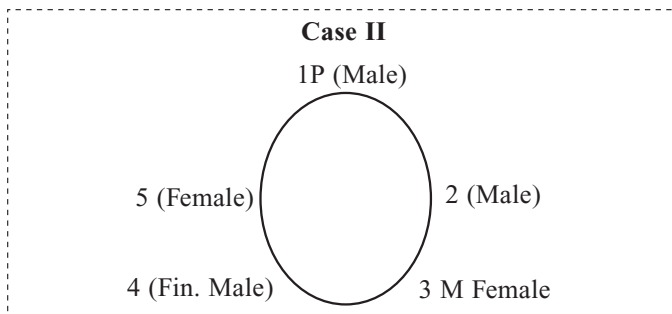
The statement in option (a) is definitely not true

Hence, the answer is option (a).

8.

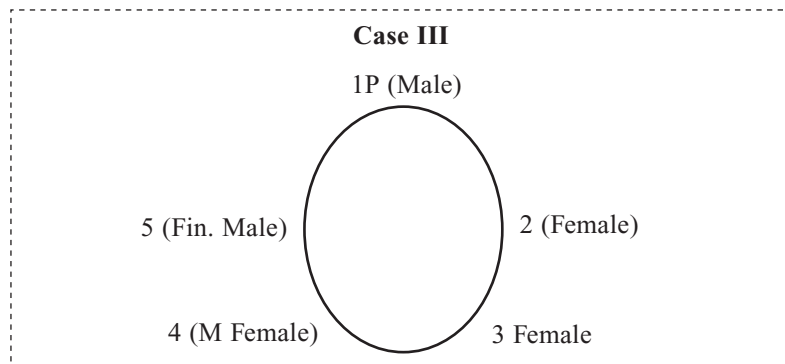


Look at the above figure, finance (F) cannot be at the second position as he always has a woman to his right whereas P i.e., production manager is a man.

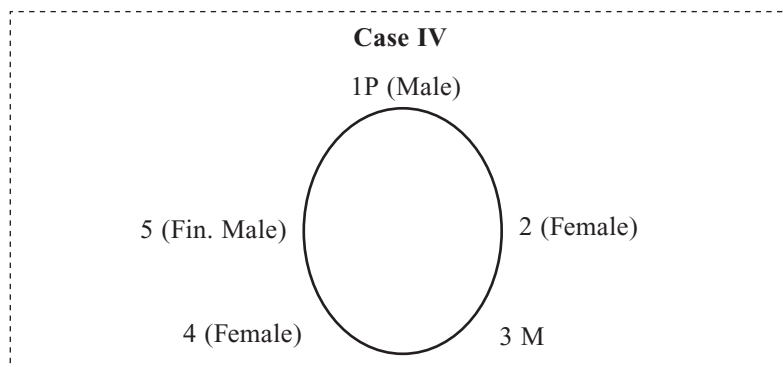


Assuming F is at the 4th position. Now M should be at the 3rd position because

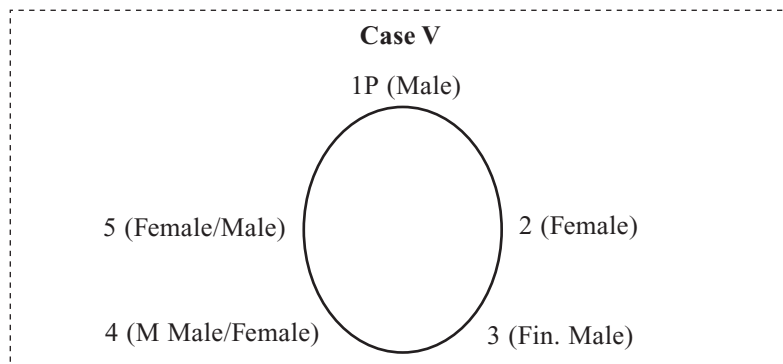
P should be seated as far as possible from M. Now M is a female as M is at the right of F. So 2nd position is occupied by a male as females cannot sit together. So the 5th position is occupied by a female. This is the 1st way.



When F is at the 5th position and the 4th position is occupied by M who is female because she is on the right of F. Therefore, the 2nd position is occupied by a female and the 3rd is occupied by a male. This is the 2nd way.



Not possible.



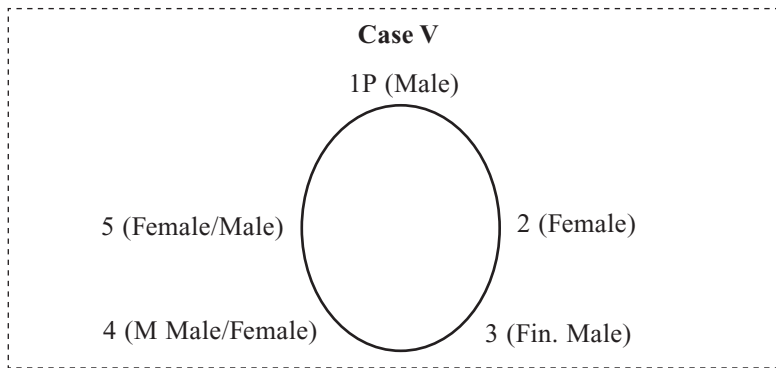
When F is at the 3rd position, the 2nd is occupied by a female. Now the 4th position is occupied by M who can be a male/female. But we can take a case from here in which M is a female. In that case the 5th position is occupied by a male.

This is the 3rd way.

Hence, in all, three arrangements are possible.

So, the answer is option (b).

9. We can solve by negating the options given:



If MIS is a female and M is at the 4th position then the 3rd position can be occupied by F who is a male and the 2nd position by H who can be a female. So the condition III negated that H has to be a woman.

Now, let us see another case where H is a male. Now the 2nd option also gets negated that H has to be a female.

Therefore the answer is (I) only. Hence the option (a) is the correct answer.

10 to 14

	N1	Skating			N2	Soft ball			N3	Steam Bath		
		In=R	Entry	Exit		R	Entry	Exit		R	Entry	Exit
Males	200	7.30	7.30	9.00	100	9.00	9.00	10.15	20	10.15	10.15	10.35
					20	9.30	9.30	10.10	5	10.15	10.25	10.45
	50	8.30	8.30	9.30	10	9.30	10.10	10.50	10	10.10	10.10	10.25
Females					10	10.10	10.10	10.50	5	10.50	10.50	11.05
	110	8.30	9.00	10.00					5	10.50	10.50	11.05
					56	10.00	10.15	10.55				
									20	10.55	10.55	11.10
		9.00	9.00	10.00	44	10.00	10.15	11.45	8	10.55	11.05	11.20
	90				1	10.00	10.50	12.20				
Kids		9.00	9.30	10.30	19	10.30	10.50	12.20				
	50				6	10.30	10.55	12.25				
	80	9.00	10.00	11.00	40	11.00	11.00	12.30				

10. For 40 children (at the bottom of the table) the waiting time is zero. Hence, option (d) is correct.

11. A total of 20 males go through all the three centers in the minimum possible time. At 7.30 a.m. they enter the centre and at 10.35 a.m. they exit from the steam bath centre. Hence, 10% of the males took the minimum possible time. Therefore, option (d) is correct.
12. A total of 10 women took the minimum time (at 8.30 a.m. they enter and at 10.25 a.m. they exit from the steam bath centre). Similarly, 8 females took the maximum time (at 8.30 a.m. they entered whereas at 11.20 a.m. they exit from the steam bath centre). So, the difference between the maximum and the minimum is $10 - 8 = 2$. Hence, the option (a) is correct.
13. The maximum time taken by any male (5) is 135 minutes (from 7.30 a.m. to 10.45 a.m.). The maximum time taken by a female (8) is 170 minutes (8.30 a.m. to 11.20 a.m.) which is greater than the maximum time taken by any male. Hence, option (d) is correct.
14. At 9 a.m. all the males will be out of the skating centre and the only people inside the centers will be females. The total number of females inside the skating activity centre at 9 a.m. = 160. Hence, 90 more members can be accommodated inside. So, $(220 - 90)$ 130 children will be waiting.

15 to 16

15. Only statements I and II are definitely true.
16. The correct ones should be either PP + BB, or, PP + BC, or, BC + PC.

17 to 22

17.

2006	2005	Country	2004
57	A	Australia	D
58	B	Kenya	E
59	C	Mozambique	F

The possible ranks for these three countries in 2005 = 51/53/58.

The minimum difference will occur if the signs of the change (+ or -) for these three countries are the same.

57	51	Australia
58	58	Kenya
59	53	Mozambique

Hence, net change = 12

Alternatively, for minimum change = Sum of ranks in 2006 – sum of ranks in 2005 = $(57 + 58 + 59) - (51 + 58 + 53) = 12$.

18.

57	51	Australia	60
58	53	Kenya	58
59	58	Mozambique	56

Hence, the maximum value of $D + E + F = 9 + 5 + 2 = 16$

19.

57	51	Australia	56
58	53	Kenya	57
59	58	Mozawmbique	58

Min value of $D + E + F = 9$

20. Cannot be determined because the ranks in 2005 and 2004 can be interchanged to give different answers.
21. The ranks available for 2004 = 56/57/58/60. Obviously the ranks 57 and 58 can be given to Australia and Kenya in 2006 as well as 2004. Hence, the difference = 0.
22. Since the question asks for possibility, we will have to see all the different options possible.
 Ranks available for 2005 = 51/53/58 and
 Ranks available for 2004 = 56/57/58/60.
 We can see that rank 58 is available for both the years 2004 and 2005. The same rank can be given to Kenya during the whole given period.

23 to 25

We can make table for this arrangement with 5 rows (1 for each friend) & 4 columns showing their names, & number of balloons, coins & needles shot by them. The number of balloons shot are 1, 4, 5, 6 & 8 while the number of coins shot are 0, 1, 2, 4 & 6.

The number of coins shot by Amar is 3 times the number of coins shot by the person who shot 4 balloons. So, Amar must have shot 6 coins & the person who shot 4 balloons must have shot 2 coins. The information about Amar can be shown in 1st row & about other person in 2nd row

The person who shot 1 balloon did not shoot any needle or coin & he was not Charu. This information can be filled in 3rd row

Eshwar shot 2 more balloons & 2 less coins than Amar. So, he must have shot 4 coins. There is only 1 possibility for numbers of balloons shot by them & it is 6 & 8 balloons by Amar & Eshwar. This information can be filled in 4th row

The person who shot 4 coins did not shoot any needle, so Eshwar did not shoot any needle. The table obtained is as:

Name	No. of balloons	No. of coins	No. of needles
Amar	6	6	
	4	2	
× Charu	1	0	0
Eshwar	8	4	0

Charu shot half as many coins as the person who shot twice as many balloons as he did. So, the other person must have shot exactly twice as many balloons & coins as Charu. The only possibility is that the other person is Eshwar & Charu is person in row 2nd. Deeksha shot balloons & coins but not needle, so must be in row 5th with 5

balloons & 1 coin & 0 needle. The 3rd row must have Binit. The number of needles shot by Amar & charu must not be 0

Name	No. of balloons	No. of coins	No. of needles
Amar	6	6	Non-zero
Charu	4	2	Non-zero
Binit	1	0	0
Eshwar	8	4	0
Deeksha	5	1	0

23. Charu shot 4 balloons & 2 coins & shot some needles too. So, statement in option (a) must be wrong. So, correct option is (a)
24. Amar shot 6 balloons & 6 coins. So, Amar shot an equal number of coins & balloons
25. Deeksha shot 5 balloons. So, option (a) is correct

PRACTICE EXERCISE 5

Directions for questions 1 to 6: *Read the following passage and solve the questions based on it.*

Looking upon the influx of high profile and sensitive cases in the Supreme Court. The CJI has decided that each case will be heard on a day to day basis by making a group of judges out of seven senior judges—Bindra, Goel, Kalyan, Mahajan, Deshbandhu, Raheja and Sinha. However all the judges need to serve on the panels collectively. They can serve either alone or in groups together, consistent with the following conditions:

- (i) Bindra serves on every panel that Kalyan serves on.
 - (ii) Kalyan serves on every panel that Sinha serves on.
 - (iii) Mahajan serves on every panel that Raheja does not serve on.
 - (iv) If Bindra serves on a panel then neither Goel nor Mahajan serve on that panel.
1. Which one of the following could be a complete list of the judges who serve together on one panel?
 - (a) Goel, Kalyan, Raheja, Sinha
 - (b) Goel, Mahajan, Deshbandhu, Raheja
 - (c) Bindra, Kalyan, Mahajan, Deshbandhu
 - (d) Bindra, Deshbandhu, Raheja, Sinha
 - (e) Goel, Kalyan, Deshbandhu, Sinha
 2. What is the maximum number of judges who could serve on a panel that Raheja does not serve on?
 - (a) Two (b) Three (c) Four
 - (d) Five (e) Six
 3. If exactly three judges serve together on a panel, then each of the following must be true except
 - (a) Bindra and Kalyan both serve on the panel.
 - (b) Raheja and Deshbandhu both serve on the panel.
 - (c) Deshbandhu and Mahajan both serve on the panel.
 - (d) Kalyan and Deshbandhu both serve on the panel.
 - (e) Goel and Raheja both serve on the panel.
 4. If Sinha and Deshbandhu serve together on a panel, then exactly what would be the size of the panel?
 - (a) One (b) Two (c) Three
 - (d) Four (e) Five
 5. If Goel and Deshbandhu serve on a panel together, then which one of the following must be true?
 - (a) Sinha does not serve on the panel
 - (b) Bindra also serves on the panel
 - (c) Raheja also serves on the panel
 - (d) Kalyan also serves on the panel
 - (e) Mahajan does not serve on the panel
 6. What is the largest possible size of the panel?
 - (a) 4 (b) 5 (c) 6
 - (d) 5 or 6 (e) Cannot be determined

Directions for questions 7 to 11: *Read the following passage and solve the questions based on it.*

There are seven friends—A, B, C, D, E, G and H at a B-School. They specialize in exactly one of the two areas: Marketing or Systems. The students choose their specialization in accordance with the following:

- (i) If D specializes in Systems then B specializes in Marketing.
 - (ii) If E specializes in Systems then H and A both specialize in Marketing.
 - (iii) G does not choose the same specialization as D.
 - (iv) If C specializes in Systems, then B also specializes in Systems.
7. Which one of the following could be a complete and accurate list of students who specialize in Systems?
- (a) D, E, C (b) H, A, G (c) B, H, C
(d) B, A, G, C (e) D, B, H, G
8. If D specializes in Marketing then which one of the following must not be true?
- (a) E specializes in Marketing
(b) G specializes in Marketing
(c) B specializes in Systems
(d) C specializes in Systems
(e) H specializes in Systems
9. If H and G both specialize in Systems, then which one of the following could be true?
- (a) E and A both specialize in Marketing
(b) C and A both specialize in Systems
(c) D and A both specialize in Marketing
(d) B and C both specialize in Systems
(e) D and E both specialize in Systems
10. What is the maximum number of friends who could specialize in Systems?
- (a) 2 (b) 3 (c) 4
(d) 5 (e) 6
11. Which one of the following is a pair of friends who cannot specialize in Marketing together?
- (a) H and G (b) D and B (c) D and G
(d) H and A (e) B and G

Directions for questions 12 to 15: Read the following passage and solve the questions based on it.

King Amitabh of Bollysteel organized initials to decide the groom for his daughter in two steps—The preliminary stage and the final stage. The preliminary stage comprised of a written test whereas in the final stage there was an archery competition. The archery competition consisted of five rounds wherein the contestants could score from 2 to 9 points in each round. The prince who scored the maximum points in these five rounds would be considered the winner in the overall standing and would marry the princess.

When the results of the preliminary stage were announced, it was found that only five princes—Shikari, Bhikhari, Atyachari, Juari and Hazari, qualified the preliminary stage and hence these were the only contestants left to complete in the final stage.

During the final stage, however, the inilats who was tabulating the scores of the princes started taking sporadic short naps and so at the end, when King Amitabh asked for the score-card to find out the final winner, he was presented the following Table:

	1st Round	2nd Round	3rd Round	4th Round	5th Round
Shikari	9		8		3
Bhikhari		2	3		
Atyachari	2	9	4	8	
Juari	4	6		5	8
Hazari		3			9

However, the initials has made the following observations too:

- (i) No two princes had scored equally in any round.
 - (ii) The difference between the total points scored by Prince Shikari and Prince Juari was 6 points.
 - (iii) Prince Bhikhari's total points were always greater than that of Prince Atyachari's total points.
 - (iv) Prince Shikari scored an even number of points both in the 2nd and the 4th rounds.
 - (v) Each of the five princes scored greater than or equal to 24 points in the five rounds.
 - (vi) There was tie between any two princes in their overall points.
12. Prince Juari won the competition and married the Princess. Also, Prince Bhikhari scored 28 points from the five rounds. Then which of the following could be false?
 - (a) Prince Atyachari scores more points than Prince Hazari in round 4
 - (b) Prince Shikari scores more points than Prince Hazari in round 2
 - (c) Prince Bhikhari scores more points than Prince Hazari in round 1
 - (d) Prince Juari scores more than Prince Shikari in round 3
 - (e) None of these
 13. If Prince Juari scores 5 points in the 3rd round and Prince Atyachari scores 4 points in the 5th round, then which of the following will definitely be false?
 - (a) Prince Shikari is 1st in the overall standing
 - (b) Prince Hazari is 2nd in the overall standing
 - (c) Prince Atyachari is 3rd in the overall standing
 - (d) Prince Juari is 4th in the overall standing
 - (e) None of these
 14. If Prince Hazari scores 2 points in the 3rd round. Then, which of the following statements is sufficient to decide the winner?
 - I. Prince Atyachari scores the maximum possible points in the 5th round.
 - II. Prince Juari scores the maximum possible points in the 3rd round.
 - (a) Only I
 - (b) Only II
 - (c) I and II
 - (d) Even I and II together are not sufficient to decide the winner
 - (e) Using either I or II will be sufficient to decide the winner
 15. If Prince Atyachari scores 5 points in the 5th Round but Prince Hazari becomes the winner with the least possible total points, then what is the least possible points scored by Prince Hazari in the 3rd round?
 - (a) 5
 - (b) 6
 - (c) 7
 - (d) 8
 - (e) Cannot be determined

Directions for questions 16 to 17: *Read the following passage and solve the questions based on it.*

There are seven persons—I, J, K, L, M, N and O in a family. They have one set each of the following three games—cards, baseball and tag.

Following are the details pertaining to the games that they play among themselves:

- (i) Each person must play exactly two out of the three games.
 - (ii) I must play cards.
 - (iii) K must play tag.
 - (iv) N must play baseball.
 - (v) M must play both games which I plays.
 - (vi) O must play both games which L plays.
 - (vi) Cards must be played by either 3 or 4 persons
 - (vii) Baseball must be played by either 4 or 6 persons
 - (ix) Tag can be played by any number of persons as long as there are a minimum of 2 persons.
16. If K plays the same two games as N plays, then which of the following is not true?
(a) I plays cards (b) N plays cards (c) K plays baseball
(d) N plays tag (d) None of these
17. If I and N play tag and four persons play cards, then the persons playing cards besides I and M are necessarily one of the following options.
(a) J and K (b) J and N (c) K and N
(d) K and O (e) None of these

Directions for questions 18 to 20: *Read the following passage and solve the questions based on it.*

- (i) In a newly constructed market, six shops on a floor in two rows facing North and South are allotted to U, V, W, X, Y and Z, not necessarily in that order. The number of shops in both the rows are equal in number.
 - (ii) V gets a North-facing shop and is not next to X.
 - (iii) W, which is next to Z gets a South-facing shop and Y gets a North-facing shop.
18. If X and Z get diagonally opposite shops and both these shops can never be at the extremes, then in how many ways can the be allotments of the shops done?
(a) 2 (b) 4 (c) 6
(d) 8 (e) None of these
19. In the above question, whose shop is between V and X?
(a) Z (b) Y (c) W
(d) U (e) Cannot be determined
20. In Q. 18, the shops of which other pairs, apart from X and Z are diagonally opposite to each other?
(a) U and Y (b) V and U (c) V and W
(d) Y and X (e) None of these

Directions for questions 21 to 25: *Read the following passage and solve the questions based on it.*

During the Doha Asian Games 2006, the following teams played in the soccer event—Afghanistan, Nepal, Pakistan, India, South Korea and Bangladesh. In the event, each team played with every other team exactly once.

The following was the scoring pattern of the event:

- (i) Each win gave three points to the winning team
- (ii) Each draw gave one point to each of the teams
- (iii) There was no point for a loss.

Following was the table of the points at the end of all the matches in the soccer event. The table showed the ranks of the teams in terms of points scored by them in the decreasing order of their total points.

Some information had been deliberately kept on hold due to certain reasons which were not to be made public. Even the results of the matches were not declared.

However, on public demand the result of only one match, which was played between India and Pakistan, was declared. It was announced that Pakistan had beaten India.

It was also given that no two teams finished with the same number of points. For the sake of convenience, all the teams were denoted by their initials only.

Table 1

Position	Team	Won	Drawn	Lost	Goals For	Goals Against	Total points
1	A				17	5	15
2	N				9	6	10
3	P					2	8
4	I				2	5	
5	S K				7	11	2
6	B				8	16	

21. Which of the following matches was a draw?
 - (a) I vs N
 - (b) I vs S K
 - (c) B vs N
 - (d) B vs S K
 - (e) None of these
22. What was the total number of points scored by I?
 - (a) 3
 - (b) 5
 - (c) 6
 - (d) 7
 - (e) Cannot be determined
23. Find the total number of goals scored in the match between N and P.
 - (a) 3
 - (b) 2
 - (c) 0
 - (d) 4
 - (e) Cannot be determined
24. The number of goals scored by A against I could be at the most
 - (a) 2
 - (b) 3
 - (c) 4
 - (d) 5
 - (e) 6
25. For how many teams could we determine the total points?
 - (a) 4
 - (b) 5
 - (c) 6
 - (d) 5 or 6
 - (e) Cannot be determined

ANSWER KEYS

1. (b)	2. (b)	3. (d)	4. (e)	5. (a)	6. (b)	7. (b)
8. (b)	9. (a)	10. (c)	11. (c)	12. (c)	13. (c)	14. (b)
15. (c)	16. (b)	17. (a)	18. (b)	19. (b)	20. (a)	21. (d)
22. (c)	23. (c)	24. (b)	25. (c)			

HINTS AND EXPLANATIONS**1 to 11**

- The option (a); (c); (d) & (e) contradicts at least 1 of the given 4 conditions. So, correct option is (b)
- As Raheja is not in the panel, so there must be Mahajan. Now, Bindra cannot serve on this panel & so Kalyan too cannot serve the panel. Further, Sinha too cannot serve the panel. So, there can be maximum 3 judges to serve the panel who are Mahajan, Goel & Deshbandhu.
- If we have Kalyan on panel, we must also have Bindra & Sinha too. So, if Kalyan & Deshbandhu are there on panel, there must be at least 4 on the panel. So, statement of option (d) is not true.
- If Sinha serve on a panel, Kalyan will also serve the panel. Now, Bindra will also be there. As there is Bindra, so Goel & Mahajan cannot serve the panel. Raheja can also be added. Deshbandhu is already in the panel. So, there are total 5 members in the panel.
- If there is Goel, we cannot have Bindra, Kalyan or Sinha. So, option (a) is correct.
- There are 2 condition based on Bindra. So, we can make 2 cases of including & excluding him. If we include Bindra there can be 5 members & if we exclude him, there can be 3.
- Only option (b) do not contradict any of the given 4 conditions. All other option contradicts at least 1 condition.
- As G do not choose the same specialization as D, so G cannot specialize in the marketing. Correct option is (b).
- As H specializes in system, so E must not have taken system for the specialization. So, the specialization of E is marketing. So, option (a) could be true.
- G, C, B, E & D could specialize in systems while H & A can do specialization in marketing. So, maximum 5 friends could specialize in systems.
- D & G cannot choose same specialization as per condition (iii).

12 to 15

- Shikari-Juari = 6. Prince Shikari and Prince Juari will always have a difference of 6 points in their overall points. Though any one of them may have 6 points more than the other.
- Considering the overall points, Bhikhari > Attyachari.

- Also Prince Shikari scores 4/8 point in the 2nd round and 2/4/6 points in the 4th round.

We can conclude the following:

12. If Prince Juari wins the competition and marries the princess and Prince Bhikhari scores 28 points from the given 5 rounds, then the table will be as given below:

Table 2

Prince	1st Round	2nd Round	3rd Round	4th Round	5th Round	Total
Shikari	9	4	8	2	3	26
Bhikhari	7	2	3	9	7	28
Atyachari	2	9	4	8		
Juari	4	6	9	5	8	32
Hazari		3			9	

If Shikari has scored points in the 2nd and the 4th rounds then the score of Juari should be 32 (i.e., 6 more). And in this case Juari has to score 9 points in the 3rd round.

Option (a), (b) and (d) will definitely be true for all cases. Only statement (c) could be false.

Hence, the correct option is (c).

13.

Prince	1st Round	2nd Round	3rd Round	4th Round	5th Round	Total
Shikari	9	8	8	6	3	34
Bhikhari	7	2	3	9	7	29
Atyachari	2	9	4	8	4	27
Juari	4	6	5	5	8	28
Hazari		3			9	

Since, The total points scored by Juari are 28 so, Shikari will score a total of 34 points. So, he must have scored 8 points in the 2nd round and 6 points in the 4th round. Also, Prince Atyachari has scored a total of 27 points. Hence, Prince Bhikhari must score 29 points (as there are no ties) so Bhikhari scores 8,9,7 points respectively from the 1st, 4th and the 5th rounds. As it can be clearly seen from the table that Atyachari is fourth or fifth even though we do not know about Hazari's score.

So, option (c) is the correct answer.

14. According to statement I, Prince Atyachari can score a maximum of 5 points in the 5th round which make his total points 28. As Prince Bhikhari can score a maximum of 29 points and Atyachari's score is always less than Bhikhari's score we get table as given below:

Table 3

Prince	1st Round	2nd Round	3rd Round	4th Round	5th Round	Total
Shikari	9		8	6		
Bhikhari	8	2	3	9	7	29
Atyachari	2	9	4	8	5	28
Juari	4	6		5	8	
Hazari		3	2		9	

According to statement II, Juari scores the maximum possible point which is 9 in the 3rd round. Then his total will be 32. Also, Hazari can score a maximum of 30 points if he scores 7 points each in the 1st and the 4th rounds. So, Juari will always be the winner with a total of 32 points.

Prince	1st Round	2nd Round	3rd Round	4th Round	5th Round	Total
Shikari	9	4	8		2	26
Bhikhari	8	2	3	9	7	29 (max)
Atyachari	2	9	4	8	4	28 (max)
Juari	4	6		5	8	32
Hazari		3		7	9	

Hence, statement II alone is sufficient to answer the question.
Therefore, option (b) is the answer.

15.

Prince	1st Round	2nd Round	3rd Round	4th Round	5th Round	Total
Shikari	9		8		3	26
Bhikhari	8	2	3	9	7	29 (max)
Atyachari	2	9	4	8	5	28 (max)
Juari	4	6		5	8	32
Hazari	7	3		7	9	

The minimum score required by Hazari to win is 33 points. When Prince Atyachari scores 5 points in the 5th round, then the total points scored by him are 28. So, Prince Bhikhari must score more than 28 points. But taking into consideration the given table, Prince Bhikhari can score a maximum of 29 points if he scores 8, 9, 7 points in the 1st, 4th and the 5th rounds respectively. But, one among Juari and Shikari will at least score 32. And Hazari can score a maximum (for the 3rd round to be minimum) of 7 points each in the 1st and the 4th rounds. So, the least possible points scored by Prince

Hazari in the 3rd round = $33 - (7 + 3 + 7 + 9) = 7$ which makes his total score as 33.

Therefore, option (c) is the answer.

16 and 17

On the basis of the given information, we can make the following table:

Cards	Tag	Baseball
I		
M	K	N

16. If K plays the same two games as N plays, this means that K and N will play tag and baseball. Therefore options (a), (c) and (d) are true and option (b) is false.
17. I and N play tag and the fourth condition says that N must play baseball. Since no player can play more than two games, N cannot be one of the other two other persons playing cards. So options (b) and (c) are ruled out.

Option (d) cannot be the answer because O and L have to play together. Therefore option (a) is the correct answer.

18 to 20

There are six shops U, V, W, X, Y and Z arranged in two rows such that the number of shops in both the rows are equal in number.

18. Using the given statements, we can conclude that:

North-facing shop: X, Y, V

South-facing shop: W, Z, U

Hence, there are four arrangements possible.

U	Z	W
V	Y	X

OR,

U	Z	W
X	Y	V

OR,

W	Z	U
V	Y	X

OR,

W	Z	U
X	Y	V

Hence, option (b) is the answer.

19. The shop between V and X is Y.

Hence, the answer is option (b).

20. It can be seen that diagonally opposite to each other are U and Y.

Hence, the answer is option (a).

21 to 25

There are total 6 teams & each team played with every other team exactly once. So, there were total 15 matches. Each team played 5 games. The teams got 3, 1 & 0 points for win, draw & loss. The table given is incomplete which is as

Position	Team	Won	Drawn	Lost	Goals For	Goals Against	Total Points
1	A				17	5	15
2	N				9	6	10
3	P					2	8
4	I				2	5	
5	SK				7	11	2
6	B				8	16	

The goals for & goals against for all 6 teams must be equal, so the number of goals for P must be 2. A got 15 points, so it has won all 5 matches (with 0 lost or drawn). N got 10 points, so it must have won 3 games & 1 must be drawn while it lost 1 game. In a similar way we can conclude that P won 2 games, while it lost 1 & 2 were drawn. SK lost 3 games, 2 were drawn & it did not win any game. For teams I & B, it cannot be clearly found. We know I lost from P & A won all 5 games, so I must have at least 2 losses. As B got 5th position, so it must have got 0 or 1 point.

Case 1: If B got 0 point: It must have lost all 5 games with 0 win & drawn. Then possibilities for I are:

1st scenario for I: 0 win, 0 loss & 5 drawn & 5 points- Not feasible as A has no drawn.

2nd scenario for I: 1 win, 1 loss & 3 drawn & 6 points- not feasible as I must have at least 2 loss (1 from A as it has won all 5 matches & 1 from P, as it is given information).

3rd scenario for I: 2 win, 2 loss & 1 drawn & 7 points- it seems feasible with 12 matches in win-loss & 3 in draws.

This (case 1- 3rd scenario) gives following table:

Position	Team	Won	Drawn	Lost	Goals For	Goals Against	Total Points
1	A	5	0	0	17	5	15
2	N	3	1	1	9	6	10
3	P	2	2	1	2	2	8
4	I	2	1	2	2	5	7
5	SK	0	2	3	7	11	2
6	B	0	0	5	8	16	0

In this possible scenario, I lost 2 matches which must be won by P & A. N must have lost match against A. It must have won against P, SK & B. It must have drawn with I. Now, A & B have 0 draws, while N & SK have 2 draws, but It is not possible as it shows 2 draw matches between them, while they played with each other just once. So, this scenario is not feasible.

Case 2: If B got 1 point: It must have lost 4 games with 0 win & 1 drawn. Then possibilities for I are:

1st scenario for I: 0 win, 1 loss & 4 drawn & 4 points- not feasible as I must have at least 2 losses (1 from A as it has won all 5 matches & 1 from P, as it is given information).

2nd scenario for I: 1 win, 2 loss & 2 drawn & 5 points- it seems feasible with 11 matches in win-loss & 4 in draws.

3rd scenario for I: 2 win, 3 loss & 0 drawn & 6 points- it seems feasible with 12 matches in win-loss & 3 in draws.

Case 2: 2nd scenario gives following table:

Position	Team	Won	Drawn	Lost	Goals For	Goals Against	Total Points
1	A	5	0	0	17	5	15
2	N	3	1	1	9	6	10
3	P	2	2	1	2	2	8
4	I	1	2	2	2	5	5
5	SK	0	2	3	7	11	2
6	B	0	1	4	8	16	1

But in this case, P & N both can have only 1 loss against A. Now, I lost against A & P. So, I must have drawn against N. Further, match between N & P must been drawn. So, there must be 2 draws for N. But, N can have only 1 draw match. So, this scenario is not feasible

Case 2: 3rd scenario gives following table:

Position	Team	Won	Drawn	Lost	Goals For	Goals Against	Total Points
1	A	5	0	0	17	5	15
2	N	3	1	1	9	6	10
3	P	2	2	1	2	2	8
4	I	2	0	3	2	5	5
5	SK	0	2	3	7	11	2
6	B	0	1	4	8	16	1

In this case I lost 3 matches, which must be from A, P & N (it is clear I lost to P & A, it lost to N as SK & B won no match, so it can lose 3rd match from N only) & won 2 matches against SK & B. P lost just 1 match which must be against A, so its match with N must been a draw. The 2nd draw for P must been with SK, else SK will left alone with 2 draws. So, match between P & SK was draw & P won from I & B. N won from I, SK & B, lost against A with a draw against P. SK lost against A, N & I, with draw with B & P. B lost 4 matches it played with A, P, N & I, its match with SK was draw.

So, A- won all 5 matches against N, P, I, SK & B, no loss, no draw

N- won against I, SK & B, lost to A, draw with P

P -won against B & I, lost to A, draw with N & SK

I- won against SK & B, lost to A, N & P, no draw

SK- no win, lost to A, N & I, draw with P & B

B- no win, lost to A, N, P & I, draw with SK

21. B vs SK was a draw
22. I has 2 win & 3 losses, so its total score is 6 points
23. P won 2 matches & it scored 2 goals in total 5 games, so the score of both the matches it won (against I & B) must been 1-0 (P scored 1 & opponent scored 0). Now, total goals against P in series are 2. But, its match with N must been a draw. It must not have scored any goal in that match. As match is a draw, so N must have also scored 0 goals in that match. So, total goals scored in P vs N match must been 0.
24. I won 2 matches & it scored 2 goals in total 5 games, so the score of both the matches it won (against SK & B) must been 1-0 (I scored 1 & opponent scored 0). Now, total goals against I in series are 5 & it lost total 3 games. If we want to maximise the goals against I in I vs A match, then goals against I in other 2 matches it lost must be minimised. So, if we assume it lost both matches with score of 0-1 (I scored 0 & opponent team scored 1). Then, A could have scored 3 (maximum possible) goals against it in A vs I match.
25. We can find total points for all 6 teams i.e. for A, N, P, I, SK & B (which are 15, 10, 8, 6, 2 & 1 respectively).

PRACTICE EXERCISE 6

Directions for questions 1 to 6: *Read the following passage and solve the questions based on it.*

- (i) Six businessmen from six different nations are staying in six successive in a hotel.
 - (ii) Each of them owns a number of cars and has donated to a number of institutions last year.
 - (iii) The businessman in room number 102 owns twice as many cars as the businessman who donated to 8 institutions last year.
 - (iv) The businessman from Uruguay and the businessman in room number 106 together own a total of 40 cars.
 - (v) The businessman from Argentina owns 8 cars less than the businessman from England but donated to 10 more institutions last year.
 - (vi) Four times the number of cars owned by the businessman in room number 104 is lesser than the number of institutions to which he donated last year.
 - (vii) The businessman in room number 103 owns 12 cars and donated to 8 institutions last year.
 - (viii) The businessman who owns 16 cars donated to 24 institutions last year.
 - (ix) The businessman in room number 105 owns 8 cars and donated to 2 institutions less than the businessman from Canada last year.
 - (x) The Brazilian businessman is staying two rooms ahead of the English businessman who is staying two rooms ahead of the Canadian businessman.
1. In which room is the Brazilian businessman staying?
 - (a) Room number 102 (b) Room number 103
 - (c) Room number 104 (d) Room number 105
 2. How many institutions did the Argentinean businessman donate to last year?
 - (a) 8 (b) 3
 - (c) 18 (d) 24
 3. The businessman of which country is staying in room number 106?
 - (a) Argentina (b) Canada
 - (c) Uruguay (d) Germany
 4. The businessman of which country donated to 24 institutions last year?
 - (a) Argentina (b) Uruguay
 - (c) Canada (d) Germany
 5. The businessman of which country owns the maximum cars?
 - (a) Argentina (b) Uruguay
 - (c) Germany (d) Brazil
 6. How many cars does the English businessman own?
 - (a) 8 (b) 12
 - (c) 4 (d) 20

Directions for questions 7 to 11: *Read the following passage and solve the questions based on it.*

The table below represents the average price of all the cars sold in a particular year from the year 2000–2004.

Table 5

Year	2000	2001	2002	2003	2004
Average price (in ₹thousand)	30	40	P	30	50

Table 6

Years	Number of cars sold
Total number of cars sold in 2000 + 2001	A
Total number of cars sold in 2001 + 2002	B
Total number of cars sold in 2002 + 2003	C
Total number of cars sold in 2003 + 2004	D
Total number of cars sold in 2004 + 2000	E

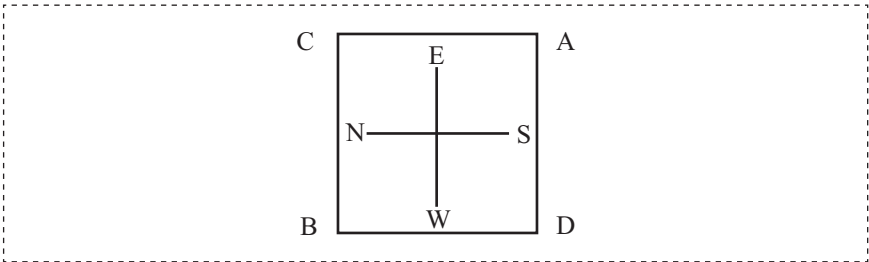
7. (I) If the value of $P = 40$, then only table 1 is sufficient to find the average price of all the cars sold in 2002.
(II) If the value of P is not given, then whatever is the value of A, B, C, D and E , the average price of all the cars sold in 2002 cannot be calculated.
(a) Only I is true (b) Only II is true
(c) Both I and II are true (d) None of the two is true
8. (I) If the value of $P = 40$, then in 2002 no car has been sold.
(II) If the value of P is given and it is not equal to 40, then the value of any three out of A, B, C, D and E is sufficient to find the value of the average price of all the cars sold in 2002.
(a) Only I is true (b) Only II is true
(c) Both I and II are true (d) None of the two is true
9. To find out the total number of cars sold in 2002 and 2003, we need the following:
(a) Only the value of P (b) Value of P, A, B, C and D
(c) Value of P, A, B, C, D and E (d) Cannot be determined

(Additional information for questions 10 to 11: Disregard table 2 for both the questions).

10. For what value of P , will the total number of cars sold in all the years be the least?
(a) $P = 30$ (b) $P > 40$
(c) $P = 40$ (d) Cannot be determined uniquely
11. It is given that in one particular year no car is sold. Which of the following is most likely to be that year?
(a) 2000 (b) 2001
(c) 2003 (d) 2004

Directions for questions 12 to 14: Read the following passage and solve the questions based on it.

The following questions are based on the diagram given below, showing four persons— A, B, C and D stationed at the four corners of a square piece of plot as shown:



E – East, S – South, W – West and N – North

12. From the original position, B and D move one and a half lengths of sides clockwise and anti-clockwise respectively. Which one of the following statements is true?
- B and D are both at the mid-point between A and C
 - D is at the mid-point between A and C; and B is at the corner originally occupied by C
 - B is at the mid-point between A and C; and D is at the corner originally occupied by A
 - B and D are both at the mid-point between A and D
13. From the positions in the original figure, C and A move diagonally to the opposite corners and then one side each clockwise and anti-clockwise respectively. Where is A now?
- At the north-west corner
 - At the north-east corner
 - At the south-east corner
 - At the south-west corner
14. From the positions in the original figure, C and A move diagonally to the opposite corners and then one side each clockwise and anti-clockwise respectively. B and D move two sides each clockwise and anti-clockwise respectively. Who is now at the north-west corner?
- A
 - B
 - C
 - D

Directions for questions 15 to 19: *Read the following passage and solve the questions based on it.*

All the roads of a city are straight and perpendicular or parallel to each other. Roads A, B, C, D and E are parallel to one another. Roads G, H, I, J, K, L and M are parallel to one another.

- Road A is 1 km east of road B
 - Road B is 0.5 km west of road C
 - Road D is 1 km west of road E
 - Road G is 0.5 km south of road H
 - Road I is 1 km north of road J
 - Road K is 0.5 km north of road L
 - Road K is 1 km south of road M
15. Which is essentially true?
- E and B intersect
 - D is 2 km west of B
 - D is at least 2 km west of A
 - M is 1.5 km north of L
16. If E is between B and C, then which of the following is false?
- D is 2 km west of A
 - C is less than 1.5 km from D
 - E is less than 1 km from A
 - D is less than 1 km from B
17. If road E is between B and C, then the distance between A and D is
- 0.5 km
 - 1 km
 - 1.5 km
 - 1.8 km
18. Which of the following possibilities would make two roads coincide?
- L is 0.5 km north of I
 - C is 1 km west of D
 - D is 0.5 km east of A
 - E and B are 0.5 km apart

19. If K is parallel to I and K is 0.5 km south of J and 1 km north of G, then which two roads would be 0.5 km apart?
- (a) I and K (b) J and K
(c) J and H (d) G and J

Directions for questions 20 to 23: *Read the following passage and solve the questions based on it.*

Mintu Babu lives in a smaller house than her brother. Mintu Babu lives in a larger house than her parents. Mintu Babu's children live with her. Mintu Babu has no other relatives.

20. If four females and two males live in a house smaller than Mintu Babu's brother, then, how many of Mintu Babu's children are boys and girls respectively?
- (a) 1, 0 (b) 0, 1
(c) 2, 1 (d) 1, 2
21. If Mintu Babu's relative U lives in a larger house than her relative S, Then, all of the following may be true except
- (a) S is U's father
(b) S is U's mother
(c) U is younger to S
(d) S is younger to U
22. Out of all the relatives of Mintu Babu who could possibly be either older or younger than her, none are the same age or older, then, how many of Mintu Babu's relatives must be younger than her?
- (a) Less than 2 (b) 2
(c) 3 (d) More than 3
23. If the number of males related to Mintu Babu equals the number of females then which of the following can be true?
- (a) Mintu Babu has 4 children
(b) Mintu Babu has 3 children
(c) Mintu Babu has 1 child
(d) Mintu Babu has 2 children

Directions for questions 24 and 25: *Read the following passage and solve the questions based on it.*

Three committees are formed from eight people, viz., F, G, H, I, J, K, L, and M. Two of the committees have three members and one of the committees has only two members. Certain other conditions are as follows:

- (i) G serves with M
(ii) L serves with only one other person
(iii) F does not serve with M
24. If K, J and I serve on different committees, which one of the following must be true?
- (a) K serves with G
(b) I serves on a committee of two
(c) I serves on a committee of three
(d) H serves on a committee of two
25. Which of the following is inconsistent with the given conditions?
- (a) K serves with H
(b) M serves with H
(c) M, H and I serve together
(d) F does not serve with G

ANSWER KEYS

1. (d) 2. (c) 3. (d) 4. (d) 5. (b) 6. (b) 7. (a)
 8. (d) 9. (c) 10. (d) 11. (c) 12. (a) 13. (d) 14. (b)
 15. (d) 16. (a) 17. (d) 18. (d) 19. (b) 20. (d) 21. (d)
 22. (c) 23. (b) 24. (a) 25. (d)

HINTS AND EXPLANATIONS*1 to 6*

From the given information:

Room	Country	Cars	Donations
101			
102			
103		12	8
104		(y)	$> 4y$
105		8	$x - 2$
106			

Here, the Brazil businessmen can stay in either room no. 105 or room no. 106. But from the options of the first question of the set, it must be 105. Let us fill the other data from it.

Room	Country	Cars	Donations
101	Canada	–	$y + 2$
102	Uruguay	24	
103	England	12	8
104	Argentina	4	18
105	Brazil	8	y
106	Germany	16	24

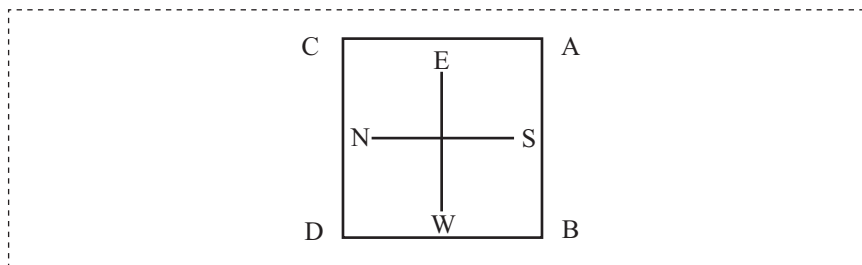
1. The Brazilian businessman is staying in room number 105.
2. The Argentinean businessman donated to 18 institutions.
3. The German businessman is staying in room number 106.
4. The German businessman donated to 24 institutions.
5. From the given options, the businessman from Uruguay owns the maximum cars.
6. The businessman from England has 12 cars.

7 to 11

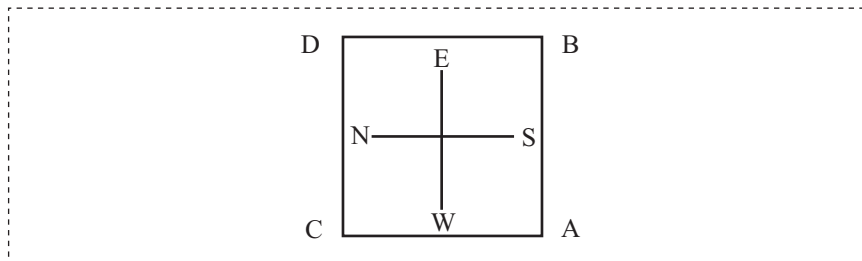
7. Using (I) if value of $P = 40$, then on two consecutive years 2001 and 2002, it has remained the same. This is only possible if the average in 2002 = 40.
Using (II) despite the value of P not given, we can find all the other things if A , B , C , D and E are given as equal. Hence, this statement is wrong and only I is true.
8. Using I, if the value of $P = 40$, then there are two possibilities for 2002. Either all the cars have been sold for 40 itself or no car has been sold. Hence, this statement is incorrect.
Using the given information in II we cannot find out. The average price of all the cars sold in 202.
Hence, none of the two statements is true.
9. We need all the unknowns to find the value.
10. Using the solution given for Q. 8, if $P = 30$ or $P = 40$ is given, we can find that either no car has been sold or all the cars have been sold at the same price. Still we have the total freedom to increase the number of cars sold in 2000 or 2004 etc. We should also not forget that using the average we cannot find out the number of articles involved.
Hence, this cannot be determined uniquely.
11. From the given options if $P = 30$, then in 2003 no car is sold.

12 to 14

12. The position will be like this:



13. The position will be like this:



14. This is similar to the above question. B is now in north west direction.
15. By using the conditions (vi) & (vii) we can interpret that M is 1.5 km north of L. Correct option is (d).

16. B is 1 km west of A & so 1 km west of B is 2 km west of A. But D is 1 km west of E which is not at B but between B & C. So, D cannot be 2 km west of A. Correct option is (a).
17. B is 1 km west of A & C is 0.5 km west of A while D is 1 km west of E which is between B & C. So, D must be between 1.5 km & 2 km of A.
18. If E is 0.5 km east of B, then it may coincide with C as C is 0.5 km east of A. Correct option is (d).
19. In the given scenario, J & K will be 0.5 km apart of each other. Correct option is (b).

20 to 23

Mintu Babu's parents (1 M, 1 F) live in the smallest house.
Mintu Babu stays with her children in the medium house.
So, Mintu Babu's brother stays in the largest house.

20. Given that 4 females and 2 males live in smaller house, 3 females and 1 male stay in Mintu Babu's house.
Hence, Mintu Babu has 3 children (1 boy and 2 girls).
21. The only relatives of Mintu Babu are:
U, staying in the larger house, is her brother.
S, staying in the smaller house, is her father/mother.
Hence, the statement 'd' cannot be true.
22. There are 3 relatives of Mintu Babu, who must be younger than her.
23. From Q. 20, it is clear that Mintu Babu has 3 children.

24 to 25

24.

Committees	Two Members
K, G, M	I, L
J, F, H,	J, L
I, F, H	

25. Use the list of the people given above.

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PART 2

DATA INTERPRETATION

SECTION 1

UNDERSTANDING DATA INTERPRETATION

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Chapter

17

INTRODUCTION TO DATA INTERPRETATION

LEARNING Objectives

In this chapter, you will learn:

- ☐ What do we understand with data?
 - ☐ What is data interpretation?
 - ☐ Different ways of representing the data
 - ☐ Problem solving techniques
-

WHAT IS DATA INTERPRETATION?

Data Interpretation is the act of transforming data with the objective of extracting useful information and facilitating conclusions on the basis of the given data. Depending upon the type of data and the questions, we might be required to apply certain statistical tools with various methods to represent the given data.

Before we move ahead to see and learn the various methods of representing data, let us understand some basics.

WHAT IS DATA?

Data is a means to represent facts, concepts or instructions in a formalized manner suitable for communication, interpretation or processing by humans or other automatic modes.

In other words, propositions like measurements or observations of a variable, which may comprise numbers, words or images can be quantified with the help of data.

Data can be a numerical or non-numerical fact and figure related to a particular social, economic or political event etc.

Let us see some examples of data:

Yesterday the Sensex closed at 14,004 points.

25% of the total population of India is below The poverty line.

In the last general elections in India, 40% of the total seats were won by regional parties. Data can be further understood to be an agent to cause the sentiments and even sometimes it can be effect also.

If the data given is distinct and separate, i.e., It can be counted (1, 2, 3....), then it is known as Discrete Data. For example, population of a country, production of cars in a manufacturing plant.

However, if the data takes any value within a finite or infinite interval, then it is known as a Continuous Variable. For example, the percentage of sugar in mangoes or weight/height etc., are continuous variables.

Significance of Organized Data

It is said, “Trust only two—God and data.” Since God cannot be everywhere to prove a point, we have to resort to data to validate points or make inferences. The significance of data can be further illustrated by the fact that data is the basis of an argument. In fact, data is the starting point for most arguments.

However, data if not properly managed is not of much use. People at the higher echelons of any organization will have no time to go through the details of all the reports. The need for organized data becomes more pertinent because data can be used to describe a current situation with respect to its future possibility. Data can establish a relationship between different phenomenon like expenditure government in the various sectors of its annual budget vis-a-vis the priority sectors; The per capita income of different countries in relation to the number of deaths due to a particular disease.

For maximum utilization of data, it should be formatted properly for easy interpretation and deduction. However, in CAT and other B-School entrance examinations, we should not expect easy-to-comprehend data. Rather, the students should be prepared to find data which is difficult to interrelate or comprehend.

Different Ways of Representing Data

Data representation in the DI section is primarily of two types:

Narration Based

Also known as caselets, these questions often involve stories that define a situation and give details of various parameters involved; including their inter-relationships.

Example

Mittal has recently acquired four companies, viz. Bank of Bozoland (BOB), My Own Bank (MOB), Zany Obliterated Bank (ZOB) and Dogmatically Obscure Bank (DOB). He noticed that the sales of DOB are half than that of BOB, whereas, the profits of DOB are double than that of BOB. The expenses of ZOB are ₹3 crores less than that of DOB, whereas, the profits of MOB is ₹1 crore less than that of ZOB. The expenses of BOB are three times than that of DOB. It is also known that the sales of ZOB are ₹15 crore or one-fourth of MOB's sales. All the figures are for 1992–93. An insider further informs Mittal that the sales of DOB are ₹10 crores more than that of ZOB and the expenses of BOB are 90% of its own sales. Sales – Expenses = Profit

1. The total sales of all the four companies is (₹crores):
(a) 200 (b) 150
(c) 125 (d) 160

Pictorial

This is the most common form of data representation. In such problems, data is presented in various pictorial forms such as line graphs, bar diagrams, line charts etc.

The important point to remember pertaining to all these questions is the fact that each and every question asked in the CAT is based on some logic and reasoning meant to check your aptitude. Few questions that involve numbers may also require a basic level of calculation skills.

Let us see the various pictorial representation of data:

Table

Tabular method is the most fundamental way of representing data. In fact, most of the different kinds of data presentation formats like the bar charts, line charts etc. originate from the table. In other words, presenting the data in a tabular format is the first step in forming other types of data presentation formats.

Example

The table given below shows the break-up of the percentage of people of different age groups frequenting bars in 4 different metro cities viz., Delhi, Hyderabad, Bangalore and Patna in the year 2002.

Cities	Percentage break-up for age groups (Years) in 2006						
	Up to 15	15– 20	20– 25	25– 30	30– 35	35– 40	Above 40
Delhi	8	13	24	21	11	17	6
Hyderabad	3	8	35	23	10	16	5
Bangalore	4	21	27	11	8	14	15
Patna	1	7	43	32	9	5	3

The tabular format is considered to be the most versatile data presentation method. All data which can be expressed in any other format can also be expressed in the format of a table. On the other hand, it is quite possible that data that can be presented in a tabular format, cannot be presented in any other format like the pie chart etc.

Pie Chart

Pie charts are a typical type of data representation where data is represented as a part of a circle. The circle represents the total value (or 100%), and the different parts represent certain proportions (or percentage) of the total. In a pie chart, the arc length of each sector (and in turn its central angle and area), is proportional to the part it represents.

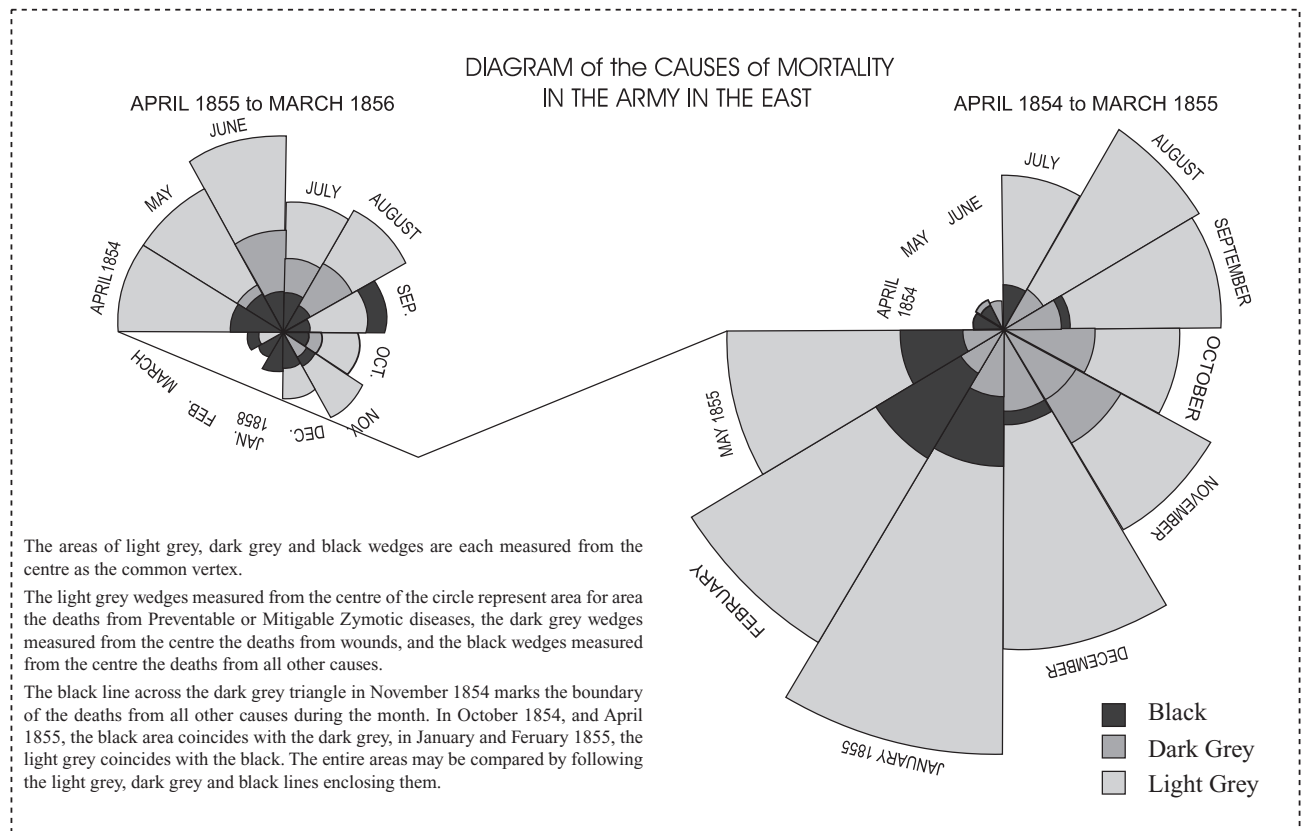
The origin of the pie chart is traced back to Florence Nightingale in 1858. This was the year when

she presented a paper on the causes of deaths in her army in the eastern part of the world.

Following is the pie chart originally developed by Florence Nightingale in the year 1858. (Actually called by her as the 'Polar Area Diagram'.)

The below graphic gives the number of deaths that occurred from diseases that could have been prevented (in light grey), those that were the results of wounds (in dark grey) and those due to other causes (in black).

There are two approaches to constructing a pie chart from any given data:



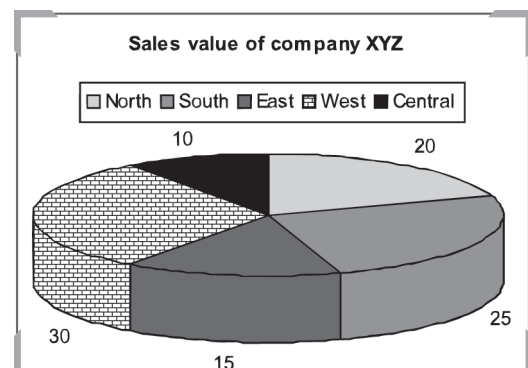
(A) Degree Approach:

The central angle in a circle represents 360° , so any part or segment in a pie chart is calculated as a proportion of 360° .

(B) Percentage Approach:

In this case, any part or segment in a pie chart is calculated as a part of 100%.

Example



2.6 Data Interpretation

If we convert the same pie chart into the degree format, we will be required to do the following conversions:

Total	=	100%	=	360°
Hence		1%	=	3.6°
Central	=	10%	=	36°
North	=	20%	=	72°
South	=	25%	=	90°
East	=	15%	=	54°
West	=	30%	=	108°

Limitations of Pie Charts

Despite the pie chart being one of the most important ways to represent data, it is marred by limitations of its own:

- Pie charts can be used only when the sum of all categories is given, for example if the categories represent proportions or percentage of a total.
- A single pie chart can represent only one continuous variable.

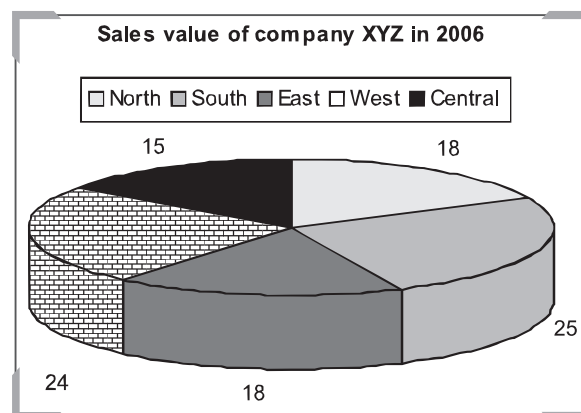
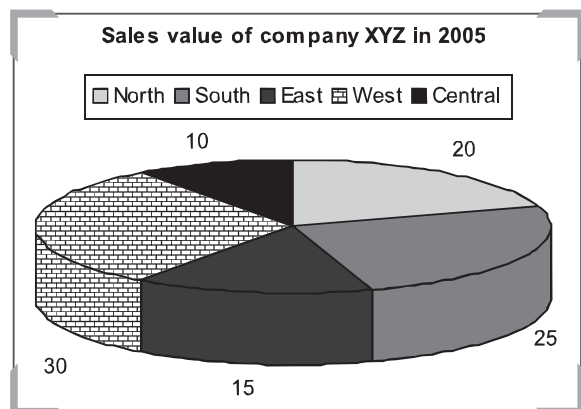
Significance of Pie Charts

The pie chart has gained prominence due to the following reasons:

- In a pie chart, we get a clear picture of the contribution of different sectors to the build up of the total. E.g., presentation of budgets.
- Comparing two pie charts is easier than comparing two bar charts or any other format of data representation.

Example

Let us see the following data:



Sales value in 2005 = ₹180 crores

Sales value in 2006 = ₹204 crores

Question

What is the percentage increase in the sales value of the East zone?

Solution

There are two percentage increases (A) The total sales value of company XYZ is increasing. (B) The percentage contribution of the East zone is increasing.

Percentage increase in The total sales value of the company XYZ = 30%

Percentage increase in the percentage contribution of the East zone = 20%

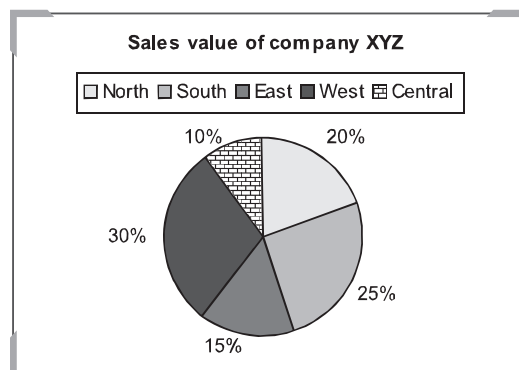
Hence, the net percentage increase = 56%
(Successive increase of 20% and 30%)

Types of Pie Charts

There are two types of pie charts:

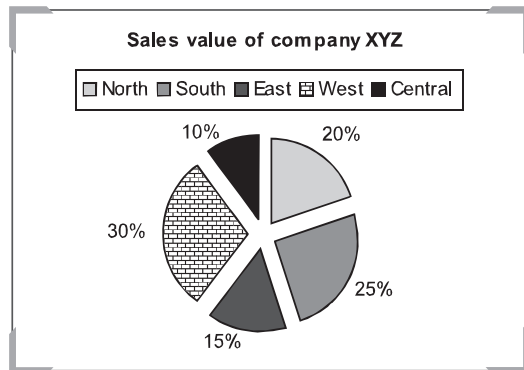
(A) Normal Pie Chart

This displays the contribution of each component of the pie.

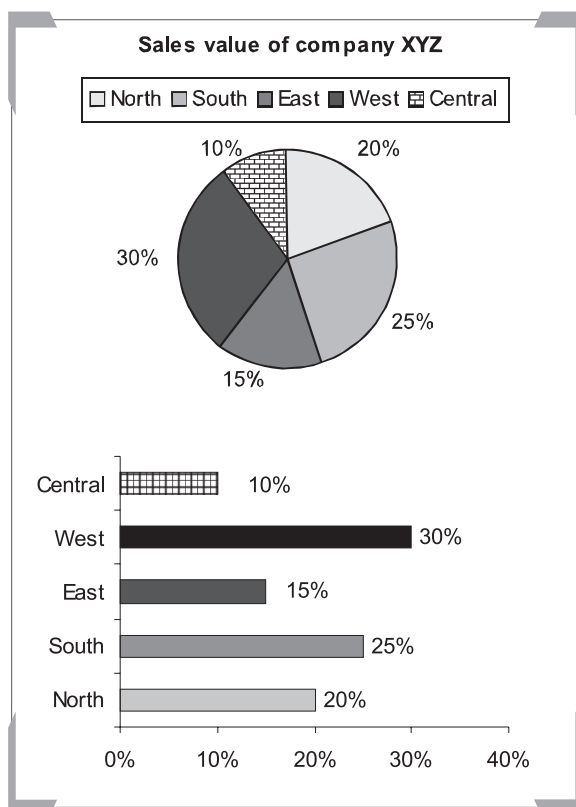


(B) Exploded Pie Chart

This pie chart has all the characteristics of a normal pie chart, the only addition is that the contribution of individual segments is highlighted.

**Bar Chart/Bar Graph**

The bar chart, in comparison to the pie chart is more versatile in representing data. It has been proven that representation using lengths as in the case of bar charts is a better indicator of data vis-a-vis pie charts wherein data is categorized in terms of areas.

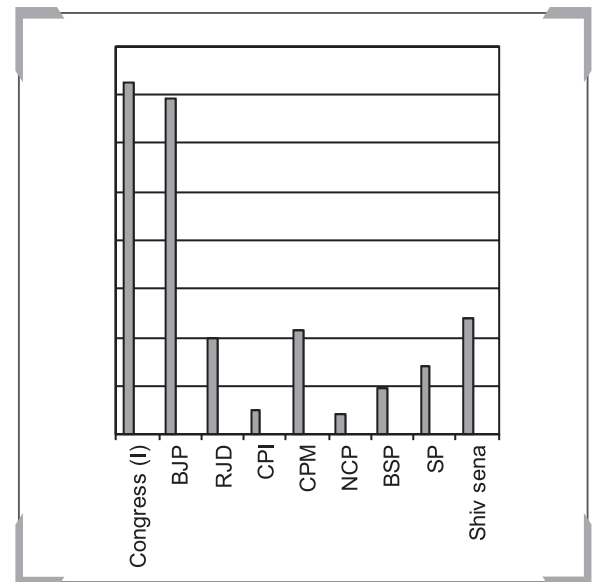


In the above diagram, the same data has been represented length-wise in the bar chart and area-wise in the pie chart. Obviously, it is easier to see the contribution of the various segments in the bar chart than in the pie chart.

A therefore, is a chart with rectangular bars of lengths proportional to the values which they represent. Usually, the terms 'bar chart' and 'bar graph' are used interchangeably. It should also be noted that in a bar chart, what matters is the length of the bar and not the width of the bar.

Example

The following bar chart represents the number of seats won by different parties in the last general election.

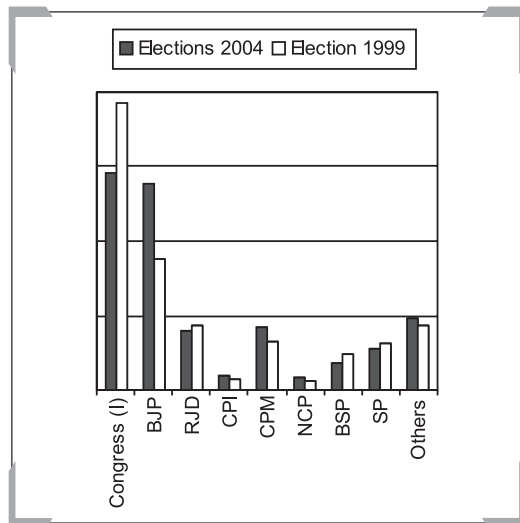
**Significance of Bar Charts**

Following are the major specialities of bar charts:

Unlike the pie chart, a single bar chart can be used to compare two, or more than two continuous variables.

Example

The following bar chart represents the number of seats won by different parties in two general elections:



Since the length parameter is easier to study than the area parameter, a bar chart gives a quick understanding of the various ranks. Hence the time taken to understand the data becomes considerably lower in a bar chart as compared to other formats of data presentation.

Types of Bar Charts

There are three types of bar charts:

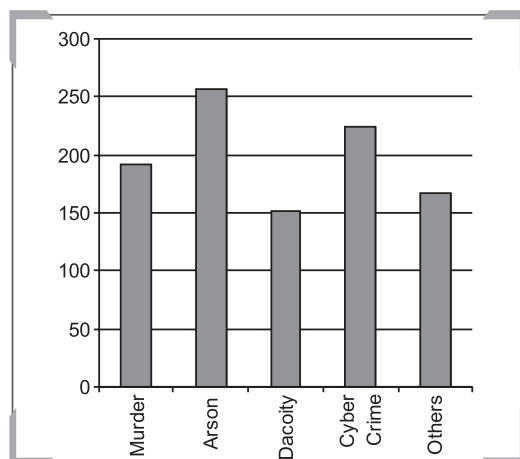
(A) Normal Bar Chart

This is a simple bar chart with the values of different segments represented in the form of bars, which could be either horizontal, vertical or both.

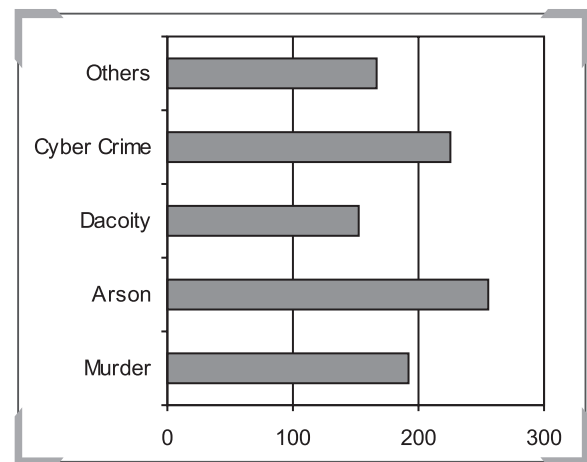
Example

The following bar chart represents the crime cases reported in Delhi in 2007:

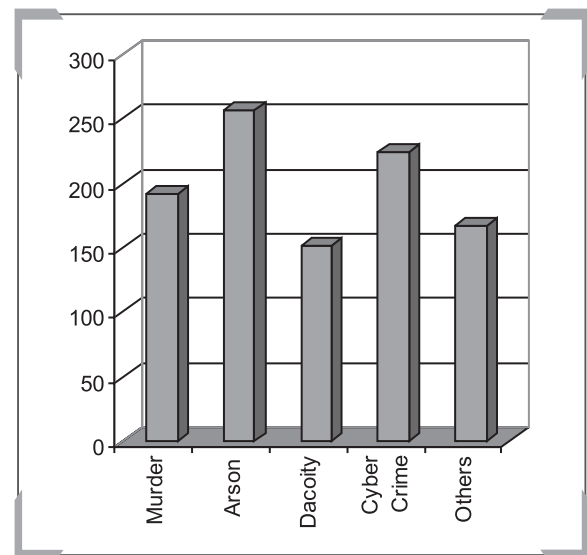
Bar Chart with Vertical Bars



Bar Chart with Horizontal Bars



Bar Charts with 3-D Effects



(B) Stacked Bar Chart Value-wise

When the same variable is to be represented on more than one parameters like; year etc., then we can have a stacked bar chart.

(C) Stacked Bar Chart Percentage-wise

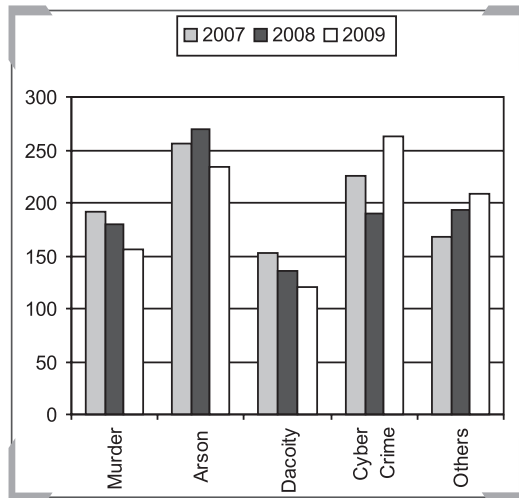
The only difference between value-wise and percentage-wise bar charts is that in the former we apply values to stack the bars and in the latter we apply percentages.

Stacked Bar Charts are also known as Cumulative Bar Charts.

Example

Here, we will see the same data in a normal bar chart, value-wise stacked bar chart and stacked bar chart percentage-wise

Normal Bar Chart



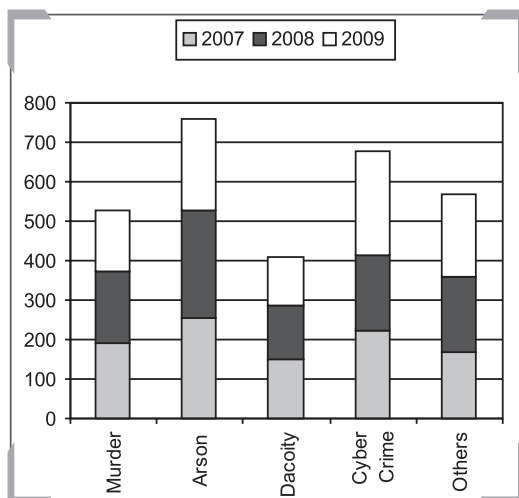
Following things can be observed in the above bar chart:

Bars representing different crimes in different years are proportional to the crimes reported.

The above bar chart takes the minimum value as 100, however the same bar chart could take the minimum value as 0 or 50 or anything else as well. The question here is, what will happen if we take the minimum value as 150?

Since some of the values are less than 150, what will happen to those? Find out yourself without using a computer.

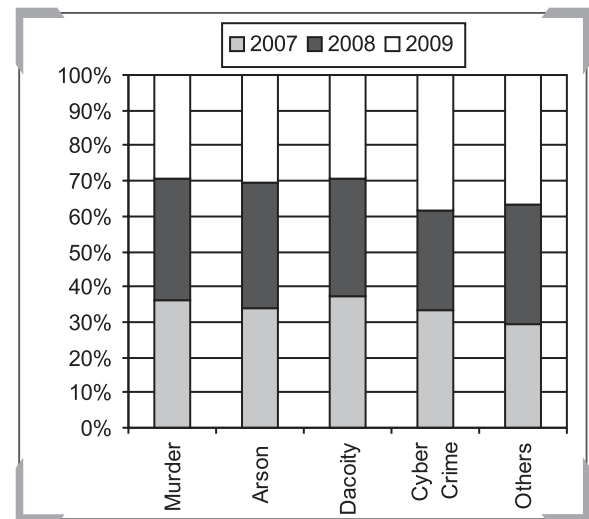
Stacked Bar Chart Value-wise



Following things can be observed in the above stacked bar chart:

- The total number of murders have been added up in one bar and the different years are shown as a part of that total.
- The same data could also have been represented by taking the sum of all the crimes reported in a particular year as a total, and the individual crimes as a part of that total.

Stacked Bar Chart Percentage-wise



Following things can be observed in the above stacked bar chart:

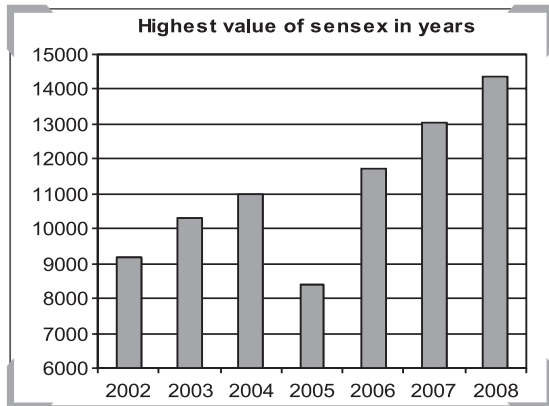
- The total number of murders have been added up and they equal to 100%; and the murders reported in different years have been taken as a percentage of that total.
- The same data could have been represented by taking the sum of all the crimes reported in a particular year as a total, and the individual crimes as a part of that total.

Line Chart/X-Y Chart

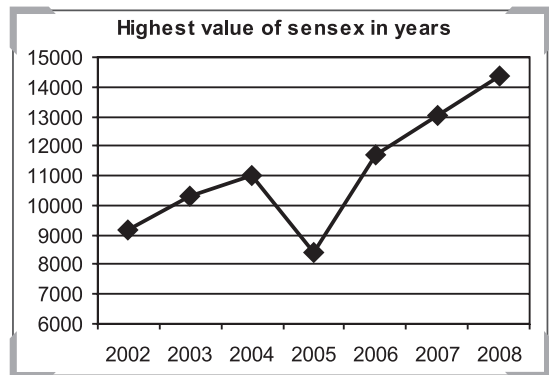
Line charts are seen as simplified forms of the normal bar chart.

Example

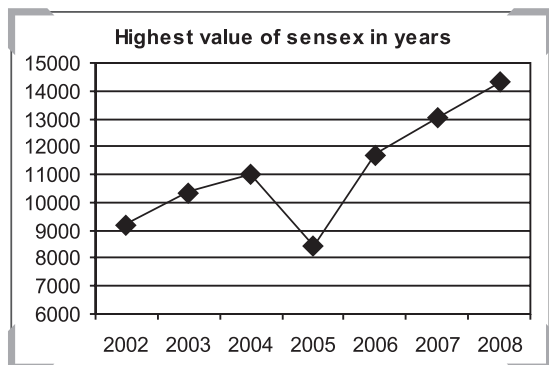
The bar chart given below represents the highest values of the sensex in the given years.



If we convert the same data into a line chart, it will look like this:



Sometimes in case of line charts, the lines are not given and only the dots are indicated in the graph. Let us see an example with the same data:



Significance of Line charts

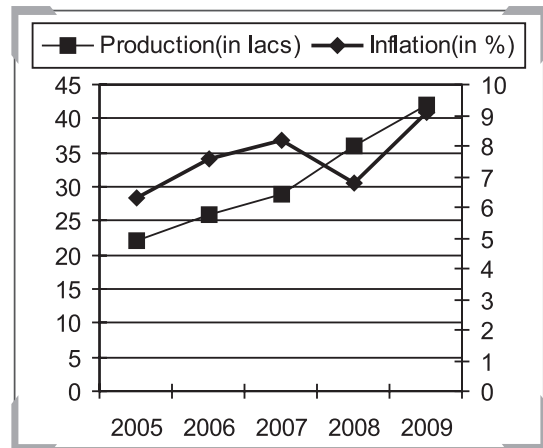
- Generally Line charts are used in case time is one of the variables in the data. The 'time' variable can be

in the form of hour, day, months years or anything that represents chronological order of events.

- It is easier to calculate the percentage changes in a line chart and thereby understand the trends of the data in a better way.
- A line chart becomes very handy in case of data with two different scales.

Example

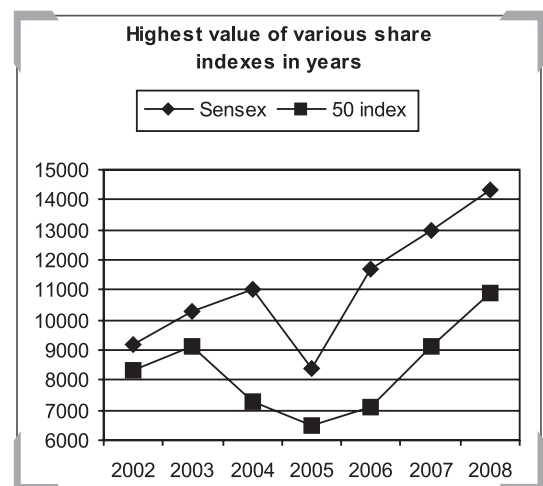
The line chart given below represents the production of soaps by a company over a period of five years and the inflation for the same period.



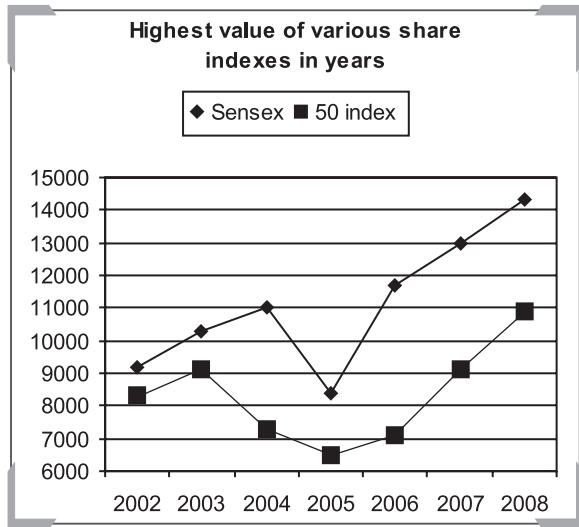
- Two or more than two variables can be represented on a line chart very easily. Besides, we can see the movement of data very easily in case of a line chart.

Example

Below given line chart represents the movements of the highest value of two indices over a given period:



The same data can be represented using dots only also:



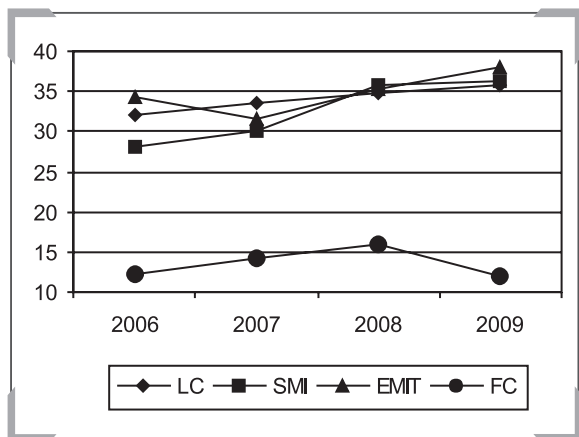
Types of Line Charts

Broadly, line charts are of three types:

Normal Line Chart

This is a simple line chart representing two or more than two variables.

In the chart given below, The total number of enrolments for four different years of for four coaching institutes are represented:

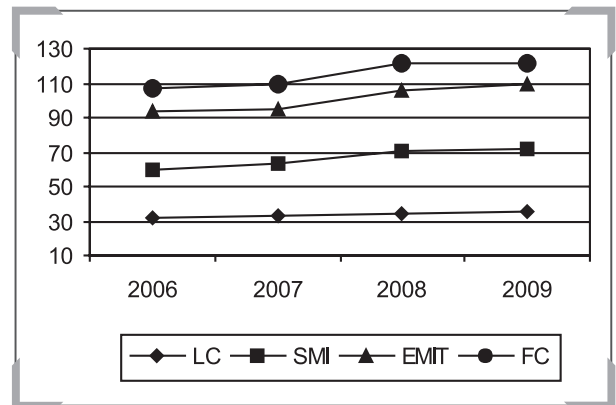


Stacked Line Chart

In a stacked line chart, the values keep on getting added to obtain the next value.

Example

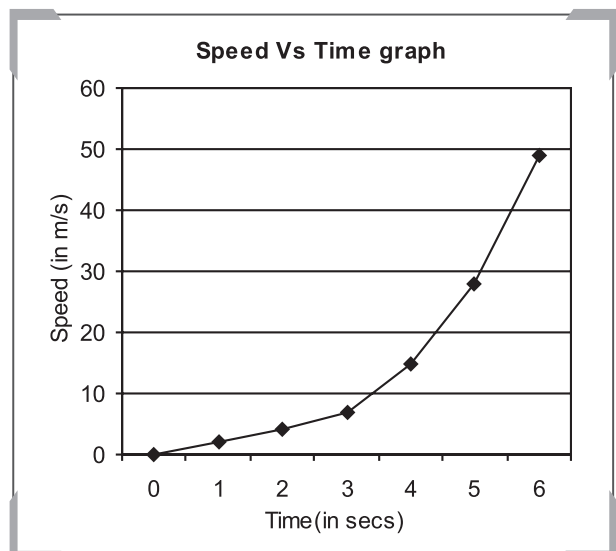
Here, the bottom line (of LC) gets added with the values of SMI to represent the value of SMI. Now this represented value of SMI is added to the actual value of EMIT to give the value of EMIT on the chart. And finally, the same is done with the value of FC.



Hence, in a stacked line chart, to obtain the values of different constituents/segments, either start with the top line or the bottom line and then keep on subtracting the values to obtain the next value.

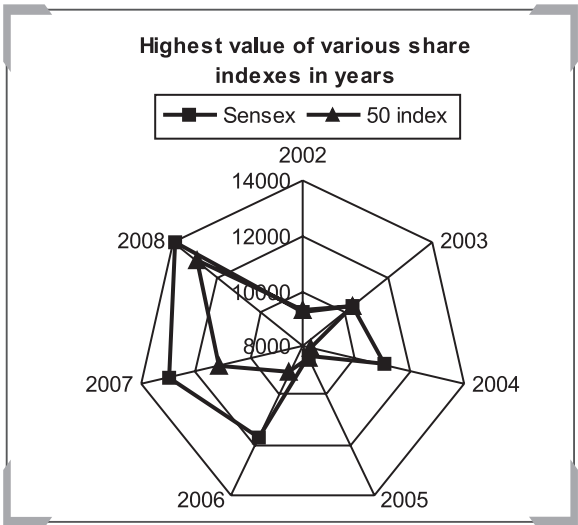
Time-Speed-Distance Line Chart

This line chart is used in tables of data collected from experiments on physical processes.



Radar Diagram

This diagram every value is represented with respect to a central point. All the changes in the values are expressed in the form of distance from this center point.

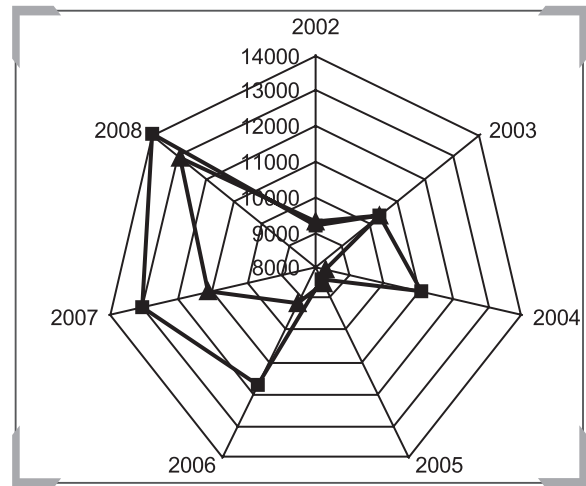


Example

The radar diagram given below represents the highest value of two indices over a given period.

It can be seen that the centre value = 8000. With every passing circle the value increases by 2000. Since here are seven years, the diagram takes the shape of a heptagon.

Had there been only six years, it would have taken the shape of a hexagon, as shown below:



Similarly, had there been only four years, the diagram would have been in the shape of a square.

Area Diagram

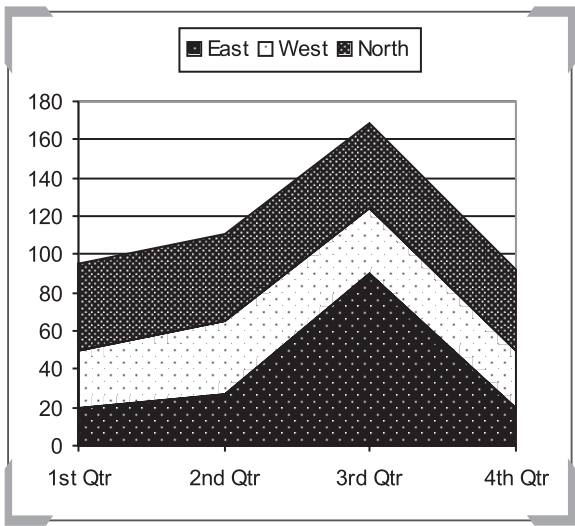
In case of an area diagram, the values are represented in terms of areas.

Example

Data set given is:

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
East	20	27	90	20
West	30	38	34	30
North	45	46	45	42

The stacked area diagram corresponding to the table given above will be like this:



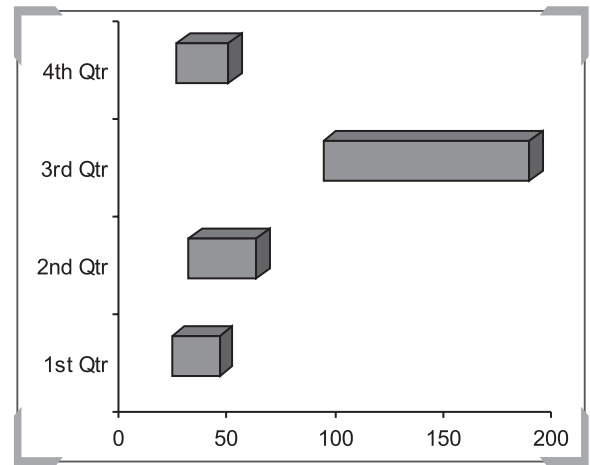
Floating Diagram

A floating diagram is used to represent the difference in any given variable between two different periods.

Example

We will convert the following table into a floating diagram:

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
2000	20	28	90	22
2001	22	31	95	24

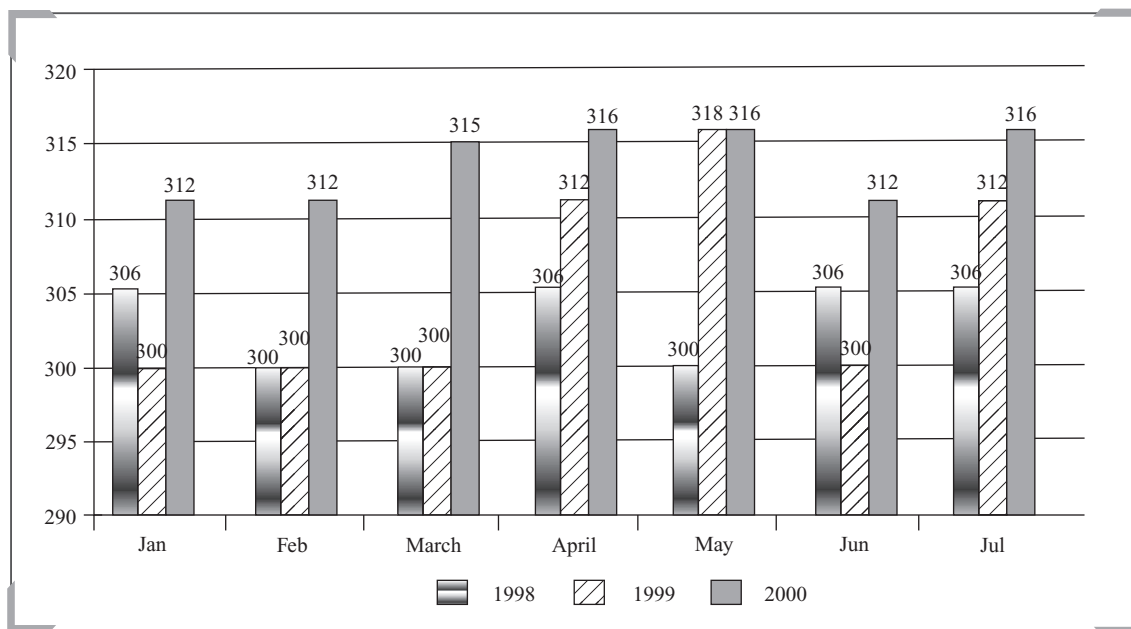


PRACTICE EXERCISE 1

Bar Chart

Directions for questions 1 to 7: Refer to the following bar graph and solve the questions based on it.

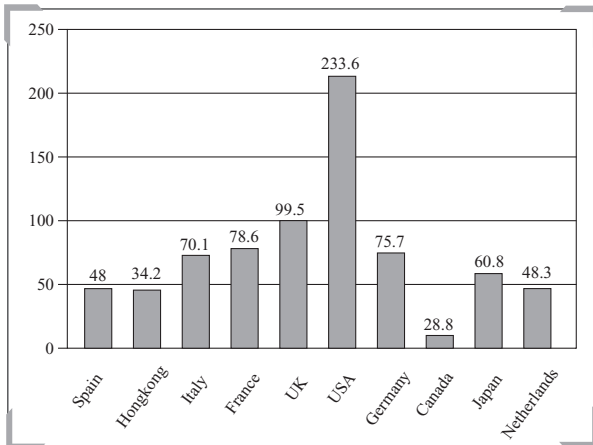
The following bar chart shows the monthly expenditure of a family comprising of five persons over a period of seven months during three different years.



- In any of the given years, which month sees the maximum percentage increase in expenses with respect to the previous month?
 - February
 - March
 - April
 - June
- What is the average monthly expenditure of the whole family in the year 2000?
 - ₹314000
 - ₹315000
 - ₹316000
 - Cannot be determined
- In April 2000, what was the percentage increase in expenditure over April 1999?
 - 1.2%
 - 2%
 - 6%
 - 9.4%
- Which period has shown the same change in trend across all the given three years?
 - February-March
 - May-June
 - March-April
 - January-February
- Which of the following statements is correct?
 - In 1998, May-June were the two consecutive months during which the expenditure was the maximum.
 - During May-June 1999, the expenditure was the maximum for the year.
 - Expenditure during January-February was the same in 1998 as well as in 1999.
 - None of these
- For how many months of the given years the expenditure has been consistently increasing or decreasing?
 - 0
 - 1
 - 2
 - 3
- Out of the following months in the options, Which month accounts for the maximum combined expenditure for three years?
 - March
 - May
 - April
 - February

Directions for questions 8 to 14: Refer to the following bar graph and solve the based on it.

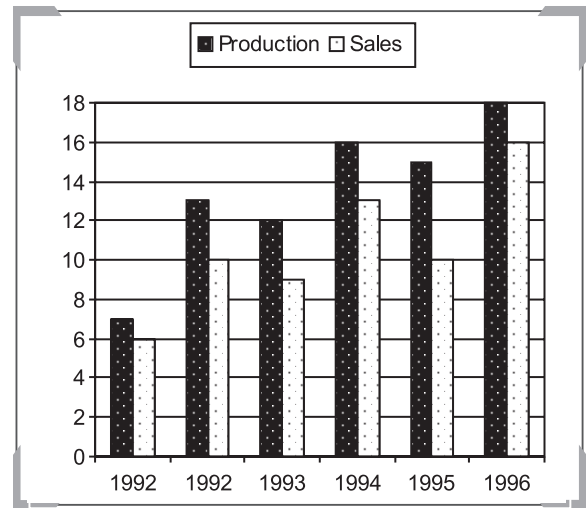
The bar chart given below represents top 10 exporters and their export value (in billion \$) in 2008.



8. If India also joins the top ten exporters list by becoming the 11th largest exporter, then what will be the effect on the average exports of these 11 countries; provided the export value of India is \$ 10 billion?
 - (a) The average will increase by 1 billion dollars
 - (b) The average will decrease by 1 billion dollars
 - (c) The average will increase by 1.1 billion dollars
 - (d) None of these
9. The ratio of exports between Spain and Japan is (approximately)
 - (a) 3 : 4
 - (b) 19 : 15
 - (c) 15 : 19
 - (d) 4 : 5
10. What is the average export of all the countries in billion dollars for the year 2008?
 - (a) 77.66
 - (b) 76.76
 - (c) 76.67
 - (d) Cannot be determined
11. If the exchange rate per dollar is ₹43 then find the difference between the values of exports by Hong Kong and UK in Rupee.
 - (a) 28.179×10^9
 - (b) 28.179×10^{10}
 - (c) 28.079×10^{10}
 - (d) 28.079×10^{11}
12. If the average export of the top ten exporters is calculated how many of the top ten exporting countries have higher export than this average?
 - (a) 3
 - (b) 4
 - (c) 5
 - (d) Cannot be determined
13. If the average export of the top ten exporters is calculated, how many countries have higher export than this average?
 - (a) 3
 - (b) 4
 - (c) 5
 - (d) Cannot be determined
14. To fight the US hegemony, the countries have decided to merge their operations by adding their exports value. What is the minimum number of countries needed to merge their operation so that their combined exports is more than the exports value of the US? (None of these ten countries export to each other.)
 - (a) 3
 - (b) 4
 - (c) 5
 - (d) None of these

Directions for questions 15 to 20: Refer to the following bar graph and solve the questions based on it.

Amount of production and sales by a company over the years (in lacs tonnes)



15. What is the difference between the sales of 1993 and 1995 (in thousand tonnes)?
 - (a) 1000
 - (b) 50
 - (c) 100
 - (d) 500
16. Total sales of 1991 and 1992 together are approximately what percentage of the sales in 1994?
 - (a) 120%
 - (b) 100%
 - (c) 50%
 - (d) 200%
17. What is the approximate percentage increase in production from 1993 to 1994?
 - (a) 20%
 - (b) 33%
 - (c) 70%
 - (d) 100%
18. The percentage of sales to production is maximum in which of the following years?
 - (a) 1992
 - (b) 1994
 - (c) 1996
 - (d) 1991

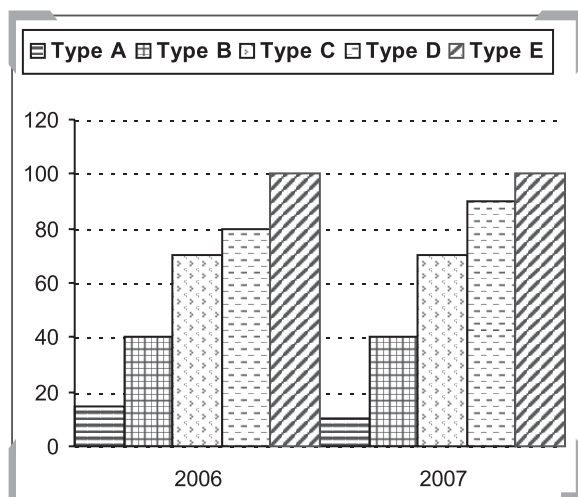
2.16 Data Interpretation

19. What is the percentage drop in sales from 1992 to 1993?
 (a) 5% (b) 40%
 (c) 10% (d) 60%
20. In which year is the difference between the production and sales the maximum?
 (a) 1992 (b) 1993
 (c) 1995 (d) 1996

Directions for questions 21 to 25: Refer to the following bar graph and solve the questions based on it.

The following bar chart gives the cumulative percentage of five different types of bikes produced by Kajaj during the given two years:

Total Bikes produced in 2006 is 4,50,000.



Total bikes produced in 2007 is 520,000.

21. What is the difference in the production of the C type bikes between 2006 and 2007?
 (a) 5,000 (b) 7,500
 (c) 10,000 (d) None of these
22. If 85% of the E type bikes produced during 2006 and 2007 are being sold by the company, then how many E type bikes are left unsold?
 (a) 1,42,800 (b) 21,825
 (c) 29,100 (d) 21,300
23. What is the approximate percentage share of the A type bikes in the total production of (2007 + 2006)?
 (a) 11 (b) 13
 (c) 15 (d) 9
24. In the case of which of the following types of bikes is the percentage increase from 2006 to 2007 the maximum?

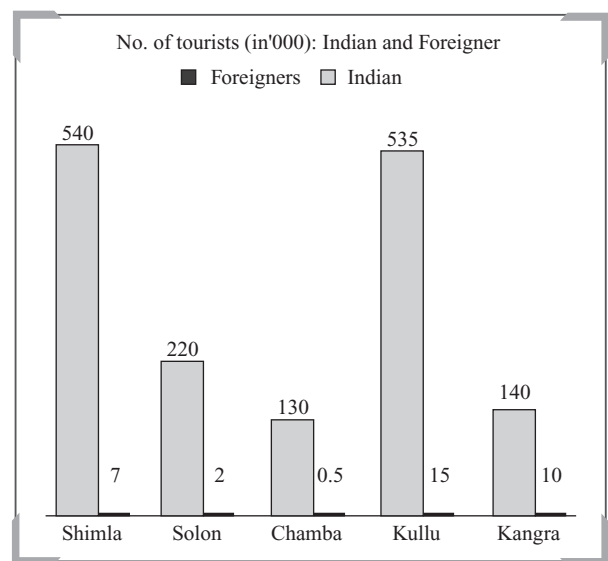
- (a) A (b) E
 (c) D (d) B

25. Production of B type bikes in 2007 is what percentage of bikes produced in 2006?

- (a) 30% (b) 40%
 (c) 35% (d) 25%

Directions for questions 26 to 30: Refer to the following bar graph and solve the based on it.

The bar graph given below shows the five districts of the state of Himachal Pradesh and the number of tourists visiting them. For the given bar chart, total number of Indian tourists is more that the total number of foreign tourists. None of the tourists can be Indian as well as foreigner.

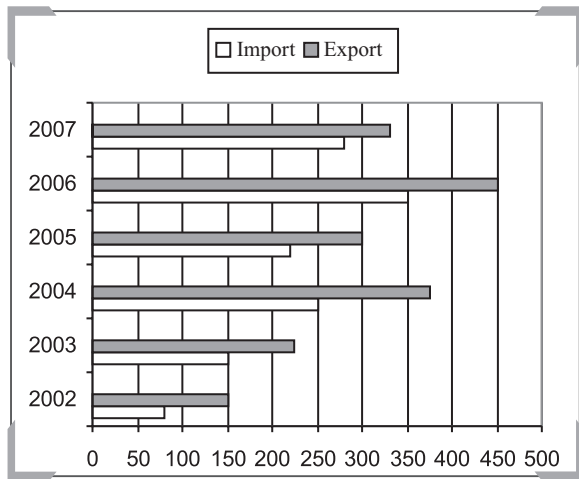


26. By what percentage are the Indian tourists visiting Chamba less than those visiting Shimla?
 (a) 30% (b) 50%
 (c) 60% (d) 75%
27. Approximately what percentage of the total tourists visiting Himachal Pradesh are foreigners?
 (a) 2% (b) 8%
 (c) 4% (d) 5%
28. What is the ratio between the Indian tourists and the foreign tourists visiting Kullu?
 (a) 105 : 3 (b) 70 : 3
 (c) 107 : 3 (d) 35 : 1
29. Which of the following districts has the maximum ratio of Indian and foreign tourists?
 (a) Shimla (b) Solon
 (c) Chamba (d) Kangra

30. Which of the following districts has the minimum ratio of Indian and foreign tourists?
 (a) Shimla (b) Solon
 (c) Chamba (d) Kangra

Directions for questions 31 to 35: Refer to the following bar graph and solve the questions based on it.

The following bar charts represents the value of exports and imports (in ₹crores) of a country for the given period:



(All the values in the above bar chart are the multiples of 10).

31. The value of exports in 2006 was what percentage of the average value of imports in the years 2004, 2005 and 2007?
 (a) 200% (b) 100%
 (c) 150% (d) None of these
32. The value of exports in 2004 was exactly what percentage of the value of imports in the same year?
 (a) 200% (b) 100%
 (c) 150% (d) None of these
33. What is the approximate difference (in ₹crores) between the average exports and the average imports for the given years?
 (a) 65 (b) 85
 (c) 105 (d) 135
34. In which year is the difference between the exports and the imports closest to ₹100 crores?
 (a) 2005 (b) 2006
 (c) 2007 (d) 2008
35. What is the percentage increase in the value of exports in 2006 over 2005?
 (a) 30% (b) 50%
 (c) 90% (d) 120%

ANSWER KEYS

1. (c)	2. (d)	3. (a)	4. (c)	5. (d)	6. (b)	7. (b)	8. (d)	9. (d)	10. (d)
11. (d)	12. (a)	13. (a)	14. (a)	15. (c)	16. (a)	17. (b)	18. (c)	19. (c)	20. (c)
21. (d)	22. (d)	23. (b)	24. (c)	25. (c)	26. (d)	27. (a)	28. (c)	29. (c)	30. (c)
31. (d)	32. (c)	33. (b)	34. (b)	35. (b)					

HINTS AND EXPLANATIONS

1 to 5

- This question can be solved by visual inspection.
- To find the average monthly expenditure during the year 2000, the total income for the year has to be known. In the chart, the income of only seven months is known. Therefore it cannot be determined.
- Value (April 2000) = 316
 Value (April 1999) = 312
 Approximate % age increase = 1.2%

- The same increasing trend is seen every year during the period March-April.
- In 1998, the period during which the expenditure was maximum was June-July.
 In 1999, the period of maximum expenditure was April-May.
 So, option (a) and (b) are incorrect. Option (c) is obviously incorrect.
 Hence option (d) has to be true.

6. Only April satisfies these conditions.
 7. Visual inspection we can see that option (b) is correct. It should also be noted that we have to find out of the options given.

8 to 14

8. The average will decrease by 6.11 billion dollars. Hence, option (d) is the correct answer.
 9. Required ratio = 4 : 5
 10. Cannot be determined because the data is given only for the top ten exporters.
 11. Required difference = $(99.5 - 34.2) \times 43 \times 10^9 = ₹28.079 \times 10^{11}$ (1 billion = 10^9)
 12. The average is 77.6. Now it can be seen that only three countries have more than this.
 13. There is no difference between this and the last question. Understand that the average is calculated for the top ten countries only, and the only countries which can have exports higher than the average exports can be the countries which are in the list of the top ten exporter countries.

15 to 20

15. The difference between sales of 1993 and 1995 = 1 lacs or 100,000
 16. Sum of sales of 1991 and 1992 = 6 + 10 = 16 lacs
 Required Answer = $\frac{16}{13} \times 100 = 123\%$
 17. Percentage increase in production from 1993 to 1994
 $\frac{16-12}{12} \times 100 = 33.33\%$
 18. Percentage of sales to production is maximum in the year when the difference between them is minimum.
 19. Percentage drop in sales from 1992 to 1993
 $= \frac{1}{10} \times 100 = 10\%$

20. By visual inspection we can see that the correct answer is option (c).

21 to 25

22. Production of E type bikes in 2006
 $= (100 - 80)\% \text{ of } 4,50,000$
 $= 20\% \text{ of } 4,50,000 = 90,000$
 And in 2007 = 10% of 5,20,000 = 52,000
 Total production = 90,000 + 52,000 = 1,42,000
 So, the number of bikes
 $= 15\% \text{ of } 1,42,000 = 21,300$
 23. Production of A type bikes in 2006 = 67,500
 Production of A type bikes in 2007 = 52,000
 $\text{Required \%} = \frac{67,500 + 52,000}{9,70,000} \times 100 = 12.3\%$
 $\approx$ Closest to option (b)
 24. By visual inspection we can say that option (c) is correct answer
 25. Percentage production of B type bikes in 2007 = that in 2006 (given) = $(40 - 15) = 25\% \text{ of } 5,20,000 = 1,30,000$.

26 to 30

26.
 $\text{Required \%} = \frac{540 - 130}{540} \times 100 = 75\%$
 27. Percentage share of foreign tourists visiting HP
 $\frac{34.5}{1600} \times 100 = 2\%$
 28. Ratio = 535 : 15 = 107 : 3

31 to 35

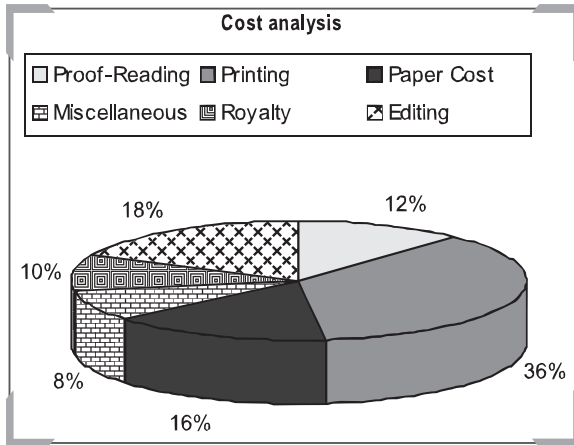
31. Required % age = $= \frac{450}{250} \times 100 = 180\%$

PRACTICE EXERCISE 2

Pie Chart

Directions for questions 1 to 5: Refer to the following pie chart and solve the questions based on it.

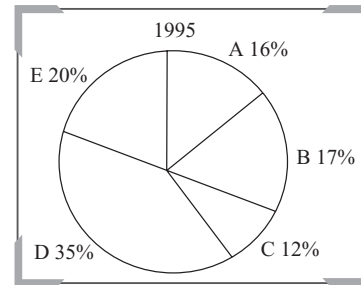
Following is the cost analysis of a book “Pearson’s Guide to Quantitative Aptitude for CAT”.



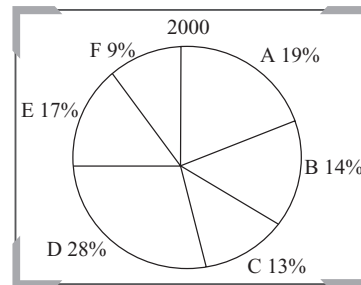
- What is the central angle showing the cost of paper?
 - 42.8°
 - 32.6°
 - 36.8°
 - 57.6°
- If the cost of printing is ₹23,400 what would the cost of royalty be?
 - ₹6500
 - ₹2340
 - ₹4680
 - ₹7840
- If the miscellaneous expenditure amounts to ₹18,000 then what is the expenditure on editing?
 - ₹8000
 - ₹14400
 - ₹46800
 - None of these
- The royalty on the book is less than the editing expenditure by
 - 8%
 - 80%
 - 44.44%
 - None of these
- If 5500 copies of the book are published and the miscellaneous expenditure amounts to ₹36,960 and the marked price is 40% above the cost price, then the marked price of each copy is
 - ₹122.50
 - ₹117.60
 - ₹126.40
 - ₹92.40

Directions for questions 6 to 10: Refer to the following pie charts and solve the questions based on it.

The pie charts given below represent the market share of different players in the electronics market in the year 1995 and 2000. A new player F has entered the market in the given period.



Market size = \$ 2.3 billion



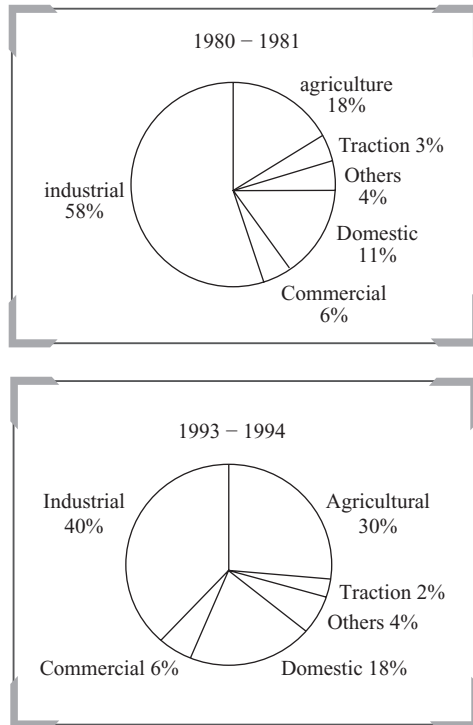
Market size = \$ 3.7 billion

- What is the percentage increase in the sales of A in the year 2000 over 1995?
 - 90%
 - 60%
 - 80%
 - 50%
- Find the CAGR with which the market has grown for the period 1995–2000?
 - 18%
 - 10%
 - 5%
 - 12%
- If the new entrant F has grown at the expense of B, C, and E, what would be the change in the net value of sales of E in the year 2000, had F not entered the market?
 - \$ 111 million
 - \$ 340 million
 - \$ 247 million
 - Cannot be determined
- What is the increase in sales (in \$ million) of A, B and C put together, over the 5 years period?
 - 103
 - 1202
 - 668
 - 854

10. If the market grows at 10% p.a. over the next 2 years and D captures $\frac{1}{3}$ rd of the new market, what would be its market share in 2002?
- (a) 29% (b) 27%
(c) 25% (d) 32%

Directions for questions 11 to 17: Refer to the following pie charts and solve the questions based on it.

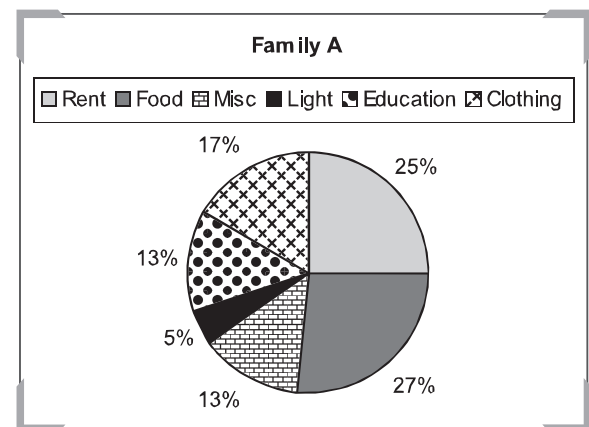
Electricity Consumption by Sector



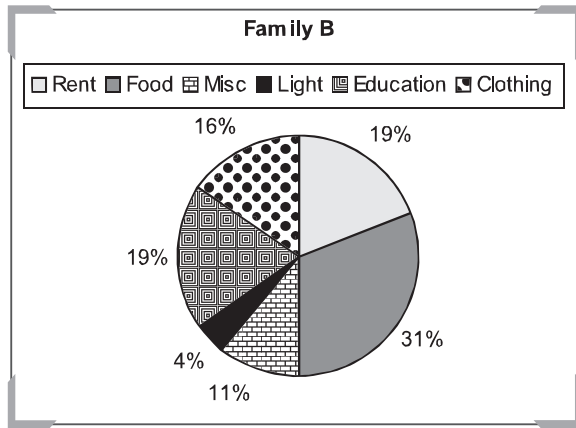
11. By what percentage has the consumption of electricity by agriculture increased in 1993-1994 over 1980-1981?
- (a) 66% (b) 33%
(c) 133% (d) Cannot be determined
12. The electricity consumption of how many sectors has definitely increased over the given period?
- (a) 2 (b) 3
(c) 4 (d) Cannot be determined
13. If the total electricity consumption in 1993-94 is 1.2 times of the total electricity consumption in 1980-1981, then how many sectors have definitely increased by more than 50% during the same period?
- (a) 1 (b) 2
(c) 3 (d) 4
14. If the total electricity consumption in 1993-1994 is 1.5 times of the total electricity consumption in 1980-1981, then what is the percentage increase in the electricity consumption of the agricultural sector in the given period?
- (a) 50%
(b) 100%
(c) 150%
(d) None of these
15. What is the minimum number of sectors required to be added up in order to be more than 50% of the consumption for the period in 1993-1994?
- (a) 1
(b) 2
(c) 3
(d) 4
16. The agricultural consumption of electricity doubled from 1980-81 to 1993-94. By how much percentage has the total electricity consumption grown from 1980-81 to 1993-94?
- (a) 20%
(b) 25%
(c) 50%
(d) Cannot be determined
17. If the electricity consumption of the 'others' category has remained constant over the period, then what is the percentage increase in the electricity consumption of the domestic category?
- (a) 63%
(b) 38%
(c) 58%
(d) Cannot be determined

Directions for questions 18 to 23: Refer to the following pie charts and solve the questions based on it.

The two pie charts given below provide the expenses of two families:



Total expenses = ₹48, 000

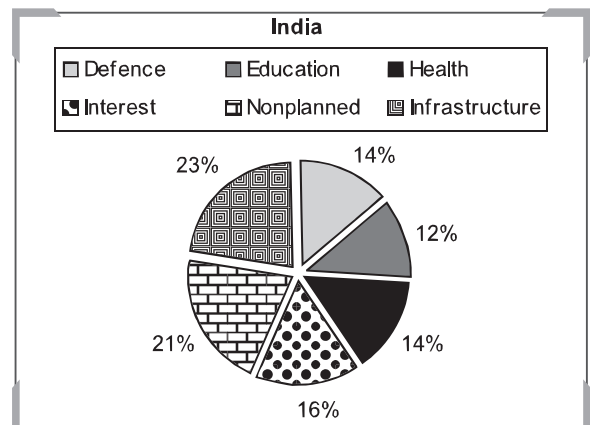
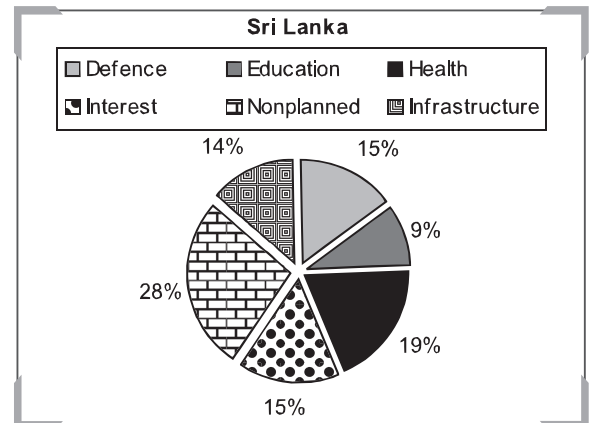
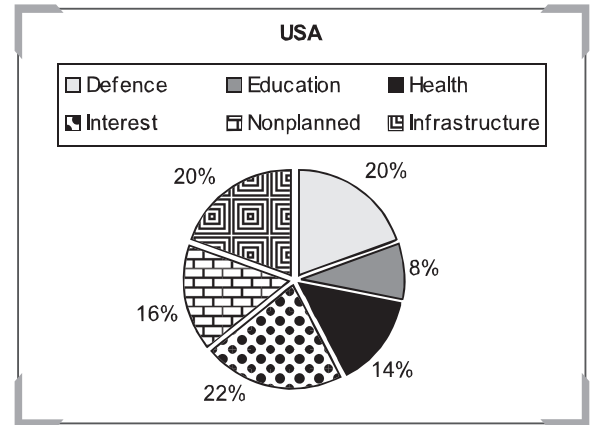


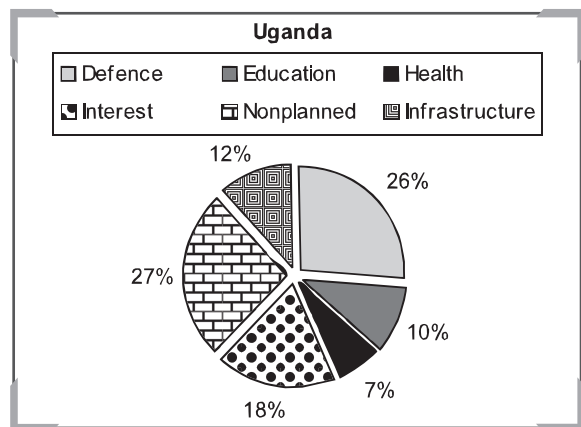
Total expenses = ₹72,000.

18. Both the families decide to double the total expenditure keeping the pattern of spending the same as given above. What will be the new ratio of expenditure on food between family A and family B?
 - (a) 27:31
 - (b) 31:27
 - (c) 2:3
 - (d) 3:2
19. If the total expenses of family B increase three-fold, keeping the expenses on education the same as given above, what will be the expense on education?
 - (a) 6.33%
 - (b) 57%
 - (c) 19%
 - (d) None of these
20. What will be the expenses on light by family A, as a percentage of expense on light by family B?
 - (a) 120%
 - (b) 83.33%
 - (c) 62.5%
 - (d) 66.66%
21. If family A and family B decide to combine their expenses, then which one of the following heads will be responsible for the highest expenses?
 - (a) Rent
 - (b) Miscellaneous
 - (c) Food
 - (d) Education
22. In the above question, how many heads will have a lower percentage share in the combined total expenses of both the families than the percentage share of family B under the same head?
 - (a) 1
 - (b) 2
 - (c) 3
 - (d) 4
23. Under how many heads are the expenses of family B more than the expenses of family A?
 - (a) Less than 3
 - (b) More than 3
 - (c) Equal to 3
 - (d) Cannot be determined

Directions for questions 24 to 30: Refer to the following pie charts and solve the questions based on it.

The following pie charts represent the budget expenditure of certain countries on various sectors for the year in 2007:





24. A country is said to be progressive if its education, health and infrastructure expenditures are in the top four expenditure sectors. How many of the four countries are progressive?
 (a) 0 (b) 1
 (c) 2 (d) 3
25. A country is said to be developing if its combined expenditure on education, health and infrastructure is at least 50% of the total expenditure. How many of the four countries are developing nations?
 (a) 0 (b) 1
 (c) 2 (d) 3
26. If a country is under military rule, it will spend maximum on defence and minimum on either health or education. How many of the above countries are under military rule?
 (a) 0 (b) 1
 (c) 2 (d) Cannot be determined
27. Which of the following sectors will have same ranking in the countries budget expenditures?
 (a) Nonplanned (b) Education
 (c) Health (d) None
28. If the budgetary expenditures of all the four countries are combined, which sector will account for the maximum expenditure?
 (a) Non-planned
 (b) Interest
 (c) Defence
 (d) Cannot be determined
29. The total budgetary expenditure of USA is four times the total budgetary expenditure of India; and the population of India is twice the population of USA. Then the per capita budgetary expenditure of USA is how many times per capita expenditure of India.
 (a) 8 (b) 4
 (c) 1/8 (d) 1/4
30. The total budgetary expenditure of Sri Lanka is twice the total budgetary expenditure of Uganda. Under how many sectors is the budgetary expenditure in Uganda more than the budgetary expenditure in Sri Lanka?
 (a) 0 (b) 1
 (c) 2 (d) 3

ANSWER KEYS

1. (d)	2. (a)	3. (d)	4. (c)	5. (b)	6. (a)	7. (b)	8. (d)	9. (c)	10. (a)
11. (d)	12. (d)	13. (b)	14. (c)	15. (b)	16. (a)	17. (a)	18. (a)	19. (a)	20. (b)
21. (c)	22. (b)	23. (b)	24. (a)	25. (a)	26. (d)	27. (d)	28. (d)	29. (a)	30. (a)

HINTS AND EXPLANATIONS

1 to 5

1. Required Angle = $(16/100 \times 360) = 57.6^\circ$
4. If the editing charges are ₹18, royalty is ₹10. On ₹18, it is less by 8. On ₹100, it is less by $(8/18 \times 100)\% = 44.44\%$

5. Let the total expenditure be ₹x. Then, $8 : 100 = 36960 : x$. So $x = ₹462000$. Therefore Cost Price of 5500 copies of the book = ₹4,62,000. Cost Price of each copy = $₹(4,62,000/500) = ₹84$. So, marked price = $140\% \text{ of } ₹84 = ₹117.60$.

6 to 10

6. There are two successive increases—First is the total increase of 60% approx. (\$ 3.7 bn in 2000 from \$ 2.3 billion in 1995) and second is the percentage share of A by 20% approx. Hence total percentage increase = 92%.
7. Market size in 2000 = \$ 3.7 billion
Market size in 1995 = \$ 2.3 billion
Therefore, growth rate

$$= [(3.7/2.3)^{1/5} - 1] \times 100 = 10 \%$$
Hence, option (b) is the correct answer.
 $3.7/2.3 = 1.6$, now to find $(1.6)^{1/5}$, $1.1^3 = 1.331$ and $1.1^2 = 1.21$ and $1.3 \times 1.2 = 1.6$
Thus, $1.6^{1/5} = 1.1$
8. Since we do not know what part of market share of B, C and E has been eaten up by F, so cannot be determined.
9. Sales value for A + B + C in 2000 = $(13 + 14 + 19)\%$ of 3.7 billion = $46\% \times 3.7 = 1.702$ billion
Sales value for A + B + C in 1995 = $(16 + 17 + 12)\%$ of 2.3 billion = 1.035 billion.
Hence increase in sales value = $1703 - 1035 = \$ 668$ million.
Hence, option (c) is the correct answer.

11 to 17

11. Since the total consumption for the given years is not known, we cannot determine it.
12. Since the total consumption for the given years is not known, we cannot determine it.
13. Total consumption has increased by 20%. So, any sector that shows an increase of even 25% will give us a net increase of 50%. There are only two sectors—agriculture and domestic. Therefore, option (b) is the correct answer.
14. There are two increases—one is the increase in the share of agriculture (66.66%) and the other is an increase of 50% in total. Net increase = 150%
Therefore, option (c) is the correct answer.
15. By visual inspection. We can see that the correct answer is option (b)
16. There is an increase in the share of agriculture (66.66%), to make the agricultural consumption double, total consumption is to be increased by 20%.

17. The electricity consumption of the 'others' category has remained constant over the period. It means that the total consumption of 1980–1981 = Total consumption of 1993–1994. So, the only increase = $[(18-11)/11] \times 100 = 63.64\%$

18 to 23

18. If the percentage increase in the expenditure of both the families, is the same then the ratio will be the same.
19. The total consumption has become 3 times more keeping the expenses on education the same. Hence the percentage consumption on education will become 1/3rd of the present.
21. By visual inspection we can see that option (c) is the correct answer.
22. It should be understood that the final percentage of expenditure will always be in between the percentage of family A and family B (It is true of any mixture that the percentage composition of the mixture will be always in between the percentage compositions of the components).
23. By visual inspection we can see that the correct answer is option (b).

24 to 30

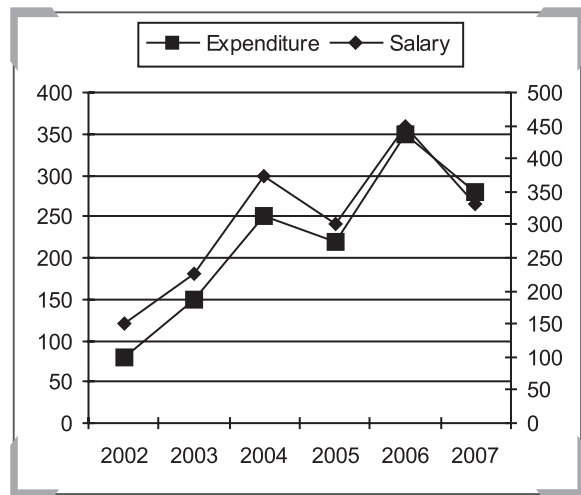
24. By visual inspection we can see that option (a) is the correct answer.
25. By visual inspection we can see that option (a) is the correct answer.
26. Understand the logic that "If a country is under military rule, it will spend maximum on defence and minimum on either health or education" does not mean that if a country is spending maximum on defence and minimum on either health or education, then it will under military rule.
[For more—See Logical Links in Part 1 of this book]
27. By visual inspection. we can see that option (d) is the correct answer.
28. Since individual expenditures of the countries are not given, we cannot determine it.

PRACTICE EXERCISE 3

Line Chart

Directions for questions 1 to 7: Refer to the following line chart and solve the questions based on it.

The line chart given below represents the salary and expenditure (in ₹) of Guru Gulab Khatri for the given period.



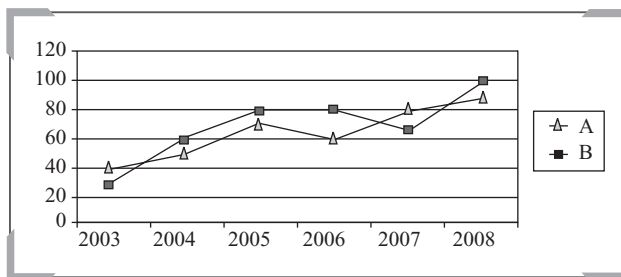
It is given that the salary is greater than the expenditure at least for four years. All the values are multiples of 5.

- By what percentage has the salary of Guru Gulab Khatri increased in 2004 over 2002?
(a) 210% (b) 150%
(c) 100% (d) 250%
- By what percentage has the expenditure of Guru Gulab Khatri increased in 2004 over 2003?
(a) 66.66% (b) 133.33%
(c) 150% (d) None of these
- For how many years the salary is more than expenditure?
(a) 4 (b) 5
(c) 6 (d) Cannot be determined
- Which year is the percentage increase in the salary of Guru Gulab Khatri maximum?
(a) 2003 (b) 2004
(c) 2006 (d) 2003 or 2006
- A year is said to be comfortable, if Guru Gulab Khatri is able to save at least 30% of his salary. How many years are comfortable during the given period?
(a) 2 (b) 3
(c) 4 (d) 5

- What is the maximum difference (in ₹) between the salary and the expenditure for any year?
(a) 70 (b) 75
(c) 125 (d) 100
- For how many years is the difference between the salary and the expenditure more than ₹80?
(a) 2 (b) 3
(c) 4 (d) 5

Directions for questions 8 to 12: Refer to the following line chart and solve the questions based on it.

Percentage profit earned by the two companies A and B over the years



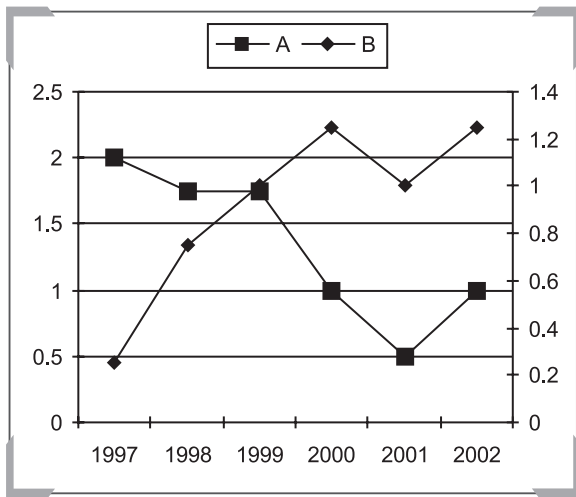
- If the income for company A in the year 2004 was ₹35 lacs what was the expenditure for company B in the same year?
(a) ₹123.5 lacs
(b) ₹128 lacs
(c) ₹132 lacs
(d) Cannot be determined
- If the income of company A in 2006 and the income of company B in 2007 are equal, what will be the ratio of expenditure of company A in 2006 to the expenditure of company B in 2007?
(a) 26 : 7 (b) 17 : 16
(c) 15 : 170 (d) None of these
- During which of the following years is the ratio of percentage profit earned by company A to that of company B, the maximum?
(a) 2003 and 2006 (b) 2005 and 2007
(c) 2003 only (d) 2008 only
- If the expenditure of company B increases by 20% from 2005 to 2006, the income in 2006 will be how many times the income in 2005?
(a) 2.16 times (b) 1.2 times
(c) 1.8 times (d) None of these

12. If the income of company A in 2006 was ₹36 lacs, what was the expenditure of company A in 2006?
- (a) ₹12.5 lacs
(b) ₹18.8 lacs
(c) ₹20 lacs
(d) None of these

Directions for questions 13 to 17: Refer to the following line chart and solve the questions based on it.

The following line chart represents the ratio of exports (in ₹) to imports (in ₹) of two countries A and B over the given period:

Left Axis = Country A ; Right Axis = Country B



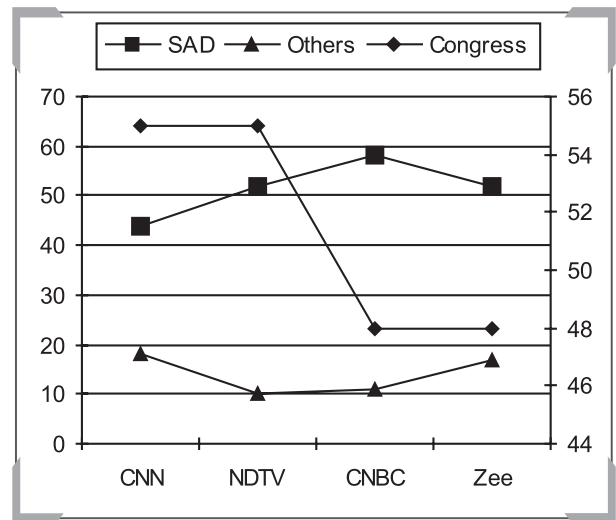
All the values are multiples of 0.25.

13. For how many years do both the countries have their respective exports more than their imports?
- (a) 1
(b) 2
(c) 4
(d) None of these
14. Due to some compulsions, one year during the period given these two countries have to do business between themselves only and they are not allowed to export to or import from any other countries. Which out of the following years is possibly that year?
- (a) 1997
(b) 1998
(c) 1999
(d) None of these
15. What can be said regarding the imports/exports of the two countries?
- (a) The value of exports of country A is constantly on the decline from 1997 to 2001.
(b) The value of imports of the country B is constantly on the rise from 1997 to 2000.
(c) The value of imports of country A is equal to the value of import in 2002 (ratio = 1 for both the years)
(d) none of these

16. For how many years is the value of exports of country B is constantly on the rise over the previous year for country B?
- (a) 2
(b) 3
(c) 4
(d) Cannot be determined
17. For how many years is the value of imports of country A is constantly on the rise over the previous year?
- (a) 2
(b) 3
(c) 4
(d) Cannot be determined

Directions for questions 18 to 20: Refer to the following line chart and solve the questions based on it.

The line chart given below represents the projections of seats for the coming Punjab assembly elections according to surveys done by four different agencies.



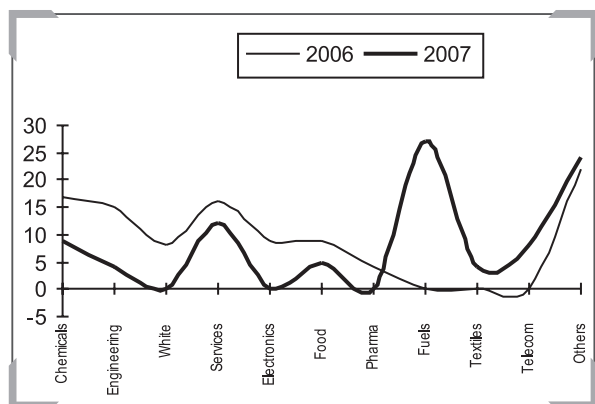
The following observations have also been made regarding the projected seats:

- (i) The others have won less than 20 seats according to the projections made by each of the agencies.
(ii) According to NDTV, the Congress' projected seats are more than the projected seats for the SAD.
(iii) The total number of seats have been won by only three parties—Congress, SAD and the others.
(iv) According to CNBC, the difference between projected seats of SAD and Congress is 20.
18. If we add the projected seats of each of the parties individually, then which of the following will have the maximum number of projected seats?
- (a) Congress
(b) SAD
(c) Congress or SAD
(d) Others

19. According to how many agencies' projections is the Congress getting more seats than the SAD?
 (a) 0 (b) 1
 (c) 2 (d) 3
20. For how many agencies' projection about seats has the sum of the two bottom ranked parties been more than the top ranking party?
 (a) 0 (b) 1
 (c) 2 (d) 4

Directions for questions 21 to 25: Refer to the following line chart and solve the questions based on it.

The following line charts give the FDI (in \$ billion) in 2006 and 2007 for the different sectors in India:



21. For how many sectors, is there an increase in the FDI in 2007 over 2006?
 (a) 2 (b) 3
 (c) 4 (d) 5
22. Which of the following sectors has seen the maximum percentage increase in its value in 2007 over 2006 (only for those sectors which have their presence in both the years)?
 (a) Fuel (b) Others
 (c) Chemical (d) None of these
23. Which of the following sectors has seen the maximum percentage decrease in its value in 2007 over 2006 (only for those sectors which have their presence in both the years)?
 (a) Fuel (b) Others
 (c) Chemical (d) None of these
24. Which of the following sectors will have the maximum FDI added in both the years?
 (a) Fuel
 (b) Others
 (c) Chemical
 (d) None of these
25. Which of the following sectors will have the minimum FDI added in both the years?
 (a) Fuel
 (b) Others
 (c) Chemical
 (d) Textile

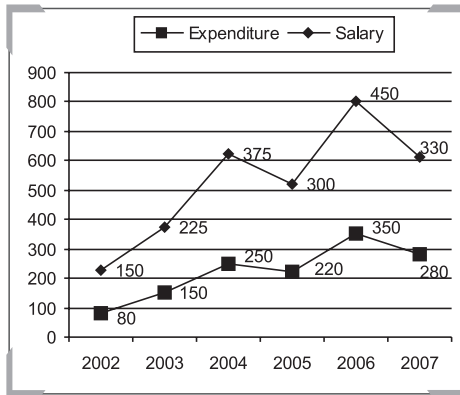
ANSWER KEYS

1. (b)	2. (a)	3. (c)	4. (b)	5. (b)	6. (c)	7. (a)	8. (d)	9. (b)	10. (c)
11. (b)	12. (d)	13. (d)	14. (d)	15. (d)	16. (d)	17. (d)	18. (c)	19. (c)	20. (d)
21. (c)	22. (b)	23. (d)	24. (b)	25. (d)					

HINTS AND EXPLANATIONS

1 to 7

For the sake of convenience, use the following chart (with the same data) to find out the solution:



Now all the questions can be done with ease.

8 to 12

8. Income-expenditures of company A and B cannot be correlated. Hence cannot be determined.
9. Expenditure of company A in 2006 =
 $\text{Income in 2006 of (A)} \times (100/160) = \text{Income in 2006 of (A)} \times 5/8$
 Expenditure of Company B in 2007 =
 $\text{Income in 2007 of (B)} (100/170) = 10/17 \text{ of Income in 2007 of B}$
 Now, $[\text{Expenditure in 2006 of (A)} / \text{Income in 2007 of (B)}] = (5/8) \div (10/17)$ [Since Income in 2006 of (A) = Income in 2007 of (B)]
 $= \frac{5}{8} \times \frac{17}{10} = \frac{17}{16}$
10. Ratio A : B is greater than 1 in only 2003 and 2007. It is 1.33 in 2003 and 1.1 in 2007.
11. Percentage profits are the same for two years, hence if expenditure increases by 20% the income should also increase by 20%. Hence, the required ratio = $120/100 = 1.2$

13 to 17

13. This never happens. Understand that if export is more than import, then the ratio will be more than 1. If export is equal to import, then the ratio will be equal to 1 and if export is less than import, then the ratio will be less than 1.
14. The ratio of one to the other should be reciprocal.
15. Despite the ratio being on a decline for country A, we cannot comment about the value of exports. it might be a possibility that imports have increased keeping exports constant. Similarly both the other options (b) and (c) can be refuted on the same grounds.
16. Since only the ratio is given, we cannot comment on the values.
17. Since only the ratio is given, we cannot command on the values.

18 to 20

Following is the table pertaining to the data set given:

	CNN	NDTV	CNBC	Zee
SAD	44	52	58	52
Congress	55	55	48	48
Others	18	10	11	17

21 to 25

Following is the table pertaining to the data given:

	Chemical	Engineering	White Goods	Services	Electronics	Food	Pharmaceutical	Fuel	Textiles	Telecommunication	Others
2006	17	15	8	16	9	9	4	0	0	0	22
2007	9	4	0	12	0	5	0	27	4	8	24

PRACTICE EXERCISE 4

Table

Directions for questions 1 to 4: Refer to the following table and solve the questions based on it.

The following table gives the exports of top six industries (in value terms) from India in 2007:

	Exports (₹crore)	Growth (in %)
Glass industry	1093	11.7
Coal Industry	1080	7
Ruby Industry	913	-8.7
Nickel Industry	663	7.1
Software Industry	605	-12.3
Diamond Industry	505	-1.5

The overall exports from India increased by 20% to ₹19,500 crore in 2007.

- What is the share of the Glass industry in the total exports for 2007?
(a) 2.5% (b) 4%
(c) 5.6% (d) 7%
- For how many of the given six industries has the share in exports increased in 2007?
(a) 0 (b) 1
(c) 2 (d) 3
- Which of the following has the maximum share among the given industries in 2006?
(a) Glass Industry
(b) Ruby Industry
(c) Software Industry
(d) Coal Industry
- What is the percentage increase in the exports of the given six industries?
(a) 0.1%
(b) 0.5%
(c) 1.05%
(d) 1.75%

Directions for questions 5 to 9: Refer to the following table and solve the questions based on it.

The following table gives the number of vehicles (in '000s) of different models and colours sold in two cities—Patna and Lucknow—in a given year.

Type	Patna					Lucknow				
	Colour					Colour				
	Black	Red	Blue	White	Silver	Black	Red	Blue	White	Silver
A	40	25	55	75	15	45	32	40	60	20
B	20	35	60	80	20	30	37	39	81	35
C	35	30	50	90	35	40	42	41	6	37
D	45	40	45	85	40	35	39	37	90	42
E	50	35	35	60	30	50	44	43	77	22
F	55	42	40	65	52	47	34	45	87	17

- For which of the following models, difference between white—coloured vehicles sold in the two cities is minimum?
(a) A (b) C
(c) D (d) None of these
- The total number of blue—coloured vehicles of model E and D sold in Lucknow is exactly equal to the number of white—coloured vehicles of which model in Patna?
(a) B (b) F
(c) C (d) A
- What is the difference between the number of blue—coloured vehicles of model C sold in Patna and the number of red coloured vehicles of model F sold in Lucknow?
(a) 8,000 (b) 10,000
(c) 12,000 (d) None of these
- The total number of silver—coloured vehicles sold in lucknow is approximately what percentage of that in Patna?
(a) 130% (b) 140%
(c) 90% (d) 100%
- In Patna the number of vehicles sold was the maximum for which of the colour—model combinations?
(a) white-C
(b) blue-B
(c) silver-B
(d) white-D

Directions for questions 10 to 14: Refer to the following table and solve the questions based on it.

The table given below gives the marks obtained by six students in six subjects:

Student	History (150)	Science (200)	Geography (150)	English (200)	Hindi (100)	Math (200)
A	75	110	90	140	75	170
B	105	130	75	130	80	140
C	95	105	80	150	90	160
D	85	115	95	125	65	135
E	115	135	110	145	70	125
F	120	160	96	110	55	145

Marks in bracket are Total Marks.

10. What is the difference between the percentage marks obtained by student B in History and the percentage marks obtained by student C in Hindi?
 - (a) 25
 - (b) 20
 - (c) 35
 - (d) 30
11. The marks obtained by student A in Math are how many times the percentage marks obtained by student F in Science?
 - (a) 2.5
 - (b) 4.125
 - (c) 1.125
 - (d) 2.125
12. What is the difference between the percentage marks obtained by student C in English and the average percentage marks of all the six subjects?
 - (a) 82
 - (b) 38
 - (c) 7
 - (d) 14
13. In how many of the given subjects has student D got more than seventy percent marks?
 - (a) none
 - (b) one
 - (c) two
 - (d) three
14. Approximately, what is the average percentage marks obtained by the six students in English?
 - (a) 67%
 - (b) 72%
 - (c) 80%
 - (d) Data inadequate

Directions for questions 15 to 18: Refer the following table and solve the questions based on it.

The following table gives the number of students from different locations who appeared and passed in the Xth standard examination conducted by CBSE over the years:

Year	Rural		Semi-urban		State Capitals		Metro-politans	
	Appeared	Passed	Appeared	Passed	Appeared	Passed	Appeared	Passed
1990	1651	209	7897	2511	5057	1464	9537	3212
1991	1832	314	8561	2932	7163	3242	10152	4015
1992	2154	935	8133	2466	8251	3151	9697	3033
1993	5035	1792	9436	3525	8526	3627	11245	5157
1994	4911	1656	9782	4012	9013	4315	12512	6323
1995	5626	2391	9965	4266	1729	4523	13625	6411

15. For the students from which of the following locations was there a continuous increase in both the appeared and passed member of candidates?
 - (a) semi-urban
 - (b) state capital
 - (c) state capital and rural
 - (d) None of these
16. In which of the following years was the percentage passed to appeared candidates from the semi-urban area the least?
 - (a) 1991
 - (b) 1993
 - (c) 1990
 - (d) 1992
17. By what approximate value did the percentage drop in the number of semi-urban candidates who appeared from 1991 to 1992?
 - (a) 5
 - (b) 10
 - (c) 15
 - (d) 8
 - (e) 12
18. The total number of candidate who passed from the rural locations in 1993 and the semi-urban locations in 1990 was exactly equal to the total number of candidates who passed from the state capitals in which of the following years?
 - (a) 1990
 - (b) 1993
 - (c) 1994
 - (d) None of these

Directions for questions 19 to 21: Refer to the following table and solve the questions based on it.

The following table gives the average marks obtained by 20 boys and 20 girls in five subjects from five different schools P, Q, R, S and T:

Subject	Maximum Marks	P		Q		R		S		T	
		B	G	B	G	B	G	B	G	B	G
English	200	85	90	80	75	100	110	65	60	105	110
History	100	40	55	45	50	50	55	40	45	65	60
Geography	100	50	40	40	45	60	55	50	55	60	65
Math	200	120	110	95	85	135	130	75	80	130	135
Science	200	105	125	110	120	125	115	85	90	140	135

In the above table, B = Boys and G = Girls

19. What were the total marks obtained by the boys in History from school Q?
(a) 900 (b) 1000
(c) 800 (d) 1300
20. In which of the following subjects did the girls have the highest average percentage marks in all the schools?
(a) Science (b) Geography
(c) English (d) History
21. What is the average mark obtained by all the students of school P taking all the subjects into account?
(a) 82 (b) 84
(c) 80 (d) Cannot be determined
23. During 1996, what is the approximate share of domestic sales of cars of the manufacturer B?
(a) 10.5% (b) 25.5%
(c) 15.5% (d) 19.5%
24. During 2000, the sales of which manufacturer has shown the maximum percentage increase over the previous year?
(a) A (b) B
(c) C (d) D
25. With respect to which of the following combinations, is the sales of cars the highest over the given period?
(a) D, 2000 (b) A, 1998
(c) A, 2000 (d) A, 1999
26. Which of the following manufacturers, has a consistent increase across the years given?
(a) A (b) B
(c) C (d) D
27. How many of the manufacturers have never shown a decline in the number of cars sold in any particular year over the previous year?
(a) 1 (b) 2
(c) 3 (d) 4
28. How many times have the number of cars sold been more than 450 for any manufacturer in any year more than once? (A manufacturer can achieve this feat)
(a) 6 (b) 7
(c) 8 (d) 9

Directions for questions 22 to 28: Refer to the following table and solve the questions based on it.

The following table shows the domestic sales of cars of five manufacturers from 1995 to 2000. (All the figures are in thousands)

Manufacturer	1995	1996	1997	1998	1999	2000
A	440	480	470	500	520	510
B	400	410	415	415	420	430
C	380	390	390	400	420	495
D	360	380	400	415	440	500
E	480	440	440	420	425	435

22. Considering the period given, the domestic sales of which manufacturer are the highest?
(a) A (b) B
(c) C (d) D

Directions for questions 29 and 30: Refer to the following table.

The following table captures the comparative performance of LIC and HDFC in the housing sector in the last four years. (All figures are in ₹crores).

Attribute	1994–1995		1993–1994		1992–1993		1991–1992	
	LIC	HDFC	LIC	HDFC	LIC	HDFC	LIC	HDFC
Loan Sanctions	618.0	1495.0	564.0	1025	607	859	511	758
Dues	24.2	29.6	20.0	27.8	16.1	25.17	5.32	19.57
Total Loans	1672.0	3747.0	1283.0	3071	852	2561	401	2125
Default Percentage	1.45	0.79	1.56	0.91	1.89	.98	1.32	0.93
Total Revenue	251.0	780.0	175.0	608	109	473	44.4	371
Net Profit	41.4	146.1	21.53	105	13.5	55.55	6.71	45.6

29. For how many years are the LIC loan sanctions 70% or more of HDFC's loan sanctions?

(a) 0 (b) 1
(c) 2 (d) 3

30. The ratio of total revenue to the loan sanctions is the least for LIC in which of the following years?

(a) 1992–1993 (b) 1993–1994
(c) 1994–1995 (d) 1991–1992

ANSWER KEYS

1. (c) 2. (a) 3. (d) 4. (c) 5. (d) 6. (a) 7. (d) 8. (c) 9. (a) 10. (b)
11. (d) 12. (c) 13. (a) 14. (a) 15. (d) 16. (d) 17. (a) 18. (d) 19. (a) 20. (a)
21. (d) 22. (a) 23. (d) 24. (c) 25. (d) 26. (d) 27. (c) 28. (c) 29. (b) 30. (d)

HINTS AND EXPLANATIONS

1 to 4

	Export (₹Crore)	
	2006	2007
Glass Industry	978	1093
Coal Industry	1009	1080
Ruby Industry	1000	913
Nickel Industry	619	663
Softwares Industry	690	605
Diamond Industry	513	505
Total	16250	19500

1. The share of Glass in the total exports for 2007 = $1093/19500 \times 100 = 5.6\%$.
2. Overall exports have increased by 20% while none of the given six industries have grown by 20%. So, we can conclude that the market shares for all the six industries will decrease in 2003. Hence option (a) is the correct answer.
3. Coal has the maximum exports in 2006. Hence, its market share is the maximum.
4. Exports for the given six industries in 2006 = 4809 crore
Exports for the given six industries in 2007 = 4859 crore
Therefore, percentage increase in the exports = $[(4859 - 4809)/4809] \times 100 = 5000/4809 = 1.05\%$.

5 to 9

5. The difference between the white-coloured cars sold is the minimum in the B type model.
6. Blue (E + D) = 43 + 37 = 80 = White (B)
7. Required difference = $(50 - 34) \times 1000 = 16,000$
8. Required Percentage = $173/192 \times 100 = 90\%$
9. White-c = 90,000

10 to 14

10. The difference in percentage marks of B (History) and C (Hindi) = $90 - 70 = 20$
11. The percentage of marks obtained by F in Science = $160/200 \times 100 = 80\%$
Required Value = $170/80 = 2.125$
12. Average percentage of marks of C = $680/1000 \times 100 = 68\%$
Percentage of marks of C in English = $150/200 \times 100 = 75\%$
Required difference = $75 - 68 = 7$
14. Average percentage of marks in English

$$= \left(\frac{140 + 130 + 150 + 125 + 145 + 110}{6} \right) \times \frac{100}{200}$$

$$= 67\%$$

15 to 18

15. By visual inspection.

19 to 21

19. Average marks obtained by 20 boys in History from school Q = 45
Therefore, Total marks = $20 \times 45 = 900$
20. From visual inspection it is clear that Science is the desired subject.
21. The table gives the data pertaining to only 40 students of the school and it is not given if this is the total number of students in the school. Therefore it cannot be determined

22 to 28

22. It is a simple calculation. Alternatively, it can be observed that A has always been more than the others except but for one year.
23. Required share

$$= (410/480 + 410 + 390 + 380 + 440) \times 100 = 19.5\%$$
24. It can be observed that the difference is the highest in case of manufacturer C. We can further observe that the largest percentage growth would be for C, as the base is the smallest.
26. By visual inspection we can say that option (d) is the correct answer.
27. By visual inspection we can say that option (c) is the correct answer. Manufacturers are B, C, D.
28. By visual inspection we can say that option (d) is the correct answer.

29 to 30

29. It happens only in 1992–1993

Chapter

18

DEVELOPING THE SKILLS

LEARNING Objectives

In this chapter, you will learn:

- ☐ Different constituents of Data Interpretation
- ☐ Various skill-sets required and the methods to acquire the same
- ☐ Calculations required
- ☐ How to excel in these calculations and the calculations specific to a particular data-set
- ☐ How to interpret the data
- ☐ Connecting different data-sets

CONSTITUENTS OF DATA INTERPRETATION (DI)

Data Interpretation is primarily aimed at assessing the candidate's ability to analyse the given data, arrive at meaningful conclusions and to take appropriate decisions. In many ways, this section truly reflects a business situation; where one is required to take a decision on the basis of available information and future trends.

In any DI question, students will be required to go through the data-set and make necessary relationships between “what is given?” and “what is asked?” These questions simulate the kinds of detailed analyses of relationships that management students must perform in solving problems under strict time restrictions.

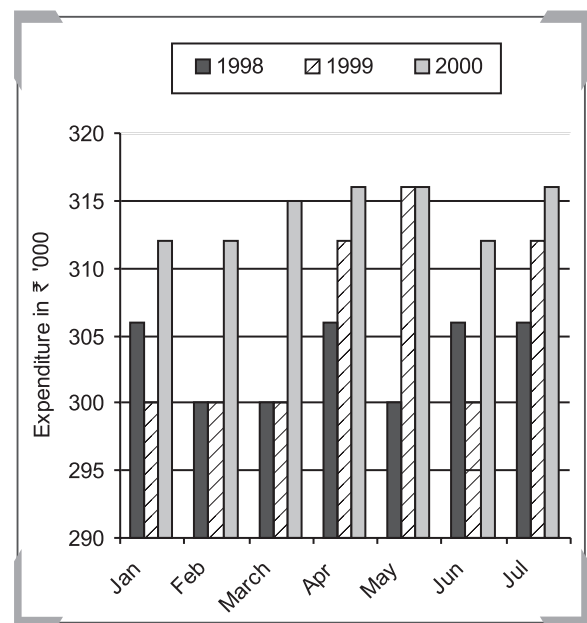
Each DI question contains three separate parts —

- (A) Data-set,
- (B) Explanations and restrictions given for the data and
- (C) Question/s.

Data-Set

The data pertaining to the question can be represented in various formats—pie chart, bar chart, line chart etc. The data-set introduces a sample or a report of some activity, done in the past, present or the future.

Example



In the above data-set, we see the expenses of a family for three years from January to July.

The same data-set can be represented by other formats like the line chart etc. keeping the essence of the data, the same.

We will learn more ways of presenting the data and how they can be inter-related, ahead in this chapter.

Explanations and Restrictions

These should be seen as the guiding principles or the helping factors associated with the data-set. Explanations help us in knowing and understanding the data better; on the other hand, restrictions narrow down our focus to what is being asked and what is to be extracted.

Example

The following are the final results of standard X. The students were tested in English, Hindi, Science, Math, Social Science, Drawing, Craft, PT and Scout-Guide. For a better presentation of the mark sheet, the scores in the first four subjects are consolidated into A1, the next three into A2 and last three into A3. The final score is the total of these three scores A1, A2 and A3. On the basis of the final score the students get their ranks. The table below gives the scores of the top eleven students of the class.

Name	Grade	Final Score	A1	A2	A3	Drawing	PT	Social service
Anana	A	725	282	217	226	80	81	69
Pankaj	B	864	310	87	267	85	86	92
Vamshi	C	812	300	290	222	70	91	74
Ram	C	805	270	262	273	65	79	97
Shann	D	900	391	292	217	96	86	81
Saket	D	876	301	297	278	65	87	93
Mini	C	825	296	296	233	50	89	91
Rashi Singh	E	905	320	290	295	72	99	99
Parul	B	895	310	290	295	72	99	98
Rakesh Rathi	B	870	276	296	298	63	99	99
Gauri	C	888	361	270	257	82	78	92

Without the given explanation, we would not have any idea about how to arrive at A1/A2/A3 and how the grades are being awarded.

Questions

And now finally, the tools to check how much you have been able to interpret the data and relate it to the explanations/restrictions given.

Here, are a few questions based upon the data-set given above:

- How many students have got grade A and more than 250 marks in all the group scores (A1, A2 and A3)?
(a) 0 (b) 1
(c) 2 (d) None of these
- In the drawing subject, what is the difference between the total marks of grade A students and grade C students?
(a) 50 (b) 52
(c) 48 (d) None of these

We will see the solution of the questions given above in the next part. Let us now go through the skill-set required to excel in the Data Interpretation section.

SKILL-SET REQUIRED

Till now, we have understood that DI questions test the following:

- Ability to understand the data and retain that in mind.
- Exposure to various types of data presentation formats
- Understanding of how restrictions limit and order behaviour
- The 'logic' inside a data-set and the algorithm to extract it to arrive at a solution

It should be noted, that even if a student has not gone through a formal training or practice of DI for any aptitude exam including CAT, can have an understanding of data and exposure to the various formats of presenting the data, just by virtue of going through any standard newspaper regularly.

However, while discussing the skill-set required, we will assume that the student is at the basic level and has just started going through DI.

Skill 1—Knowing the Terminology

There can be various economic or non-economic terms like CAGR, inflation etc., involved in the data-set, and it is a prerequisite to have a good understanding of these terms.

Example

If the production of wheat in 2004 was 100 million tonnes and in 2007 it was 133 million tonnes, then find the (A) Percentage Growth, (b) SAGR, (c) CAGR.

Solution

- (A) Percentage Growth = $\left[\frac{\text{Growth}}{\text{Initial value}} \right] \times 100 = 33\%$
- (B) SAGR (Simple Annual Growth Rate)—It is the average growth rate over the given period. It is calculated by dividing the growth percentage by the number of years involved.
In the above case, $\text{SAGR} = 33/3 = 11\%$
- (C) CAGR (Compounded Annual Growth Rate)—It is the year to year growth rate over the given period. To calculate this, we take the help of the fundamentals of compound interest. We take the final value as the amount after the given period and the initial value as the principal.

In the above case,

$$133 = 100 \left(1 + \frac{r}{100} \right)^3$$

Hence, $r = 10\%$ (approx.)

Skill 2—Knowing the Different Formats of Presenting the Data

Having discussed earlier, the significance of organized data, we can automatically conclude that the same data when presented in an unorganized way makes difficult reading and is not of much use. The same data can be presented differently. In one format, it might make easy reading; in another format, it might make difficult reading.

Example

	Location 1	Location 2	Location 3	Location 4	Location 5
2004	112	128	98	132	102
2005	118	147	120	120	108
2006	120	144	126	124	113

Explanation

A company is selling its products at five different locations and the sales value (₹thousands) of different locations for three consecutive years is given.

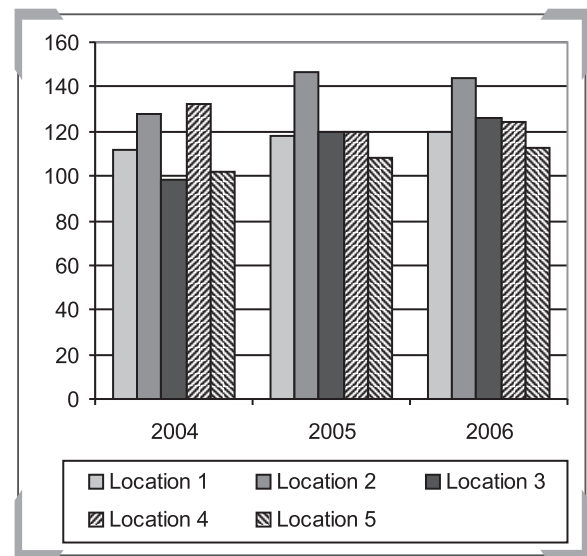
Question

1. Which of the following locations has the maximum sum of sales value for the three years?
- (a) Location 1 (b) Location 2
(c) Location 3 (d) Location 4

Solution

This question simply requires the sum of the sales value of each of the locations for three years. Obviously, location 2 is the answer.

However, if we convert the same data into a bar chart, then it can be seen by simple observation that location 2 is the answer.



Since the bar of location 2 is above the other two for two years and in 2004, it is just a bit lower than one of the bars; we can simply say that location 2 produces the maximum combined sales value for the three years.

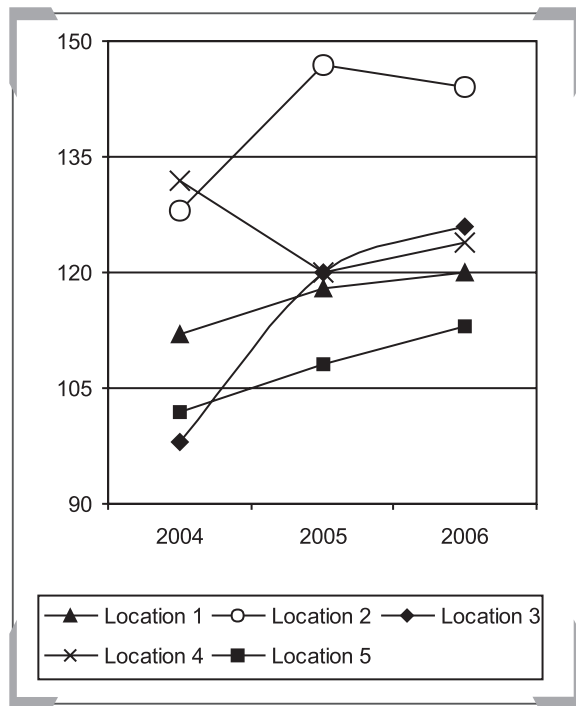
Question

2. Which of the following locations has the minimum sum of sales value for the three years?
- (a) Location 1 (b) Location 2
(c) Location 3 (d) Location 5

Solution

It can be seen that the bar of location 5 is lower than all the bars for two years and once it is equal to the bar of location 3; hence, location 5 produces the minimum combined sales value for the three years.

If we convert the same data into a line chart, it becomes more obvious than the bar chart that location 2 and location 5 give the maximum and minimum sales value for the given period.



Question

3. Which of the following locations has seen the maximum percentage increase in the sales value in 2005 over 2004?

Solution

If we try to solve this question with the help of bar chart, it becomes a bit difficult without having the actual values. So, we are left with either the line chart or the given table.

In case of a table, this question can definitely be solved by calculation and observation. But if we see the same situation in case of a line chart, we can simply rule out location 1/location 4/location 5 as the answer. Now, from the remaining two locations 2 and 3, despite the slope being almost the same, the base in location 3 is very low with respect to the base in location 2. Hence, location 3 will have more percentage increase.

We will learn more about the different formats of presenting data, ahead in this chapter.

Hence, we can see that with different forms of data representation, one can gather different conclusions

just by visual inspection. However, the speed with which this conclusion can be drawn depends heavily on the kind of chart given.

Skill 3—Knowing What is to be Found Out

In my experience of dealing with students from varied backgrounds, many a times I have seen that students are not able to solve a question because they have got very impressed with the data. And as a result, they lose track of what is to be found out.

Remember, never ever get ‘emotionally attached’ to a question.

As an examinee, you are not supposed to get into the technicalities of the data. Rather, you should focus upon what is being asked in the question, and how to extract information from the data-set relevant to the given question.

However, during practice, one needs to focus not just on solving the problems on hand, but also on building an algorithm to solve similar problems whenever they occur.

Cracking the questions require a very systematic approach. The primary focus should be on understanding the question. It would be worthwhile to read the question patiently and carefully. At this juncture, efforts towards building your vocabulary and improving your reading skills might help you. One must pay attention to otherwise innocuous words and phrases such as “at most” or “at least”, “cannot be less than”, “cannot be more than” etc.

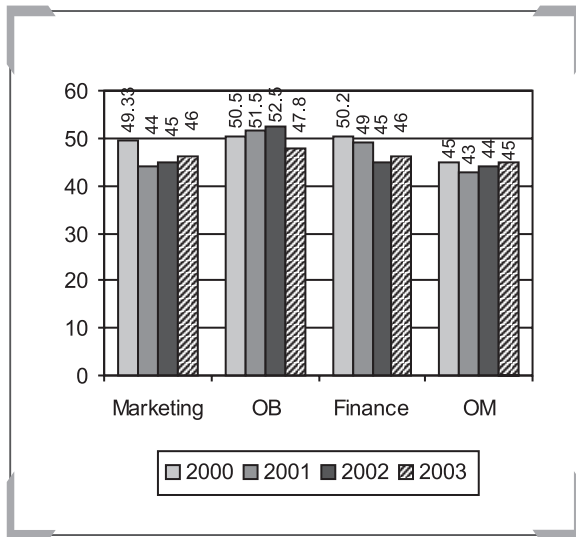
Till now we have discussed data, the significance of organized data and the skill set required to solve the questions.

Let us see a few questions from an actual CAT DI paper:

CAT 2005

A management institute was established on 1 January 2000 with 3, 4, 5, and 6 faculty members in the Marketing, Organizational Behaviour (OB), Finance, and Operations Management (OM) areas respectively, to start with. No faculty member retired or joined the institute in the first three months of the year 2000. In the next four years, the institute recruited one faculty member in each of the four areas. All these new faculty members, who joined the institute subsequently over the years, were 25 years old at the time of their joining the institute. All of them joined the institute on April 1. During these four years, one of the faculty members

retired at the age of 60. The following diagram gives the area-wise average age (in terms of number of completed years) of faculty members as on April 1 of 2000, 2001, 2002, and 2003.



- 1 From which area did the faculty member retire?
- Finance
 - Marketing
 - OB
 - OM

To solve this question, following things were required:

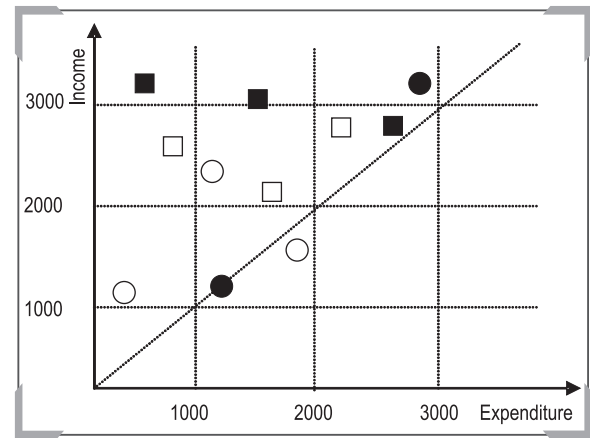
- Understanding the passage given at the beginning of the DI set.
- Understanding the above bar chart.
- Understanding the question and the process of how to inter-relate the data.

Of course we can calculate the sum of ages of all the faculty members in all the areas and for all the years. There were 3 faculty members in Marketing in 2000 (inception of the institute), hence, the sum of completed years of these three faculty members in 2000 = $49.33 \times 3 = 148$ years. But the main problem lying ahead is, for how many years and areas can we do the same thing? As this will involve a good amount of calculation, it will require a good amount of time and patience.

CAT 2004

The data points in the figure below represent the monthly income and expenditure data of individual

members of the Ahuja family (■), the Bose family (□), the Coomer family (○), and the Dubey family (●). For these questions, saving is defined as



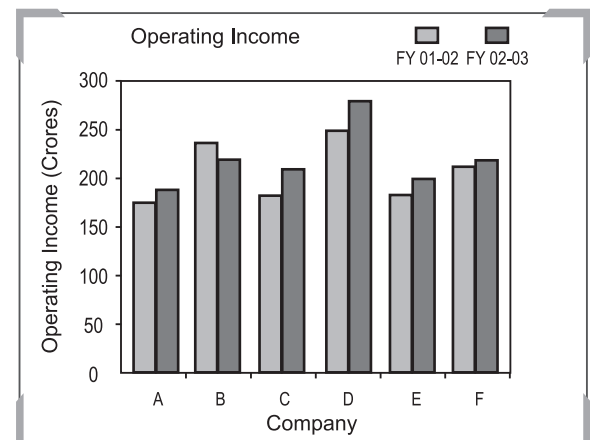
2. Which family has the lowest average income?
- Ahuja
 - Bose
 - Coomar
 - Dubey

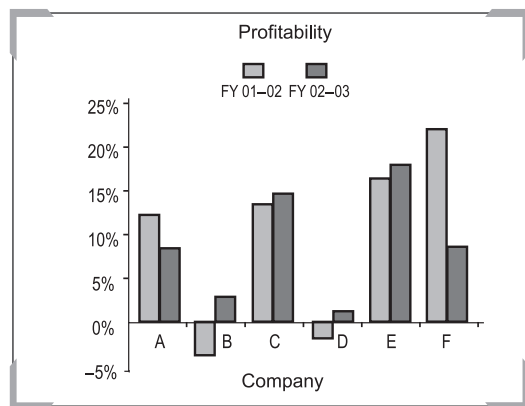
To solve this question, following things are required—

- Understanding the data as given above.
- Understanding the question and the process of how to inter-relate the data.

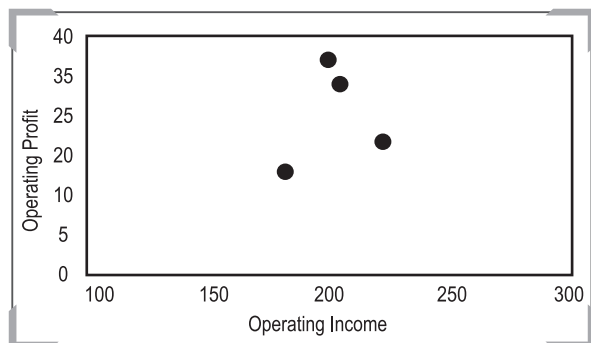
CAT 2003 (Re-Test)

The profitability of a company is defined as the ratio of its operating profit to its operating income, typically expressed in percentage. The following two charts show the operating income as well as the profitability of six companies in the Financial Years (FYs) 2001–2002 and 2002–2003.





The operating profits of four of these companies are plotted against their respective operating income figures for the FY 2002–2003, in the third chart given below.



3. What is the approximate average operating profit, in FY 2001–2002, of the two companies excluded from the third chart?
- (a) –7.5 crore
(b) 3.5 crore
(c) 25 crore
(d) Cannot be determined

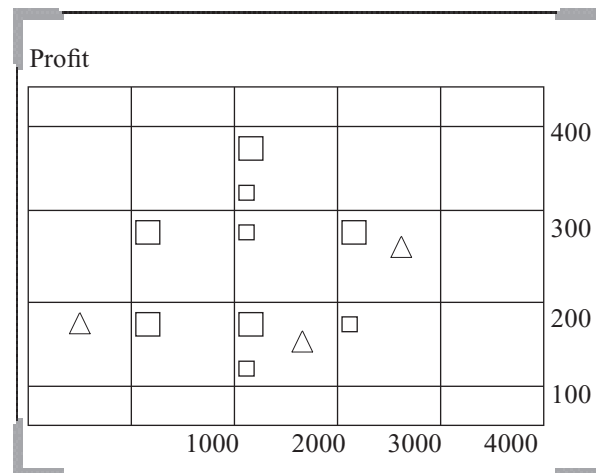
To solve this question, following things are required—

- Understanding of the definitions given above
- Understanding of the above representations of the data-set

The biggest problem one would face while solving this question is how to inter-relate the data given.

CAT 2003 (Leaked)

Each point in the graph below shows the profit and turnover data for a company. Each company belongs to one of the three industries: textile, cement and steel.



4. For how many companies does the profit exceed 10% of the turnover?
- (a) 8 (b) 7
(c) 6 (d) 5

To solve this question, following things are required:

- Understanding of the above representations of the data-set.
- Finding out which one is textile, cement and steel.

(For solution of all these questions refer to CAT papers given in this book.)

- The above examples illustrate a few simple facts:
- Data is an important tool for decision-making and drawing inferences.
- However, having only the data does not serve the purpose; it should be presented in a proper format.
- Despite the data being presented in a proper way, the most important thing is having the capability to interpret it.

CALCULATION TECHNIQUES

Despite the trend at CAT having shifted from easy-to-understand-data-with-difficult-calculations to more logical questions with lesser calculations, it is not advisable to sit for CAT without being reasonably good at quick calculations and approximations.

The importance of a good calculation speed can be understood with the following statistics:

We are taking a sample of a student who attempts 15 questions in DI at CAT. All the figures taken ahead are 'on an average' basis.

Number of calculations/questions

= 4–5 calculation

Hence, the total number of calculations done

= 60–75 calculations

If a calculation takes 6 seconds on an average, then time invested in doing calculations only

= 360–450 secs

= 6–7:30 minutes

Now if we double our calculation speed, we would have 3–4 minutes of extra time. What leverage can be taken from this ‘generated time’ depends totally upon the caliber of the student. Even if a student solves only one question than what he actually would have, and gets it right; the percentile in DI might differ by 1–2 percentile.

Following are the most frequent type of calculations done at CAT—

Addition

This is the most important calculation and takes the lion’s share of the whole calculation section. Addition is also treated as the building block for all the other calculations like subtraction, multiplication etc.

Unfortunately, we don’t have any scut for additions. The only thing that can be done is, practice.

I would suggest a 4×4 table for this practice:

	Column 1	Column 2	Column 3	Column 4
Row 1				
Row 2				
Row 3				
Row 4				

Fill in this table with two digit numbers and add all the columns and rows. To obtain a faster speed, it is advisable that both the digits are added simultaneously. For this, we need to train our mind to retain both the digits of a number simultaneously and then add it in one go with the two digits of the other number.

I would suggest, that rather than adding the unit digit first, add the tens place digit first; and while your brain is adding the tens place digit, your eyes should have captured the unit digit.

Sample table:

	Column 1	Column 2	Column 3	Column 4	
Row 1	36	42	67	98	243
Row 2	46	54	28	72	200
Row 3	58	45	82	89	274
Row 4	49	58	36	92	235
	189	199	213	351	

Rate your calculation speed:

Equal to or less than 15 seconds— Excellent

More than 15 seconds— Less than or equal to 30 seconds— Good

More than 30 seconds— Less than or equal to 60 seconds— Average

More than 60 seconds— A lot work is needed

The above given time includes time for writing the sum and it does not consider the time taken for creating the table and putting values inside it.

The idea is that if, $3 + 4 = 7$ can be done without any effort (ask yourself after doing the addition if did you put any effort), then we could be in a position to do $79 + 68 = 147$ also without any effort. And with this practice exercise, we want to achieve the same.

Subtraction

Once we attain a good speed in addition, subtraction too will become fast as a natural outcome.

Multiplication

Here, again addition is the key. However, it is advisable to know the basics of Vedic maths for multiplication.

Some of the methods are given below:

Base Method

In this method of multiplication, we use a number as a base, like 10, 50, 100 etc. We should try to assume the base that is closer to both the numbers.

Examples

1. 105×107

Both the numbers are close to 100, so let us assume 100 as the base. We will now find the deficit/surplus from the base.

Base = 100, Surplus = 5 and 7

$$\begin{array}{r|l}
 105 & +5 \\
 107 & +7 \\
 \hline
 112 & 35
 \end{array}$$

Right part (after slash) is the product of the surplus. Since base = 100 and surplus are 5 and 7, so product would be $5 \times 7 = 35$.

Left part (before slash) could be either number plus surplus of the other multiplicand. Hence left part would be either $(105 + 7)$ or $(107 + 5) = 112$ (both will always be the same) i.e., 112.

Left part would be the equivalent to Number $\times$ 100. In this case, $112 \times 100 = 11200$

Now we will add both the right part and the left part = $11200 + 35 = 11235$

Hence, the result of the multiplication would be 11235.

Example

2. 97×102

$$\begin{array}{r|l}
 97 & -3 \\
 102 & +2 \\
 \hline
 99 & -06
 \end{array}$$

97×102

Base = 100, Deficit = $97 - 100 = -3$,

Surplus = $102 - 100 = 2$

Right part will now be $(-3) \times 2$ i.e., -06 . To take care of the negative we will borrow 1 from the left part, which is equivalent to borrowing 100 (because we are borrowing from the hundred digits of the left part). Thus this part will be $100 - 06 = 94$.

So, the answer = 9894

Place value Method

In this method of multiplication, every digit is assigned a place value and we do the multiplication by equating the place values of multiplicands with the place value of the product.

Examples

$$\begin{array}{r}
 1_3 \ 2_3 \ 5_1 \ 4_0 \\
 \times \ 3_3 \ 3_2 \ 2_1 \ 1_0 \\
 \hline
 6 \ 5 \ 4 \ 3 \ 2 \ 1 \ 0
 \end{array}$$

Conventionally, the unit digit is assigned a place value of 0, tens place digit is assigned a place value of 1, hundreds place digit is assigned a place value of 2, thousands place digits is assigned a place value of 4 and so on.

Now, this multiplication is a two-step process:

Step 1—Add the place values of digits of the numbers given (1254×3321) to obtain the place value of the digits of the product.

For example, using the place values of the multiplicands i.e., using 0, 1, 2 and 3 of the number 1254 and the same place values 0, 1, 2 and 3 of the other multiplicand 3321, we can get 0 place value in the product in just one way i.e., adding 0 and 0.

$$\begin{array}{r}
 1_3 \ 2_3 \ 5_1 \ 4_0 \\
 \times \ 3_3 \ 3_2 \ 2_1 \ 1_0 \\
 \hline
 6 \ 5 \ 4 \ 3 \ 2 \ 1 \ 0
 \end{array}$$

Place value 1 in the product can be obtained in two ways:

$$\begin{array}{r}
 1_3 \ 2_3 \ 5_1 \ 4_0 \\
 \times \ 3_3 \ 3_2 \ 2_1 \ 1_0 \\
 \hline
 6 \ 5 \ 4 \ 3 \ 2 \ 1 \ 0
 \end{array}$$

Place value 2 can be obtained in three ways:

$$\begin{array}{r}
 1_3 \ 2_3 \ 5_1 \ 4_0 \\
 \times \ 3_3 \ 3_2 \ 2_1 \ 1_0 \\
 \hline
 6 \ 5 \ 4 \ 3 \ 2 \ 1 \ 0
 \end{array}$$

Place value 3 can be obtained in four ways:

$$\begin{array}{r}
 1_3 \quad 2_3 \quad 5_1 \quad 4_0 \\
 \times \quad 3_3 \quad 3_2 \quad 2_1 \quad 1_0 \\
 \hline
 6 \quad 5 \quad 4 \quad 3 \quad 2 \quad 1 \quad 0
 \end{array}$$

Place value 4 can be obtained in three ways:

$$\begin{array}{r}
 1_3 \quad 2_3 \quad 5_1 \quad 4_0 \\
 \times \quad 3_3 \quad 3_2 \quad 2_1 \quad 1_0 \\
 \hline
 6 \quad 5 \quad 4 \quad 3 \quad 2 \quad 1 \quad 0
 \end{array}$$

Place value 5 can be obtained in two ways:

$$\begin{array}{r}
 1_3 \quad 2_3 \quad 5_1 \quad 4_0 \\
 \times \quad 3_3 \quad 3_2 \quad 2_1 \quad 1_0 \\
 \hline
 6 \quad 5 \quad 4 \quad 3 \quad 2 \quad 1 \quad 0
 \end{array}$$

Place value 6 can be obtained in one way:

$$\begin{array}{r}
 1_3 \quad 2_3 \quad 5_1 \quad 4_0 \\
 \times \quad 3_3 \quad 3_2 \quad 2_1 \quad 1_0 \\
 \hline
 6 \quad 5 \quad 4 \quad 3 \quad 2 \quad 1 \quad 0
 \end{array}$$

And this is the maximum place value that can be obtained.

Step 2—Now multiply the corresponding numbers one by one.

$$\begin{array}{r}
 1_3 \quad 2_3 \quad 5_1 \quad 4_0 \\
 \times \quad 3_3 \quad 3_2 \quad 2_1 \quad 1_0 \\
 \hline
 6 \quad 5 \quad 4 \quad 3 \quad 2 \quad 1 \quad 4_0
 \end{array}$$

$$\begin{array}{r}
 1_3 \quad 2_3 \quad 5_1 \quad 4_0 \\
 \times \quad 3_3 \quad 3_2 \quad 2_1 \quad 1_0 \\
 \hline
 6 \quad 5 \quad 4 \quad 3 \quad 2 \quad 3_1 \quad 4_0
 \end{array}$$

$$\begin{array}{r}
 1_3 \quad 2_3 \quad 5_1 \quad 4_0 \\
 \times \quad 3_3 \quad 3_2 \quad 2_1 \quad 1_0 \\
 \hline
 6 \quad 5 \quad 4 \quad 3 \quad 5_2 \quad 3_1 \quad 4_0
 \end{array}$$

$$\begin{array}{r}
 1_3 \quad 2_3 \quad 5_1 \quad 4_0 \\
 \times \quad 3_3 \quad 3_2 \quad 2_1 \quad 1_0 \\
 \hline
 6 \quad 5 \quad 4 \quad 4_3 \quad 5_2 \quad 3_1 \quad 4_0
 \end{array}$$

And so on, we can find the product = 4164534

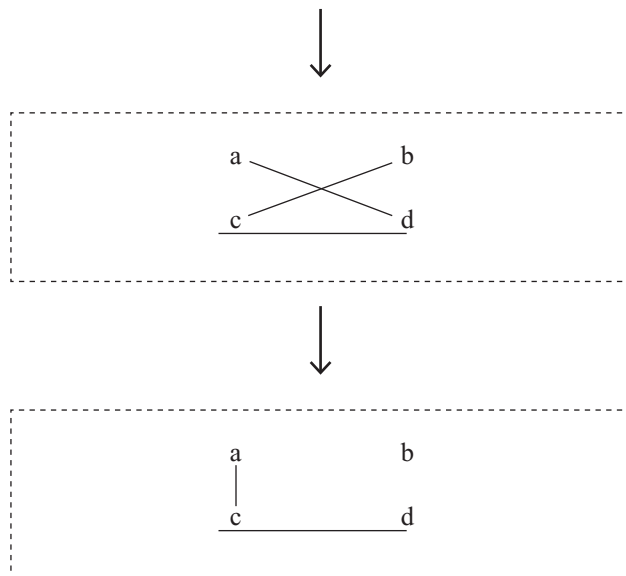
This method is most useful in case of multiplications of 2 digits $\times$ 2 digits or 2 digits $\times$ 3 digits or 3 digits $\times$ 3 digits multiplication.

Example

3. $ab \times cd$

$$\begin{array}{r}
 a \quad b \\
 \times \quad c \quad d \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 a \quad b \\
 \times \quad c \quad d \\
 \hline
 \end{array}$$



Similarly, we can have a proper mechanism for multiplication of 2 digits $\times$ 3 digits or 3 digits $\times$ 3 digits using the above given place value method.

Division

Most of the division calculations can be done by approximation techniques without actually finding the original value.

Example

$$\frac{3548}{4182}$$

Let us approximate this value.

There are three golden rules of approximation:

1. Range of approximation should be $\pm 2\%$ with respect to the actual result.
2. Approximation should be done only if the options are at a considerable gap, say $\pm 5\%$ at least.
3. One of the key things to be kept in mind while doing approximation is the direction of the approximation i.e., one should know if the actual result will be more or less than the approximated result.

We should know that in any division, if the numerator and the denominator are both either increased or decreased by the same percentage, then the result will be exactly the same. While it is practically not possible to find such situations always, we will use this to know

the direction while doing approximation for the above calculation:

Approximation 1

Eliminate the unit digit of both the numerator and the denominator

$$\frac{3548}{4182} \approx \frac{354}{418}$$

Now, the objective is to break the numerator into the parts of the denominator.

$$354 = 209(50\% \text{ of } 418) + 145$$

$$145 = 105(25\% \text{ of } 418 \text{ approx.}) + 40$$

$$40 = 10\% \text{ of } 418$$

$$\text{Hence, net value} = 85\% = 0.85$$

Is this value more or less than the actual value?

Let us compare it with the actual result = 0.8483, which is a slightly less than the approximated result of ours.

Approximation 2

Eliminate the unit and tens place digit of both the numerator and the denominator

$$\frac{3548}{4182} \approx \frac{35}{41}$$

$$35 = 20.5(50\% \text{ of } 41) + 14.5$$

$$14.5 = 12(30\% \text{ of } 40 \text{ approx.}) + 2.5 = 30\% \text{ of } 41 + 6\% \text{ of } 41(\text{approx.})$$

$$[\text{Since } 0.41 = 1\% \text{ of } 41]$$

Hence, net value = 86% = 0.86. This is slightly more than the actual value.

Ratio Comparison

This is one of the most important calculations and is very extensively sought after in DI. On an average, while performing 100 odd calculations in DI, at least 8–10 calculations will be on comparing the ratios. Normally there are two methods for comparing two or more than two ratios:

Cross Multiplication Method

This is one of the conventional methods of comparing two ratios.

Example

Let us compare 11/15 and 13/18.

$$\frac{11}{15} \quad \frac{13}{18}$$

Cross multiplying the numerator of the 1st fraction with the denominator of the 2nd fraction and denominator of the 1st fraction with the numerator of the 2nd fraction,

$$\frac{11 \times 18}{198} \quad \frac{13 \times 15}{195}$$

Since, 198 is greater than 195; so the 1st fraction (11/15) is greater than the 2nd fraction (13/18).

Decimal Calculation Method

$$\frac{11}{15} = 0.7333 \quad \frac{13}{18} = 0.722$$

Obviously, here the 1st fraction $\left(\frac{11}{15}\right)$ is greater than the 2nd fraction $\left(\frac{13}{18}\right)$.

However, if we have to compare 3156/5438 and 3423/5822, then using any of the above two methods becomes cumbersome and a good amount of time will be required.

Here, we will compare ratios with the help of percentage.

Percentage Comparison Method

Let us first understand this with the help of the following ratios:

1st Case

$$\frac{10}{15} \xrightarrow{100\%} \frac{20}{30}$$

2nd Case

$$\frac{10}{15} \xrightarrow{100\%} \frac{30}{30}$$

3rd Case

$$\frac{10}{15} \xrightarrow{300\%} \frac{30}{60}$$

In the 1st case, percentage change in numerator (100%↑) = percentage change in denominator (100%↑), So ratios are equal.

In the 2nd case, percentage change in the numerator (200%↑) > percentage change in the denominator (100%↑). So the 2nd ratio is greater than the 1st ratio.

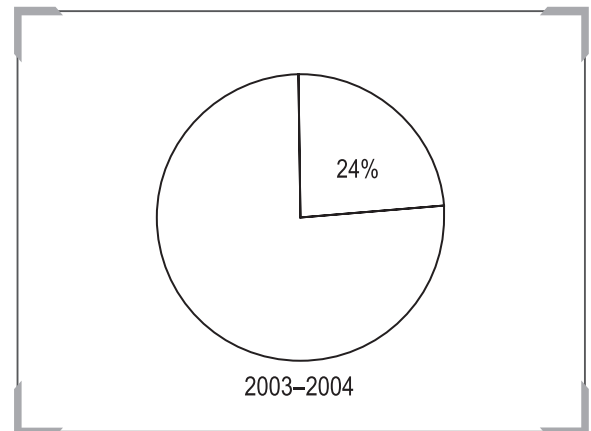
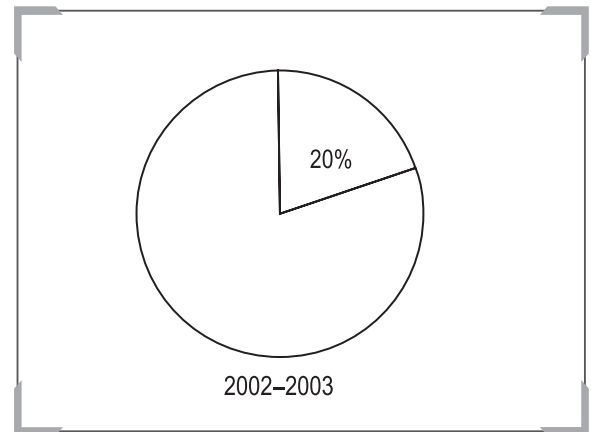
In the 3rd case, percentage change in the numerator (200%↑) < percentage change in the denominator (300%↑). So the 1st ratio is greater than the 2nd ratio.

This particular example can also be seen as a general rule for determining the order of ratios.

Besides these general calculation techniques, there are certain techniques specific to particular types of data presentation formats:

Pie Chart Calculation Technique

The following figure shows the sales of *Due North Inc.* for the year 2002–2003 and 2003–2004. It is also given that the share of North India in the total sales figure is 20% and 24% for the two respective years.



The total sales for 2002–2003 is ₹1202 crores and for 2003–2004, it is ₹1381 crores.

Question

What is the percentage growth in the sales value of North India in 2003–2004 over the sales value of 2002–2003?

Solution

The normal way of doing this question is –

Sales value of North India in 2002–2003
= ₹240.4 crores

Sales value of North India in 2003–2004
= ₹331.4 crores

So, growth = ₹91 crore

So, Percentage growth =

$$\frac{\text{Growth}}{\text{Initial Value}} \times 100 = 37.93\%$$

Alternatively, there are percentage increases in two factors of the given pie-charts, i.e., share is increasing from 20% to 24% and then the total sales value is increasing from ₹1202 crores to ₹1381 crores.

Rather than calculating the sales value of the individual years, we can directly calculate the net percentage change by calculating the percentage changes independently in the above mentioned two factors.

Percentage growth in share = 20%

$$\left(\frac{\text{Growth} \times 100}{\text{Initial Value}}; \text{and remember that it is not } 4\% \right)$$

Percentage growth in total value $\cong$ 15% approx.

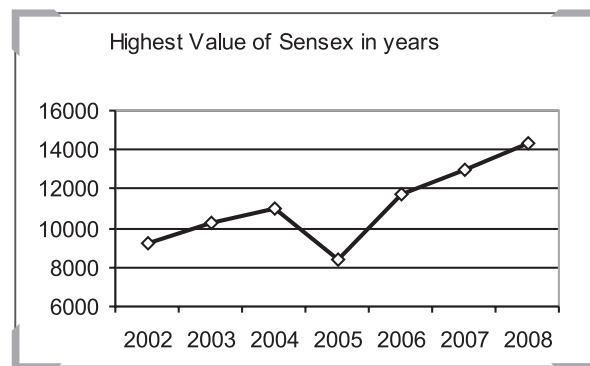
So, $100 \rightarrow 20\% \uparrow \rightarrow 120 \rightarrow 15\% \uparrow \rightarrow 138$, OR
 $100 \rightarrow 15\% \uparrow \rightarrow 115 \rightarrow 20\% \uparrow \rightarrow 138$

So, net percentage growth = 38%

Line Chart/Bar Chart

In case of line charts bar charts, understanding the process of slope calculation between two consecutive periods/constituents/segments, can give us the highest or lowest percentage change in the whole chart.

Example



Question

When does the highest percentage increase occur between any two years during the whole period?

Solution

Let us start by going through the slopes of different lines joining the two values.

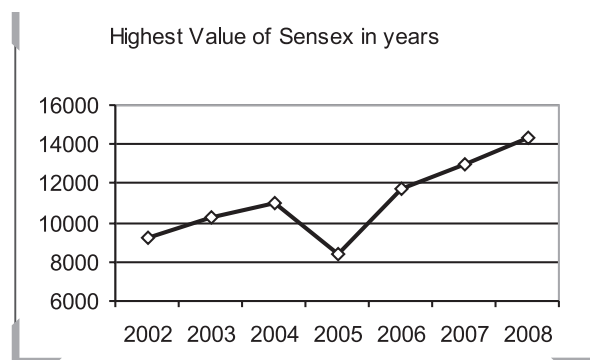
(Slope is defined as the tangent of the angle formed by the line in an anti-clockwise direction with the X-axis.)

If we find out the angle at the place of slope, it will serve the purpose.

It can be seen in the above line chart that the angle between 2005 and 2006 is the highest. Hence, the maximum percentage increase occurs during 2005–2006.

What is to be done if the angle formed between the two different periods is almost the same?

Let us see this through a final example:



In the line chart given above, the line between 2006–2007–2008 is almost straight; hence the slope is almost the same. But, as we can see, the base

(or, denominator) is lower in 2005 than in 2006, hence, the percentage increase in 2005–2006 will be higher than 2006–2007.

Whatever we have discussed till now about line charts is true for bar charts as well.

CONNECTING DIFFERENT DATA-SETS

We have seen in Chapter 1, Introduction to Data Interpretation, that there exists a certain relationship among almost all the data presentation formats, it is quite possible to convert a data-set given in one format to a data-set in another format.

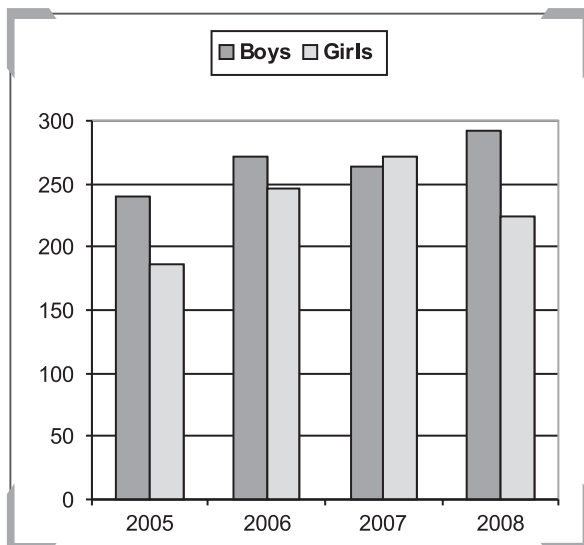
Example

A number of boys and girls passed out from a school during 2005–2007:

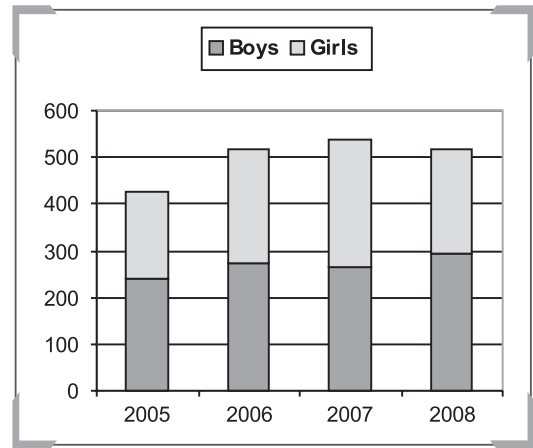
Tabular Presentation

	Boys	Girls
2005	240	186
2006	272	246
2007	264	272
2008	292	224

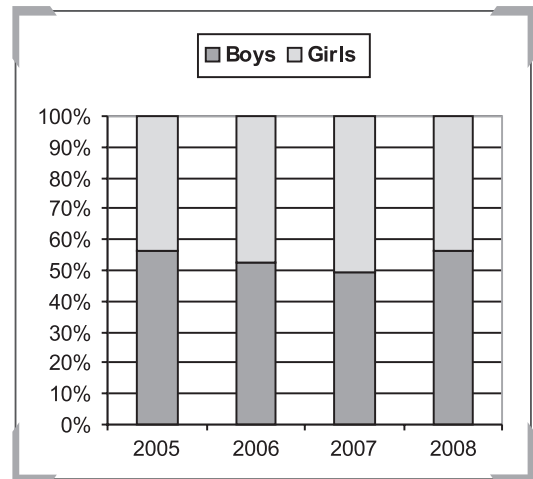
Bar Chart



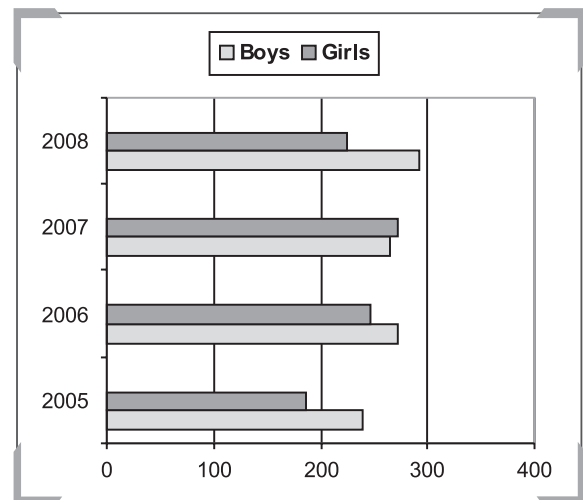
Value-Wise Stacked Bar Chart

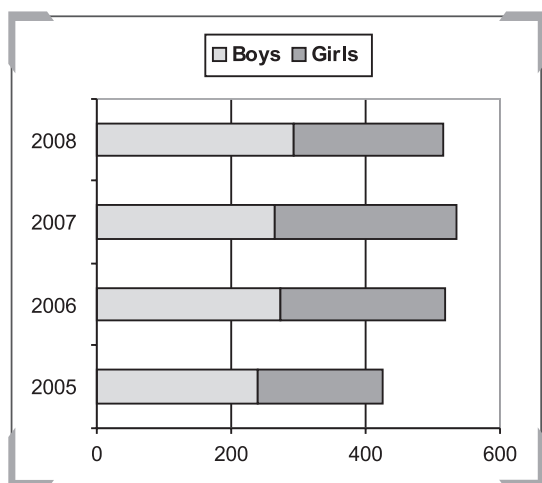
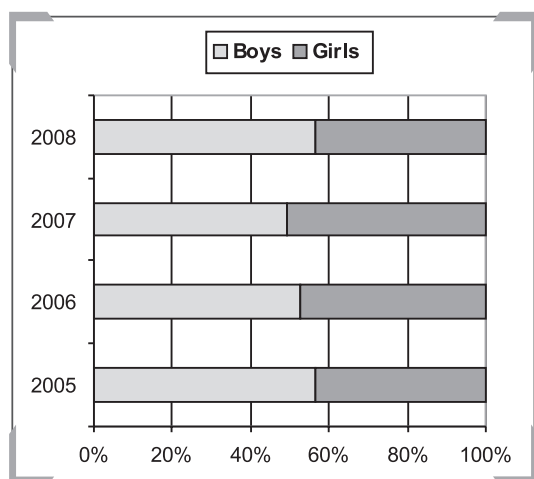
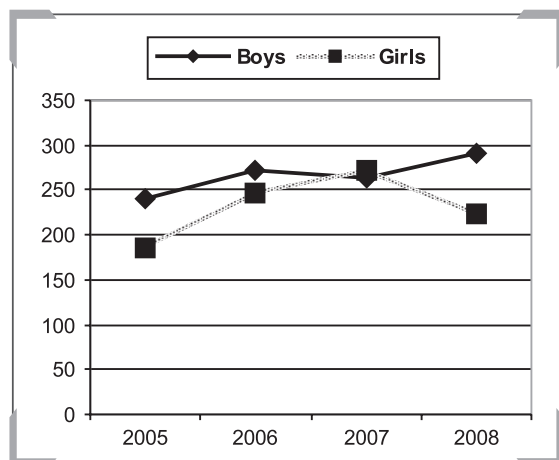
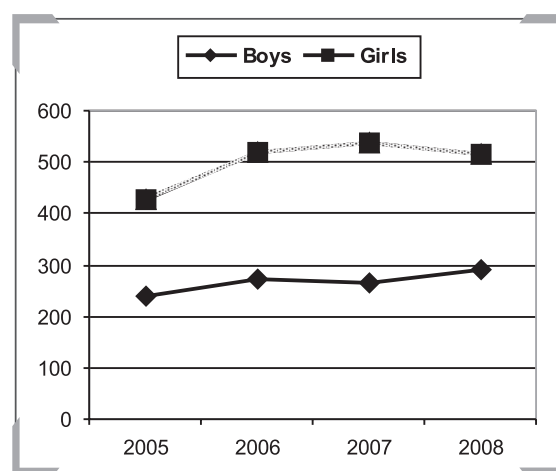
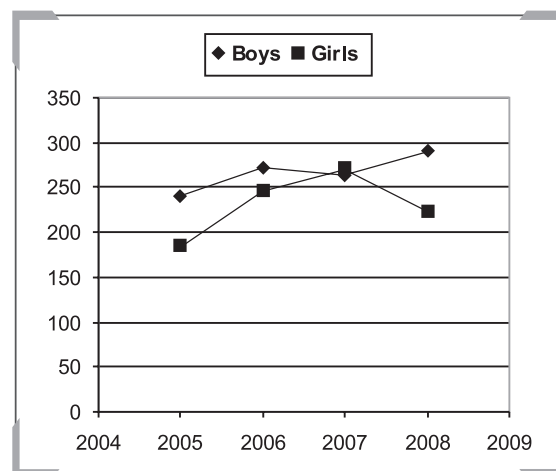
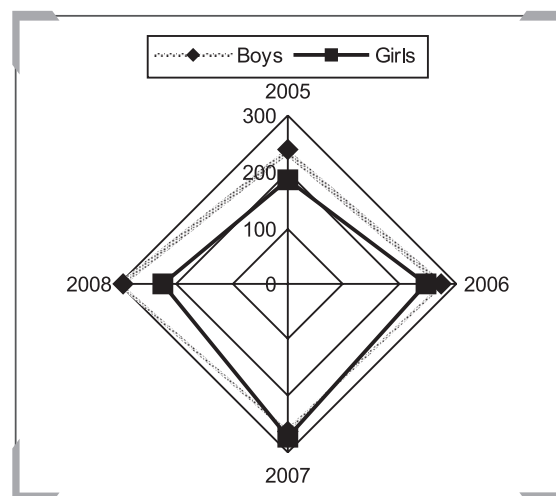


Percentage-wise Stacked Bar Chart

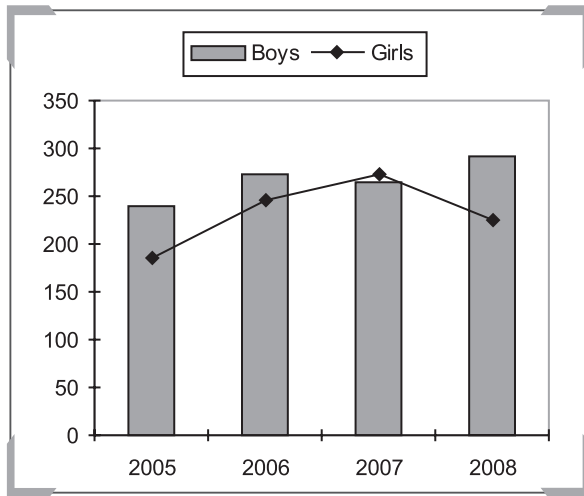


Horizontal Bar Chart

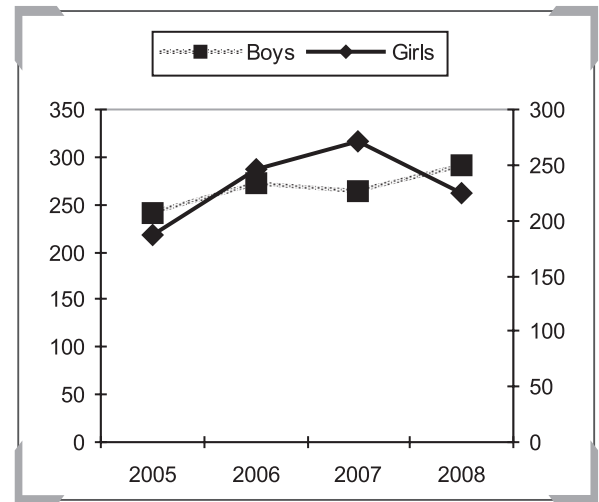


Horizontal Value-wise Stacked Bar Chart**Horizontal Percentage-wise Stacked Bar Chart****Line Chart****Stacked Line Chart****Line chart (with dots)****Radar Diagram**

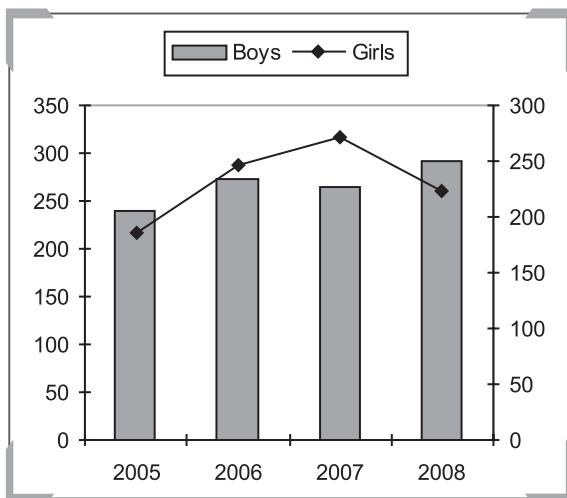
Combination Chart (Line Chart + Bar Chart)



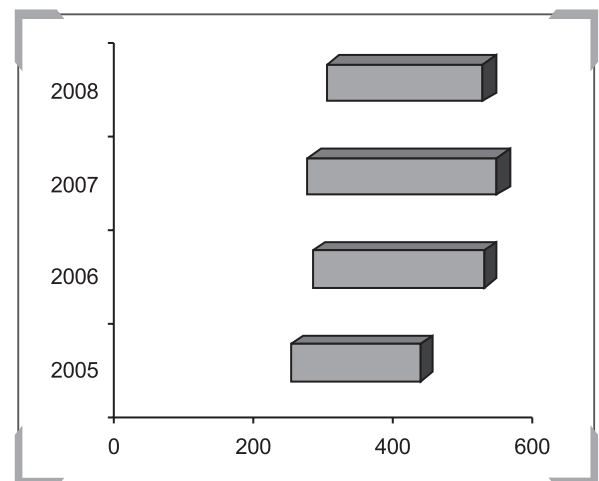
Line Chart with Independent Axes



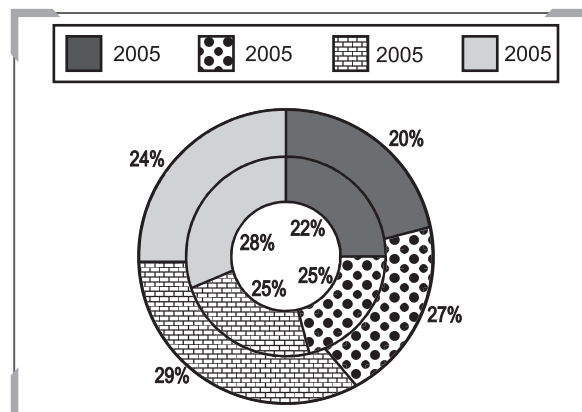
Combination Chart (Line Chart + Bar Chart) with Independent Axes



Floating Diagram



Doughnut Graph

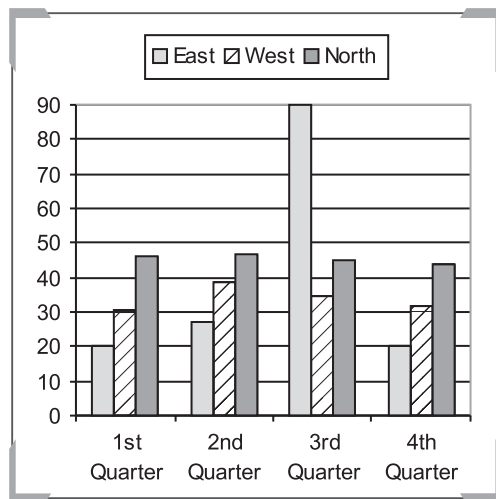


PRACTICE EXERCISE 1

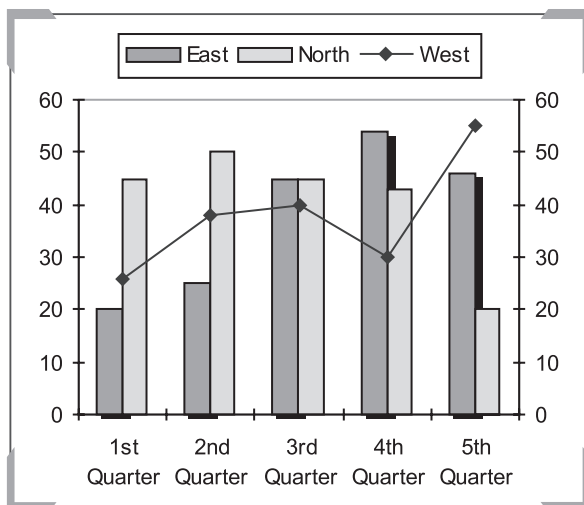
1. Convert the following table into (i) bar chart (ii) line chart (iii) set of pie charts.

	BJP+	Congress	Communist	RJD+	Others
1996	154	214	38	32	72
1999	198	172	46	46	56
2004	234	146	52	42	34

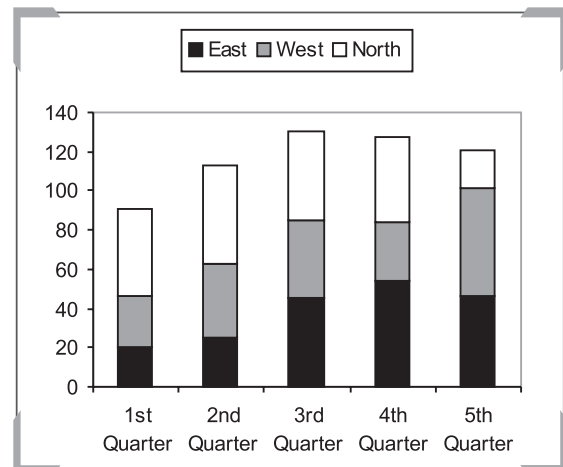
2. Convert the above given table into a line chart with two different axes—BJP on one axis and all the other parties on the second axis.
3. Convert the below given bar chart into (i) line chart (ii) table



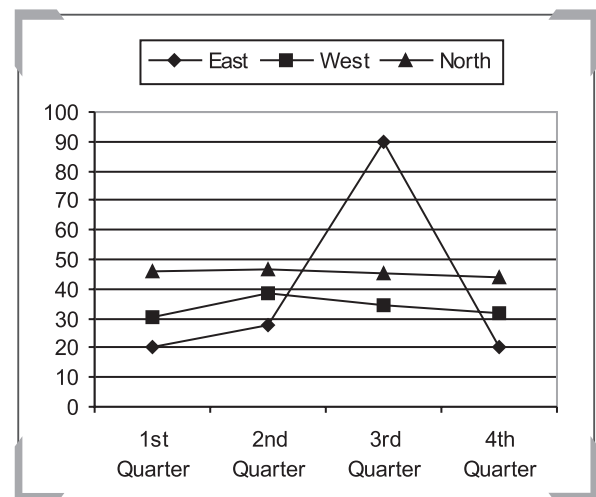
4. Convert the below given line chart on two axes into (i) line chart on a single axis (ii) table (iii) bar chart.



5. Convert the below given stacked bar chart into (i) normal bar chart (ii) line chart (iii) pie charts.



6. Convert the below given line chart into (i) bar chart (ii) stacked bar chart (iii) pie charts.



7. Rank the following ratios in descending order (without actual calculation):

$3426/4536$ $3754/4765$
 $3954/4865$ $4024/5128$
 $3136/4129$

8. Rank the following ratios in ascending order (without actual calculation):

$7324/6453$
 $7212/6123$
 $8345/7128$
 $8523/7027$
 $6873/5896$

Chapter

19

DATA SUFFICIENCY

LEARNING Objectives

In this chapter, you will learn:

- ☐ How does a typical Data Sufficiency question look like
 - ☐ Similarity/Dissimilarity between Data Sufficiency questions and Quantitative Aptitude questions
 - ☐ Various do's and don'ts of solving Data Sufficiency questions
 - ☐ Process of solving the questions
-

DATA SUFFICIENCY QUESTIONS

Data Sufficiency questions are designed to test the student's ability to reason with a limited set of data and to reach a valid conclusion. To solve data sufficiency questions, we should have a clear understanding of the different situations that might come with the questions. Besides, we should be clear with the format of the possible questions and various do's and don'ts related to the above situation and solution.

In most of the cases, a data sufficiency question will have the following structure:

Q. A question will be asked.

Statement 1 – One set of information will be given.

Statement 2 – Another set of information will be given.

On the basis of the statements, four or five different options will be provided. One of those options will be the most probable choice and hence the answer.

Significance of Data Sufficiency

In post MBA life, a manager is virtually burdened with the weight of the data—sometimes organized and

sometimes unorganized. DS questions test the ability of the future managers to prune the data to make decisions. Apart from testing the decision making ability of the individual, DS questions also try to evaluate the ability of the student to see into the future that is visualize and predict what can happen in the next 2–3 minutes. Try to understand this—We might find the answer to the question asked in 2–3 minutes time with the help of the given statements, but can we find out the answer right away without actually investing those 2–3 minutes. So, the question now is—Can we predict correctly what is going to happen in the next 2–3 minutes without actually living those 2–3 minutes?

A data sufficiency question is designed—by virtue of its design and content—in such a way that it essentially checks students' ability to reason out. In most of the cases of DS questions, basic concepts of Quantitative Aptitude will be required.

Various do's and don'ts of Data Sufficiency

The process to solve the DS questions is a bit different from the process involved in solving the QA or LR/DI questions. There are certain key things that we should

keep in mind before solving the DS questions. Let us look at them one by one:

1. Understanding the options

This is the first step in solving the DS questions. One must go through the options and understand them clearly. Sometimes, the options given in data set themselves can become a perennial source of problem.

Let us understand the statements given in the options:

If the option statement reads like—“If the question can be solved by using only one of the statements alone, but not by the other statement alone”.

It means—Out of the given two (or, more) statements, only one statement can answer the question given, and the other statement cannot give the answer to the question given. In this case either the first statement will give the answer or the second one, but not both simultaneously i.e., if the first statement can give the answer, then second statement cannot give the answer and vice-versa.

If the option statement reads like— “If the question can be solved by using either of the statements alone”.

It means—Out of the given two (or more) statements, the question can be solved by using any one of the statements alone. In this case either first statement will give the answer or the second one used individually and independently.

If the option statement reads like — “If the question can be solved by using both (or all) the statements together, but not by either of the statements alone”.

It means—Out of the given two (or more) statements, the question can be solved only if the information given in both (or all) the statements is used together. And, using only one of the statements alone cannot solve the given question.

If the statement reads like— “If the question cannot be solved by even using both the statements together”.

It means—Out of the given two (or more) statements, the question cannot be solved even by using the information given in both (or all) the statements together.

Once you have understood the statements given in the options, you must not forget to see which statement corresponds to which option. CAT is known to introduce the surprise element quite often, and this also can be one of those surprises which might catch you unaware if you are not careful about this basic fact.

2. General awareness/assumptions are not allowed

As an unproclaimed rule, the element of general awareness cannot be used to solve the DS questions. However this is also true for QA and LR /OI, but its importance in DS increases manifold.

Let us understand this with an example:

Example 1

Is New Delhi the most polluted city in India?

Statement 1 – The Capital of India is the most polluted city in India.

Statement 2 – New Delhi is the capital.

Solution

Well, we can understand that statement 1 alone cannot answer the question, as it is not given that New Delhi is the capital of India.

If your answer is “Both the statements together can answer the question”, think again. It is not given in statement 2 that New Delhi is the capital of India.

So, answer to this question is “Cannot be determined.”

However, we should have a clear idea regarding the differences between a universal fact like “Pythagoras theorem” and general awareness like “New Delhi is the capital of India”.

Universal facts like mathematical principles are not the general awareness stuff, and hence can be used.

Example 2

In how many days A and B working together can finish a work?

Statement 1—A can finish the same work alone in 10 days.

Statement 2—B can finish the same work alone in 15 days.

Solution

Understandably, we cannot have a unique answer to this question by using the statements alone. However, in this case we cannot solve this question even by using both the statement together.

FLAW DETECTOR—Had this question been a question in Quantitative Aptitude, we must have got the answer by using the methods of time and work. However, in this case of data sufficiency, since it is not given that A and B start working together and kept on working together till the work is finished, we cannot solve this question even by using both the statements together.

And we cannot make assumptions that they started working together and kept on working till the work is finished.

Answer should be unique

This is one aspect that makes the process of solving the DS questions different from the process of solving QA or DI/LR questions. While in case of QA, we can have multiple values of a variable; in DS there should be only one value of any variable or constant given.

Example 3

What is the value of x ?

Statement 1— $x^2 - 5x + 6 = 0$

Statement 2— $x^2 + 2x - 15 = 0$

Solution

Using statement 1, value of $x = 2, 3$

Since we are not getting unique value of x using statement 1 alone, we will say that statement 1 alone is not sufficient to give the answer.

Using statement 2, value of $x = -5, 3$

Since we are not getting unique value of x using statement 2 alone, we will say that statement 2 alone is not sufficient to give the answer.

Till now we have seen that using the statements alone is not sufficient to find the answer. Hence, we will move on to using both the statements together.

Using statement 1 and 2 simultaneously, we get a common unique value of $x = 3$.

Hence, “both the statements together are needed to answer the question.”

Example 4

What is the value of x , where x is the length of a rectangle?

Statement 1— $x^2 - 5x + 6 = 0$

Statement 2— $x^2 + 2x - 15 = 0$

Solution

Using statement 1, value of $x = 2, 3$

Since we are not getting unique value of x using statement 1 alone, we will say that statement 1 alone is not sufficient to give the answer.

Using statement 2, value of $x = -5, 3$

x being the length of the rectangle, it cannot be negative. Hence, $x = 3$ is the unique answer that we are getting using statement 2 alone.

Concern for the answer, and not the technicalities

Quite a few times it has been observed that students, rather than solving the questions, tend to get into the technicalities of the data. This furthers students’ ‘emotional attachment’ with the question ending up in the wastage of time and efforts.

Example 5

Can we fill up a big drum of 2000 litres capacity with exactly 88 litres of water (there is unlimited supply of water)?

Statement 1—There is a bucket having a of capacity 20 litres.

Statement 2—There is a bucket having a of capacity 50 litres and a mug of 3 litres capacity.

Solution

Using statement 1, we can fill anything in the multiples of 20 litres only. And it can never be ascertained that the drum has exactly 88 litres of water. So, answer to the question is—We may or may not be able to fill up a big drum with exactly 88 litres of water. And whatever the quantity of the water in the drum is, we can not be sure if this is exactly 88 litres of water.

Using statement 2, we can fill the drum exactly with 88 litres of water ($50 + 50 - 3 - 3 - 3 - 3$). Hence, answer to the question is—Yes, we can fill up a big drum with exactly 88 litres of water.

So, we can find the answer using statement 2 alone.

Example 6

Is $y > x$?

Statement 1— $x^2 > y^2$.

Statement 2— $x^3 > y^3$.

Solution

Using statement 1, assuming some of the values of x and y can tell us that in some cases $x > y$ and in some of the cases $y > x$.

x	y	Remarks
5	4	$x > y$
-5	-4	$y > x$

While assuming the values, we can take only those values of x and y that satisfy the given statement.

Using statement 2,

$$\begin{aligned} & x^3 > y^3 \\ \Rightarrow & x > y \end{aligned}$$

Now look at the question. Obviously, we are getting an answer that y is not greater than x .

Hence, statement 2 alone is sufficient to answer the question.

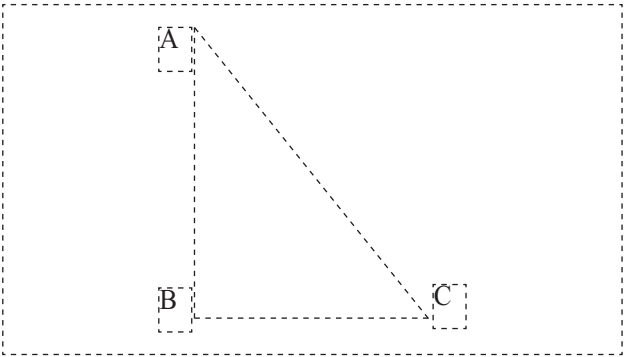
Look for the obvious, but don't miss the hidden

Looking at any of the statements gives us an idea of the facts given, and sometimes we get so enamored with these obvious facts that we fail to see something hidden. Evidently, there is no point saying that "You should not make silly mistakes" (because nobody does it intentionally anyway. However, we can reduce the incidences of these silly mistakes or missing some hidden information.

Some of the precautions that must be taken while tackling any DS question:

1. While assuming the values, take different set of values (like positive, negative, fractions between 0 and 1) to make an informed decision.

2. Any geometrical figure should not be taken as accurate unless it is given. For example, the below given triangle ABC given below cannot be taken as a right-angled triangle even though it appears to be so.



Hence, no conclusion should be drawn by finding proportionate value of length or the angle in any geometrical figure unless such are clearly stated.

Example 7

Is Arvind the father of Puja?

- Statement 1 — Puja is the daughter of Arvind.
Statement 2 — Arvind is the aunt of Abhishek.

Solution

Using statement 1, despite the fact that Puja is the daughter of Arvind, we cannot conclude that Arvind is the father of Puja. Arvind can be the mother too.

Using statement 2, in first impression statement 2 seems to be irrelevant, but looking closely at this statement gives us an idea that Arvind is a woman (only women can be aunts). And hence, we can conclude that Arvind is not the father of Puja.

Therefore, statement 2 alone is sufficient to answer the question.

PRACTICE EXERCISE 1

Directions for questions 1 to 25: Each item is followed by two statements, A and B. Answer each question using the following instructions.

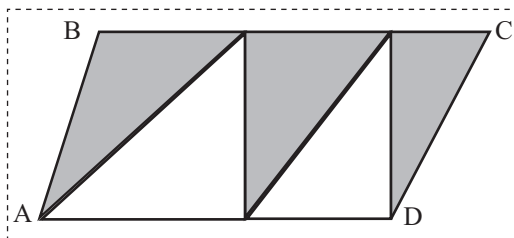
Choose (a) If the question can be answered by one of the statements alone and not by the other.

Choose (b) If the question can be answered by using either statement alone.

Choose (c) If the question can be answered by using both the statements together, but cannot be using either statement alone.

Choose (d) If the question cannot be answered even by using both the statements together.

1. Is the point P on the circle with center O?
 - A. Q is a point on the circle and the distance from P to Q is equal to the distance from O to Q.
 - B. Q is on the circle and PQO is an equilateral triangle.
2. Is Arvind the father of Puja?
 - A. Puja is the daughter of Arvind.
 - B. Arvind is the brother of Abhishek.
3. If the ratio of boys to girls attending school in 2000 was $\frac{1}{3}$, what was the ratio of boys to girls attending school in 2001?
 - A. 100 more boys were attending school in 2001 than in 2000.
 - B. 150 more girls were attending school in 2001 than in 2000.
4. If a and b are positive numbers, is $b > a$?
 - A. $a^2 > b$
 - B. $a^2 > b^2$
5. What is the area of the unshaded region in the given figure (Points E, F are on the line BC and point G is on the line AD)?



- A. ABCD is a parallelogram.
- B. Area of ABCD is 50 square units.

6. If the integer P divisible by 15?
 - A. Sum of the digits of P equals 15.
 - B. Unit digit of P is 6.
7. Is Q a positive number?
 - A. $4Q + 24 > 0$
 - B. $4Q - 24 < 0$
8. How many chocolate bars, 2 inches wide and 4 inches long can be packed into carton C?
 - A. The inside dimension of carton C are 8 cm by 12 cm.
 - B. The width of carton C is equal to the height and $\frac{3}{4}$ of the length.
9. What are the values of x and y?
 - A. $3x + 2y = 45$
 - B. $y = 22.5 - 1.5x$
10. Is x an even number?
 - A. $4x + 3y$ is an even number.
 - B. $3x + 4y$ is an even number.
11. What is the ratio of the number of boys and girls in a school (Number of boys and girls are natural numbers)?
 - A. Number of boys is 40 more than girls.
 - B. Number of girls is 80% of the number of boys.
12. What is the difference between two numbers?
 - A. First number is 60% of the other number.
 - B. 50% of the sum of first and second number is 24.
13. How many marks did Arpit Sinha obtain in mathematics?
 - A. Arpit Sinha secured on an average 55% marks in mathematics, physics, and chemistry together.
 - B. Arpit Sinha secured 10% marks more in mathematics than the average of mathematics, physics and chemistry.
14. Is $x > y$?
 - A. $\frac{(x^4 - y^4)}{x^3 + y^3} > 0$
 - B. $\frac{x^3 - y^3}{x^4 + y^4} > 0$
15. What is a two digits number?
 - A. The number obtained by interchanging the digits is smaller than the original number by 63.
 - B. Sum of the digits is 11.

16. x , y , and z are integers, is x an odd number?
 A. an odd number is obtained when x is divided by 5.
 B. $(x+y)$ is an odd number.
17. What is the number x ?
 A. The LCM of x and 18 is 36.
 B. The HCF of x and 18 is 2.
18. Is y greater than x ?
 A. $x+y = 2$
 B. $x/y = 2$
19. Which of the four numbers w , x , y , and z is the largest?
 A. The average of w , x , y and z is 25.
 B. The numbers w , x , and y are each less than 24.
20. P , Q , R , and S are four consecutive even integers. What is the value of the largest integer among these?
 A. The average of the four numbers is the first prime number greater than 10.
 B. The ratio between the largest and the smallest of the number is less than 10.
21. Is A greater than B ?
 A. $(A + 3)$ is greater than $(B + 2)$.
 B. Fourth power of A is greater than third power of B .
22. Which of the following is greater: $\frac{a+x}{b+x}$ or $\frac{a}{b}$?
 A. $\frac{a}{b} > 1$
 B. x is positive.
23. How many boys and girls are there in the family of 7 children?
 A. Each boy in the family has as many sisters as brothers.
 B. Each girl in the family has as many brothers as sisters.
24. In how many days does Binod finish a certain work?
 A. Binod is twice as efficient as Amar.
 B. Akshay is twice as efficient as Binod.
25. What is the equation of the straight line AB ?
 A. Straight line AB is perpendicular to another straight line $3x + 5y = 10$
 B. Straight line AB passes through the point $(1, 2)$.

ANSWER KEYS

1. (a)	2. (b)	3. (c)	4. (a)	5. (b)	6. (a)	7. (d)	8. (c)	9. (d)	10. (d)
11. (a)	12. (c)	13. (d)	14. (a)	15. (c)	16. (a)	17. (d)	18. (c)	19. (d)	20. (a)
21. (d)	22. (c)	23. (b)	24. (d)	25. (c)					

HINTS AND EXPLANATIONS

1. Using statement A alone, since it is given that the centre of the circle is O , hence OQ is the radius of the circle. But point Q can be inside the circle or on the circle or outside the circle and in all these cases $OQ = PQ$. Hence, statement A alone does not give the answer.
 Using statement B alone, $PQ = QO = PO =$ Radius of the circle.
 Hence, point P is on the circle.
2. Using statement A alone, Arvind can be father or mother of Puja.
 Using statement B alone, obviously it cannot be solved.
 Using both the statements together, since Arvind is the brother of Abhishek, hence Arvind is a male. Hence Arvind is the father of Puja.
3. Using statement A alone, nothing can be concluded.
 Using statement B alone, nothing can be concluded.
 Using both the statements together, if the ratio of boys to girls in 2000 = $x/3x$, then the new ratio of boys to girls in 2001 = $\frac{x+100}{3x+150}$
 Now everything depends upon the value of x . Hence cannot be determined uniquely.
4. Using statement A alone, depending upon the values of A and B , either can be greater ($A = 10$, $B = 1$ or $A = 5$, $B = 10$) according to the condition given in the statement.
 Using statement B alone, since both the numbers a and b are positive, and $a^2 > b^2$, hence $a > b$.

So, the answer to the question is – No, b is not greater than a .

5. Using both the statements together, since the base and height of ABCD and unshaded region are same, hence the area of unshaded region is half of area (ABCD).
6. Using statement A alone, nothing can be concluded. Numbers can be 195 or 159 etc. Otherwise also, we know that if any number is divisible by 5 and 3 both, then the number will be divisible by 15. If the sum of the digits is 15, then the number is divisible by 3 but nothing can be said about the divisibility of this number by 5.

Using statement B alone, since the unit digit of P is 6, hence this number is not divisible by 5, and hence not divisible by 15.

Answer (a)

7. A. $4Q + 24 > 0$ Or, $4Q > -24$, or, $Q > -6$
Hence, Q can be negative or positive or zero as well.
- B. $4Q - 24 < 0$
Or, $4Q < 24$, or, $Q < 6$

Hence, Q can be negative or positive or zero as well.

9. Using statement A alone, since the equation is in two variables and there is one equation nothing can be concluded.

Using statement B alone, since the equation is in two variables and there is one equation nothing can be concluded.

Using both the equations together, both the equations are same. Hence, cannot be determined.

10. Is x an even number?

- A. $4x + 3y$ is an even number.
B. $3x + 4y$ is an even number.

Using statement A alone, if $4x + 3y$ is an even number then both $4x$ and $3y$ should be either odd or both should be even. Both $4x$ and $3y$ cannot be odd (as $4x$ is even) and hence both of $4x$ and $3y$ are even.

Now even if $4x$ is even, then we cannot conclude that x is even or odd.

Using statement B alone, if $3x + 4y$ is an even number then both $3x$ and $4y$ should be either odd or both should be even.

If each of $3x$ and $4y$ is even, then x can take values like $x = 4/3$, which is neither odd nor even.

If each of $3x$ and $4y$ is odd, then $3x$ is odd. But using this we cannot conclude that x is also odd. x may be a fraction also like $x = 1/3$ or even it can be an odd number.

FLAW DETECTOR—Whenever we are required to assume the values, we should assume the different values viz. Positive nos., negative nos., fractional values and definitely the fractional values between 0 and 1 before validating our result.

11. Using statement A alone, we cannot determine the ratio of boys and girls.

Using statement B alone, Number of girls = $4/5$
Number of boys, now we can find out the ratio of boys and girls in the school.

12. Using statement A, we get the ratio between the two numbers but not the difference between the numbers. Statement B gives the sum of the numbers but not the difference. Using both the statements together gives the difference between the numbers.

13. In none of the statements given marks have been given in terms of numbers, hence we cannot find the marks obtained in mathematics.

14. Using statement A, we cannot determine if $(x^4 - y^4)$ is greater than zero or less than zero since we do not have the sign of $(x^3 + y^3)$. Hence we cannot determine anything.

Using statement B, we cannot determine if

$$(x^3 - y^3) > 0 \text{ since } (x^4 + y^4) > 0.$$

$$(x^3 - y^3) > 0, \text{ so, } x > y.$$

15. Using statement A alone gives that the difference between the digits of the number is 7. This gives the possibility of many numbers like 81, 92 etc.

Using statement B alone also gives the possibility of many numbers.

Using both the statements together, we get a unique number.

16. Using statement A alone, we get that the quotient obtained when x is divided by an odd number is odd. Hence x has to be odd.

Using statement B alone, one of x and y will be odd and other one will be even. So we cannot determine that which of x or y is even?

17. Using statement A, value of x can be $22 \times 30 - 1$. Hence, two values of x are possible.

Using statement B, value of x can be

$$21 \times 30 \times 5N \times 7N \times \dots,$$

where value of N can be any real number.

Using both the statements together, we can see that no unique value of X is possible.

- 18.** Using statement A alone cannot give us any result.

Using statement B alone cannot give us any result since the values of x and y can be positive as well as negative too.

Using both the statements together will give us the result.

- 19.** Using statement A alone cannot give us any result.

Using statement B alone gives that value of three of the given numbers is less than the average. Hence, fourth number will be greater than the average. So, this fourth number is largest.

- 20.** Using statement A alone, average of the given four numbers = 11, hence their sum = 44, hence the numbers will be 8, 10, 12, 14. Hence, the value of largest integer, whichever is that, is 14.

Using statement B alone is not going to give us the result.

PRACTICE EXERCISE 2

Directions for questions 1 to 20: Each item is followed by two statements, A and B. Answer each question using the following instructions.

Choose (a): If the question can be answered by one of the statements alone and not by the other.

Choose (b): If the question can be answered by using either statement alone.

Choose (c): If the question can be answered by using both the statements together, but cannot be using either statement alone.

Choose (d): If the question cannot be answered even by using both the statements together.

1. A, B, C, D are playing cricket and scored 96 runs together. Did A score the maximum runs?
A. A scored 23 runs.
B. B and C together scored 42 runs.
2. Is ab an even number?
A. a is divisible by 3.
B. $(b + 1)$ is divisible by 4.
3. Three teams of woodcutters took part in a competition (to cut the maximum quantity of wood). Which team could win the competition?
A. The first and the third teams cut twice as much as the second team cut.
B. The second and the third teams cut three times as much as the first team cut.
4. If m and n are integers, is m divisible by 11?
A. mn is divisible by 110.
B. n is divisible by 2.
5. On a fishing trip, Sanju and Ajay each caught some fishes. Who caught more fish?
A. Sanju and Ajay caught fishes in the ratio 2 : 3.
B. After Sanju stopped fishing, Ajay continued fishing until he caught 12 fishes.
6. What are the ages of three brothers (ages are natural numbers)?
A. The product of their ages is 21.
B. The sum of their ages is not divisible by 3.
7. Is $5x + 25$ is divisible by 50?
A. x is divisible by 5.
B. x is divisible by 10.
8. How many of a, b, c, d are odd, given that all of them are positive integers?
A. $ad + bc$ is odd.
B. $ac + bd$ is odd.
9. A is not shorter than B, who in turn, is not taller than C who is shorter than D. who among A, B, C and D is the tallest?
A. C and A are of equal height.
B. B and A are of equal height.
10. If Bhushan or Charan passed the examination, then neither Sujan nor Tarun passed the examination. Did Bhushan pass the examination?
A. Tarun did not pass the examination.
B. Sujan passed the examination.
11. Six people—A through F—sit around a circular table, not necessarily in the same order. B and E sit opposite each other. Does C sit opposite D?
A. If C and E interchange their positions, then E will be to the immediate left of B.
B. If A and B interchange their positions, then B will be to the immediate left of E.
12. Average age of a, b, c , and d is 46 years. Who is the oldest among them?
A. c is 91 years old.
B. Ages (in years) of all of them are distinct natural numbers.
13. Product of a, b, c , and d is 1003 (a, b, c and d are all natural numbers). Which one is the largest among them?
A. $a > b > c$
B. $a > b > d$
14. What is the least common multiple of $a \times b, b \times c$ and $c \times a$ (a, b, c are all natural numbers)?
A. least common multiple of a, b and c is 30.
B. The highest common factor of a, b and c is 2.
15. What are the values of m and n ?
A. n is an even integer, m is an odd integer, and m is greater than n .
B. Product of m and n is 30.
16. On a given day, a boat ferried 1500 passengers across the river in 12 hours. How many round trips did it make?
A. The boat can carry 200 passengers at any time.
B. It takes 40 min each way and 20 min of waiting time at each terminal.

17. What is the value of x ?
 A. x and y are unequal even integers, less than 10, and x/y is an odd integers.
 B. x and y are even integers, each less than 10, and product of x and y is 12.
18. What are the ages of two individuals, x and y ?
 A. The age difference between them is 6 years.
 B. The product of their ages is divisible by 6.
19. If m and n are consecutive positive integers, is $m > n$?
 A. $m - 1$ and $n + 1$ are consecutive positive integers.
 B. m is an even integer.
20. Which of a , b , c and d is/are odd?
 A. $ad + bc$ is odd.
 B. $ac + bd$ is odd.

ANSWER KEYS

1. (a) 2. (d) 3. (c) 4. (d) 5. (a) 6. (d) 7. (a) 8. (c) 9. (b) 10. (a)
 11. (c) 12. (c) 13. (a) 14. (d) 15. (d) 16. (a) 17. (d) 18. (d) 19. (a) 20. (a)

HINTS AND EXPLANATIONS

1. Using statement A alone, since the average runs scored by all of them = 24, and runs scored by $A = 23$, hence we can conclude that at least one of remaining three persons must have scored more than the score of A. So, A didn't score maximum runs.
 Using statement B alone cannot give us any result.
2. Using statement A alone cannot give us any result.
 Using statement B alone gives that b is an odd number.
 Using both the statements together we get ab is an odd number.
4. Using statement A, at least one of m or n will be divisible by 11, but we are not sure that which of m or n will be divisible by 11.
 Using statement B, n is divisible by 2 but it does not give that which of m or n is divisible by 11.
 Using both the statements together, we cannot find if m is divisible by 11 or not.
5. Using statement A alone, we can find out that Sanju caught more fishes than Ajay whereas using statement B alone, we cannot find that who caught more fishes.
6. Using statement A alone, ages of the brothers can be $-21, 1, 1$ or $1, 7, 3$. Hence, using statement A alone will not give us the unique answer.
 Using statement B alone also will not give us the result.
- Even after using both the statements together, we cannot find the ages of the brothers as both the possibilities $(21 + 1 + 1)$ and $(1 + 7 + 3)$ are not divisible by 3.
7. Using statement A alone, assuming some values of x ($= 5$ or $= 10$) gives that $5x + 25$ is sometimes divisible and sometimes not divisible.
 Using statement B alone, whatever values of x we take, we see that $5x + 25 = 5(x + 5)$ is not divisible by 10.
8. Using both the statements together, we can find the answer.
9. This question can be answered by using either statement alone.
10. Question can be answered by using the statement B alone but not by statement A alone.
11. Question can be answered by using both the statements together but not by any of the statements alone.
12. Sum of their ages = 184 years.
 Using statement A alone, since the age of C = 91 years, hence sum of ages of rest of them = 93 years. Using this we cannot find that who is oldest of them.
 Using statement B alone we cannot get the answer.
 Using both the statements together, since the age has to be natural number, so minimum possible age of any one of them = 1 year. So, the youngest of them can be 1 year old, second youngest of them

can be 2 years old, hence the maximum age of third person can be 90 years.

So, C is the oldest of them.

13. $1003 = 1 \times 1 \times 17 \times 59$

Using both the statements together, 'a' is the largest one.

14. Using statement A alone, values of a, b and c can be- 2, 3, 5 or 2, 3, 30. Hence, answer cannot be obtained using statement A only.

Using statement B alone, values of a, b and c can be 2, 4, 6 or 4, 6, 8 etc. Hence, answer cannot be obtained using statement B only.

Using both the statements together, values of a, b and c can be - 2, 6, 10 or 6, 10, 30. And we can

see that we are not getting a unique value of $a \times b$, $b \times c$ and $a \times c$.

15. (Don't forget to take the negative values of m and n)
16. This question can be answered by using statement B alone but not by using statement A alone.
17. (Don't forget to take the negative values of x and y)
18. Using statement A alone will not give us the answer.
Using statement B alone will not give us the answer.
Using both the statements together also will not give us the answer.
19. This question can be solved by using statement A alone but not by using statement B alone.

PRACTICE EXERCISE 3

Directions for questions 1 to 17: Each item is followed by two statements, A and B. Answer each question using the following instructions.

Choose (1): If the question can be answered by first statement (statement A) alone but not by the second statement (statement B) alone.

Choose (2): If the question can be answered by second statement (statement B) alone but not by the first statement (statement A) alone.

Choose (3): If the question can be answered by using either statement alone.

Choose (4): If the question can be answered by using both the statements together, but cannot be using either statement alone.

Choose (5): If the question cannot be answered even by using both the statements together.

Now Choose the answer from the given options.

- Is the integer y greater than 4?
A. 2^y is a factor of 8
B. 2^4 is a factor of y
(a) 1 (b) 3
(c) 4 (d) 2
(e) 5
- A sum of ₹215 is distributed among three persons A, B and C. Who gets the least?
A. A gets $\frac{2}{3}$ rd of what (B + C) are getting.
B. B gets $\frac{1}{5}$ th of what (A + C) are getting.
(a) 1 (b) 3
(c) 4 (d) 2
(e) 5
- What is the HCF of natural numbers A and B?
A. LCM of the natural numbers A and B is 101.
B. A and B are distinct natural numbers.
(a) 1 (b) 4
(c) 2 (d) 3
(e) 5
- Ram is the son of Shyam and father of Dharam. All of these people—Ram, Shyam and Dharam are politicians. Is Shyam an honest politician?
A. Sons of all the honest politicians are honest politicians. Ram is an honest politician.
B. Son of only a dishonest politician is a dishonest politician. Dharam is a dishonest politician.
(a) 1 (b) 4
(c) 2 (d) 3
(e) 5
- $y = f(x)$ is said to be an even function if $f(x) = f(-x)$. Is $y = f(x)$ an even function?

A. Graph of $y = f(x)$ lies in only two quadrants and both these quadrants are adjacent to each other.

B. Graph of $y = f(x)$ lies in only two quadrants and both these quadrants are opposite to each other.

- (a) 1 (b) 2
(c) 3 (d) 4
(e) 5

6. In an examination of five papers, marks obtained by Pranav are in the ratio 4 : 5 : 6 : 7 : 8 across the five papers. Each paper carries the same maximum marks. In how many papers did Pranav obtain more than 50% of the maximum marks?

A. Total marks obtained by Pranav in all the papers together is 300 marks.

B. Lowest percentage of marks obtained by Pranav in any of the papers of this examination is 30%.

- (a) 1 (b) 3
(c) 2 (d) 4
(e) 5

7. N is a natural number. Is N a perfect square?

A. When N is divided by 100, remainder obtained is 2.

B. Total number of factors of N is odd.

- (a) 1 (b) 3
(c) 2 (d) 4
(e) 5

8. What is the respective speed of two trains of lengths 70 m and 75 m?

A. They take 35 seconds to cross each other when they are running in the same direction.

B. They take 10 seconds to cross each other when they are running in the opposite direction.

- (a) 1 (b) 3
(c) 2 (d) 4
(e) 5

9. Vijay and Rupesh are two friends working in the same company. Sum of their monthly salaries is more than ₹1 lac per annum. Who saves more per month?

A. Ratio of monthly income of Vijay and Rupesh is 3 : 5.

B. Ratio of monthly expenses of Vijay and Rupesh is 1 : 2.

- (a) 1 (b) 3
(c) 2 (d) 4
(e) 5

10. Is triangle ABC a right-angled triangle?

A. Ratio of length of side AB and side $BC = 3 : 2$

- B. Ratio of length of side BC and side CA = 4 : 5
 (a) 1 (b) 3
 (c) 2 (d) 4
 (e) 5
11. A bus is running with a uniform speed from Patna to Gaya. It met with an accident somewhere enroute. What is the speed of this bus?
 A. Due to this accident, speed of bus got reduced by 22%. And Due to this one bus reached Gaya 40 minutes late.
 B. Had the accident occurred 5 km ahead of the point where the accident occurred, it would have reached Gaya only 20 minutes late.
 (a) 1 (b) 3
 (c) 2 (d) 4
 (e) 5
12. There are five members—P, Q, R, S and T in a family. How many members of this family are male?
 A. T has two sisters—Q and S.
 B. P is the father of T and R is the only son of T.
 (a) 1 (b) 3
 (c) 2 (d) 4
 (e) 5
13. Which month is the current month?
 A. Sum of dates of last Monday of previous month and 1st Thursday of next month is 38 and both the dates are of the same year.
 B. Current year is a leap year and the month in the question is from current year.
 (a) 5 (b) 4
 (c) 3 (d) 2
 (e) 1
14. 1st January 19PQ is Monday, where P and Q are the last two digits of the year in such a way that maximum value of P and Q each is 6. Which is the next year when 1st January will be a Monday?
 A. 19PQ is a leap year.
 B. 19PQ is a non-leap year.
 (a) 1 (b) 3
 (c) 2 (d) 4
 (e) 5
15. A triangle is circumscribed by a circle. Is this triangle a right-angled triangle?
 A. Triangle is isosceles triangle.
 B. One side of the triangle is the largest possible chord of the circle.
 (a) 1 (b) 3
 (c) 2 (d) 4
 (e) 5
16. Triangle ABC is a right angled triangle. What is the distance between circumcentre and the centroid of this triangle ABC?
 A. Inradius of $\Delta ABC = 5$ units
 B. Two smaller sides of the ΔABC are 3 units and 4 units.
 (a) 1 (b) 3
 (c) 2 (d) 4
 (e) 5
17. What is the HCF of $(5a - 1)$ and $(5b - 1)$?
 A. HCF of a and b = 5
 B. a and b are natural numbers.
 (a) 1 (b) 3
 (c) 2 (d) 4
 (e) 5
- Directions for questions 18 to 20: Each item is followed by three statements, A, B and C. Answer each question using the following instructions.**
- Mark (a): if the question can be answered by using any two statements together but not by using any statement alone
- Mark (b): if the question can be answered by using either of the statements alone.
- Mark (c): if the question can be answered only by using all the three statements together and neither by any pair of statements nor by any statement independently.
- Mark (d): if the question cannot be answered using the statements in any case.
- Mark (e): if none of the above four options are correct.
18. A football is kept inside a circular field. What is the probability of this ball being closer to the center of the circle than to the periphery of the ground?
 A. Radius of the circular field is 15 m.
 B. Radius of the football is 5 cm.
 C. Ratio of circumference and diameter of the circle is constant.
19. A and B are running continuously around a circular track with respective uniform speed. They start running from the same point at the same time. After how much time will they meet at the diametrically opposite point of their starting point?
 A. Speed of A is 20 m/s and speed of B is 35 m/s.
 B. Length of the track is 1000 m.
 C. Both A and B are running in the same direction.
20. At how many different points, graph of $f(x) = ax^2 + bx + c = 0$ will cut X- axis?
 A. $a > 0$, $b > 0$ and $c > 0$.
 B. Discriminant of $f(x) < 0$
 C. $a < 0$.

ANSWER KEYS

1. (b)	2. (c)	3. (b)	4. (c)	5. (b)	6. (c)	7. (b)	8. (e)	9. (d)	10. (d)
11. (d)	12. (e)	13. (e)	14. (a)	15. (c)	16. (c)	17. (a)	18. (e)	19. (e)	20. (e)

HINTS AND EXPLANATIONS

- Using statement A, y can have any integer value from 0–3, hence can be determined using statement A alone.
Using statement B, minimum value of y can be 16. And hence y is greater than 4.
- Obviously, using the statements alone will not give the result. However, if we use both the statements together, then we will get the result that who is earning the least.
- Using statement A only gives us two different sets of values of A and B – (101, 101) and (101, 1). So, unique value of HCF cannot be obtained.
Using the statement B only also does not give us a unique number.
However, using both the statements together gives us the values of A and B as – (101, 1). And HCF of these two numbers = 1.
- Using statement A, we cannot find if the fathers of all the honest politicians are honest or not? It is only said that if the father is honest, then the son will be honest; however, it does not mean that son of dishonest politicians cannot be honest. [For more, see the chapter—Logical Link in the 1st part of this book]. So, nothing can be determined on the basis of this statement alone.
Using statement B, since son of only a dishonest politician can be a dishonest politician, hence we can conclude that if a politician is dishonest, then his father will also be dishonest. On the basis of this, if Dharam is dishonest politician then his father Ram is dishonest politician and if Ram is dishonest politician then his father Shyam is dishonest politician. And this answers our question.
- Using statement A, nothing can be inferred about the even or odd nature of the function $y = f(x)$.
Using statement B, since the graph lies in only two quadrants opposite to each other, it cannot be the graph of any even function. Hence, $y = f(x)$ is not an even function.
- Using statement A, since it is not given that what are the maximum marks for each of the papers, hence just by knowing that 300 marks are obtained by Pranav does not provide us with any other information.
Using statement B, Let us assume that the marks obtained by Pranav are $4x$, $5x$, $6x$, $7x$ and $8x$. Now, $4x = 30\%$. Hence, now we can find out that in how many papers Pranav has scored more than 50% marks.
- Using statement A, if the remainder obtained when N is divided by 100 is 2, then the unit digit of N is 2. Hence, N cannot be a perfect square.
Using statement B, since the total number of factors of N is odd, hence N is a perfect square. [Total number of factors of any perfect square is odd and vice-versa is also true.]
- Using statement A and B independently, we cannot find the speed of the trains. Even using both the two statements together, we get two speeds but we cannot find that which speed corresponds to which train.
Hence, the speed of the trains cannot be determined.
- Obviously, it can be seen that using the statements alone will not give us the solution.
Using both the statements together, since the ratio of expenses is more than the ratio of income and both the fractions are proper fractions, hence it can be concluded on the basis of the data given that Rupesh is saving more than Vijay in all the cases.
- Obviously, it can be seen that using the statements alone will not give us the solution.
Using both the statements together will give us the ratio of sides of the triangle. Using that we can find out if the triangle ABC is right-angled or not?
- Using statement A alone,
Sum of dates of last Monday of previous month and 1st Thursday of next month is 38 is possible only if last Monday is 31st and 1st Thursday is 7th.

(Since if we take $30 + 8 = 38$, then 30 can be last Monday of any month but 8th can not be the 1st Thursday of any month)

So, 31st of last month is a Monday. Hence 7th of current month—14th of current month—21st of current month—28th of current month will be a Monday.

Now, if current month is a month with 30 days, then 5th of next month will be a Monday, so 7th of next month cannot be a Thursday.

If current month is a month with 31 days, then 4th of next month will be a Monday, so 7th of next month will be a Thursday.

Finally, we can conclude that previous month and current month, both are having 31 days. Since both the dates are of the same year, so current month is August.

We cannot find the answer using statement B alone.

14. We know that any leap year and leap year +5 will have same 1st January. Hence, 19(PQ + 5) will have its 1st January as Monday. Hence, question can be solved using statement A alone. However, statement B alone will not give us a unique result.

Nature of year	No. of years after which 1st January will be same
Leap year	5
Leap year + 1	6
Leap year + 2	6
Leap year + 3	11

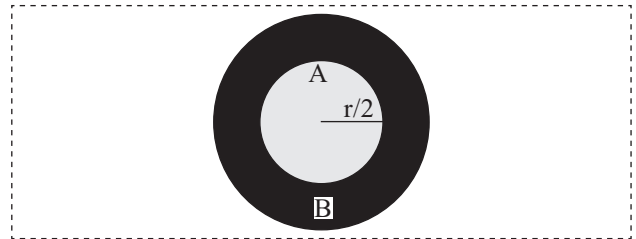
15. Using statement A alone will not answer this question. Using statement B alone tells that one side of the triangle is the diameter of the circle and hence will be the hypotenuse of the circle. Hence, the triangle is right-angled triangle.
16. Using statement A alone, we cannot find the circum radius of the triangle ABC.
Using statement B alone, since the circum radius of the right-angled triangle is half the hypotenuse

of the triangle, so we can find out the circum radius of the triangle. And $1/3$ rd of this circum radius will be the distance between circum centre and the centroid. In short, $1/6$ th of the hypotenuse will be the distance between circum centre and the centroid.

18. This question can be solved without using any of the statements given.

Football will be closer to the center than to the circumference if point is lying in the segment A.

$$\text{Area of segment A} = \frac{1}{4}\pi r^2$$



So, probability of point being closer to the circumference = $\frac{1}{4}\pi r^2 / \pi r^2 = 1/4$

[The probability of ball being closer to the center = Area of the smaller circle inside / Area of the larger circle ($A / (A + B) = 1/4$)]

19. This question can be solved by using statement A individually. Since ratio of speed of A and speed of B = 4 : 7, hence total number of meeting points = 3 (if they are running in the same direction) and total number of meeting points = 11 (if they are running in the opposite direction). In none of these cases, A and B will meet at diametrically opposite point of their starting point.

Using statement B or statement C alone will not give us the result.

20. This question can be solved by using statement B alone. Since discriminant < 0 , hence this equation $f(x) = 0$ will not have any real root, and hence graph of $f(x) = 0$ will not cut X-axis.

So, graph of $f(x) = 0$ cuts X-axis at 0 point.

Using statement B or statement C alone will not give us the unique result.

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PART 2

DATA INTERPRETATION

SECTION 2

PRACTISING DATA INTERPRETATION

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Chapter

20

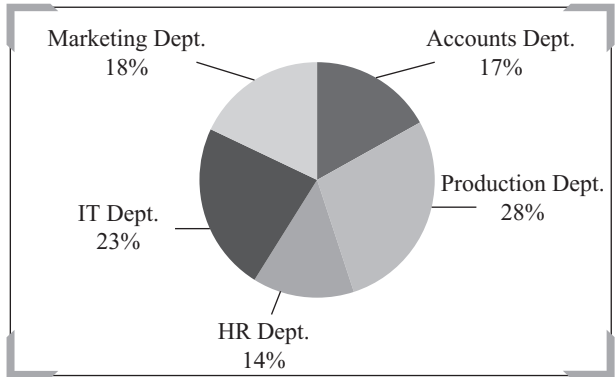
FOUNDATION EXERCISES

PRACTICE EXERCISE 1

Directions for questions 1 to 5: *Go through the data set given below and solve the questions based on it.*

Following pie chart shows the break-up of employees working in various departments of an organization. Table provides the ratio of men to women. It is given that Total Number of Employees = 1800

Percentage Break up of employees



Ratio of Men to Women

Department	Men	Women
Production	11	1
HR	1	3

Department	Men	Women
IT	5	4
Marketing	7	5
Accounts	2	7

- What is the number of men working in the Marketing department?
(a) 132 (b) 174
(c) 126 (d) 189
(e) None of these
- The number of women working in the IT department of the Organization forms **approximately** what per cent of the total number of employees in the Organization from all departments together?
(a) 7 (b) 5
(c) 19 (d) 15
(e) 10
- What is the respective ratio of the number of women working in the HR department of the organization and the total number of employees in that department?
(a) 3:4
(b) 2:5
(c) 2:9
(d) 3:7
(e) None of these

4. What is the respective ratio of the number of men working in the Accounts department to the total number of employees working in that department?
 (a) 9:2 (b) 7:6
 (c) 2:9 (d) 6:7
 (e) None of these
5. The number of men working in the Production department of the organization forms what percentage of total number of employees working in that department? (Rounded off to two digits after decimal)
 (a) 89.76 (b) 91.67
 (c) 88.56 (d) 94.29
 (e) None of these

Directions for questions 6 to 10: Go through the data set given below and solve the questions based on it.

Per cent profit earned by six companies over the years

Company/ Year	P	Q	R	S	T	U
2004	11	12	3	7	10	6
2005	9	10	5	8	12	6
2006	4	5	7	13	12	5
2007	7	6	8	14	14	7
2008	12	8	9	15	13	5
2009	14	12	11	15	14	8

6. If the profit earned by Company R in the year 2008 was ₹18.9 lakhs, what was the income in that year?
 (a) ₹303.7 lakhs (b) ₹264.5 lakhs
 (c) ₹329.4 lakhs (d) ₹228.9 lakhs
 (e) None of these
7. What is the percentage rise in per cent profit of Company T in year 2009 from the year 2004?
 (a) 42 (b) 35
 (c) 26 (d) 48
 (e) None of these
8. If the profit earned by Company P in the year 2007 was ₹2.1 lakhs, what was its expenditure in that year?
 (a) ₹30 lakhs (b) ₹15 lakhs
 (c) ₹23 lakhs (d) ₹27 lakhs
 (e) ₹None of these

9. What was the average per cent profit of Company S over all the years together?
 (a) 13.5 (b) 11
 (c) 12 (d) 14
 (e) None of these
10. What is the difference between the per cent profit earned by Company Q in the year 2005 and the average of the per cent profits earned by the remaining companies together in that year?
 (a) 4 (b) 2
 (c) 1 (d) 3
 (e) None of these

Directions for questions 11 to 15: Go through the data set given below and solve the questions based on it.

Following table provides the data regarding the number of tickets sold (Number in thousands) in a week at multiplexes of six cities. Data has been given corresponding to five movies – A, B, C, D and E.

Movie →	A	B	C	D	E
City ↓					
Mumbai	20	15	35	26	18
Delhi	17	19	21	25	28
Kolkata	32	24	19	21	17
Chennai	18	21	32	28	34
Hyderabad	16	34	26	29	22
Lucknow	15	27	20	35	26

11. The number of tickets to movie B sold in Hyderabad was approximately what percentage of the total number of tickets of the same movie sold in all the cities together?
 (a) 15 (b) 18
 (c) 12 (d) 20
 (e) 24
12. What is the difference between the number of tickets of movie D sold in Kolkata and the number of tickets of movie B sold in Lucknow?
 (a) 700
 (b) 7,000
 (c) 14,000
 (d) 9,000
 (e) None of these

13. What is the average number of tickets of movie C sold in all the six cities?
 (a) 15,500 (b) 2,550
 (c) 24,000 (d) 25,500
 (e) None of these
14. The number of tickets of movie E sold in Chennai is what percentage of number of tickets of movie A sold in Mumbai?
 (a) 170 (b) 70
 (c) 30 (d) 130
 (e) None of these
15. In which city was the total number of tickets of all the five movies together sold the minimum?
 (a) Delhi (b) Chennai
 (c) Lucknow (d) Kolkata
 (e) None of these

Directions for questions 16 to 20: Go through the data set given below and solve the questions based on it.

Number of Entertainment shows held in various cities in a year (Number in Hundreds)

Cities	Shows				
	Dance	Music	Drama	Standup Comedy	Mimicry
M	15	21	24	0.8	0.9
N	12.4	13	26	2	0.5
O	5.7	8	12	0.3	0.2
P	11.3	6	18	1	1.5
Q	17	12.4	11	3	0.4
R	14	10.5	9.8	0.7	0.1

16. The mimicry shows held in city M are what per cent of the drama shows held in city O?
 (a) 7
 (b) 8.5
 (c) 6.5
 (d) 8
 (e) None of these
17. What is the average number of entertainment shows held in city P?
 (a) 756
 (b) 678
 (c) 786
 (d) 698
 (e) None of these
18. If the number of music shows in cities N and Q is increased by 5%, what will be the total number of music shows in both the cities together?
 (a) 2.602
 (b) 2.667
 (c) 2.540
 (d) 2.605
 (e) None of these
19. What is the respective ratio of the number of dance shows held in city N to the number of drama shows held in city R?
 (a) 49:62
 (b) 49:51
 (c) 62:45
 (d) 62:49
 (e) None of these
20. What is the total number of standup comedy shows held in all the cities together?
 (a) 820
 (b) 740
 (c) 780
 (d) 810
 (e) None of these

ANSWER KEYS

1. (d) 2. (e) 3. (a) 4. (c) 5. (b) 6. (d) 7. (e) 8. (a) 9. (c) 10. (b)
 11. (e) 12. (e) 13. (d) 14. (a) 15. (a) 16. (e) 17. (a) 18. (b) 19. (d) 20. (c)

HINTS AND EXPLANATIONS

1 to 5

- Number of men working in the Marketing department
 $= 1800 \times \frac{18}{100} \times \frac{7}{12} = 189$
Hence option (d) is the answer.
- Number of women working in IT department
 $= 1800 \times \frac{23}{100} \times \frac{4}{9} = 184$
Hence required percentage $\cong \frac{184}{1800} \times 100 = 10$
Hence option (e) is the answer.
- Required ratio = 3:4. Hence option (a) is the answer.
- Required ratio = 2:9. Hence option (c) is the answer.
- Required percentage = $\frac{11}{12} \times 100 = 91.67$. Hence option (b) is the answer.

6 to 10

- If the expenditure be ₹X lacs, then $\frac{18.9}{x} \times 100 = 9$
 $\Rightarrow x = \frac{18.9 \times 100}{9} = ₹210 \text{ lacs}$
Hence Income = ₹(210 + 18.9) lacs = ₹228.9 lacs.
Hence option (d) is the answer.
- Percentage increase = $\frac{4}{10} \times 100 = 40$
Hence option (e) is the answer.
- Required expenditure of the company = $\frac{2.1 \times 100}{7} = ₹30 \text{ lacs}$. Hence option (a) is the answer.
- Average per cent profit = $\frac{7+8+13+14+15+15}{6} = 12\%$. Hence option (c) is the answer.
- Required difference = $10 - \left(\frac{9+5+8+12+6}{5} \right) = 10\% - 8\% = 2\%$. Hence option (b) is the answer.

11 to 15

- Total number of tickets sold of movie B = (15 + 19 + 24 + 21 + 34 + 27) thousands = 140 thousands
Required percentage = $\frac{34}{140} \times 100 = 24$. Hence option (e) is the answer.

- Required difference = (27000 - 21000) = 6000. Hence option (e) is the answer.
- Average number of tickets of movie C sold in all the cities = $\left(\frac{35+21+19+32+26+20}{6} \right)$ thousand
 $= \frac{153}{6}$ thousand = 25500. Hence option (d) is the answer.
- Required percentage = $\frac{34}{20} \times 100 = 170$.
Hence option (a) is the answer.
- Total number of tickets sold of all the movies together:
Mumbai $\rightarrow (20 + 15 + 35 + 26 + 18)$ thousand = 114 thousand
Delhi $\rightarrow (17 + 19 + 21 + 25 + 28)$ thousand = 110 thousand
Kolkata $\rightarrow (32 + 24 + 19 + 21 + 17)$ thousand = 113 thousand
Chennai $\rightarrow (18 + 21 + 32 + 28 + 34)$ thousand = 133 thousand
Hyderabad $\rightarrow (16 + 34 + 26 + 29 + 22)$ thousand = 127 thousand
Lucknow $\rightarrow (15 + 27 + 20 + 35 + 26)$ thousand = 123 thousand
Hence option (a) is the answer.

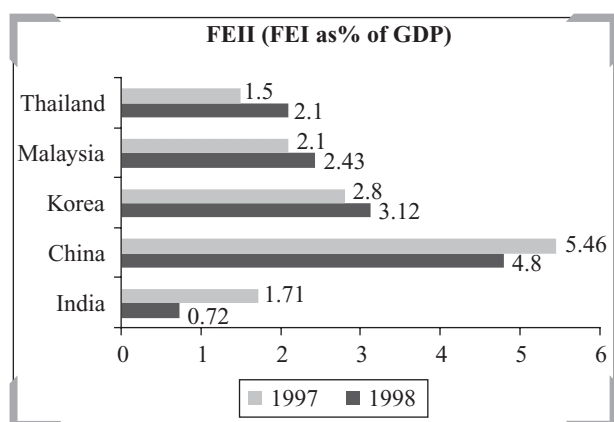
16 to 20

- Required percentage = $\frac{0.9}{12} \times 100 = 7.5$. Hence option (e) is the answer.
- Required average = $\frac{11.3+6+18+1+1.5}{5} \times 100 = \frac{3780}{5} = 756$.
Hence option (a) is the answer.
- Number of music shows in cities N and Q = 105% of (13 + 12.4) = 25.4 $\times \frac{105}{100} = 2667$. Hence option (b) is the answer.
- Required ratio = 12.4:9.8 = 124:98 = 62:49. Hence option (d) is the answer.
- Total number of standup comedy shows = (0.8 + 2 + 0.3 + 1 + 3 + 0.7) $\times 100 = 780$. Hence option (c) is the answer.

PRACTICE EXERCISE 2

Directions for questions 1 to 5: Go through the data set given below and solve the questions based on it.

The following graph gives the data about foreign equity inflow index (FEII) for five countries for two years 1997 and 1998. FEII is taken as the ratio of foreign equity inflow (FEI) to the country's GDP. FEII is expressed as percentage in the graph.



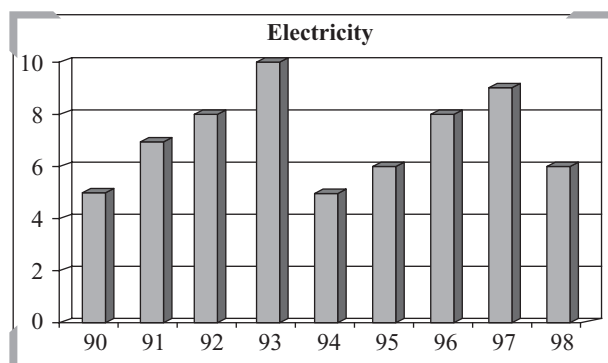
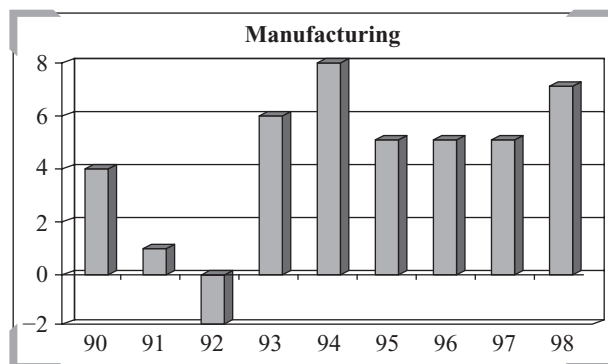
- Which country has shown the maximum percentage change in FEII in 1998 relative to 1997?
 - India
 - China
 - Korea
 - Malaysia
- If China's FEI is 10 times that of India in the year 1998, which of the following is true for 1998?
 - China's GDP is 70% more than India.
 - China's GDP is 40% more than India.
 - China's GDP is 50% more than India.
 - Nothing can be inferred.
- If GDP of India increased by 5%, GDP of China increased by 7% and that of Korea decreased by 2% from year 1997 to 1998, which of the following is/are true?
 - FEI to china was higher in 1998 than in 1997.
 - FEI to china was lower in 1998 than in 1997.
 - India's FEI has increases from 1997 to 1998.
 - FEI to Korea was lower in 1998 than in 1997.
 - Korea's FEI has increased in 1998 from 1997.
 - I and III
 - II and V
 - II, III and V
 - All of these

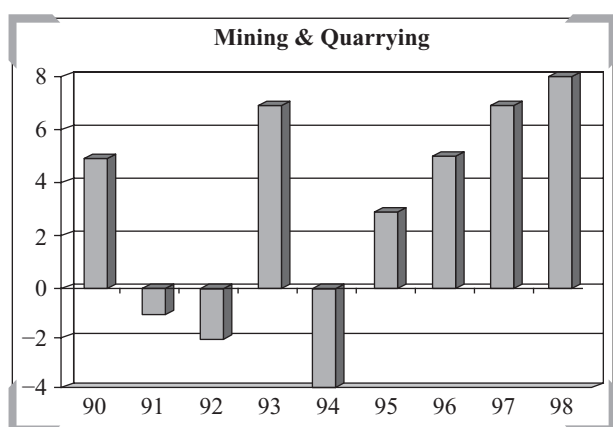
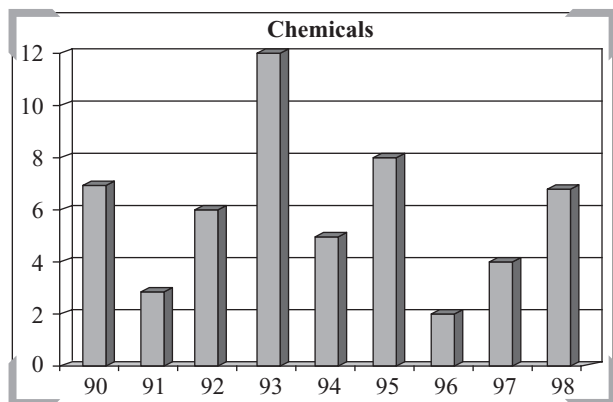
- Which of the following can be inferred from the given data?
 - China's GDP is more than India.
 - China's GDP is less than India
 - India's GDP is less than Malaysia
 - Nothing can be deduced
- In how many countries has the FEI increased from 1997 to 1998?
 - 1
 - 2
 - 3
 - cannot be determined

Directions for questions 6 to 12: Go through the data set given below and solve the questions based on it.

The following graphs provide data about four of the industrial sectors in the Republic of Reposia. Manufacturing constituted 20%, Mining & Quarrying 15%, Electricity 15% and Chemicals 10% of the Republic's total industrial production in 1989. For the period 90-98, the graphs give the percentage change in production over the previous year's production.

1989 production values has been assigned an index of 100 for each of the four sectors.





6. What was the average annual growth rate in production for all four sectors combined between 89 and 98?
- (a) 1.2% (b) 6%
(c) 56.6% (d) 104%

7. When during the given period, was the maximum production level in the electricity sector achieved?
- (a) 89 (b) 93
(c) 95 (d) 98
8. When, during the given period, was the minimum production level in the manufacturing sector achieved?
- (a) 89 (b) 90
(c) 93 (d) 98
9. For the given period, which sector showed the highest growth rate?
- (a) Electricity (b) Manufacturing
(c) Chemical (d) Mining & Quarrying
10. In 92, the index for the chemical sector as compared to the index for the Electricity sector was
- (a) greater by 6 (b) less by 5
(c) greater by 20 (d) less by 20
11. By what percentage was the output of the manufacturing sector more than that of the chemical sector in 91?
- (a) 84% (b) 91%
(c) 98% (d) cannot be determined
12. When did the maximum percentage change in the production levels of the mining and quarrying sector take place?
- (a) 93-94 (b) 92-93
(c) 96-97 (d) 97-98

Directions for questions 13 to 18: Go through the data set given below and solve the questions based on it.

Following grid presents the percentage composition of five verticals under different sectors.

Sector	Factories	Employment	Fixed Capital	Variable Cost	Value Added
Government	18	15	14	22	25
Central	8	6	5	7	10
State	4	6	4	8	3
Central/State	6	3	5	7	12
Public	12	8	6	19	8
Private	55	65	72	54	62
Joint	15	12	8	5	5
Total	100	100	100	100	100

13. If the total work force was 76 million whereas the total value added was 225 million, then which of the following had the maximum value addition per worker?
 (a) Central (b) State
 (c) Central/State (d) Public
14. Which of the following sectors has the maximum fixed capital invested per factory?
 (a) Central (b) State
 (c) Central/State (d) Public
15. If the variable is proportional to the number of employees and the production per employee, then for which of the following is the production highest?
 (a) Government (b) Private
 (c) Joint (d) Public
16. If the government has a fixed capital of \$200 million in the Iron & Steel industry, which corresponds to 20.012% of its total investment as fixed capital, then how much did the government invest (in ₹million) in Maruti Udyog Ltd which forms 25% of the investment in the joint sector? (1US \$ = ₹45)
 (a) 6500 (b) 2500
 (c) 143 (d) 145
17. Maruti Udyog Ltd is a joint project of the Indian Government and Suzuki Motors Japan, each having equal stake. One fine day, the Indian government decides to disinvest from the venture due to losses occurring from labour problems. How many money will be disinvested?
 (a) ₹246 million
 (b) ₹6500 million
 (c) \$ 246 million
 (d) \$ 6500 million
18. Which of the following statements is true?
 (a) The number of government employees is more than that of the number of factories in the joint sector
 (b) The number of employees in the public is same as fixed capital of joint sector
 (c) both (a) and (b)
 (d) Cannot say

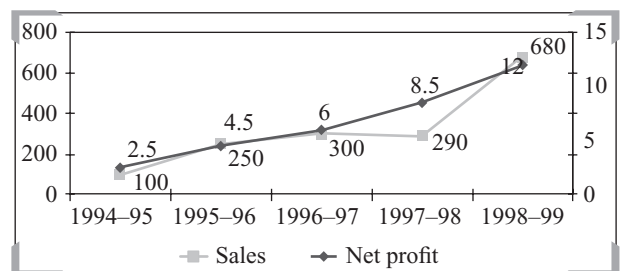
Directions for questions 19 to 21: Go through the data set given below and solve the questions based on it.

Five women decided to go shopping to M.G. Road, Bangalore. They arrived at the designated meeting place in the following order: 1. Archana, 2. Chellamma, 3. Dhenuka, 4. Helen, and 5. Shahnaz. Each women spent at least ₹1000. below are some additional facts about how much they spent during their shopping spree.

- The women who spent ₹2234 arrived before the lady who spent ₹1193.
 - One women spent ₹1340 and she was not Dhenuka.
 - One women spent ₹1378 more than Chellamma.
 - One women spent ₹2517 and she was not Archana.
 - Helen spent more than Dhenuka.
 - Shahnaz spent the largest amount and Chellamma the smallest.
19. What was the amount spent by Helen?
 (a) ₹1193
 (b) ₹1340
 (c) ₹2234
 (d) ₹2517
20. Which of the following amount was spent by one of them?
 (a) ₹1139
 (b) ₹1378
 (c) ₹2571
 (d) ₹2718
21. The women who spent ₹1193 is
 (a) Archana (b) Chellamma
 (c) Dhenuka (d) Helen

Directions for questions 22 to 25: Go through the data set given below and solve the questions based on it.

The figure below represents sales and net profit in ₹crore of IVP Ltd for five years from 1994–95 to 1998–99. During this period the sales increased from ₹100 crore to ₹680 crore. Correspondingly, the net profit increased from ₹2.5 crore to ₹12 crore. Net profit is defined as the excess of sales over total costs.



22. The highest percentage of growth in sales, relative to the previous year occurred in
 (a) 1995–96 (b) 1996–97
 (c) 1997–98 (d) 1998–99
23. The highest percentage growth in net profit, relative to the previous year, was achieved in
 (a) 1998–99 (b) 1997–98
 (c) 1996–97 (d) 1995–96

2.74 Data Interpretation

24. Defining the profitability as the ratio of net profit to sales, IVP Ltd, recorded the highest profitability in
- (a) 1998–99 (b) 1997–98
(c) 1994–95 (d) 1996–97
25. With profitability as defined in question 24, it can be concluded that:
- (a) Profitability is non-increasing during the five years from 1994–95 to 1998–99.
(b) Profitability is non-decreasing during the five years from 1994–95 to 1998–99.
(c) Profitability remained constant during the five years from 1994–95 to 1998–99
(d) None of above.

ANSWER KEYS

1. (a) 2. (c) 3. (b) 4. (d) 5. (d) 6. (b) 7. (d) 8. (a) 9. (a) 10. (b)
11. (b) 12. (d) 13. (c) 14. (b) 15. (b) 16. (a) 17. (b) 18. (d) 19. (b) 20. (a)
21. (c) 22. (a) 23. (d) 24. (b) 25. (d)

HINTS AND EXPLANATIONS

1 to 5

1. Percentage change for India = $\frac{0.72 - 1.71}{1.71} > 50\%$
- Percentage change for China = $\frac{5.46 - 4.8}{5.46}$; 12%
- Percentage change for Korea = $\frac{3.12 - 2.8}{2.8} \approx 11\%$
- Percentage change for Malaysia = $\frac{0.33}{2.1} - \approx 15\%$
- Hence, maximum % change is for India
2. For the year 1998
- For China, $\frac{FEIH_{China}}{GDP_{China}} = 0.048$ (1)
- For India, $\frac{FEIH_{India}}{GDP_{India}} = 0.0072$ (2)
- $\frac{FEI_{China}}{FEI_{India}} = 10$
- on dividing (1) by (2):
- $\frac{GDP_{China}}{GDP_{India}} \times 10 = \frac{0.048}{0.0072} = \frac{20}{3}$
- $\Rightarrow \frac{GDP_{China}}{GDP_{India}} = \frac{3}{2} = 1.5$
- So percentage difference between china's GDP and India's GDP = 50%

3. Since the comparisons are for the same country in each case, assume the GDP as 100 in 1997 in all cases. So, GDP of China, India and Korea in 1998 is 105, 107 and 98 respectively.

$$\frac{FEI_{1998}}{FEI_{1997}} = \frac{FEI_{1998} \times GDP_{1998}}{FEI_{1997} \times GDP_{1997}}$$

$$\text{For China: } \frac{FEI_{1998}}{FEI_{1997}} = \frac{4.8 \times 107}{5.46 \times 100} < 1$$

$$\text{For India: } \frac{FEI_{1998}}{FEI_{1997}} = \frac{0.72 \times 105}{1.71 \times 100} < 1$$

$$\text{For Korea: } \frac{FEI_{1998}}{FEI_{1997}} = \frac{3.12 \times 98}{2.8 \times 100} < 1$$

So, II and V are correct.

4. It can be seen that all the values (FEII) are expressed as a ratio of FEI to GDP, the absolute values of GDP cannot be determined.
5. Since only the ratios of GDP and FEI are known, the increase in one independent of other cannot be determined.

6 to 12

6. You may note that apart from a few years for manufacturing and mining & quarrying, the annual growth rates in most years have been positive and near the 5 – 6% mark for all the sectors. The other options [a], [c], and [d] are too far away to be

considered. Alternatively, for ease of calculation take the 1989 values for a manufacturing as 400, Mining & quarrying and Electricity as 300 each and Chemicals as 200. then, the final value for manufacturing would be nearly 580, that for mining & quarrying would be about 365; that for electricity would be around 550; and for Chemicals would be around 335.

⇒ Initial value of production

$$= 400 + 300 + 300 + 200 = 1200$$

Final value of production

$$= 580 + 365 + 550 + 335 = 1830$$

⇒ Overall % increase $\approx 52.5\%$

⇒ Average annual growth = $52.5/9 = 5.85\%$

7. Electricity production has increased throughout (as growth rates are positive throughout) and the maximum production would be achieved in the last year, i.e., 98.

8. The production for manufacturing can be minimum either in 1989 or in 1992 (when the growth rate is negative).

If Manufacturing started with a production of 100 in 1989, then production in 1992 will be $100 \times 1.04 \times 1.01 \times 0.97 > 1$

So, the production in 1989 was the least

9. Electricity has shown the highest growth rate in all the years and therefore, would have the highest growth rate for the entire period.

10. Electricity in 1992:

$$100 \times 1.05 \times 1.07 \times 1.08 = 121.4$$

Chemicals in 1992:

$$100 \times 1.07 \times 1.03 \times 1.06 = 116.8$$

⇒ In 1992, the index of chemicals is less than that of electricity by approximately 5.

11. Let Manufacturing in 1989 = 200 and Chemicals in 1989 = 100

⇒ Manufacturing in 1991:

$$200 \times 1.04 \times 1.01 = 210$$

and Chemicals in 1991:

$$100 \times 1.07 \times 1.03 = 110$$

$$\text{Required percentage} = \frac{210 - 110}{110} \times 100 = 90\%$$

12. As can be seen directly from the graph, the highest increase (that of 8%) for Mining and Quarrying was in the year 1998, relative to 1997.

13 to 18

13. Values added per worker for various sectors will be proportional to following ratios:

Central	10/6
State	3/6
Central/state	12/3
Public	8/8/

14. Fixed capital per factory will be proportional to the following ratios:

Central	5/8
State	4/4
Central/state	5/6
Public	6/12

15. If the variables are proportional to the number of employees and the production per employees, then we can say that the variable cost is directly proportional to the production. Since the variable cost is maximum for private sector, it will also have the maximum production.

16. If 20% of govt. fixed capital is equal to \$ 200 million
⇒ Total govt. sector fixed capital = \$ 1000 m which is equivalent to 14% of the total fixed capital. Now, 25% of Govt. investment in joint sector i.e., 25% of the 8% of the total = 2% of total fixed capital will be given by:

$$(1000 \times 2)/14 = \$ 143 \text{ million}$$

Value in ₹ is given by:

$$143 \times 45 = ₹ 6450 \text{ million}$$

17. From the above question the money disinvested will be ₹ 6450 million.

18. Neither of the statements [A] or [B] can be inferred as we know only the percentages and not the actual values of the employees, factories or fixed capital.

19 to 21

One of the women spent $2517 - 1378 = 1139$, she is Chellamma. This is the only possibility as we add ₹ 1378 even to the least amount ₹ 1193, we will not be able to satisfy all the conditions given simultaneously.

So, the table obtained is:

Archana	Chellamma	Dhenuka	Helen	Shahnaz
2234	1139	1193	1340	2517

22 to 25

22. From graph it is clear that, growth in sales is negative for 1997–98. The change for 1996–97 is very small. We need to check for 1995–96 & 1998–99
For 1995–96 = $(250 - 100)/100 \times 100\% = 150\%$
For 1998–99 = $(680 - 290)/290 \times 100\% = 134.5\%$
So, the highest percentage change of growth of sales is for year 1995–96
23. In 1995–96, the change is from 2.5 to 4.5, clearly it is more than 50% change in net profit. In none other option, this change is even 50%. So, the highest percentage change of growth of net profit is for year 1995–96

We must try to solve such type of questions without actual calculation to save time

24. Profitability for 1994–95 = $2.5/100 = 0.025$
Profitability for 1996–97 = $6/300 = 0.02$
Profitability for 1997–98 = $8.5/290 = 0.029$
Profitability for 1998–99 = $12/680 = 0.018$
So, highest profitability was recorded for 1997–98.
25. Profitability for 1994–95 = $2.5/100 = 0.025$
Profitability for 1995–96 = $4.5/250 = 0.018$
Profitability for 1996–97 = $6/300 = 0.02$
Profitability for 1997–98 = $8.5/290 = 0.029$
Profitability for 1998–99 = $12/680 = 0.018$
So, we cannot conclude the statements of options (a), (b) & (c)

PRACTICE EXERCISE 3

Directions for questions 1 to 5: Go through the data set given below and solve the questions based on it.

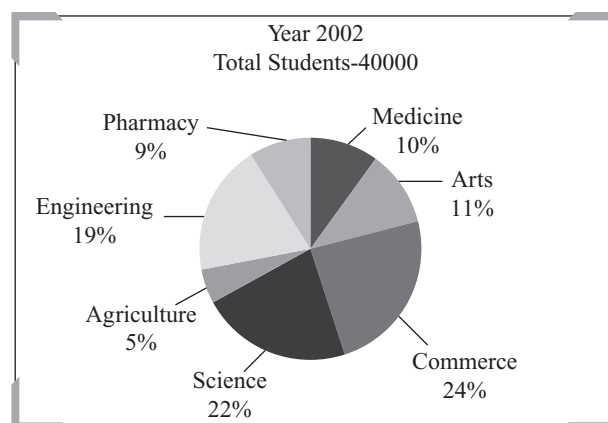
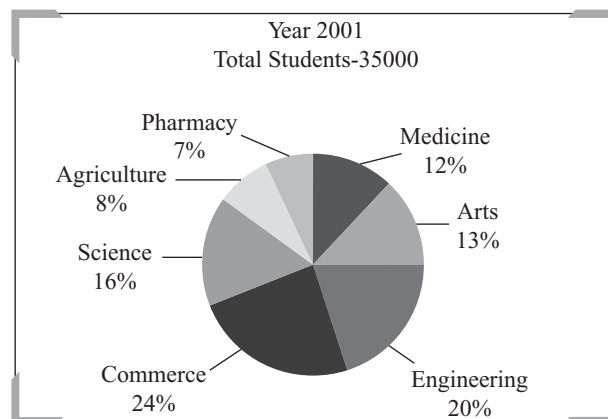
Following table provides the number of workers employed in six units of a factory during the years:

Year/Unit	A	B	C	D	E	F
1998	145	88	115	120	140	136
1999	128	76	122	112	152	132
2000	136	96	132	124	158	140
2001	183	92	125	135	166	126
2002	160	107	140	118	170	146
2003	152	110	148	128	175	150

- In the year 2000 the number of employed workers by unit 'C' is what per cent of the total number of employed workers by all the units in the same year (rounded off to two places of decimal)?
 (a) 16.39 (b) 17.21
 (c) 16.88 (d) 17.31
 (e) None of these
- For all the given years, what is the difference between the average number of workers in units D and E?
 (a) 37 (b) 33
 (c) $33\frac{2}{3}$ (d) $37\frac{1}{3}$
 (e) None of these
- In which year the percentage increase/decrease in the number of employed workers is minimum for unit 'F'?
 (a) 1999 (b) 2000
 (c) 2002 (d) 2003
 (e) None of these
- For all the given years, in which unit the average number of employed workers were maximum?
 (a) D (b) A
 (c) C (d) E
 (e) None of these
- In the years 1998 and 1999, what is the approximate ratio between the number of employed workers in all the units?
 (a) 13:14 (b) 37:36
 (c) 10:9 (d) 13:11
 (d) 4:3

Directions to questions 6 to 10: Go through the data set given below and solve the questions based on it.

Number of students studying in different faculties in the years 2001 and 2002 from State X.



Answer all the questions based upon the pie charts given above.

- In which faculty there was decrease in the number of students from 2001 to 2002?
 (a) None
 (b) Commerce
 (c) Agriculture
 (d) Pharmacy
 (e) None of these
- What is the ratio between the number of students studying pharmacy in the years 2001 and 2002 respectively?
 (a) 4:3 (b) 41:72
 (c) 2:3 (d) 49:72
 (e) None of these

2.78 Data Interpretation

8. What was the approximate percentage increase in the number of students of Engineering from the year 2001 to 2002?
 (a) 17% (b) 13%
 (c) 5% (d) 23%
 (e) 9%
9. In the year 2001, the number of student studying Arts and Commerce together is what percentage of the number of students studying these subjects together in 2002?
 (a) 76 (b) 92
 (c) 82 (d) 79
 (e) 97

10. In which of the following faculties, the percentage change (consider absolute value) in the number of students was minimum from 2001 to 2002?
 (a) Arts
 (b) Science
 (c) Commerce
 (d) Medicine
 (e) Engineering

Directions to questions 11 to 15: Go through the data set given below and solve the questions based on it.

Following table gives the salary of six persons and the percentage break up of their salaries.

Person	Per Annum Income (₹In Lakhs)	Percentage break up of spending pattern					
		Eating out	Shopping	Watching Movies	Health	Savings	Miscellaneous
Ritu	2.05	21.8	14.6	20.4	16.4	14.5	12.3
Satish	2.25	20.9	15.7	15.6	11.4	15.3	21.1
Arun	1.95	14.3	16.6	18.5	21.5	16.4	12.7
Vidya	2.00	18.6	14.5	18.7	21.5	16.2	10.5
Arif	1.75	17.8	12.8	19.5	21.0	18.2	10.7
Suresh	1.70	12.0	18.6	10.5	18.2	22.4	18.3

11. What is the total amount of savings of all the persons together?
 (a) ₹1,98,460 (b) ₹1,42,524
 (c) ₹1,89,520 (d) ₹1,56,625
 (e) ₹1,62,780
12. Who spends the maximum amount on shopping?
 (a) Ritu (b) Suresh
 (c) Satish (d) Arun
 (e) Vidya
13. What is the respective ratio of total amount spent by Ritu on Eating out and Watching Movies together to the total amount spent by Arun on the same?
 (a) 156:211
 (b) 217:253
 (c) 253:217

- (d) 211:156
 (e) None of these
14. Amount spent by Suresh on health is what per cent of the total amount spent by all the people together on Health? (round off to two digits after decimal)
 (a) 16.24 (b) 14.60
 (c) 19.04 (d) 12.35
 (e) None of these
15. Per annum income of Arif is **approximately** what per cent of the total per annum income of all the men together?
 (a) 10 (b) 22
 (c) 27 (d) 19
 (e) 15

Directions to questions 16 to 20: *Go through the data set given below and solve the questions based on it.*

Following table provides the number of women working in various departments of six different organizations:

Department	Production	HR	IT	Finance	Marketing	Merchandising
Organization						
P	155	250	320	405	150	50
Q	178	300	415	328	127	90
R	58	275	204	250	188	66
S	102	190	198	200	190	75
T	110	100	256	305	250	85
U	60	150	225	220	168	35

16. Number of women working in the HR department from organization S is what per cent of the total number of women working in the HR departments from all organizations together? (rounded off to two digits after decimal)
 - (a) 13.45
 - (b) 19.16
 - (c) 21
 - (d) 15.02
 - (e) None of these
17. What is the average number of women working in the Finance department from all organizations together?
 - (a) 226
 - (b) 287
 - (c) 312
 - (d) 308
 - (e) None of these
18. Which organization has the least number of women employees working in all the given departments together?
 - (a) T
 - (b) R
 - (c) U
 - (d) S
 - (e) None of these
19. What is the respective ratio of number of women working in IT department from organizations P, Q and U together to the number of women working in the Marketing department of organizations P, S and T together?
 - (a) 59:33
 - (b) 96:31
 - (c) 71:19
 - (d) 71:23
 - (e) None of these
20. If the women working in the Production department of organization Q were also to work in its Merchandising department, what would be the approximate percentage of women employees working for the Merchandising department of organization Q?
 - (a) 19
 - (b) 26
 - (c) 30
 - (d) 23
 - (e) 15

ANSWER KEYS

1. (e) 2. (d) 3. (d) 4. (d) 5. (b) 6. (c) 7. (d) 8. (e) 9. (b) 10. (a)
 11. (a) 12. (c) 13. (d) 14. (b) 15. (e) 16. (d) 17. (e) 18. (c) 19. (e) 20. (a)

HINTS AND EXPLANATIONS

1 to 5

1. In the year 2000, the number of employed workers by unit C = 132
 Total number of employed workers in all the units in year 2000

$$= 136 + 96 + 132 + 124 + 158 + 40 = 786$$

Therefore required percentage = $\frac{132}{786} \times 100 = 16.79$
 Hence option (e) is the answer.

2. Total number of workers in unit 'D' during the given years = 120 + 112 + 124 + 135 + 118 + 128 = 737

$$\text{Therefore Average} = \frac{737}{6}$$

Total number of workers in unit 'E' during the given years

$$= 140 + 152 + 158 + 166 + 170 + 175 + 961$$

$$\text{Therefore Average} = \frac{961}{6}$$

$$\text{Therefore required difference} = \frac{961}{6} - \frac{737}{6} = \frac{224}{6}$$

$$= 37\frac{1}{3}$$

Hence option (d) is the answer.

3. For unit 'F', the percentage change in the number of workers in the year:

$$\text{In 1999: } \frac{136-132}{136} \times 100 = 2.94\% \text{ decrease}$$

$$\text{In 2000: } \frac{140-132}{132} \times 100 = 6.06\% \text{ increase}$$

$$\text{In 2001: } \frac{140-126}{140} \times 100 = 10\% \text{ decrease}$$

$$\text{In 2002: } \frac{140-126}{126} \times 100 = 15.87\% \text{ increase}$$

$$\text{In 2003: } \frac{150-146}{146} \times 100 = 2.74\% \text{ increase}$$

Hence option (d) is the answer.

4. For each unit we need to find the total number of employees for all years. We can observe that E has the highest total value & so average value too.

5. Total number of employed workers in all units in 1998 = 145 + 88 + 115 + 120 + 140 + 136 = 744

Total number of employed workers in all units in 1999 = 128 + 76 + 122 + 112 + 152 + 132 = 722

$$\text{Therefore required ratio} = 744 : 722 = 37 : 36$$

Hence option (b) is the answer.

6 to 10

6. Let us 1st spend some time observing the data set, and identify if we can eliminate the some options through observation without doing actual calculation:

First, we will observe the data for options (b), (c) and (d).

Looking at option (d), Pharmacy cannot have decline in the data as its percentage share is rising and total number of students is also rising. Similarly option (b) cannot be the answer as share of commerce is fixed at 24%.

Number of students decreased from 2800 to 2000 in Agriculture. Hence option (c) is the answer.

7. Number of students studying Pharmacy in 2001 = 2450
Number of students studying Pharmacy in 2002 = 3600

$$\text{Therefore Required ratio} = 2450 : 3600 = 49 : 72$$

Hence option (d) is the answer.

8. Difference = 7600 - 7000 = 600

$$\text{Hence required percentage increase} = \frac{600}{7000} \times 100 = 8.57\%$$

Hence option (e) is the answer.

9. Total number of students in Arts and Commerce faculties in 2001 = 4200 + 7700 = 11900

Total number of students in Arts and Commerce faculties in 2002 = 4400 + 9600 = 14000

$$\text{Therefore required percentage} = \frac{12950}{14000} \times 100 = 92\%$$

Hence option (b) is the answer.

10. Question is asking for absolute value in the percentage change of different faculty across the two years $\Rightarrow$ So we are required to calculate percentage increase as well as percentage decrease both, as applicable for different faculty.

Again, let us first observe the data set and identify if we can eliminate any option by simple observation of data:

We can eliminate option (b) Science – Percentage contribution of science has increased from 16% to 22% – so it cannot be the answer. (Going through the actual calculation, Science = $\frac{8800 - 5600}{5600} \times 100 = 57\%$)

Similarly option (c) Commerce cannot be the answer as it will have net percentage change = 14.28%. (We will calculate the change in total number of students only, and since the percentage contribution of commerce remains same in both the years, answer would be equivalent to the percentage change in the total number of students.) Hence even option (c) cannot be the answer.

Let us calculate for remaining three options:

Percentage change in the faculty of:

$$\text{Arts} = \frac{4550 - 4400}{4400} \times 100 = 3.2\%$$

$$\text{Engineering} = \frac{7600 - 7000}{7000} \times 100 = 8.57\%$$

$$\text{Medicine} = \frac{4200 - 4000}{4200} \times 100 = 4.7\%$$

[Since question asks for absolute value of percentage change, we do not care for percentage increase or percentage decrease].

Hence, the percentage change in Arts is minimum.

Hence option (a) is the answer.

11 to 15

11. Savings for different persons:

$$\text{Ritu} \rightarrow \frac{2.05 \times 14.5}{100} = ₹0.29725 \text{ lakh}$$

$$\text{Satish} \rightarrow \frac{2.25 \times 15.3}{100} = ₹0.34425 \text{ lakh}$$

$$\text{Arun} \rightarrow \frac{1.95 \times 16.4}{100} = ₹0.3198 \text{ lakh}$$

$$\text{Vidya} \rightarrow \frac{2 \times 16.2}{100} = ₹0.324 \text{ lakh}$$

$$\text{Arif} \rightarrow \frac{1.75 \times 18.2}{100} = ₹0.3185 \text{ lakh}$$

$$\text{Suresh} \rightarrow \frac{1.70 \times 22.4}{100} = ₹0.3808 \text{ lakh}$$

$$\text{Total savings} = ₹(0.29725 + 0.34425 + 0.3198 + 0.324 + 0.3185 + 0.3808) \text{ lakh} = ₹1.9846 \text{ lakh} = ₹198460$$

Hence option (a) is the answer.

12. Amount spent on shopping by:

$$\text{Satish} \rightarrow ₹ \frac{(2.25 \times 15.7)}{100} \text{ lakh} = ₹0.35325 \text{ lakh}$$

He spends maximum.

Hence option (c) is the answer.

13. Amount spent by Ritu on:

$$\text{Eating out} = \frac{(21.8 \times 2.05)}{100} = ₹0.4469 \text{ lakh}$$

$$\text{Watching movies} = \frac{20.4 \times 2.05}{100} = ₹0.4182 \text{ lakh}$$

$$\text{Total amount} = ₹(0.4469 + 0.4182) \text{ lakh} = ₹0.8651 \text{ lakh}$$

Amount spent by Arun on:

$$\text{Eating out} = \frac{1.95 \times 14.3}{100} = ₹0.27885 \text{ lakh}$$

$$\text{Watching movies} = \frac{18.5 \times 1.95}{100} = ₹0.36075 \text{ lakh}$$

$$\text{Total amount} = ₹(0.27885 + 0.36075) \text{ lakh} = ₹0.6396$$

$$\text{Required ratio} = 0.8651 : 0.6396 = 211 : 156$$

Hence option (d) is the answer.

14. Amount spent on health by:

$$\text{Suresh} \rightarrow ₹ \frac{1.70 \times 18.2}{100} \text{ lakh} = ₹0.3094 \text{ lakh}$$

Similarly,

$$\text{Ritu} \rightarrow ₹0.3362 \text{ lakh}$$

$$\text{Satish} \rightarrow ₹0.2565 \text{ lakh}$$

$$\text{Arun} \rightarrow ₹0.41925 \text{ lakh}$$

$$\text{Vidya} \rightarrow ₹0.43 \text{ lakh}$$

$$\text{Arif} \rightarrow ₹0.3675 \text{ lakh}$$

$$\text{Total expenditure on health} = ₹(0.3094 + 0.3362 + 0.2565 + 0.41925 + 0.43 + 0.3675) \text{ lakh} = ₹2.11885 \text{ lakh}$$

$$\text{Required percentage} = \frac{0.3094}{2.11885} \times 100 = 14.60$$

Hence option (b) is the answer.

15. Total annual income = ₹(2.05 + 2.25 + 1.95 + 2 + 1.751.7) lakhs = ₹11.7 lakhs

$$\text{Required percentage} = \frac{1.75}{11.7} \times 100 = 14.95 = 15$$

Hence option (e) is the answer.

16 to 20

16. Number of women working in HR departments = 250 + 300 + 190 + 100 + 150 = 1265

$$\text{Required percentage} = \frac{190}{1265} \times 100 = 15.02$$

Hence option (d) is the answer.

17. Average number of women working in finance department from all organization together =
- $\frac{(405 + 328 + 250 + 200 + 305 + 220)}{6} = 284.66$

18. Number of women employees in organization:

$$P \rightarrow 155 + 250 + 320 + 405 + 150 + 50 = 1330$$

$$Q \rightarrow 178 + 300 + 415 + 318 + 127 + 90 = 1428$$

$$R \rightarrow 58 + 275 + 204 + 250 + 188 + 66 = 1041$$

$$S \rightarrow 102 + 190 + 198 + 200 + 190 + 75 = 955$$

$$T \rightarrow 110 + 100 + 256 + 305 + 250 + 85 = 1106$$

$$U \rightarrow 60 + 150 + 225 + 220 + 168 + 35 = 858$$

Clearly, Organization U has the least number of employees.

Hence option (c) is the answer.

19. Number of IT employees from organizations P, Q and U = 320 + 415 + 225 = 960

$$\text{Number of marketing department employees from organizations P, S and T} = 150 + 190 + 250 = 590$$

$$\text{Required ratio} = 96 : 59$$

Hence option (e) is the answer.

20. Number of employees in production department of organization Q = 178

$$\text{Therefore Number of women in merchandising department of organization Q} = 178 + 90 = 268$$

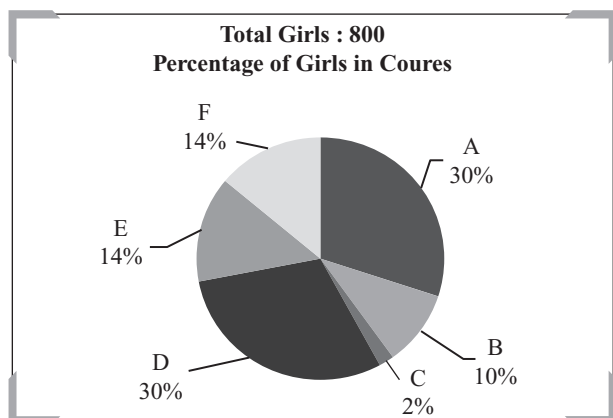
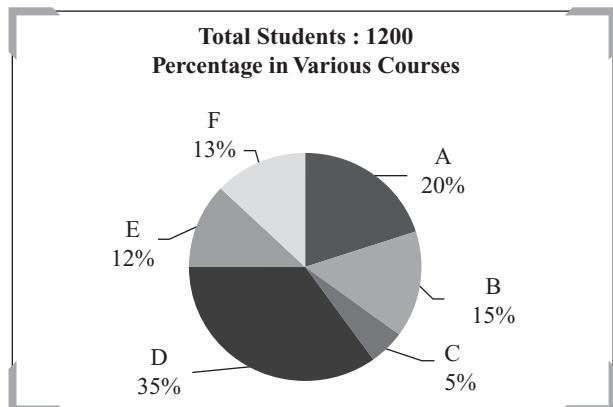
$$\text{Required percentage} = \frac{268}{1428} \times 100 = 18.77 = 19$$

Hence option (a) is the answer.

PRACTICE EXERCISE 4

Directions for questions 1 to 5: Go through the data set given below and solve the questions based on it.

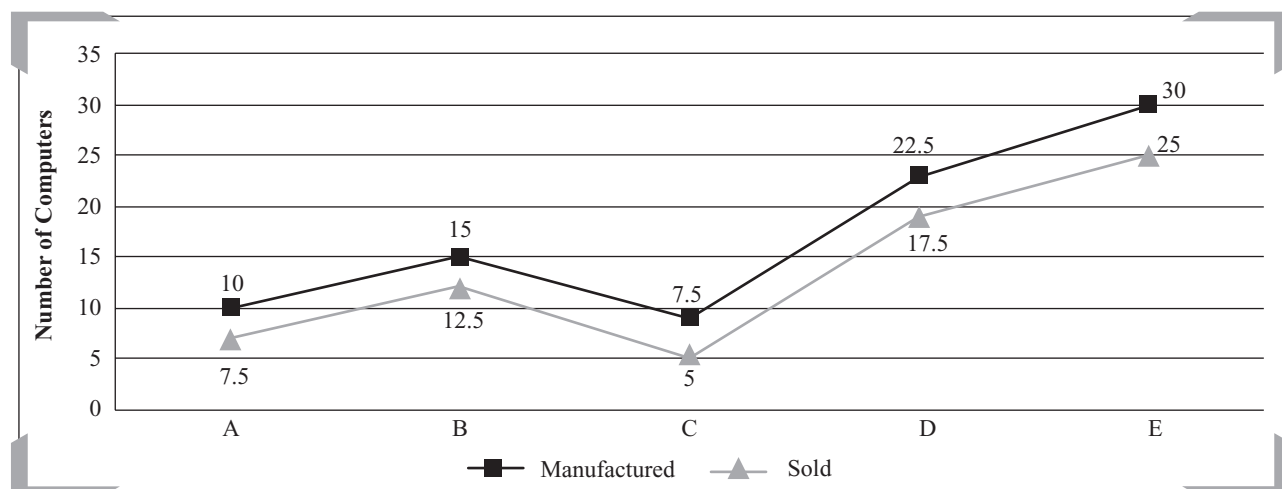
Pie charts given present the percentage of students in various courses (A, B, C, D, E, F) and percentage of girls out of these courses.



- For which course is the number of boys the minimum?
(a) E (b) F
(c) C (d) A
(e) None of these
- How many girls are there in course C?
(a) 44 (b) 16
(c) 40 (d) 160
(e) None of these
- For course D, what is the respective ratio of boys and girls?
(a) 3:4 (b) 4:5
(c) 3:5 (d) 5:6
(e) None of these
- For which pair of courses is the number of boys the same?
(a) E and F
(b) A and D
(c) C and F
(d) B and D
(e) None of these
- For course E, the number of girls is how much per cent more than the boys for course E?
(a) 250 (b) 350
(c) 150 (d) 80
(e) None of these

Directions for questions 6 to 10: Go through the data set given below and solve the questions based on it.

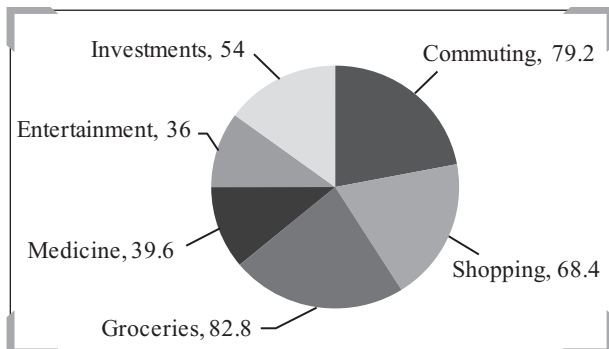
Number of Computers Manufactured and Sold by Various Companies in a Year (Number in Lakhs)



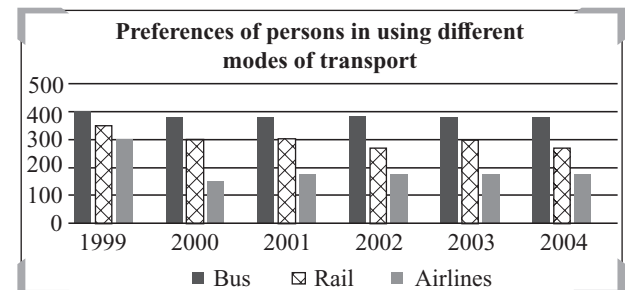
6. What is the respective ratio of the number of computers manufactured by companies A and C together to the number of computers sold by companies A and C together?
 (a) 4:5 (b) 14:11
 (c) 8:9 (d) 7:5
 (e) None of these
7. What is the difference between the average number of computers manufactured by all the companies together and the average number of computers sold by all the companies together?
 (a) 3500 (b) 35000
 (c) 350000 (d) 3500000
 (e) None of these
8. The number of computers sold by company B is what per cent of the number of computers manufactured by company B? (Rounded off to two digits after decimal)
 (a) 83.33 (b) 120
 (c) 78.83 (d) 106.54
 (e) None of these
9. The number of computers manufactured by company D is what per cent of the number of computers manufactured by company E?
 (a) 125 (b) 112.5
 (c) 85 (d) 65.25
 (e) 75
10. The number of computers manufactured by company B is approximately what per cent of the number of computers manufactured by all the companies together?
 (a) 22 (b) 18
 (c) 14 (d) 26
 (e) 32
11. What is the amount spent by the family on commuting?
 (a) ₹10,076 (b) ₹10,534
 (c) ₹6,870 (d) ₹8,702
 (e) None of these
12. What is the respective ratio of amount spent by family on Medicine to the amount spent on Groceries?
 (a) 1:2 (b) 13:21
 (c) 3:5 (d) 11:23
 (e) None of these
13. What is the total amount spent by the family on Entertainment and Shopping together?
 (a) ₹9,618 (b) ₹13,282
 (c) ₹13,740 (d) ₹11,908
 (e) None of these
14. Total amount spent by the family on Groceries, Entertainment and Investments together forms **approximately** what per cent of amount spent on Commuting?
 (a) 209 (b) 76
 (c) 154 (d) 42
 (e) 218
15. Amount spent by the family on Medicine forms what per cent of amount spent on Shopping? (Rounded off to two digits after decimal)
 (a) 43.67 (b) 49.52
 (c) 57.89 (d) 61.89
 (e) None of these

Directions for questions 11 to 15: Go through the data set given below and solve the questions based on it.

Following pie chart gives the degree wise break-up of expenditure of a family in a particular month.



Total amount spent in this month = ₹45,800.



Note - All the values are in the multiples of 25.

16. From 1999 to 2004, the total number of people who preferred to travel by rail, was **approximately** how many millions?
 (a) 1300 (b) 1500
 (c) 1600 (d) 1800
 (e) 2000

17. The number of people preferring to travel by rail in 2004, was how many millions fewer than the number of people preferring to travel by rail in 1999?
 (a) 70 (b) 45
 (c) 75 (d) 50
 (e) None of these
18. In 2001, the people preferring to travel by bus represented approximately what per cent of the people preferring to travel by buses, rail and airlines together in that year?
 (a) 65 per cent (b) 35 per cent
 (c) 55 per cent (d) 75 per cent
 (e) 45 per cent
19. What is the respective ratio of the number of people preferring to travel by bus to the number of people preferring to travel by rail in the year 2002?
 (a) 15:11 (b) 9:7
 (c) 7:9 (d) 11:15
 (e) None of these
20. In the year 2003, if all the airlines reduced their rates by 50% and 50% of the people who preferred to travel by rail, now preferred airlines, **approximately** how many millions of people prefer to travel by air?
 (a) 290 (b) 313
 (c) 330 (d) 300
 (e) 325

ANSWER KEYS

1. (d) 2. (b) 3. (a) 4. (c) 5. (a) 6. (d) 7. (c) 8. (a) 9. (e) 10. (b)
 11. (a) 12. (d) 13. (b) 14. (e) 15. (c) 16. (d) 17. (c) 18. (e) 19. (a) 20. (e)

HINTS AND EXPLANATIONS

1 to 5

1. Number of boys in course A is minimum i.e., zero. Hence option (d) is the answer.
2. Number of girls in course C = 16. Hence option (b) is the answer.
3. Required ratio = $180:240 = 3:4$. Hence option (a) is the answer.
4. Number of boys in each of courses C and F = 44. Hence option (c) is the answer.
5. Required percentage = $\frac{112-32}{32} \times 100 = \frac{80}{32} \times 100 = 250$. Hence option (a) is the answer.

6 to 10

6. Number of computers manufactured by companies A and C together = $(10 + 7.5)$ lakh = 17.5 lakhs
 Number of computers sold by companies A and C together = $(7.5 + 5)$ lakh = 12.5 lakhs
 Hence required ratio = $17.5 : 12.5 = 7 : 5$. Hence option (d) is the answer.
7. Average number of computers manufactured by all the companies together

$$= \left(\frac{10+15+7.5+22.5+30}{5} \right) \text{ lakhs} = \left(\frac{85}{5} \right) \text{ lakhs} = 17 \text{ lakhs}$$

Average number of computers sold by all the companies together = $\left(\frac{7.5+12.5+5+17.5+25}{5} \right) \text{ lakhs}$
 $= \left(\frac{67.5}{5} \right) \text{ lakhs} = 13.5 \text{ lakhs}$

Hence required difference = $(17 - 13.5)$ lakhs = 3.5 lakhs = 350000. Hence option (c) is the answer.

8. Required percentage = $\frac{12.5}{15} \times 100 = 38.33\%$. Hence option (a) is the answer.
9. Required percentage = $\frac{22.5}{30} \times 100 = 75\%$. Hence option (e) is the answer.
10. Number of computers manufactured by all the companies together = 85 lakhs
 Number of computers manufactured by company B = 15 lakhs
 Hence required percentage = $\frac{15}{85} \times 100 = 17.65 = 18$
 Hence option (b) is the answer.

11 to 15

- 11.** Angle for commuting = $79.2^\circ \Rightarrow 360^\circ = 45800$
 $\Rightarrow 79.2^\circ = \frac{45800}{360} \times 79.2 = ₹10076.$
 Hence option (a) is the answer.
- 12.** Ratio of amount spent must be same as ratio of respective angles = $\frac{39.6^\circ}{82.8^\circ} = 11 : 23$
- 13.** Total angle of amount spent on shopping & entertainment = $36^\circ + 68.4^\circ = 104.4^\circ$.
 So, total expenditure = $\frac{104.4^\circ}{360^\circ} \times 45,800 = ₹13,282.$
- 14.** Total angle for expenditure on grocery, entertainment & investment = $82.8^\circ + 36^\circ + 54^\circ = 172.8^\circ$.
 Angle for amount spent on commuting = 79.2° .
 Required percentage = $\frac{172.8}{79.2} \times 100\% = 218\%$
- 15.** Angle for amount spent on medicine = 39.6° .
 Angle for amount spent on shopping = 68.4° .
 Required percentage = $\frac{39.6}{68.4} \times 100\% = 57.89\%.$

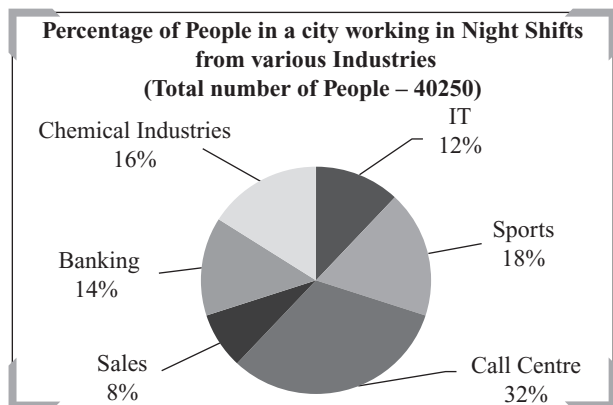
16 to 20

- 16.** Total number of people travelling by rail = $(350 + 300 + 300 + 275 + 300 + 275)$ millions = 1800 million. Hence option (d) is the answer.
- 17.** Required difference = $350 - 275 = 75$ millions. Hence option (c) is the answer.
- 18.** Total number of people travelling by buses, rail and airlines in 2001 = $375 + 300 + 175 = 850$ millions
 Number of people travelling by buses = 375 millions.
 Hence, Required percentage = $\frac{375}{850} \times 100 = 45.$
 Hence option (e) is the answer.
- 19.** Required ratio = $375 : 275 = 15 : 11$. Hence option (a) is the answer.
- 20.** In the year 2003:
 Number of people travelling by rail = 300 millions
 Number of people travelling by air = 175 millions
 Now, 50 % of people travelling by rail shift to air.
 Hence required number of people = $175 + 150 = 325$ million
 Hence option (e) is the answer.

PRACTICE EXERCISE 5

Directions for questions 1 to 5: Go through the data set given below and solve the questions based on it.

Following pie chart give the percentage of people working in night shift from various industries. Table given ahead presents the percentage of females out of number of people working in night shift in different industries.



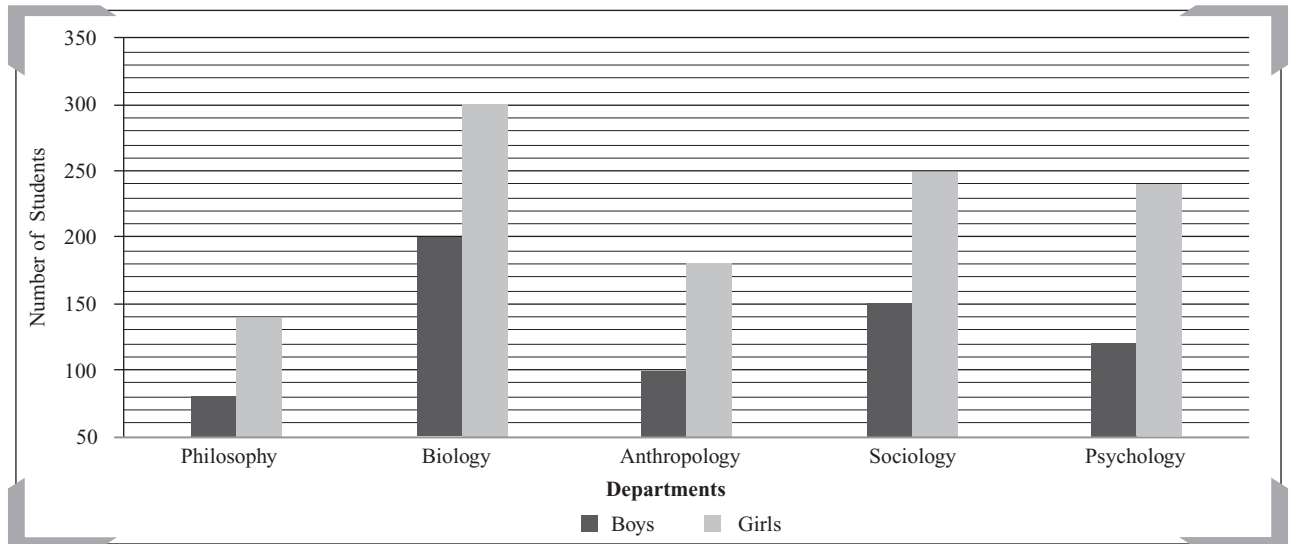
Percentage of Females from various Industries working in night shifts

Industries	Females
IT	20%
Sports	20%
Call Centre	45%
Sales	60%
Banking	40%
Chemical Industries	15%

- What is the respective ratio of men to the women working in night shifts from the Call Centre industry?
(a) 9:11 (b) 7:5
(c) 8:13 (d) 11:7
(e) None of these
- What is the approximate average number of females working in night shifts from all the industries together?
(a) 2227
(b) 4481
(c) 3326
(d) 2823
(e) 4107
- What is the total number of men working in night shifts from all the industries together?
(a) 28297
(b) 25788
(c) 28678
(d) 26887
(e) None of these
- The number of women from the sports industry is what per cent of the total number of people working in the night shifts from all the industries together?
(a) 5.6
(b) 3.6
(c) 3.2
(d) 4.4
(e) None of these
- What is the difference between the total number of men and the total number of women working in night shifts from all the industries together?
(a) 13254
(b) 13542
(c) 13524
(d) 13363
(e) None of these

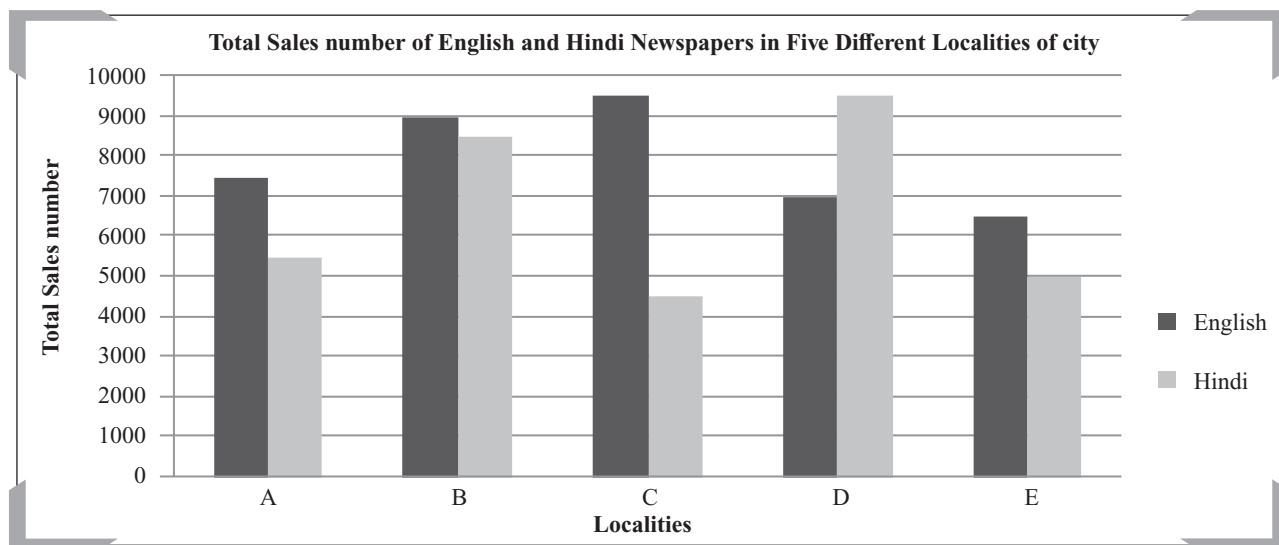
Directions for questions 6 to 10: *Go through the data set given below and solve the questions based on it.*

Following bar chart presents the total number of Boys and Girls in Five Different Departments in a college:



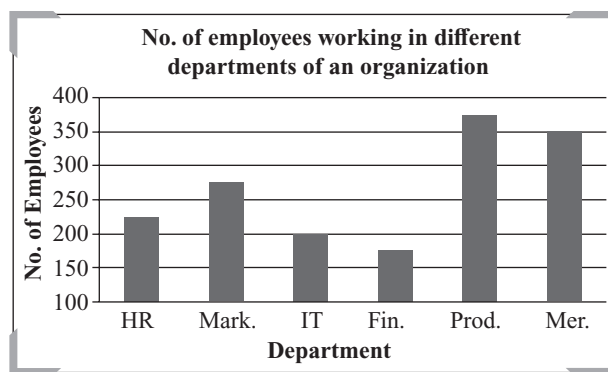
6. The number of girls from Biology department is approximately what per cent of the total number of girls from all the departments together?
 - (a) 32
 - (b) 21
 - (c) 37
 - (d) 43
 - (e) 27
7. What is the difference between the total number of boys and the total number of girls from all the departments together?
 - (a) 440
 - (b) 520
 - (c) 580
 - (d) 460
 - (e) None of these
8. What is the average number of boys from all the departments together?
 - (a) 122
 - (b) 126
 - (c) 130
 - (d) 134
 - (e) None of these
9. The number of boys from Anthropology department is **approximately** what per cent of the total number of boys from all the departments together?
 - (a) 15
 - (b) 23
 - (c) 31
 - (d) 44
 - (e) 56
10. What is the respective ratio of number of girls from Philosophy department to the number of girls from Psychology department?
 - (a) 1:2
 - (b) 7:12
 - (c) 5:12
 - (d) 3:4
 - (e) None of these

Directions for questions 11 to 15: Go through the data set given below and solve the questions based on it.



11. What is the difference between the total sale of English newspapers and the total sale of Hindi newspapers in all the localities together?
 - (a) 6000
 - (b) 6500
 - (c) 7000
 - (d) 7500
 - (e) None of these
12. The sale of English newspaper in locality A is **approximately** what per cent of the total sale of English newspapers in all the localities together?
 - (a) 527
 - (b) 25
 - (c) 111
 - (d) 236
 - (e) 19
13. What is the respective ratio of the sale of Hindi newspapers in locality A to the sale of Hindi newspapers in locality D?
 - (a) 11:19
 - (b) 6:5
 - (c) 5:6
 - (d) 19:11
 - (e) None of these
14. The sale of English newspaper in localities B and D together is approximately what per cent of the sale of English newspaper in localities A, C and E together?
 - (a) 162
 - (b) 84
 - (c) 68
 - (d) 121
 - (e) 147
15. What is the average sale of Hindi newspapers in all the localities together?
 - (a) 6600
 - (b) 8250
 - (c) 5500
 - (d) 4715
 - (e) None of these

Directions for questions 16 to 20: Go through the data set given below and solve the questions based on it.



All the data values given above are in the multiples of 25. Following table presents the ratio of male and female in the organization:

Department	Males	Females
HR	9	16
Marketing	3	2
IT	9	31
Finance	2	3
Production	11	4
Merchandising	4	3

Note: Mark. – Marketing; Fin. – Finance; Prod. – Production; Mer. – Merchandising

16. What is the total number of males working in all departments together?
 (a) 755 (b) 925
 (c) 836 (d) 784
 (e) None of these
17. What is the number of females working in the HR department?
 (a) 158 (b) 128
 (c) 136 (d) 144
 (e) None of these
18. What is the respective ratio of total number of employees working in the production department to those working in the Merchandising department?
 (a) 15 : 14 (b) 8 : 7
 (c) 14 : 15 (d) 7 : 8
 (e) None of these
19. Which is the department with lowest number of females working?
 (a) Marketing
 (b) Production
 (c) HR
 (d) Finance
 (e) None of these
20. What is the total number of employees from all departments together in the organization?
 (a) 1500
 (b) 1575
 (c) 1525
 (d) 1625
 (e) None of these

ANSWER KEYS

1. (e) 2. (a) 3. (d) 4. (b) 5. (c) 6. (e) 7. (d) 8. (c) 9. (a) 10. (b)
 11. (b) 12. (e) 13. (a) 14. (c) 15. (a) 16. (c) 17. (d) 18. (a) 19. (b) 20. (e)

HINTS AND EXPLANATIONS

1 to 5

Number of people working in night shifts:

$$\text{IT industry} \rightarrow 40250 \times \frac{12}{100} = 4830 \quad \text{Number of women} = 4830 \times \frac{20}{100} = 966 \text{ and no. of men} = 4830 - 966 = 3864$$

$$\text{Sports industry} \rightarrow 40250 \times \frac{18}{100} = 7245 \quad \text{Number of women} = 7245 \times \frac{20}{100} = 1449 \text{ and no. of men} = 7245 - 1449 = 5796$$

$$\text{Call centre} \rightarrow 40250 \times \frac{32}{100} = 12880 \quad \text{Number of women} = 12880 \times \frac{45}{100} = 5796 \text{ and no. of men} = 12880 - 5796 = 7084$$

$$\text{Sales} \rightarrow 40250 \times \frac{8}{100} = 3220 \quad \text{Number of women} = 3220 \times \frac{60}{100} = 1932 \text{ and no. of men} = 3220 - 1932 = 1288$$

$$\text{Banking} \rightarrow 40250 \times \frac{14}{100} = 5635 \quad \text{Number of women} = 5635 \times \frac{40}{100} = 2254 \text{ and no. of men} = 5635 - 2254 = 3381$$

$$\text{Chemical industry} \rightarrow 40250 \times \frac{16}{100} = 6440 \quad \text{Number of women} = 6440 \times \frac{15}{100} = 966 \text{ and no. of men} = 6440 - 966 = 5474$$

1. Required ratio = 7084:5796 = 11:9. Hence option (e) is the answer.
2. Number of women = 966 + 1449 + 5796 + 1932 + 2254 + 966 = 13363

Hence required average = $\frac{13363}{6} = 2227$. Hence option (a) is the answer.

3. Number of women = $3864 + 5796 + 7084 + 1288 + 3381 + 5474 = 26887$. Hence option (d) is the answer.
4. Total number of working people = 40250
Number of women in sports industry = 1449
Hence required percentage = $\frac{1449}{40250} \times 100 = 3.6$.
Hence option (b) is the answer.
5. Required difference = $26887 - 13363 = 13524$. Hence option (c) is the answer.

6 to 10

6. Number of girls in all departments = $140 + 300 + 180 + 250 + 240 = 1110$
Hence required percentage = $\frac{300}{1110} \times 100 = 27\%$
Hence option (e) is the answer.
7. Total number of boys in all the departments = $80 + 200 + 100 + 150 + 120 = 650$
Number of girls = 1110
Hence required difference = $1110 - 650 = 460$
Hence option (d) is the answer.
8. Average number of boys = $\frac{650}{5} = 130$
Hence option (c) is the answer.
9. Number of all boys = 650
Number of boys from Anthropology department = 100
Hence required percentage = $\frac{100}{650} \times 100 = 15.38 = 15$
Hence option (a) is the answer.
10. Number of girls from Philosophy department = 140
Number of girls from Psychology department = 240
Required ratio = $140:240 = 7:12$
Hence option (b) is the answer.

11 to 15

11. Total sale of Hindi Newspapers = $5500 + 8500 + 4500 + 9500 + 5000 = 33000$
Total sale of English Newspapers = $7500 + 9000 + 9500 + 7000 + 6500 = 39500$
Required difference = $39500 - 33000 = 6500$
Hence option (b) is the answer.
12. Required percentage = $\frac{7500}{39500} \times 100 = 19$
Hence option (e) is the answer.

13. Required ratio = $5500:9500 = 11:19$
Hence option (a) is the answer.
14. Total sale of English Newspaper in localities B and D = $9000 + 7000 = 16000$
Total sale of English Newspaper in localities A, C and E = $7500 + 9500 + 6500 = 23500$
Hence required percentage = $\frac{16000}{23500} \times 100 = 68\%$
Hence option (c) is the answer.
15. Average sale of Hindi Newspaper = $\frac{33000}{5} = 6600$
Hence option (a) is the answer.

16 to 20

16. Number of males:
HR department $\rightarrow 225 \times \frac{9}{25} = 81$
Marketing department = $275 \times \frac{3}{5} = 165$
IT department = $200 \times \frac{9}{40} = 45$
Finance department = $175 \times \frac{2}{5} = 70$
Production department = $375 \times \frac{11}{15} = 275$
Merchandising department = $350 \times \frac{4}{7} = 200$
Therefore Total number of males = $81 + 165 + 45 + 70 + 275 + 200 = 836$
Hence option (c) is the answer.
17. Number of females working in the HR department = $225 \times \frac{16}{25} = 144$
Hence option (d) is the answer.
18. Required ratio = $375:350 = 15:14$
Hence option (a) is the answer.
19. Number of females in different departments:
HR department $\rightarrow 225 - 81 = 144$
Marketing department $\rightarrow 275 - 165 = 110$
IT department $\rightarrow 200 - 45 = 155$
Finance department $\rightarrow 175 - 70 = 105$
Production department $\rightarrow 375 - 275 = 100$
Merchandising department $\rightarrow 350 - 200 = 150$
Hence option (b) is the answer.
20. Total number of employees = $225 + 275 + 200 + 175 + 375 + 350 = 1600$
Hence option (e) is the answer.

PRACTICE EXERCISE 6

Directions for questions 1 to 5: Go through the data set given below and solve the questions based on it.

Study the following profile of Parliament carefully and answer the questions given below it.

PROFILE OF PARLIAMENT (comprising of Lok Sabha and Rajya Sabha) IN YEAR 2014:

Total Members in Parliament = 640 (490 from Lok Sabha and 150 from Rajya Sabha)

Lok Sabha (No. of Members)	Party	Rajya Sabha (No. of Members)
280	A	90
180	B	45
30	Others	15
490	Total	150
SEX		
435	Males	120
55	Females	30
RELIGION		
348	Hindus	85
42	Muslims	20
75	Sikhs	35
25	Christians	10
PROFESSION		
300	Graduates	50
45	Business men	19
60	Educators	11
85	Unknown	70

1. What is the **approximate** percentage of the Muslim members in Lok Sabha?
- (a) 9% (b) 11%
(c) 13% (d) 14%
(e) 7%

2. In Rajya Sabha, if 30 male members were replaced by 30 female members, then what is the ratio of male members to female members respectively?
- (a) 3 : 1 (b) 3 : 2
(c) 1 : 3 (d) 2 : 3
(e) 2 : 1
3. What percentage of members in parliament are businessmen?
- (a) 8% (b) 20%
(c) 30% (d) 18%
(e) 10%
4. If all the 'others' party members of Lok Sabha join the party 'B' then what would be the ratio between members of party 'A' to the members of party 'B' respectively.
- (a) 3:2 (b) 6:5
(c) 4:3 (d) 7:6
(e) 4:5
5. Out of total members of party 'B' in Parliament, what percentage of the members belongs to Rajya Sabha?
- (a) 30% (b) 35%
(c) 25% (d) 20%
(e) 15%

Directions for questions 6 to 10: Go through the data set given below and solve the questions based on it.

Various Food-grains sold by farmers at prices (Price Per Kg.) mentioned:

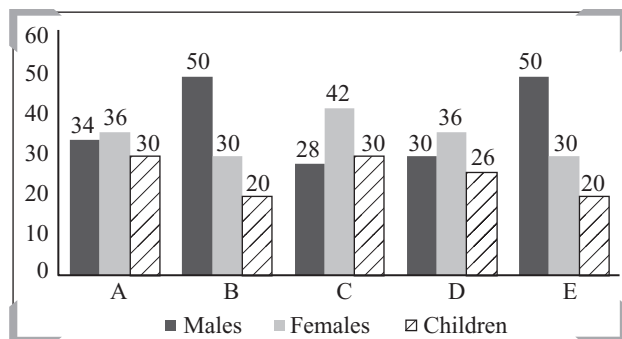
Food grains	Rice	Corn	Bajra	Paddy	Jowar
Farmers					
A	30	22.5	22	24	18
B	36	28	24.5	25	24
C	40	24	21	26	20.5
D	34.5	27.5	28	25	25
E	36	32	30	28.5	27

6. If farmer A sell 350 kg of Rice, 150 kg of Corn and 250 kg of Jowar, how much would he earn?
- (a) ₹19425 (b) ₹18,500
(c) ₹15,585 (d) ₹18,375
(e) ₹None of these

7. What is the average price per kg of Bajra sold by all the farmers together?
 (a) ₹25.10 (b) ₹24.50
 (c) ₹25 (d) ₹23.40
 (e) None of these
8. Farmer D and farmer E, both sell 240 kg of Bajra each. What would be the respective ratio of their earnings?
 (a) 15 : 14 (b) 11 : 13
 (c) 14 : 15 (d) 13 : 15
 (e) None of these
9. Farmer C sells 180 kg each of Corn, Paddy and Jowar grains. How much does he earn?
 (a) ₹13,540
 (b) ₹12,550
 (c) ₹13,690
 (d) ₹12,690
 (e) None of these
10. Earnings on 150 kg of Paddy sold by farmer B is **approximately** what percentage of the earnings on the same quantity of Rice sold by the same farmer?
 (a) 65 (b) 69
 (c) 73 (d) 60
 (e) 75
11. What is the total number of adult females in colonies A, B and C together?
 (a) 1785 (b) 1821
 (c) 1479 (d) 1692
 (e) None of these
12. The number of children in colony A are **approximately** what per cent of the number of children in colony E?
 (a) 121 (b) 116
 (c) 75 (d) 101
 (e) 98
13. What is the respective ratio of the number of adult males to the number of adult females in colony B?
 (a) 3:5 (b) 7:5
 (c) 8:7 (d) 5:7
 (e) None of these
14. What is the average number of residents from all the colonies together?
 (a) 1654 (b) 1600
 (c) 1580 (d) 1574
 (e) None of these
15. What is the difference between the number of adult males and the number of children in colony D?
 (a) 138
 (b) 126
 (c) 136
 (d) 135
 (e) None of these

Directions for questions 11 to 15: Go through the data set given below and solve the questions based on it.

Following bar chart provides the percentage of Adult Males, Adult Females and Children out of total population in five colonies A, B, C, D and E:

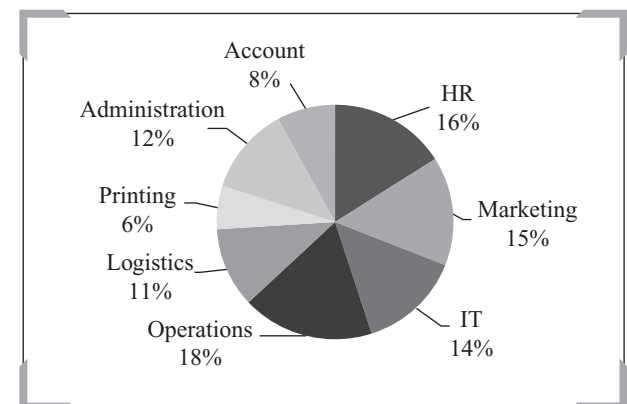


Total number of Residents in these Colonies

Colonies	Residents
A	1250
B	2050
C	1800
D	1150
E	1620

Directions for questions 16 to 20: Go through the data set given below and solve the questions based on it.

Following pie chart presents the percentage of employees working in different departments in an organization. Total Number of Employees = 2500



Following is the ratio of males to females in different departments in the same organization:

Male: Female Ratio			
Department	Male	:	Female
Administration	7	:	5
Accounts	2	:	3
HR	5	:	3
Marketing	7	:	8
IT	3	:	4
Operations	5	:	4
Logistics	6	:	5
Printing	2	:	1

16. What is the ratio between male employees in Administration and Printing Departments respectively?
 (a) 7:4 (b) 4:7
 (c) 3:4 (d) 7:3
 (e) None of these
17. What is the difference between total number of employees in IT and Operations Departments?
 (a) 75 (b) 150
 (c) 100 (d) 50
 (e) None of these
18. What is the ratio between total number of males in HR and Marketing and the total number of females in these two departments respectively?
 (a) 13:15
 (b) 15:13
 (c) 13:17
 (d) 17:14
 (e) None of these
19. How many female employees are there in HR Department?
 (a) 250
 (b) 120
 (c) 125
 (d) 150
 (e) None of these
20. What is the difference between the male and female employees in Logistics Department?
 (a) 50 (b) 25
 (c) 75 (d) 100
 (e) None of these

ANSWER KEYS

1. (a) 2. (b) 3. (e) 4. (c) 5. (d) 6. (d) 7. (a) 8. (c) 9. (d) 10. (b)
 11. (b) 12. (b) 13. (e) 14. (d) 15. (a) 16. (a) 17. (c) 18. (d) 19. (d) 20. (b)

HINTS AND EXPLANATIONS

1 to 5

1. Required percentage = $\frac{42}{490} \times 100 = 9\%$
 Hence option (a) is the answer.
2. Required ratio = $(120 - 30) : (30 + 30) = 90:60 = 3:2$
 Hence option (b) is the answer.
3. Number of businessmen = $45 + 19 = 64$
 Hence required percentage = $\frac{64}{100} \times 100 = 10\%$
 Hence option (e) is the answer.
4. Required ratio = $280 : (180 + 30) = 280:210 = 4:3$
 Hence option (c) is the answer.

$$5. \text{ Required percentage} = \frac{45}{(180+45)} \times 100$$

$$= \frac{45}{225} \times 100 = 20\%$$

Hence option (d) is the answer.

6 to 10

6. Farmer A's earnings = $\text{₹}(350 \times 30 + 150 \times 22.5 + 250 \times 18) = \text{₹}(10500 + 3375 + 4500) = \text{₹}18375$
 Hence option (d) is the answer.

7. Average price of Bajra = ₹ $\left(\frac{22+24.5+21+28+30}{5} \right)$
per kg = ₹25.10 per kg

Hence option (a) is the answer.

8. Required ratio = $240 : 28 : 240 : 30 = 14:15$

Hence option (c) is the answer.

9. Farmer C's earnings = ₹ $(180 \times 24 + 180 \times 26 + 180 \times 20.5)$ = ₹ $180(24 + 26 + 20.5)$ = ₹ (180×70.5) = ₹12690

Hence option (d) is the answer.

10. Required percentage = $\frac{25}{36} \times 100 = 69$

Hence option (b) is the answer.

11 to 15

11. Total number of adult females in colonies A, B and C together = $\left(\frac{1250 \times 36}{100} + \frac{2050 \times 30}{100} + \frac{1800 \times 42}{100} \right)$
= $(450 + 615 + 756) = 1821$

Hence option (b) is the answer.

12. Number of children in colony A = $\frac{1250 \times 30}{100} = 375$

Number of children in colony E = $\frac{1620 \times 30}{100} = 324$

Required percentage = $\frac{375}{324} \times 100 = 116$

Hence option (b) is the answer.

13. Required ratio = $50:30 = 5:3$

Hence option (e) is the answer.

14. Average number of residents from all the colonies together = $\frac{1250+2050+1800+1150+1620}{5} = \frac{7870}{5}$
= 1574

Hence option (d) is the answer.

15. Required difference = $(38 - 26)\%$ of 1150
= $\frac{12 \times 1150}{100} = 138$

Hence option (a) is the answer.

16 to 20

16. Total number of employees in administration department = $\frac{2500 \times 12}{100} = 300$

Number of male employees = $\frac{7}{12} \times 300 = 175$

Total number of employees in printing department
= $\frac{2500 \times 6}{100} = 150$

Number of male employees = $\frac{2}{3} \times 150 = 100$

Therefore Required ratio = $175:100 = 7:4$

Hence option (a) is the answer.

17. Required difference = $2500 \times (18 - 14)\% = \frac{2500 \times 4}{100}$
= 100

Hence option (c) is the answer.

18. Total number of employees in HR department
= $\frac{2500 \times 16}{100} = 400$

Hence no. of males = $\frac{5}{8} \times 400 = 250$ and number of females = $400 - 250 = 150$

Number of employees in marketing department
= $\frac{2500 \times 15}{100} = 375$

Number of males = $\frac{7}{15} \times 375 = 175$

Number of females = $375 - 175 = 200$

Therefore Required ratio = $(250 + 175) : (150 + 200)$
= $425:350 = 17:14$

Hence option (d) is the answer.

19. Number of employees in HR department = 16% of
 $2500 = \frac{16}{100} \times 2500$
= 400.

Number of female employees in HR department
= $\frac{3}{8}$ of total employee.
= $\frac{3}{8} \times 400 = 150$

20. Total number of employees in logistics department
= $\frac{2500 \times 11}{100} = 275$

Number of males = $\frac{6}{11} \times 275 = 150$

Number of females = $275 - 150 = 125$

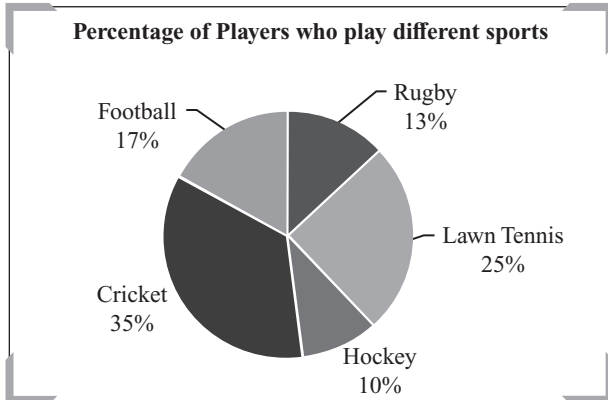
Hence required difference = $150 - 125 = 25$

Hence option (b) is the answer.

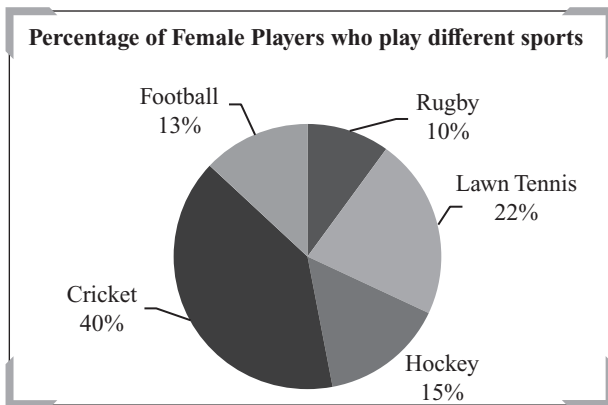
PRACTICE EXERCISE 7

Directions for questions 1 to 5: Go through the data set given below and solve the questions based on it.

Following pie chart give the percentage wise break-up of total players who play five different sports. Given that total number of players = 4200.



Out of total 4200 players, number of female players is equal to 2000. Following pie chart present the breakup of female players playing these five sports.



- What is the number of total players who play football and rugby together?
(a) 620 (b) 357
(c) 630 (d) 1260
(e) None of these
- What is the difference between the number of the female players who play lawn tennis and the number of male players who play rugby?
(a) 94 (b) 84
(c) 220 (d) 240
(e) None of these
- What is the respective ratio of the number of female players who play cricket and number of male players who play hockey?
(a) 20:7 (b) 4:21
(c) 20:3 (d) 3:20
(e) None of these
- What is the total number of male players who play football, cricket and lawn tennis together?
(a) 1,724 (b) 1,734
(c) 1,824 (d) 1,964
(e) None of these
- Number of male players who play rugby is approximately what percentage of the total number of players who play lawn tennis?
(a) 33 (b) 39
(c) 26 (d) 21
(e) 43

Directions for questions 6 to 10: Go through the data set given below and solve the questions based on it.

Number of Articles (in thousands) Manufactured (M) and Defective (D) by 5 units of a company over the Years

UNIT

Year	I		II		III		IV		V	
	M	D	M	D	M	D	M	D	M	D
1996	53	21	45	12	76	38	56	21	46	18
1997	49	18	32	10	45	24	63	24	36	14

Year	UNIT									
	I		II		III		IV		V	
1998	50	18	48	18	55	16	68	30	34	15
1999	65	20	68	15	57	20	54	19	48	12
2000	70	31	72	13	82	22	48	27	58	10
2001	44	15	56	22	38	32	40	15	60	11

6. What is the ratio between total number of articles manufactured by unit III to that by Unit V for all the years together?
 (a) 353 : 282
 (b) 282 : 353
 (c) 457 : 215
 (d) 215 : 457
 (e) None of these
7. What is the average number of defective items from Unit II for the given years?
 (a) 21,500
 (b) 17,000
 (c) 12,500
 (d) 15,000
 (e) None of these
8. During which year the largest percentage of articles were defective out of the articles manufactured by unit IV?
 (a) 1996 (b) 1997
 (c) 1998 (d) 1999
 (e) 2000
9. What was the percentage (rounded off to nearest integer) of defective articles over the number of articles manufactured by all units together in the year 2001?
 (a) 42
 (b) 40
 (c) 37
 (d) 33
 (e) None of these
10. During which year was the percentage increase/decrease in manufacture from the previous year the highest for Unit I?
 (a) 1998 (b) 2001
 (c) 1999 (d) 1997
 (e) None of these

Directions for questions 11 to 15: Go through the data set given below and solve the questions based on it.

Number of Males and Females staying in various Societies:

Societies	Males	Females
A	250	350
B	400	150
C	300	275
D	280	300
E	180	250
F	325	300

Percentage of Male and Female Children in the Societies:

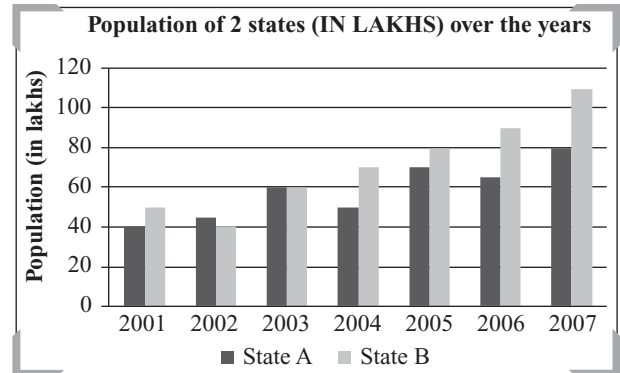
Societies	Children (out of total population)	Male Children out of total children	Female Children out of total children
A	25%	40%	60%
B	40%	75%	25%
C	16%	25%	75%
D	25%	80%	20%
E	40%	50%	50%
F	24%	46%	54%

11. What is the respective ratio of the number of adult females to the total number of female children staying in all the societies together?
 (a) 243:82
 (b) 112:71
 (c) 82:243
 (d) 71:112
 (e) None of these
12. What is the total number of female children staying in all the societies together?
 (a) 314
 (b) 433
 (c) 410
 (d) 343
 (e) None of these
13. What is the respective ratio of the total number of adult males in societies A and B together to the total number of adult males in societies E and F together?
 (a) 3520
 (b) 3360
 (c) 4100
 (d) 3000
 (e) None of these
14. What is the total number of members staying in all the societies together?
 (a) 3520
 (b) 3360
 (c) 4100
 (d) 3000
 (e) None of these
15. What is the difference between the number of male children in society B and the number of male children in society F?
 (a) 84
 (b) 14
 (c) 96
 (d) 26
 (e) None of these

Directions to questions 16 to 20: Go through the data set given below and solve the questions based on it.

Following chart gives the population of 2 states from year 2001 to year 2007:

(All the values are in the multiples of 5 lakhs)



16. Population of State B in 2002 is what per cent of the total population of State B in all the years together?
 (a) 18% (b) 26%
 (c) 14% (d) 12%
 (e) 8%
17. What is the ratio between the total population of State A for the years 2001, 2002 and 2003 together and the total population of State B for the years 2005, 2006 and 2007 together respectively?
 (a) 27 : 53 (b) 54 : 29
 (c) 29 : 56 (d) 53 : 27
 (e) None of these
18. For which State and in which year the per cent rise in population from the previous year was the highest?
 (a) State B – 2003 (b) State B – 2002
 (c) State A – 2004 (d) State A – 2005
 (e) None of these
19. What is the per cent rise in population of State B from 2003 to 2004?
 (a) $16\frac{1}{3}$ (b) $16\frac{2}{3}$
 (c) $18\frac{2}{3}$ (d) $18\frac{1}{3}$
 (e) None of these
20. Approximately what is the average population of State A for all the given years?
 (a) 65 lakhs (b) 50 lakhs
 (c) 48 lakhs (d) 58 lakhs
 (e) 52 lakhs

ANSWER KEYS

1. (d)	2. (a)	3. (c)	4. (b)	5. (a)	6. (a)	7. (d)	8. (e)	9. (b)	10. (b)
11. (a)	12. (c)	13. (d)	14. (e)	15. (c)	16. (e)	17. (c)	18. (a)	19. (b)	20. (d)

HINTS AND EXPLANATIONS

1 to 5

1. Average number of players who play Football and Rugby = $[(17 + 13) \% \text{ of } 4200]$
 $= 4200 \times \frac{30}{100} = 1260$. Hence option (d) is the answer.
2. Number of players who play Rugby = $4200 \times \frac{13}{100} = 546$
 Number of female players who play Rugby = $2000 \times \frac{10}{100} = 200$
 Hence Number of male players who play Rugby = $546 - 200 = 346$
 Number of female players who play Lawn Tennis = $2000 \times \frac{22}{100} = 440$
 Hence required difference = $440 - 346 = 94$. Hence option (a) is the answer.
3. Number of female cricketers = $2000 \times \frac{40}{100} = 800$
 Number of male Hockey players = $\frac{4200 \times 10}{100} - \frac{2000 \times 15}{100} = 420 - 300 = 120$
 Hence Required ratio = $800:120 = 20:3$.
 Hence option (c) is the answer.
4. Number of male players who play Football, Cricket and Lawn Tennis
 $= (17 + 35 + 25)\% \text{ of } 4200 - (13 + 40 + 22)\% \text{ of } 2000$
 $= 4200 \times \frac{77}{100} - 2000 \times \frac{75}{100} = 3234 - 1500 = 1734$
 Hence option (b) is the answer.
5. Number of male players who play Rugby = $4200 \times \frac{13}{100} - 200 = 346$
 Number of players who play Lawn Tennis = $4200 \times \frac{25}{100} = 1050$
 Hence required percentage = $\frac{346}{1050} \times 100 = 33$
 Hence option (a) is the answer.

6 to 10

6. Number of articles manufactured by:
 Unit III $\rightarrow (76 + 45 + 55 + 57 + 82 + 38)$ thousands = 353 thousands
 Units V $\rightarrow (46 + 36 + 34 + 48 + 58 + 60)$ thousands = 282 thousands
 Hence Required ratio = $353:282$
 Hence option (a) is the answer.
7. Required average = $\frac{(12+10+18+15+13+22)}{6}$
 thousands = $\frac{90}{6} = 15$ thousands
 Hence option (d) is the answer.
8. It was in the year 2000. Hence option (e) is the answer.
9. Number of articles manufactured in 2001 = $(44 + 56 + 38 + 40 + 60)$ thousands = 238 thousands
 Number of defective items = $(15 + 22 + 32 + 15 + 11)$ thousands = 95 thousands
 Hence Required percentage = $\frac{95}{238} \times 100 = 39.9 = 40$. Hence option (b) is the answer.
10. Percentage increase in 1999 = $\frac{15}{50} \times 100 = 30\%$
 Percentage decrease in 2001 = $\frac{26}{70} \times 100 = 37.14\%$
 Hence, percentage decrease was highest in 2001.
 Hence option (b) is the answer.

11 to 15

11. Number of children:
 Society A $\rightarrow 600 \times \frac{25}{100} = 150$
 Number of female children = $150 \times \frac{60}{100} = 90$
 Number of male children = $150 - 90 = 60$
 Society B $\rightarrow 550 \times \frac{40}{100} = 220$
 Number of female children = $220 \times \frac{25}{100} = 55$
 Number of male children = $220 - 55 = 165$

$$\text{Society C} \rightarrow 575 \times \frac{16}{100} = 92$$

$$\text{Number of female children} = 92 \times \frac{75}{100} = 69$$

$$\text{Number of male children} = 92 - 69 = 23$$

$$\text{Society D} \rightarrow 580 \times \frac{25}{100} = 145$$

$$\text{Number of female children} = 145 \times \frac{20}{100} = 29$$

$$\text{Number of male children} = 145 - 29 = 116$$

$$\text{Society E} \rightarrow 340 \times \frac{40}{100} = 172$$

$$\text{Number of female children} = 172 \times \frac{50}{100} = 86$$

$$\text{Number of male children} = 172 - 86 = 86$$

$$\text{Society F} \rightarrow 625 \times \frac{24}{100} = 150$$

$$\text{Number of female children} = 150 \times \frac{54}{100} = 81$$

$$\text{Number of male children} = 150 - 81 = 69$$

$$\text{Number of adult females} = (350 + 150 + 275 + 300 + 250 + 300) - 410 = 1625 - 410 = 1215$$

$$\text{Number of female children} = 90 + 55 + 69 + 29 + 86 + 81 = 410$$

$$\text{Hence required ratio} = 1215:410 = 243:82$$

Hence option (a) is the answer.

12. Using the data obtained in the previous question:

Number of all female children = 410. Hence option (c) is the answer.

13. Number of adult males in societies A and B = $(250 - 60) + (400 - 165) = 190 + 235 = 425$

Number of adult males in societies E and F = $(180 - 86) + (325 - 69) = 94 + 256 = 350$

$$\text{Required ratio} = 425:350 = 17:14$$

Hence option (d) is the answer.

14. Number of all members = $(250 + 350) + (400 + 150) + (300 + 275) + (280 + 300) + (180 + 250) + (325 + 300) + 150 + 220 + 92 + 145 + 172 + 150 = 4289$

Hence option (e) is the answer.

15. Required difference = $165 - 69 = 96$

Hence option (c) is the answer.

16 to 20

16. Total population of state B in all the years = $(50 + 40 + 60 + 70 + 80 + 90 + 100)$ lakhs = 490 lakhs

Population of state B in 2002 = 40 lakhs

$$\text{Hence required percentage} = \frac{40}{490} \times 100 = 8.16\%$$

Hence option (e) is the answer.

17. Required ratio = $(40 + 45 + 60):(80 + 90 + 110) = 145:280 = 29:56$

Hence option (c) is the answer.

18. It is obvious from the graph.

Hence option (a) is the answer.

19. Percentage increase = $\frac{70-60}{60} \times 100 = \frac{50}{3} = 16\frac{2}{3}$

Hence option (b) is the answer.

20. Average population of the state

$$A = \left(\frac{40 + 45 + 60 + 50 + 70 + 65 + 80}{7} \right) \text{ Lakhs} = \frac{410}{7}$$

lakhs = 58 lakhs

Hence option (d) is the answer.

PRACTICE EXERCISE 8

Directions for questions 1 to 5: Refer to the tables given below and answer the questions that follow.

Table 1 give the transportation cost of a product from six factories F1, F2, F3, F4, F5 and F6 to five warehouses W1, W2, W3, W4 and W5.

	W1	W2	W3	W4	W5
F1	60	25	45	40	80
F2	85	40	45	60	75
F3	80	20	45	50	90
F4	90	40	55	25	70
F5	95	20	40	45	80
F6	85	35	50	50	75

Table 2 give the transportation cost of the same product from five warehouses W1, W2, W3, W4 and W5 to six retailers R1, R2, R3, R4, R5 and R6.

	R1	R2	R3	R4	R5	R6
W1	40	20	40	30	85	25
W2	50	50	45	60	70	30
W3	20	10	50	50	80	35
W4	40	30	45	40	90	40
W5	50	30	50	40	70	30

In addition to the above tables given, following table gives the transportation cost incurred from different retailers to the five different colonies C1, C2, C3, C4 and C5.

	C1	C2	C3	C4	C5
R1	10	25	10	10	10
R2	15	10	15	10	15
R3	10	20	10	15	10
R4	20	10	15	15	10
R5	15	10	20	20	20
R6	10	15	15	15	15

- What is the minimum transportation cost incurred in transferring the product from any factory to any colony?
(a) ₹45 (b) ₹65
(c) ₹55 (d) None of these
- What is the minimum transportation cost incurred in transferring the product from any factory to the colony C2?
(a) ₹45 (b) ₹60
(c) ₹55 (d) None of these
- If one unit produced in each of the factories is to be sent to each of the colonies, then what will be the total transportation cost incurred?
(a) ₹1705 (b) ₹1980
(c) ₹2185 (d) None of these
- $F_i W_j R_k C_l$ represents that the product has moved in this cycle – Factory i to warehouse j to retailer k to colony l. If $i = 2$ and $k = 2$, then what is the sum of $(j + l)$ for the lowest transportation cost incurred in one product transferred from $i = 2$ to any of the colonies?
(a) 4 (b) 5
(c) 7 (d) cannot be determined
- In the above question, if $j = 2$, then how many different value/s of $(i + k + l)$ is/are possible for the lowest transportation cost incurred in one product transferred from any of the factories to any of the colonies?
(a) 1 (b) 2
(c) 3 (d) cannot be determined

Directions for questions 6 to 10: Refer to the table given below and answer the questions that follow.

Given below are the forecasts of world and Asian energy demand for the years 1991, 2001 and 2011. The demand is given in million barrels per day, crude oil equivalent.

	1991		2001		2011	
	World	Asia	World	Asia	World	Asia
Petrol	50.0	4.0	70.0	10.0	80.0	15.0
Naphtha	30.0	0.5	40.0	2.5	50.0	5.0
Solid Fuels	50.0	4.0	60.0	5.0	75.0	10.0
Nuclear Fuel	10.0	0.5	20.0	1.0	25.0	1.3
Hydro Energy	10.0	1.0	10.0	1.5	20.0	2.0
Total	150.0	10.0	200.0	20.0	250.0	33.3

6. What can be inferred from the given table?
- Percentage increase in the number of Petrol using vehicles/agents have increased in Asia than the world in the decade 1991–2001.
 - Exploration of Naphtha is low in Asia is less than the exploration of Naphtha in the world throughout the period.
 - Both (a) and (b)
 - None of these
7. Over 1991–2011, which two fuels meet more than 60% of the total energy demand of both the world and Asia?
- Petrol and Naphtha
 - Petrol and Solid fuels
 - Naphtha and Solid fuels
 - None of these
8. Which fuel's proportion in the total energy demand increases over the decade 1991–2001 and decreases over the decade 2001–2011 for both the world and Asia?
- Petrol
 - Naphtha
 - Solid fuels
 - Nuclear Fuel
9. Which is the fuel whose proportion in the total energy demand will decrease continuously over the period 1991–2011, in Asia?
- Naphtha
 - Solids fuels
 - Nuclear Fuel
 - Hydro Energy
10. Which is the fuel whose proportions to the total energy demand of the world will remain constant over the period 1991–2011 but whose proportion will increase in the total energy demand in Asia?
- Naphtha
 - Solids fuels
 - Nuclear Fuel
 - Hydro Energy

Directions for questions 11 to 14: Refer to the table given below and answer the questions that follow.

Following table gives some incomplete information on the marks obtained by four persons Amit, Binit, Charu and Dilip in four different subjects.

	Physics	Chemistry	Maths	English	Total
Amit	80	70	–	80	–
Binit	60	–	60	–	–
Charu	–	–	60	–	220
Dilip	90	–	70	60	–

Additional Information:

- Amit's average marks was 72.5, in all the four subjects.
 - The average marks in Physics for all four persons was 67.5.
 - Binit's Average marks for all four subjects was 1.5 times Charu's marks in physics.
 - Binit and Dilip scored the same marks in English. The average English marks were the same as the average Physics marks.
 - The total marks in Chemistry was 10 less than the total marks in physics for all four persons.
11. Who scored the lowest total?
- Amit
 - Binit
 - Charu
 - Dilip
12. The average marks for all four persons (for all the four subjects) is (approx.)
- 65.625
 - 81.225
 - 99.5
 - 105.6
13. Who is the highest scorer in chemistry?
- Amit
 - Binit
 - Charu
 - Dilip
14. Who is the lowest scorer in physics?
- Amit
 - Binit
 - Charu
 - Dilip

Directions for questions 15 to 17: In each question, there are two statements: A and B, either of which can be true or false on the basis of the information given below.

A research agency collected the following data regarding the admission process of a reputed management school in India.

Year	Gender	Number bought application forms	Number appeared for written test	Number called for interviews	Number selected for the course
2002	Male	61205	59981	684	171
	Female	19236	15389	138	48
2003	Male	63298	60133	637	115
	Female	45292	40763	399	84

Chosse (a) if only A is true

Chosse (b) if only b is true

Chosse (c) if both A and B are true

Chosse (d) if neither A nor b is true

15. **Statement A:** The success rate of moving from written test to interview stage for males was worse than for females in 2003.

Statement B: The success rate of moving from written test to interview test to interview stage for females was better in 2002 than in 2003.

16. **Statement A:** In 2002, the number of females selected for the course as a proportion of the number of females who bought application forms, was higher than the corresponding proportion for males.

Statement B: In 2002, among those called for interview, males had a greater success rate than females.

17. **Statement A:** The percentage of absentees in the written test among females decreased from 2002 to 2003.

Statement B: The percentage of absentees in the written test among males was larger than among females in 2003.

Directions for questions 18 to 20: Answer the questions on the basis of the information given below.

The table below provides certain demographic details of 30 respondents who were part of a survey investigating the irregularities in NREGS. The demographic characteristics are: gender, number of children, and age of respondents. The first number in each cell is the

number of respondents in that group. The minimum and maximum age of respondents in each group is given in brackets. For example, there are five female respondents with no children and among these five; the youngest is 34 years old, while the oldest is 49.

No. of children	Male	Female	Total
0	1(38,38)	5(34,49)	6
1	1(32,32)	8(35,57)	9
2	8(21,65)	3(37,63)	11
3	2(32,33)	2(27,40)	4
Total	12	18	30

18. The percentage of respondents aged less than 40 years is at least

(a) 10% (b) 16.67%
(c) 20.0% (d) 30%

19. Given the information above, the percentage of respondents older than 35 can be at most

(a) 30% (b) 73.33%
(c) 76.67% (d) 90%

20. The percentage of respondents that fall into the 35 to 40 years age group (both inclusive) is at least

(a) 6.67% (b) 10%
(c) 13.33% (d) 26.67%

ANSWER KEYS

1. (d) 2. (d) 3. (d) 4. (d) 5. (d) 6. (d) 7. (b) 8. (a) 9. (d) 10. (a)
11. (c) 12. (a) 13. (d) 14. (c) 15. (d) 16. (d) 17. (a) 18. (d) 19. (c) 20. (c)

HINTS AND EXPLANATIONS

1 to 5

1. F3 to W2 to R6 to C1 is the lowest = $20 + 30 + 10 = ₹60$.
2. F3 to W2 to R6 to C2 is the minimum = $20 + 30 + 15 = ₹65$.
4. F2 – W3 – R2 – either C2/C4. Hence two different values possible.

5. There can be two values of $i = 3/5$, one value of $j = 2$, one value of $k = 6$ and one value of $l = 1$. Hence two different sums are possible.

6 to 10

6. Obviously cannot be inferred. (a) seems probable, but number of vehicles/agents need not be increasing. There can be other reasons also like reduction in the efficiency of the vehicle etc.

7.

		1991		2001		2011	
		World	Asia	World	Asia	World	Asia
Total energy		150	10	200	20	250	33.3
Naphtha	Value	30	0.5	40	2.5	50	5
	Proportion	20%	5%	20%	12.50%	20%	15.01
Solid fuels	Value	50	4	60	5	75	10
	Proportion	33.30%	40%	30%	25%	30%	30.03
Petrol	Value	50	4	70	10	80	15
	Proportion	33.30%	40%	35%	50%	32%	45.04

Hence, solid fuels and Petrol combined constitute more than 60 percent of total energy in both the world and Asia for the given period.

8. It can be seen from the table that Petrol is the fuel whose proportion in the total energy demand increases during 1991–2001 and decreases during 2001–2011 for both the world and Asia.
9. For the answer choices given and for Asia we can take make the following table.

		1991	2001	2011
Total energy		10	20	33
Naphtha	Value	0.5	2.5	5
	Proportion	5%	12.50%	15.15%

		1991	2001	2011
Total energy		10	20	33
Solid fuels	Value	4	5	10
	Proportion	40%	25%	30.30%
Nuclear Fuel	Value	0.5	1	1.3
	Proportion	5%	5%	3.90%
Hydro Energy	Value	1	1.5	2
	Proportion	10%	7.50%	6.06%

Hence, we can see that the proportion of Hydro Energy goes on decreasing over the period.

10. For answer choices given and for the worlds, we can make the following table.

		1991	2001	2011
	Total energy	150	200	250
Naphtha	Value	30	40	50
	Proportion	20%	20%	20%
Solid Fuels	Value	50	60	75
	Proportion	33%	30%	30%
Nuclear Fuel	Value	10	20	25
	Proportion	6.66%	10%	10%
Hydro Energy	Value	10	10	20
	Proportion	6.66%	5%	8%

Hence, we can see that the proportion of Naphtha remains constant over the given period.

11 to 14

From the given information the following table can be prepared:

	Physics	Chemistry	Maths	English	Total
Amit	80	70	60	80	290
Binit	60	60	60	60	240
Charu	40	50	60	70	220
Dilip	90	80	70	60	300

Now all the questions can be answered.

11. (c) 12. (a) 13. (d) 14. (c).
 15. **Statement A:** Success rate of moving from written test to interview for male in 2003 = $\frac{637}{60133} \times 100$ & for women it is $\frac{399}{40763} \times 100$. It is clear for males it is more than 1% & for women it is less than 1% (we must avoid actual calculation)

Statement B: Success rate of moving from written test to interview for females in 2003 = $\frac{399}{40763} \times 100$

& for year 2002 it is $\frac{138}{15389} \times 100$. We can easily

observe without actual calculation that it was more in 2002 as compared to 2003.

So, both Statement A & Statement B are wrong.

16. **Statement A:** Proportion of females & male selected for course as compared to total females & males who bought application form in 2002 is $\frac{48}{19236}$ & $\frac{171}{61205}$ respectively clearly proportion is more for males.

Statement B: Success rate of males & females for those who were called for interview in 2002 is $\frac{171}{684}$ & $\frac{48}{135}$ respectively. Clearly success rate of female is higher.

So, both Statement A and Statement B are wrong.

17. **Statement A:** The % of females absentees in written-test in 2002 & 2003 are $\frac{19236-15389}{19236} \times 100 = 20\%$ & $\frac{45292-40763}{45292} \times 100 \approx 10\%$. Clearly Statement A is correct.

Statement B: The % of male absentees in 2003 = $\frac{63298-60123}{63298} \times 100 \approx 5\%$ clearly Statement B is wrong.

18 to 20

18. The minimum number of males (or females) for any group on the basis of number of children = 0 (if lower age is more than 40)
 = All (if upper age is less than 40)
 = 1 (if lower age is less than 40 & upper)
 So, minimum possible number of people below 40 age is 9.
 Hence, required percentage = $9/3 \times 100\% = 30\%$.
19. $\frac{23}{30} \times 100 = 76.67\%$. Hence option (c) is the answer.
20. $\frac{4}{30} \times 100 = 13.33\%$. Hence option (c) is the answer.

Chapter

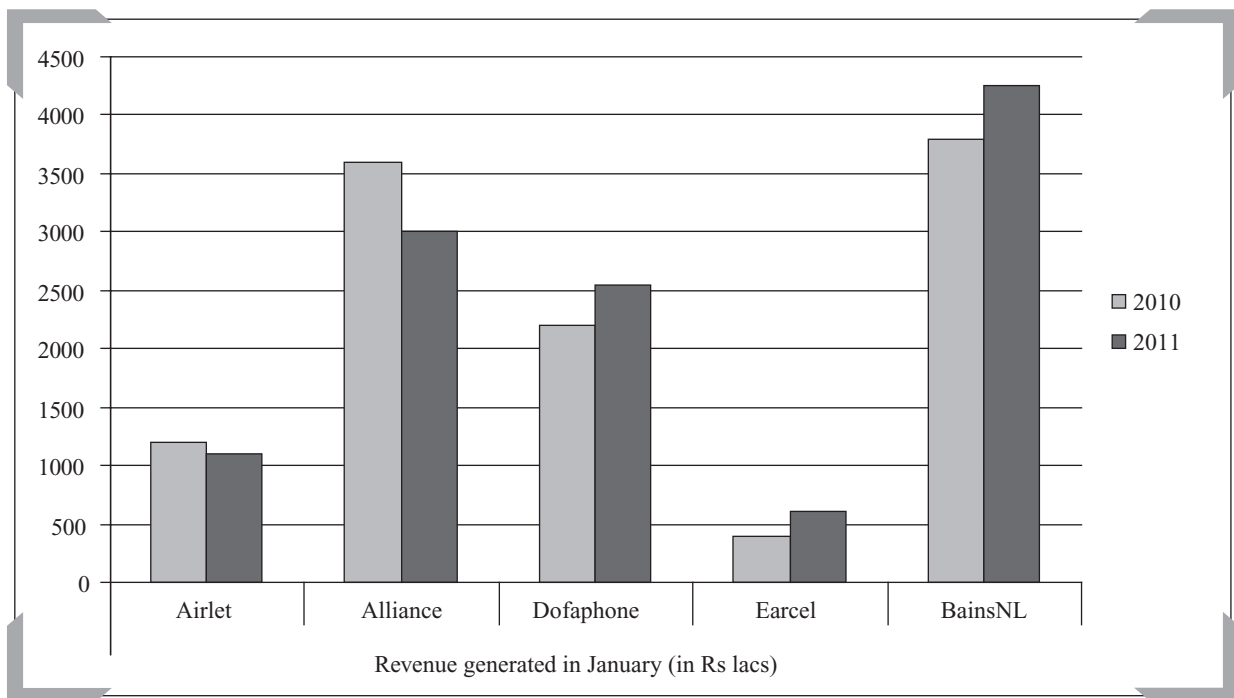
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MODERATE EXERCISES

PRACTICE EXERCISE 1

Directions for questions 1 to 4: *Go through the data set given below and solve the questions based on it.*

Following chart gives the revenue of 5 telecom companies generated in Jan'2010 and Jan'2011. All the values are in the multiples of 50.



Following table provides the number of users of these telecom companies for the same two years in the month of January (in lacs):

Number of Users (in lacs)					
	AirLet	Alliance	Dofaphone	Earcel	BainsNL
2010	242	324	286	42	422
2011	259	318	294	46	440

- ARPU is defined as Average Revenue Per User. For which of the following companies ARPU in the month of January maximum for both the years combined?
 - Alliance
 - Dofaphone
 - Earcel
 - BainsNL
- ARPU is defined as Average Revenue Per User. For how many companies, ARPU has increased in January 2011 over January 2010?
 - 2
 - 3
 - 4
 - 5
- In January 2011, VAS (Value Added Services) was launched by all these five telecom companies for the first time. Following table gives the percentage of revenue generated through VAS by these companies in the month of January 2011 (out of total revenue generated in January 2011 as given in the bar chart):

AirLet	Alliance	Dofaphone	Earcel	BainsNL
18%	9%	12%	22%	6%

Which of the following is NOT correct for the VAS revenue generated by these companies for the year 2011?

- VAS revenue of Alliance is more than the VAS revenue of BainsNL.
 - VAS revenue of AirLet is more than the VAS revenue of Alliance.
 - If we arrange VAS revenue of all these companies in ascending order, then VAS revenue of BainsNL will be the median.
 - Cannot be determined
- In January 2010, SMS Services was launched by all these five telecom companies for the first time. Following table gives the percentage of revenue generated through SMS services by these companies in the month of January 2010 (out of total revenue generated in January 2010 as given in the bar chart):

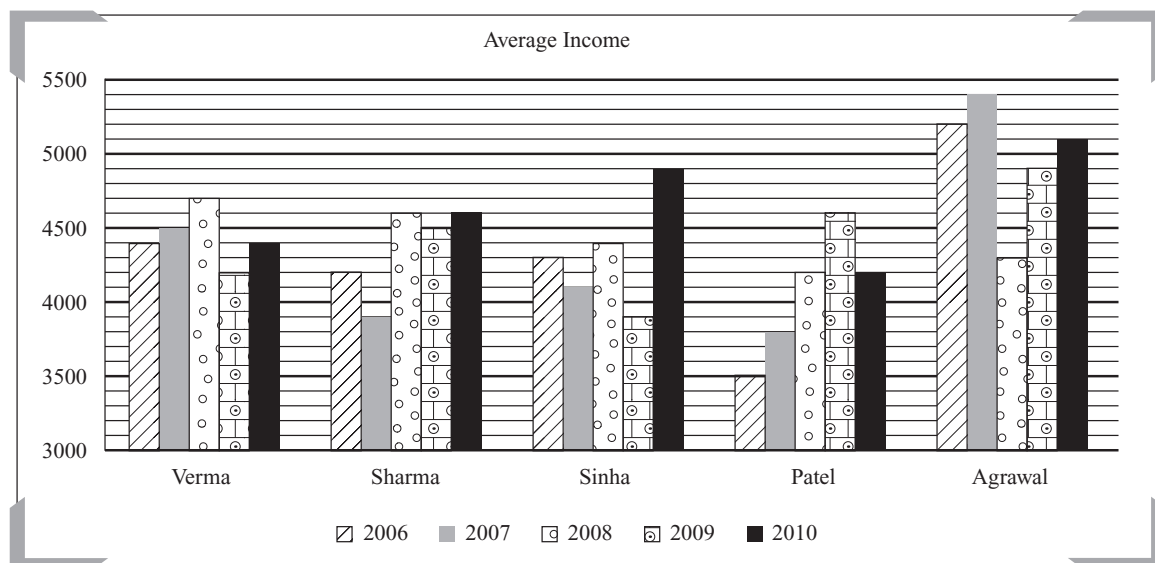
AirLet	Alliance	Dofaphone	Earcel	BainsNL
12%	16%	9%	6%	14%

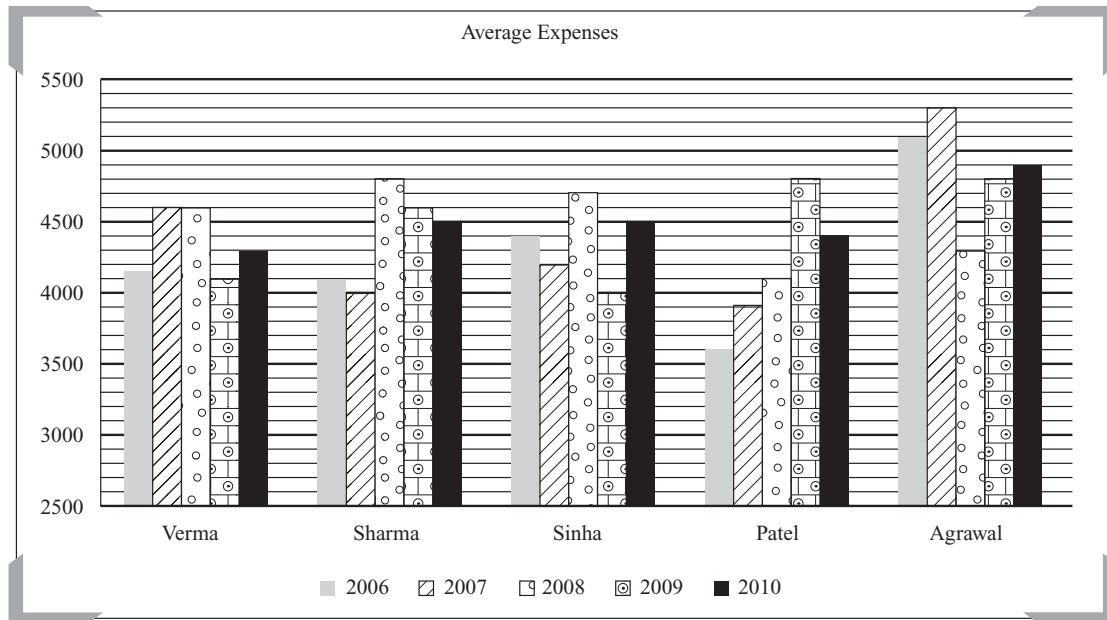
What is the ratio of revenue generated through SMS services by Alliance Telecom to the revenue generated by Earcel through SMS in 2010?

- 8:3
- 7:2
- 4:7
- cannot be determined

Directions for questions 5 to 7: Go through the data set given below and solve the questions based on it.

Following bar charts give the average income and average expense for five families in the five years from 2006 to 2010. Average Savings for the year = Average Income – Average Expenses.





All the values are in the multiples of 100.

5. For how many families, savings is non-negative for each of the years?
 (a) 0 (b) 1
 (c) 2 (d) 3
6. Which of the following families' total savings is maximum over the given period?
 (a) Agrawal (b) Sharma
 (c) Patel (d) Verma
7. For how many families, total savings is negative over the given period?
 (a) 2 (b) 3
 (c) 4 (d) 5

Directions for questions 8 to 10: Go through the data set given below and solve the questions based on it.

Following table gives the loans disbursed (only principal value and NOT the interest) across sectors (in ₹Crore) by a bank in the period 2005–2010. There is no overlapping of loan disbursals across the given sectors. All the Loans disbursed are of only two types—Standard loan or NPA Loan.

Sectors	Standard Loan	NPA Loan
Coal	1481.41	11.27
Mining	4517.06	62.97
Iron and Steel	41972.67	836.9

Sectors	Standard Loan	NPA Loan
Metal Products	8196.7	294.08
All Engineering	17903	475.6
Electricity	9052	34.77
Cotton Textiles	16907.7	593.27
Jute Textiles	275.7	17.57
Other Textiles	17264.1	536.9
Sugar	4718.9	26.1
Tea	375.3	102.5
Food Processing	13325.1	590.2

Standard loans are those loans for which repayments are regular and NPA Loan (Non Performing Asset Loan) are those loans for which repayment installments have stopped coming and bank have considered these loans as 'bad debt'.

8. For how many sectors, NPA loan is more than 2% of the total loan?
 1. 5
 2. 6
 3. 7
 4. None of these

9. For which sector, NPA loan as a percentage of total loan maximum?
1. Jute Textiles
 2. Metal products
 3. All Engineering
 4. None of these
10. Which of the following correctly presents the range of value of standard loan as a percentage of total loan

disbursed for all the sectors taken together for the whole period?

1. Between 96% and 97%
2. Between 97% and 98%
3. Between 98% and 99%
4. None of these

ANSWER KEYS

1. (c) 2. (b) 3. (d) 4. (d) 5. (b) 6. (a) 7. (b) 8. (c) 9. (d) 10. (b)

HINTS AND EXPLANATIONS

1 to 4

1. Following is the list of ARPU:

	AirLet	Alliance	Dofaphone	Earcel	BainsNL
ARPU					
Jan 10	4.7	10.49	7.5	10.7	9
ARPU					
Jan 11	4.2	9.4	8.67	13.04	9.6

It can be seen clearly that Earcel is maximum for both the years. Hence it will be maximum combined also. Hence option (c) is the answer. Alternatively, it can be observed that all the bars except Earcel gives less than 10 ARPU in the 1st year and in 2nd year, Earcel is maximum.

2. Following is the list of ARPU:

	AirLet	Alliance	Dofaphone	Earcel	BainsNL
ARPU					
Jan 10	4.7	10.49	7.5	10.7	9
ARPU					
Jan 11	4.2	9.4	8.67	13.04	9.6

Hence option (b) is the answer.

- 3.

VAS	AirLet	Alliance	Dofaphone	Earcel	BainsNL
2011	18%	9%	12%	22%	6%
Revenue	198	270	306	132	255

Statements (a) and (c) are true and (b) is false. Hence answer is option (d) cannot be determined.

4. Data is given for January 2010, and question is asking for the whole year 2010. Hence cannot be determined. Hence option (d) is the answer.

Solution to Questions 5 to 7

This question set is purely based upon observation. That also, very careful observation. During online CAT, such kind of questions have been reported by the students where solving a question was more a job of 'eyes' than the job of 'brain'.

5. For Verma family, saving is negative in 2007, so we do not need to check for other years. For Sharma family also, saving is negative in 2007. For Sinha and Patel family, savings is negative in first year itself. For Agrawal family, this is zero for 2008, and positive for all the years. Since question is asking for non-negative value, Agrawal family's data satisfies this condition. Hence option (b) is the answer.
6. Only two families have positive savings—Verma and Agrawal. Agrawal's savings is more than Verma's savings. Hence option (a) is the answer.
7. Sharma, Sinha and Patel family have negative total savings. Hence option (b) is the answer. Following is the detailed list of savings:

	2006	2007	2008	2009	2010	Summation
Verma	200	-100	100	100	100	400
Sharma	100	-100	-200	-100	100	-200

	2006	2007	2008	2009	2010	Summation
Sinha	-100	-100	-300	-100	400	-200
Patel	-100	-100	100	-200	-200	-500
Agrawal	100	100	0	100	200	500

8 to 10

8. Following sectors have more than 2% NPA loan - Metal Products, All Engineering, Cotton Textiles,

Jute Textiles, Other Textiles, Tea and Food Processing. Hence option (c) is the answer.

9. It can be clearly seen that maximum value occurs for Tea (roughly 21%). This question was a test of observation only. Hence option (d) is the answer.
10. Total standard loan = 135989.6 cr
 Total disbursal = 139571.8
 Hence percentage = 97.43%
 Alternatively, it can be observed that NPA loan as a percentage of total loans come equal to 2% – 3%. Hence Standard loan = 100% – (2% to 3%) = 97% – 98%. Hence option (b) is the answer.

PRACTICE EXERCISE 2

Directions for questions 1 to 3 Go through the information given below and solve the questions based on it.

ABC is a firm that deals with furniture. Manufacturing of table requires three levels of assembly. The finished table is at first level. The leg assembly and tabletop are second level. The pieces that go into the leg assembly are at the third level which consists of short rails, long rails and legs. One unit of table requires one unit of tabletop and one unit of leg assembly. One unit of leg assembly requires 2 units of short rails, 2 units of long rails and 4 units of legs. Orders are placed just in time to minimize storage.

The lead time for activities are (Lead time is waiting time required to complete one activity)

Parts	Weeks
Assemble table	1
Finished leg assembly	1
Purchase legs	1
Purchase short rails	1
Purchase long rails	1
Purchase table top	2

The availability of parts at present:

Parts	Units
Finished Table	50
Leg assembly	100
Legs	150
Short rails	50
Long rails	0

Parts	Units
Table top	50

Demand of finished tables:

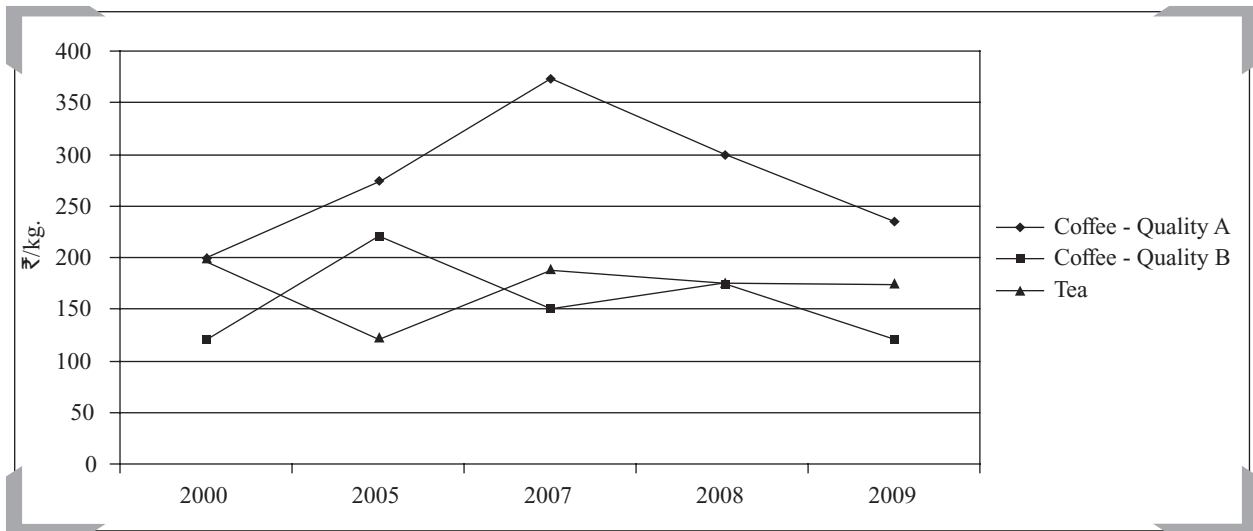
Details	Week 4	Week 5	Week 6
Demand (units)	200	150	100

For delivering any table in subsequent weeks, demand of previous weeks must be met first. First demand occurs in week 4.

- For meeting the demand of 200 units of finished table of week 4, when would the first order of tabletops be placed?
 - Week 1
 - Week 3
 - Week 5
 - None of these
- Keeping in mind the inventory, how many legs should be ordered for meeting the demand of week 4 finished tables?
 - 200
 - 50
 - 400
 - 800
- Keeping in mind the inventory, when and how many units of short rail would be placed for meeting the demand of finished table of week 6?
 - 100 units in week 1
 - 200 units in week 3
 - 300 units in week 6
 - None of these

Directions for questions 4 to 7: Go through the data set given below and solve the questions based on it.

The line chart depicts the price trend of beverages (₹/kg) from 2000 to 2009.



Following table provides the price indices for agricultural commodities in the years 2000 to 2009. For the sake of calculation, base year is considered as the year 2000. In the year 2000, unit price of the items mentioned = 100.

Price indices for agricultural commodities

Item	2000	2005	2007	2008	2009
1. Beverages	100	127	158	135	104
2. Food	100	98	107	101	85
3. Raw Materials	100	113	105	84	85

Assume that the index for beverage is based on the three beverages for which the price trend is shown in the line chart given at the top.

4. In 2009, what is the quantity of tea that can be bought for ₹2,000?
 - (a) 10.8 kg
 - (b) 5.88 kg
 - (c) 11.7 kg
 - (d) 12.8 kg
5. During which period was the change in the price (₹/kg/years) the lowest for coffee quality A?

- (a) 00 – 05
- (b) 05 – 07
- (c) 07 – 08
- (d) 08 – 09

6. For which of the three beverages is the change in price between 00 and 09 not in conformity with the trend for beverage price index?
 - I. Coffee – Quality A
 - II. Coffee – Quality B
 - III. Tea
 - (a) III only
 - (b) I and II
 - (c) I and III
 - (d) II and III
7. Assuming that equal weightage is given to each of three beverages in calculating the index, which one contributes most to the rise in index from 2000 to 2009?
 - (a) Tea
 - (b) All contribute equally
 - (c) Coffee – Quality A
 - (d) Coffee – Quality B

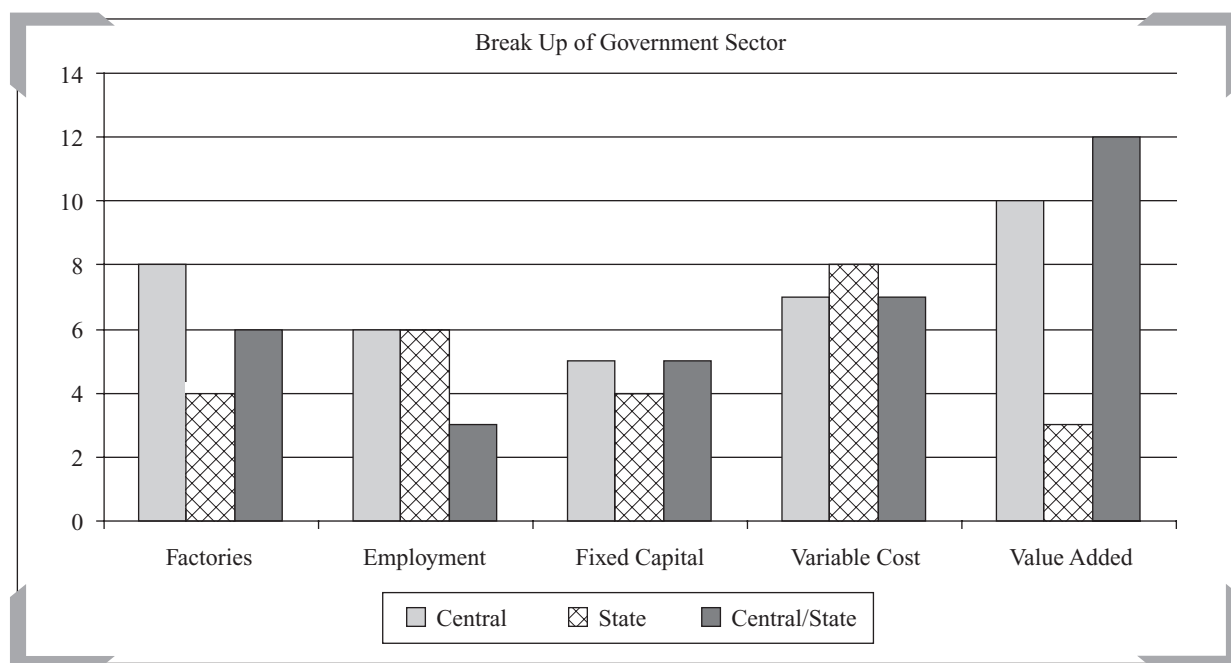
Directions for questions 8 to 11: Go through the chart given below and solve the questions based on it.

Following grid presents the percentage composition of five verticals under different sectors viz., Government, Public, Private, Joint.

Sector	Factories	Employment	Fixed Capital	Variable Cost	Value Added
Government	18	15	14	22	25
Public	12	8	6	19	8
Private	55	65	72	54	62
Joint	15	12	8	5	5
Total	100	100	100	100	100

For example, of all the factories, 18% are owned by Government.

Further, Government sector can be further broken down into three sub-sectors—Central, State, Central/State. Following bar chart gives a break-up of the government sector data (as given in Table above):



8. If the total work force was 76 million whereas the total value added was ₹225 million, then which of the following had the maximum value addition per worker?
 - (a) Central
 - (b) State
 - (c) Central/State
 - (d) Public
9. Which of the following sectors has the maximum fixed capital invested per factory?
 - (a) Central
 - (b) State
 - (c) Central/State
 - (d) Public
10. If the variable is proportional to the number of employees and the production per employee, then for which of the following is the production highest?
 - (a) Government
 - (b) Private
 - (c) Joint
 - (d) Public
11. If the government has a fixed capital of \$200 million in the Iron & Steel industry, which corresponds to 20.012% of its total investment as fixed capital, then how much did the government invest (in ₹million) in Aruti Udyog Ltd. which forms 25% of the investment in the joint sector? (1 US \$ = ₹45)
 - (a) 7860
 - (b) 2500
 - (c) 143
 - (d) 145

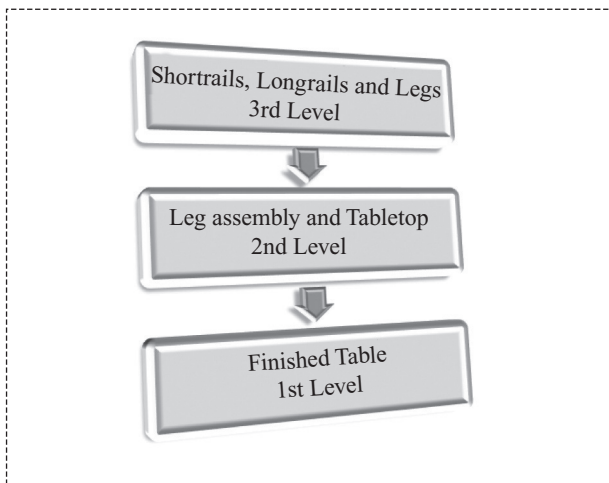
ANSWER KEYS

1. (a) 2. (b) 3. (d) 4. (b) 5. (a) 6. (d) 7. (c) 8. (c) 9. (b) 10. (b)
11. (a)

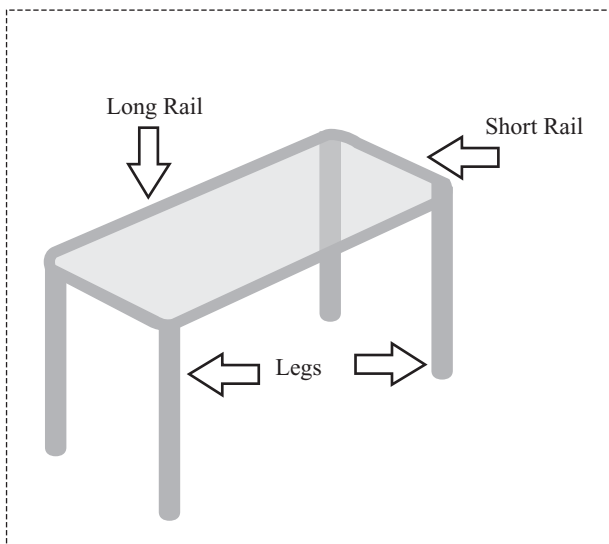
HINTS AND EXPLANATIONS

Storyline:

There are three levels of work in table making:



For the sake of understanding the terms used (Short rail and long rail), have a look at the following picture (though we really don't need to understand this to solve the questions):



- We need to have 200 units of finished table in week 4.
For 200 tables, we need to have the following:
200 units of tabletop and 200 units of leg assembly.
200 units of leg assembly = $200 \times (2 \text{ units of short rails, } 2 \text{ units of long rails and } 4 \text{ units of legs}) = 400 \text{ units of long rails} + 400 \text{ units of short rails} + 1600 \text{ legs}$.
We already have 50 finished tables and 50 table top with us. So we need to order 100 tabletops.
Lead time involved related to table top are – Purchase table top (2 weeks) and assemble table (1 week). So Total Lead time = 3 weeks.
Since tables are to delivered in week 4, hence we need to place the order 3 weeks back (keeping a lead time of 3 week). Hence table top shall be ordered in $4 - 3 = \text{first week}$.
Hence option (a) is the answer.
- Total demand of finished table in week 4 = 200 tables.
Net availability right now:

Parts	Units
Finished Table	50
Leg assembly	100
Legs	150

- We already have 50 finished table, so we need to manufacture 150 tables.
For this, we need to have $150 \times 4 = 600 \text{ legs}$.
Out of this, following number of legs are available:
100 leg assembly contains = $100 \times 4 = 400 \text{ legs}$.
Spare legs available = 150 legs.
So total number of legs available = 550 legs.
Hence we need to order $600 - 550 = 50 \text{ legs}$.
Hence option (b) is the answer.
- Before we deliver the demand of week 6, we need to deliver the demands of previous weeks – week 4 and week 5.

So, in effect, total demand to be delivered = Demand of week 4 + demand of week 5 + demand of week 6 = $200 + 150 + 100 = 450$ finished tables
 So, total number of short rails required = $450 \times 2 = 900$ short rails

We are required to decide that when and how many Short rails shall be ordered?

Let us first calculate that how many short rails are present right now.

The availability of parts at present:

Parts	Units
Finished Table	50
Leg assembly	100
Legs	150
Short rails	50
Long rails	0
Table top	50

Total number of short rails present = 50×2 (in Finished Table) + 100×2 (in Leg Assembly) + 50 (Short rails) = 250 Short rails.

Hence total number of short rails required to be ordered = $900 - 250 = 650$ short rails.

Since none of the options contain 650 short rails in it, we are not required to check further that when is it required to be ordered.

Hence option (d) None of these is the answer.

Storyline of 4 to 7

Line charts are typically used for trend analysis for chronological data. A clear trend of price change can be seen through the line chart—with a word of caution because gap in number of years between two data point is not same. Table given below presents the index value for Beverages, based upon the data from line chart, and two other items. As stated in the first line, you may expect questions which ask to compare the trends of different items across the years.

Solution and Explanation for 4 to 7

4. This question needs a simple calculation. Price per kg of tea in 2009 = ₹170/kg.

Hence quantity that can be bought for

$$₹1000 = \frac{1000}{170} = ₹5.88/\text{kg}$$

Hence option (b) is the answer.

5. Question is asking for change, and not increase or decrease. So we are required to work upon with magnitude only, and sign (positive or negative) is not important.

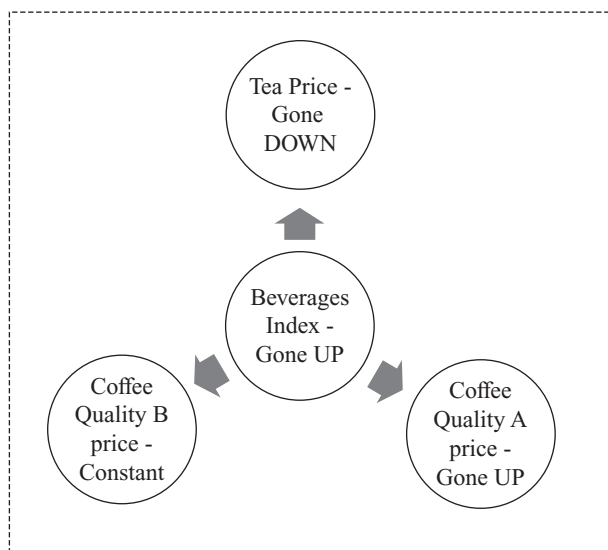
Year Span	Total Change	Total Years	Change/year
2000 – 2005	75	5	15
2005 – 2007	105	2	52.5
2007 – 2008	80	1	80
2008 – 2009	65	1	65

It is obvious that change/year is minimum in the year 2000 – 2005. Hence option (a) is the answer.

6. Index has the following pattern: Increase – Increase – Decrease – Decrease
 Only Coffee Quality A shows this trend.
 Hence option (d) is the answer.

7. Beverages Index in the year 2000 = 100
 Beverages Index in the year 2009 = 104. So there is a rise in index.

It can be observed that Tea price has remained same and price of Coffee Quality A has gone down in 2009 over 2000.



Only the price of Coffee Quality A has gone up. So it can be concluded that Coffee quality A has the maximum impact on the beverages index and hence contributes most.

Hence option (c) is the answer.

Storyline of 8 to 11

Table provides percentage share (or composition) of Factories, Employment, Fixed Capital, Variable cost and Value added among four sectors viz. Government sector, Public sector, Private sector and Joint sector.

Key point here is to understand that Government sector is broken down into three sub sectors. For all the data given in Government sector, corresponding data for sub sectors is provided in the bar chart.

Solution and Explanations for 8 to 11

$$8. \quad \text{Value addition per worker} = \frac{\text{Value Added}}{\text{No. of Employees}}$$

Total value added = ₹225 million and Total work force = 76 million.

We go by the options and calculate Value added per worker for all the given options:

$$\text{For Central} = \frac{10\% \text{ of ₹225 million}}{6\% \text{ of 76 million}}$$

$$\text{For State} = \frac{3\% \text{ of ₹225 million}}{6\% \text{ of 76 million}}$$

$$\text{For Central/State} = \frac{12\% \text{ of ₹225 million}}{3\% \text{ of 76 million}}$$

$$\text{For Public} = \frac{8\% \text{ of ₹225 million}}{8\% \text{ of 76 million}}$$

Calculation Short Cut:

Inserted of calculating the real value in the above four options, what we can do is quick ratio comparison. We can observe that $\frac{\text{₹225 million}}{76 \text{ million}}$ is present in all the ratios. Let us assume

$$\frac{\text{₹225 million}}{76 \text{ million}} = N.$$

So the four ratios become like the following:

$$\text{For Central} = \frac{10\% \text{ of } 225 \text{ million}}{6\% \text{ of 76 million}} = \frac{10\%}{6\%}$$

$$\text{For State} = \frac{3\% \text{ of ₹225 million}}{6\% \text{ of 76 million}} = \frac{3\%}{6\%} N$$

$$\begin{aligned} \text{For Central/State} &= \frac{12\% \text{ of ₹225 million}}{3\% \text{ of 76 million}} \\ &= \frac{12\%}{3\%} N \end{aligned}$$

$$\text{For Public} = \frac{8\% \text{ of ₹225 million}}{8\% \text{ of 76 million}} = \frac{8\%}{8\%} N$$

It can be now clearly seen that the ratio is largest in case of Central/State. Hence option (c) is the answer.

In such questions, we can do the proceeding in a nutshell like the following:

Value added per worker for various sectors will be proportional to following ratios:

Central	10/6
State	3/6
Central/state	12/3
Public	8/8

9. Using the method given in A1:
Fixed capital per factory will be proportional to the following ratios:

Central	5/8
State	4/4
Central/state	5/6
Public	6/12

Hence option (b) is the answer.

10. If the variables are proportional to the number of employees and the production per employee, then we can say that the variable cost is directly proportional to the production. Since the variable cost is maximum for private sector, it will also have the maximum production.

Hence option (b) is the answer.

11. Since options are not so close, we can take 20.012% = 20%

If 20% of govt. fixed capital is equal to \$200 million $\Rightarrow$ Total govt. sector fixed capital = \$ 1000 m which is equivalent to 14% of the total fixed capital. Now, 25% of Govt. investment in joint sector i.e., 25% of the 8% of the total = 2% of total fixed capital will be given by: $\frac{1000 \times 2}{14} = \$ 143$ million

Value in ₹ is given by: $143 \times 55 = ₹7865$ million

Hence option (a) is the answer.

PRACTICE EXERCISE 3

Directions for questions 1 to 4: Go through the data set given below and solve the questions based on it.

Following table gives the percentage change in the sales revenue of five companies. Some of these data are missing and have been replaced by variable x and y .

Companies	From 2010 to 2011	From 2011 to 2012
A	20%	-15%
B	8%	12%
C	14%	-6%
D	20%	$x\%$
E	$Y\%$	-8%

- From 2010 to 2012, Company D's sales revenue has remained constant. What is the value of x ?
(a) -20% (b) -25%
(c) -16.66% (d) cannot be determined
- If sales revenue of company A was ₹100 in 2010, then what is its revenue in 2012?
(a) ₹110 (b) ₹102
(c) ₹92 (d) cannot be determined
- Sales revenue of companies D and E are same in the year 2012. Which of the following between X and Y is greater?
(a) X (b) Y
(c) $X = Y$ (d) cannot be determined
- Which of the companies from A or B or C has the maximum sales volume?
(a) A (b) B
(c) C (d) cannot be determined

Directions for questions 5 to 7: Go through the data set given below and solve the questions based on it.

The table below provides certain demographic details of 30 respondents who were part of a survey investigating the irregularities in NREGS. The demographic characteristics are: gender, number of children, and age of respondents. The first number in each cell is the number of respondents in that group. The minimum and maximum age of respondents in each group is given in

brackets. For example, there are five female respondents with no children and among these five; the youngest is 34 years old, while the oldest is 49.

No. of children	Male	Female	Total
0	1(38,38)	5(34,49)	6
1	1(32,32)	8(35,57)	9
2	8(21,65)	3(37,63)	11
3	2(32,33)	2(27,40)	4
Total	12	18	30

- The percentage of respondents aged less than 40 years is at least
(a) 10% (b) 16.67%
(c) 20.0% (d) 30%
- Given the information above, the percentage of respondents older than 35 can be at most
(a) 30% (b) 73.33%
(c) 76.67% (d) 90%
- The percentage of respondents that fall into the 35 to 40 years age group (both inclusive) is at least
(a) 6.67%
(b) 10%
(c) 13.33%
(d) 26.67%

Directions for questions 8 to 10: Go through the information given below and solve the questions based on it.

Five friends meet every morning at Sree sagar restaurant for an idli-vada breakfast. Each consumes a different number of idli and vada. The number of idli consumed are 1,4,5,6 and 8, while the number of vadas consumed are 0,1,2,4 and 6. Below are some more facts about who eats what and how much:

- The number of vadas eaten by Ignesh is three times the number of vadas consumed by the person who eats four idlis.
- Three persons, including the one who eats four vadas eat without chutney.

- iii. Sandeep does not take any chutney.
 - iv. The one who eats one idli does not eat any vadas or chutney. Further, he is not Mukesh.
 - v. Daljits eats idli with chutney and also eats vada.
 - vi. Mukesh, who does not take chutney, eats half as many vadas as the person who eats twice as many idlis as he does.
 - vii. Bimal eats two more idlis than Ignesh, but Ignesh eats two more vadas than Bimal.
8. Which of the following statement is true?
- (a) Daljit eats 5 idlis
 - (b) Ignesh eats 8 idlis
 - (c) Bimal eats 1 idli
 - (d) Bimal eats 6 idlis.

9. Which of the following statement is true?
- (a) Sandeep eats 2 vadas.
 - (b) Mukesh eats 4 vadas.
 - (c) Ignesh eats 6 vadas.
 - (d) Bimal eats 2 vadas.
10. Which of the following statements is true?
- (a) Mukesh eats 8 idlis and 4 vada but not chutney
 - (b) The person who eats 5 idlis and 1 vada does not take chutney.
 - (c) The person who eats equal number of vadas and idlis also takes chutney.
 - (d) The person who eats 4 idlis and 2 vada also takes chutney.

ANSWER KEYS

1. (c) 2. (b) 3. (d) 4. (d) 5. (d) 6. (c) 7. (c) 8. (a) 9. (c) 10. (c)

HINTS AND EXPLANATIONS

Storyline of 1 to 4

Question mentions the percentage change in the sales revenue of five companies. Understand that unless price per article is mentioned, we cannot find out the sales volume. To solve the questions ahead, you may be required to use (a) Successive Percentage change expression, (b) Product Stability Ratio.

Solution and Explanations for 1 to 4

1.

Company	From 2010 to 2011	From 2011 to 2012
D	20%	%x

Method 1:

It is given that company D's revenue in 2010 is same as its revenue in 2012. So the increase (in amount) in 2011 shall be compensated (negatively) in 2012. Assume that the revenue in 2010 is ₹100.

$$₹100 \xrightarrow{20\% \uparrow} ₹120 \text{ (in 2011)} \xrightarrow{x\% \downarrow}$$

₹100 (in 2012)

$$\begin{aligned} \text{So percentage decrease} &= \frac{\text{Decrease}}{\text{Initial Value}} \times 100 \\ &= \frac{20}{120} \times 100 = 16.66\% \end{aligned}$$

Method 2: Use product stability ratio to find out the percentage decrease. Corresponding to percentage increase of 20% (1/5), percentage decrease should be (1/6) = 16.66%

[For a detailed account on Percentage, go through the book "Quantitative Aptitude and Data Interpretation for CAT" written by me].

Hence option (c) is the answer.

2. ₹100 $\xrightarrow{20\% \uparrow}$ ₹(in 2011) $\xrightarrow{15\% \downarrow}$ ₹102 (in 2012). Hence correct option is (b)

3. It is like population of two countries are same this year, and we have been asked to find out a relation between their populations two years back. It is not possible to determine. Hence option (d) cannot be determined is the answer.

4. Information given in the question set is regarding the sales value. Hence any question regarding sales volume cannot be answered. Hence option (d) cannot be determined is the answer.

As explained in the opening statements, number of respondents can be counted up as per the requirement in the individual question.

5. We have to find out the minimum number of respondents less than age 40 years.
Following is the number of respondents aged less than 40 years

No. of children	Male	Female	Total
0	1	1	2
1	1	1	2
2	1	1	2
3	2	1*	3
Total	5	4	9

Percentage of minimum respondents aged less than 40 years = $\frac{9}{30} \times 100 = 30\%$

6. We have to find out the maximum number of respondents aged more than 35 years. Following is the number of respondents aged:

No. of children	Male	Female	Total
0	1	4	5
1	0	7	7
2	7	3	10
3	0	1	1
Total	8	15	23

Hence option (c) is the answer.

- $$\begin{aligned}\text{Hence percentage respondents} &= \frac{4}{30} \times 100 \\ &= 13.33\%\end{aligned}$$

StoryLine of 8 to 10

This is a classical analytical reasoning question involving data—you are expected to match the variable (Name of person – Number of Idlis and Vadas eaten) as per the conditions given.

I have put this set in this book because one is required to crack the data (number of idlis/vadas eaten) using the concept of ratio to solve this set.

To solve such questions, it is advisable to draw table using the information given – one by one:

Using point (i):

- Number of Vadas eaten by Ignesh is three times the number of vadas consumed by somebody. Hence number of vadas eaten by Ignesh should be 3 times of a number. Only possibility here = 6
- We also know that the person **who eats four idlis eats two vadas**. (So that Ignesh can eat three times the number of vadas eaten by this person).

[illegible]

Using point (ii): This does not give any concrete information. So we move on to the next point (iii).

Using point (iii): This does not give any concrete information. So we move on to the next point (iv).

Using point (iv):

- (a) **Person who eats One Idli eats Zero Vada.**
 (b) He is not Mukesh. So Mukesh cannot eat 0 (zero) vadas.
 So we can fill the relevant blocks in the grid.

Idlis							Vadas			
Name	1	4	5	6	8	0	1	2	4	6
Ignesh						No	No	No	No	Yes
Sandeep										No
Mukesh	No					No				No
Daljit										No
Bimal										No

Using point (v):

- (a) Daljit eats both idli and vada. So we'll put a NO in 0 Vadas (Zero Vadas).

Idlis							Vadas			
Name	1	4	5	6	8	0	1	2	4	6
Ignesh						No	No	No	No	Yes
Sandeep										No
Mukesh	No					No				No
Daljit						No				No
Bimal										No

Using Point (vi):

- (a) Number of vadas eaten by Mukesh = Half of the number of vadas eaten by somebody (let us call him X).
 This gives us two possibilities – either Mukesh eats 2 vadas or 1 vada. In any case Mukesh cannot eat 4 vadas.
 (b) Number of idlis eaten by Mukesh = Half of the number of idlis eaten by somebody (the same guy X).
 In this case, the only possibility is – Mukesh eats 4 idlis and that 'somebody X' eats 8 idlis.
 We'll fill these information in the relevant blocks of the grid:

Idlis							Vadas			
Name	1	4	5	6	8	0	1	2	4	6
Ignesh		No				No	No	No	No	Yes
Sandeep		No								No
Mukesh	No	Yes	No	No	No	No			No	No
Daljit		No				No				No
Bimal		No								No

(New blocks have been filled using ***bold and italics*** font).

Using point (vii):

- (a) Bimal eats two more idlis than Ignesh $\Rightarrow$ Only possible option for this to happen is: Bimal = 8 idlis and Ignesh = 6 idlis.

Name	Idlis						Vadas			
	1	4	5	6	8	0	1	2	4	6
Ignesh	No	No	No	Yes	No	No	No	No	No	Yes
Sandeep		No		No	No					No
Mukesh	No	Yes	No	No	No	No			No	No
Daljit		No		No	No	No				No
Bimal	No	No	No	No	Yes					No

(New blocks have been filled using ***bold and italics*** font).

- (b) Ignesh eats two more vadas than Bimal $\Rightarrow$ Ignesh eats 6 vadas, so, Vimal eats 4 vadas.

Name	Idlis						Vadas			
	1	4	5	6	8	0	1	2	4	6
Ignesh	No	No	No	Yes	No	No	No	No	No	Yes
Sandeep		No		No	No				No	No
Mukesh	No	Yes	No	No	No	No			No	No
Daljit		No		No	No	No			No	No
Bimal	No	No	No	No	Yes	No	No	No	Yes	No

(New blocks have been filled using ***bold and italics*** font).

Now, we have used all the direct statements. Its time to join two or more statements together to fill in the remaining blocks.

Using (i) b - the person **who eats four idlis eats two vadas** $\Rightarrow$ Since Mukesh **eats four idlis**, Mukesh eats two vadas.

Name	Idlis						Vadas			
	1	4	5	6	8	0	1	2	4	6
Ignesh	No	No	No	Yes	No	No	No	No	No	Yes
Sandeep		No		No	No			No	No	No
Mukesh	No	Yes	No	No	No	No	No	Yes	No	No
Daljit		No		No	No	No		No	No	No
Bimal	No	No	No	No	Yes	No	No	No	Yes	No

(New blocks have been filled using ***bold and italics*** font).

Now, for Daljit in Vadas, only one block is empty. This is shown in grey colour.

Idlis							Vadas			
Name	1	4	5	6	8	0	1	2	4	6
Ignesh	No	No	No	Yes	No	No	No	No	No	Yes
Sandeep		No		No	No			No	No	No
Mukesh	No	Yes	No	No	No	No	No	Yes	No	No
Daljit		No		No	No	No	??	No	No	No
Bimal	No	No	No	No	Yes	No	No	No	Yes	No

This further fills in the grey cells. Other cells filled in this way are shown in grey colour:

Idlis							Vadas			
Name	1	4	5	6	8	0	1	2	4	6
Ignesh	No	No	No	Yes	No	No	No	No	No	Yes
Sandeep		No		No	No		No	No	No	No
Mukesh	No	Yes	No	No	No	No	No	Yes	No	No
Daljit		No		No	No	No	Yes	No	No	No
Bimal	No	No	No	No	Yes	No	No	No	Yes	No

This leaves us with only one option for Sandeep: Number of vadas eaten = 0.

Idlis							Vadas			
Name	1	4	5	6	8	0	1	2	4	6
Ignesh	No	No	No	Yes	No	No	No	No	No	Yes
Sandeep		No		No	No	Yes	No	No	No	No
Mukesh	No	Yes	No	No	No	No	No	Yes	No	No
Daljit		No		No	No	No	Yes	No	No	No
Bimal	No	No	No	No	Yes	No	No	No	Yes	No

(Shown in grey cell).

Using (iv) a - **Person who eats One Idli eats Zero Vada.** Since **Sandeep** eats **zero Vada**, he eats **One Idli**.

Name	Idlis						Vadas			
	1	4	5	6	8	0	1	2	4	6
Ignesh	No	No	No	Yes	No	No	No	No	No	Yes
Sandeep	Yes	No	No	No	No	Yes	No	No	No	No
Mukesh	No	Yes	No	No	No	No	No	Yes	No	No
Daljit	No	No	Yes	No	No	No	Yes	No	No	No
Bimal	No	No	No	No	Yes	No	No	No	Yes	No

(new blocks have been shown in grey colour).

This leaves only one option for Sandeep – 5 idlis (Shown in above table).

Finally, we arrive at the following table:

Name	Idlis						Vadas			
	1	4	5	6	8	0	1	2	4	6
Ignesh	No	No	No	Yes	No	No	No	No	No	Yes
Sandeep	Yes	No	No	No	No	Yes	No	No	No	No
Mukesh	No	Yes	No	No	No	No	No	Yes	No	No
Daljit	No	No	Yes	No	No	No	Yes	No	No	No
Bimal	No	No	No	No	Yes	No	No	No	Yes	No

Summary Chart

	Idli	Vada
Ignesh	6	6
Sandeep	1	0
Mukesh	4	2
Daljit	5	1
Bimal	8	4

8. Daljit eats 5 idlis. Hence option (a) is the answer.
9. Ignesh eats 6 vadas. Hence option (c) is the answer.
10. Use statement (ii) – three persons eat without chutney. Hence option (c) is the answer.

Method 2:

We can make table for this arrangement with 5 rows (1 for each friend) & 4 columns showing their names, & number of Idli (eaten by them), number of Vada (eaten by them), and with chutney(yes/no, whether they consumed chutney or not). The numbers of Idlis are 1, 4, 5, 6 & 8 while the numbers of vadas are 0, 1, 2, 4 & 6.

The number of Vadas eaten by Ignesh is 3 times the number of Vadas eaten by the person who ate 4 Idlis. So, Ignesh must have eaten 6 Vadas & the person who ate 4 Idlis must have eaten 2 Vadas. The information about Ignesh can be shown in 1st row & about other person in 2nd row

The person who ate 1 Idli did not ate Vada & also he didn't consume Chutney. He is not Mukesh. This information can be filled in 3rd row

Bimal ate 2 more Idlis & 2 less Vadas than Ignesh. So, he must have eaten 4 Vadas. There is only 1 possibility for numbers of Idlis eaten by them & it is 6 & 8 Idlis by Ignesh & Bimal. This information (about Bimal) can be filled in 4th row & we also get number of Idlis eaten by Ignesh which can be filled in row 1

The person who ate 4 Vadas did not consumed Chutney, so Bimal did not consumed Chutney. The table obtained is as:

Name	No. of Idlis	No. of Vadas	Consumed Chutney
Ignesh	6	6	
	4	2	
× Mukesh	1	0	No
Bimal	8	4	No

Mukesh ate half as many Vadas as the person who ate twice as many Idlis as he ate. So, the other person must have eaten exactly twice as many Idlis & Vadas as Mukesh. The only possibility is that the other person is Bimal & Mukesh is person in row 2nd. It is also given that Mukesh didn't consumed Chutney. Daljit ate Idlis

& Vadas & he also consumed Chutney, so he must be shown in row 5th with 5 Idlis & 1 Vada & Yes for Chutney consumed. The 3rd row must have Sandeep. Exactly 3 persons did not consume Chutney, so 2 must have consumed Chutney. One of them is Daljit & other must be Ignesh (as he is the last person left about whom we still don't know whether he consumed Chutney or not)

Name	No. of Idlis	No. of Vadas	Consumed Chutney
Ignesh	6	6	Yes
Mukesh	4	2	No
Sandeep	1	0	No
Bimal	8	4	No
Daljit	5	1	Yes

8. Daljit eats 5 idlis. So, option (a) is correct
9. Ignesh eats 6 vadas. So, option (c) is correct
10. Ignesh eats 6 Idlis & 6 Vadas (i.e. equal number of Idlis & Vadas). He also consumed Chutney. So, option (c) is correct

PRACTICE EXERCISE 4

Directions for questions 1 to 5: Go through the data set given below and solve the questions based on it.

There are two bus services available to travel from Chandigarh (CHD) to Delhi—one of Patel Roadways and the other of Rajan Roadways. The distance between

the two places is 250 km. Each of these buses stops at four locations on the way from Chandigarh to Delhi. These locations are Ambala (AB), Kurukshetra (KU), Saharanpur (SH) and Panipat (PAN). The arrival and departure times of the two buses are given below in the table:

	CHD (dep)	AB (arr)	AB (dep)	KU (arr)	KU (dep)	SH (arr)	SH (dep)	PAN (arr)	PAN (dep)	Delhi (arr)
Patel roadways	09:30	10:40	10:42	11:30	11:35	12:10	12:12	13:40	13:42	14:30
Rajan roadways	14:30	15:40	15:42	16:20	16:23	17:00	17:15	18:15	18:18	19:00

NOTE: Arr stands for arrival and Dep stands for departure.

- What is the difference between the speeds of faster and slower bus (including stoppages)?
(a) 3.33 km/h (b) 5.55 km/h
(c) 6.66 km/h (d) 7.77 km/h
- Between which stretches is the ratio of the speeds of the two bus services 1:1?
(a) AB to KU (b) CHD to AB
(c) SH to PAN (d) cannot be determined
- What is the percentage difference between the maximum speed of Rajan roadways bus and the minimum speed of Patel roadways bus?
(a) 12% (b) 19%
(c) 26% (d) Cannot be determined
- In which stretches of the journey is the speed of Patel roadways bus minimum (Assume distance between the stops to be equal)?
(a) CHD to AB (b) AB to KU
(c) KU to SH (d) SH to PAN
- If the average speed is calculated keeping in mind only the running time of the bus, what would be the percentage difference in time taken by the Patel Roadways bus, if its speed is decreased by 20%?
(a) 20% (b) 25%
(c) 33.33% (d) 42.5%

Directions for questions 6 to 9: Answer the questions on the basis of the information given below.

Chunmun likes six different types of fruits—Mangoes, Apples, Oranges, Peaches, Guavas and Litchis. Following table provides information about the minimum and the maximum price of each of the mentioned fruits.

The table also provides information about the number of fruits of each type and the average price of each fruit.

Assume that the price of each fruit is an integer. There is only one mango that has the minimum price and there is only one mango that has the maximum price. The same holds true for each type of fruit.

	Minimum Price	Maximum Price	Average Price	Number of Fruits
Mango	20	28	23	16
Apple	40	50	46	24
Orange	4	8	7	40
Peach	16	26	20	34
Guava	3	8	5	28
Litchi	10	18	16	30

- Find the approximate average price of fruits with Chunmun.
(a) ₹18 (b) ₹20
(c) ₹23 (d) ₹15
- The number of mangoes whose price is more than ₹21 is at least
(a) 3 (b) 4
(c) 5 (d) 6
- Given that the price of four peaches with Chunmun is ₹22 each and there are exactly 10 peaches whose

price is ₹18. The number of peaches with Chunmun whose price is at least ₹25 is at most

- (a) 13 (b) 12
(c) 11 (d) 9

9. Total number of guavas with Chunmun whose price is less than the average price of the guavas with Chunmun is at least

- (a) 17 (b) 18
(c) 19 (d) 20

10. A train leaves New Delhi to Mumbai. Five minutes later another train leaves Mumbai for New Delhi, with a speed double than the train that left New Delhi to Mumbai. Which train will be closer to New Delhi when they meet?

- (a) Faster one
(b) Slower One
(c) Both will be at the same distance
(d) Depends upon the speed of trains and total distance between New Delhi and Mumbai

ANSWER KEYS

1. (b) 2. (b) 3. (d) 4. (d) 5. (b) 6. (a) 7. (d) 8. (d) 9. (b) 10. (c)

HINTS AND EXPLANATIONS

Storyline of 1 to 5

Based upon the concepts of Time Speed and Distance (TSD), this set requires you to use the fundamentals and basic formula Distance = Time × Speed. There are five stretches of the whole journey from Chandigarh to Delhi – Chandigarh to Ambala, Ambala to Kurukshetra, Kurukshetra to Saharanpur, Saharanpur to Panipat and Panipat to Delhi. Data to calculate the time taken in any stretch is given for two bus services – Patel Roadways and Rajan Roadways. Since total distance is given (=250 km), speed of the bus services for the whole journey can be calculated. Though you should keep in your mind that NOT all the stretches are of equal length, so despite time taken in any stretch is given, speed in any particular stretch cannot be calculated.

Solution and Explanation for 1 to 5

1. Total time taken by Patel roadways bus = 5 hours

$$\text{Average speed of Patel roadways bus} = \frac{250}{5}$$

$$= 50 \text{ km/h}$$

$$\text{Total time taken by Rajan roadways bus} = 4.5 \text{ hours}$$

$$\text{Average speed of Patel roadways bus} = \frac{250}{4.5}$$

$$= 55.55 \text{ km/h}$$

[Instead of calculating $\frac{250}{4.5}$, you should calculate

$$\frac{500}{9} = 55.55 \text{ kmph}]$$

Hence slower by 5.55 km/h. Hence, option (b) is the answer.

2. Though individual speed cannot be calculated, ratio of speeds can be calculated. It can be seen that time taken by both bus services is same between CHD to AB. Hence option (b) is the answer.

3. Distance between any two stretches is not given. So, despite time taken between any two stretches can be calculated by taking the difference, we cannot calculate the speed. Hence answer is option (d) cannot be determined.

4. This question allows us to have the assumption that all the stretches are of equal length. We can answer this question without calculating the actual speed. We just have to see that in which stretch time taken to travel is maximum. More is the time taken, less is the speed.

Time taken to travel from SH to PAN is 1 hour 28 min, which is the highest. Hence, speed is lowest on this stretch.

Hence, option (d) is the answer.

5. We don't need to go through the table given to solve this question. This question is based upon the simple application of ratio/percentage in TSD.

If speed decreases by 20% then time increases by $25\% \left(= \frac{1}{0.8} = 1.25 \right)$.

Hence, option (b) is the answer.

Solution and Explanation for 6 to 9

6. Total price of fruits with Chunmun is $23 \times 16 + 46 \times 24 + 7 \times 40 + 20 \times 34 + 5 \times 28 + 16 \times 30 = ₹368 + ₹1104 + ₹280 + ₹680 + ₹140 + ₹480 = ₹3052$.

Total number of fruits with Chunmun is $16 + 24 + 40 + 34 + 28 + 30 = 172$.

$$\text{Average price of fruits with Chunmun} = \frac{3052}{172} = ₹17.74$$

Closest value given in the options is ₹18. Hence option (a) is the answer.

7. The total price of mangoes with Chunmun is $16 \times 23 = ₹368$.
Total price of 14 mangoes = $368 - (20 + 28) = ₹320$

Out of the given 14 mangoes assume that maximum number of mangoes have price equal to ₹21.

The maximum price of any mango out of these 14 mangoes is ₹27

$$\text{So, } 9 \times 21 + 1 \times 23 + 4 \times 27 = ₹320$$

Therefore, the number of mangoes whose price is more than ₹21 is $1 + 4 + 1 = 6$.

Hence option (d) is the answer.

8. The price of the 18 peaches with Chunmun whose price is not known to us = X

$$X = 20 \times 34 - (16 + 26 + 4 \times 22 + 10 \times 18) = ₹370$$

Assume that maximum number of peaches have price equal to ₹17

$370 = 25 \times 8 + 17 \times 10$. Number of peaches with Chunmun whose price is at least ₹25 is at most $8 + 1 = 9$.

Hence option (d) is the answer.

9. The total price of the guavas with Chunmun is $5 \times 28 = 140$

The total price of the 26 guavas whose price is not known is $140 - (3 + 8) = ₹129$.

Assume maximum number of guavas have price equal to ₹7

$129 = 8 \times 7 + 1 \times 5 + 17 \times 4$. Therefore, the number of guavas with Chunmun whose price is less than the average price of the guavas with Chunmun is at least $17 + 1 = 18$.

Hence option (b) is the answer.

10. Since trains are meeting, both the trains are at the same point. If both the trains (or two persons) are at the same point, they will be equidistant from all the points on this earth. Hence option (c) is the answer.

PRACTICE EXERCISE 5

Directions for questions 1 to 4: *Go through the data set given below and solve the questions based on it.*

Following table gives the data regarding population of selected states and Union Territories (UTs) of India. Same data is given for India also.

State/Union Territory	India/States/Union Territory #	Sex ratio (females per 1,000 males)					
		Total population		Child population (less than 7 years)		Population (7 years and above)	
		2001	2011	2001	2011	2001	2011
C1	C2	C3	C4	C5	C6	C7	C8
INDIA	INDIA	933	940	927	914	934	944
01	Jammu & Kashmir	892	883	941	859	884	887
02	Himachal Pradesh	968	974	896	906	980	983
03	Punjab	876	893	798	846	888	899
04	Chandigarh	777	818	845	867	767	812
05	Uttarakhand	962	963	908	886	973	975
06	Haryana	861	877	819	830	869	885
07	NCT of Delhi	821	866	868	866	813	866
08	Rajasthan	921	926	909	883	923	935
09	Uttar Pradesh	898	908	916	899	894	910
10	Bihar	919	916	942	933	914	912
11	Sikkim	875	889	963	944	861	883
12	Arunachal Pradesh	893	920	964	960	878	913
13	Nagaland	900	931	964	944	890	929
14	Manipur	974	987	957	934	977	995
15	Mizoram	935	975	964	971	930	976

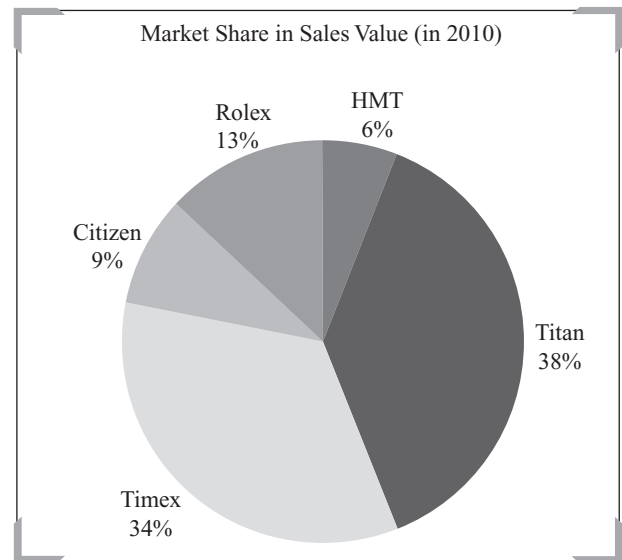
- How many states/UTs have shown the same trend of increase or decrease as shown by India across C3 to C8?
(a) 6 (b) 7
(c) 8 (d) 9
- What percentage of total population of Bihar in 2011 are females?
(a) 51.8% (b) 47.8%
(c) 49.1% (d) 50.2%
- What percentage of total population of India in 2001 is of children less than 7 years age?
(a) 16.66% (b) 14.28%
(c) 11.11% (d) cannot be determined
- For how many states or union territories in 2011, percentage of children aged less than 7 years is at least 50% of the total population of the that state or union territory?
(a) 6 (b) 7
(c) 8 (d) 9

Directions for questions 5 to 8: Go through the data sets given below and solve the questions based on it.

Following data sets given below present the statistics related to the Indian watch industry.

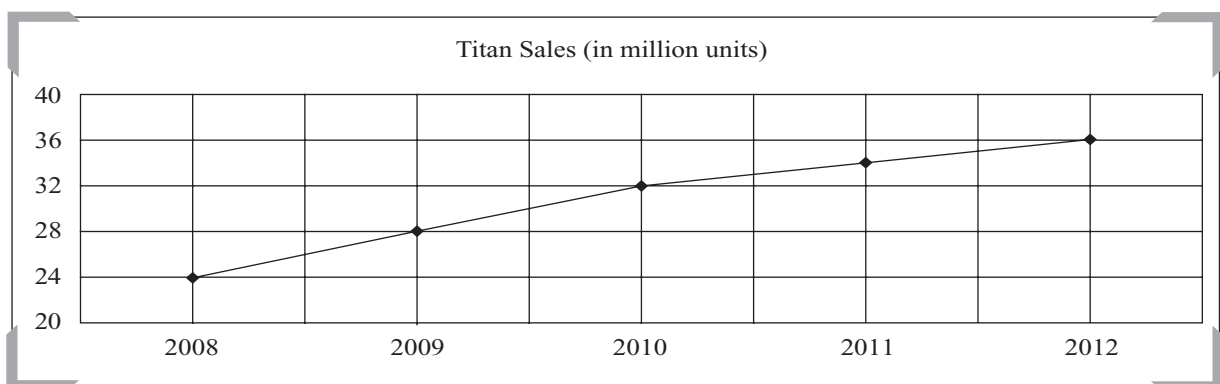
There are five companies and their respective market share of the year 2010 is given in the pie chart given below.

Chart 1:



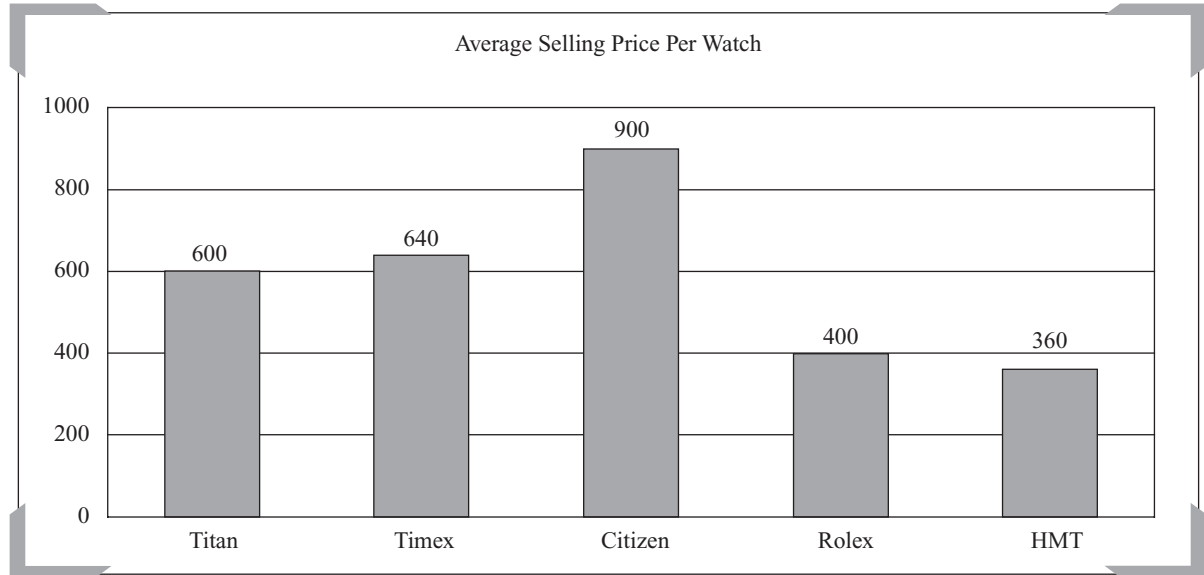
Following line chart presents the Titan Sales volume (in million units) for the years 2008 to 2012. All the values are even numbers.

Chart 2:



Following bar chart presents the average selling price (in ₹) of these companies in the year 2010:

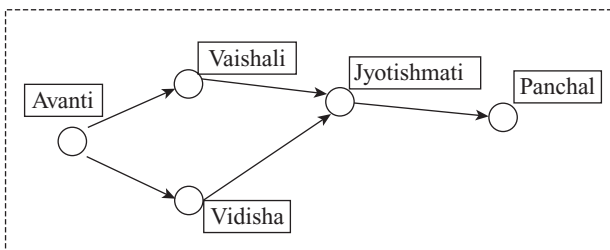
Chart 3:



Assume there is no export or import.

5. For how many years, is it possible to calculate the size of domestic watch market (in ₹)?
(a) 0 (b) 1
(c) 2 (d) 5
6. Which company has the second lowest sales (in ₹ terms) in the year 2010?
(a) Citizen (b) Rolex
(c) HMT (d) Timex
7. Which year saw the lowest growth rate in number of unit sold over the previous year for Titan?
(a) 2009 (b) 2010
(c) 2011 (d) 2012
8. What is the size of the domestic market in the year 2010 (in ₹)?
(a) ₹757 crores (b) ₹7578 crores
(c) ₹75789 crores (d) Cannot be determined

Directions for questions 9 to 11: Read the passage given below and solve the questions based on it.



The figure shows an oil Pipeline network among 5 cities. Each pipeline has the load carrying capacity of 1000 and each destination has a specific requirement that has to be met. The city of Vaishali and Jyotishmati have a requirement of 400 each. The requirement at Panchal is 700 where as that at Vidisha is 200. The load can be carried in the indicated directions only. It is further given that the load carried from Vaishali to Jyotishmati is 300.

9. What is the free capacity in the Avanti – Vidisha pipeline?
(a) 300
(b) 200
(c) 100
(d) 0
10. What is the free capacity in the Avanti – Vaishali pipeline?
(a) 0
(b) 100
(c) 200
(d) 300
11. What is the quantity moved from Avanti to Vidisha?
(a) 200
(b) 800
(c) 700
(d) 1000

ANSWER KEYS

1. (c) 2. (b) 3. (b) 4. (a) 5. (b) 6. (b) 7. (d) 8. (b) 9. (d) 10. (d)
11. (d)

HINTS AND EXPLANATIONS

Storyline of 1 to 4

Table presents the population data of Indian and 15 states/UTs for two years—2001 and 2011. Further, table also gives the sex ratio of these states under two headings—Age less than 7 years and 7 years and above. Since a unified data is also given, this gives rise to the case of weighted average.

Solution and Explanation for 1 to 4

- States that show the same trend are—Uttarakhand, NCT of Delhi, Rajasthan, Uttar Pradesh, Sikkim, Arunachal Pradesh, Nagaland and Manipur = 8 states. Hence option (c) is the answer.
- For every 1000 males, there 916 females in Bihar. Using this we can find out the percentage of females in the total population of Bihar.

Actual Calculation:

$$\text{Percentage of females} = \frac{916}{1916} \times 100 = 47.8\%$$

Approximation Short Cut:

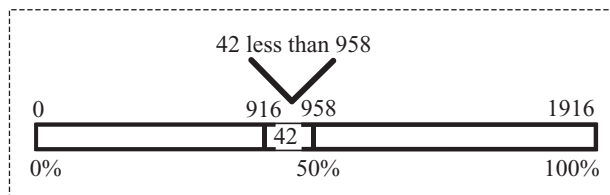
Since number of males is more than number of females, hence percentage of males will be more than the percentage of females. So percentage of males > 50% and percentage of females < 50%. Due to this, we can eliminate options (d) and (a).

Total population of Bihar = $916x + 1000x = 1916x$
We are required to calculate: Percentage of females

$$= \frac{916}{1916} \quad [\text{we have removed } x \text{ from the numerator and denominator}]$$

Knowing the fact that females' population is less than 50% and the remaining options hovering around 47%-49%, we benchmark the whole data around 50%.

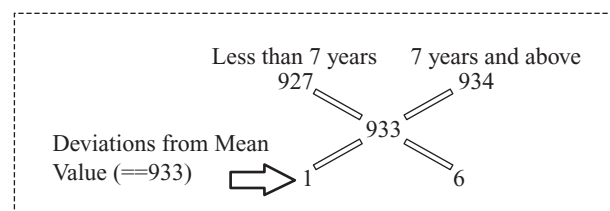
$$50\% \text{ of } 1916 = \frac{1}{2} \times 1916 = 958$$



$$1\% \text{ of } 1916 = 19.16 = \text{Approx. } 20$$

So, 42 is approx. 2.1% of 1916. Hence 916 is 2.1% less than 50% = 47.9%. Closest option is option (b) 47.9%. Hence option (b) is the answer.

- This is a direct question on Weighted Average concept. We can solve this question using Criss Cross solving method of Alligation:



$$\text{So, } \frac{\text{Children of less than 7 years}}{\text{Aged 7 years and above}} = \frac{1}{6}$$

$$\text{Hence percentage of children of age less than 7 years out of total population} = \frac{1}{7} \times 100 = 14.28\%.$$

Hence option (b) is the answer.

- Using the method of alligation (as shown in A3), we can simply conclude that:
For all the states/UTs, in which value of “child population less than 7 years” is more than the state’s or UT’s value, percentage of “child population less than 7 years” will be 50% or more. Now we just have to see that for how many states/UTs, “child population less than 7 years” is more than the value given for the whole state/UT.

State/UT	India/States/Union Territory #	Sex ratio (females per 1,000 males)			
		Total population	Child population (less than 7 years)	Population (7 years and above)	Column (6) > Column (4)?
Col. (1)	Column (2)	Column (4)	Column (6)	Column (8)	
01	Jammu & Kashmir	883	859	887	Less
02	Himachal Pradesh	974	906	983	Less
03	Punjab	893	846	899	Less
04	Chandigarh	818	867	812	More
05	Uttarakhand	963	886	975	Less
06	Haryana	877	830	885	Less
07	NCT of Delhi	866	866	866	Equal
08	Rajasthan	926	883	935	Less
09	Uttar Pradesh	908	899	910	Less
10	Bihar	916	933	912	More
11	Sikkim	889	944	883	More
12	Arunachal Pradesh	920	960	913	More
13	Nagaland	931	944	929	More
14	Manipur	987	934	995	Less
15	Mizoram	975	971	976	Less

So, the required states/UTs are = Chandigarh, NCT of Delhi (Exactly 50%), Bihar, Sikkim, Arunachal Pradesh, Nagaland = 6 states/UTs. Hence option (a) is the answer.

Storyline of 5 to 8

Sales Value = Sales Volume × Average Price per unit

Total Market Size =

$$\frac{\text{Sales Value of Company X}}{\text{Market Share (in percentage) of company X}} \times 100$$

Further, Read the solution of 1.

Solution and Explanation for 5 to 8

5. Question is asking for size of domestic market (in ₹). Out of three different data sets given in the question (a pie chart, a line chart and a bar chart), we have Rupees value in only one data set – Bar chart. In pie chart and line chart, we do not have any information in Rupees Terms. So to answer any question in Rupees terms, we need to use Chart 3 - Bar chart.

How do we calculate the size of domestic watch market:

Chart 1 provides the market share in sales volume in 2010. Chart 2 provides the sales volume of Titan from 2008 to 2012.

Using chart 2, Sales volume of Titan in 2010 = 32 million units and using chart 3, average selling price = ₹900/watch. So, total market value for Titan in 2010 = **32 million units × ₹900/watch = ₹X (Assume) [we are not required to calculate this value as question is ONLY asking for the possibility of market size calculation].**

Now, using chart 1, market share of Titan is known = 38% = ₹X. Using this, we can calculate 100% = Total Market Size of domestic watch market.

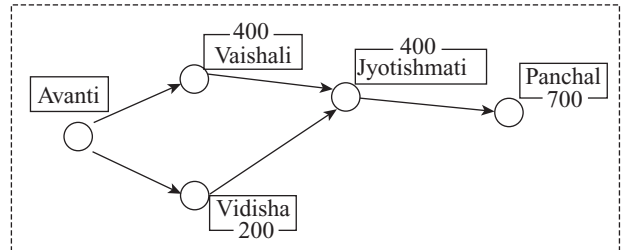
Hence it is possible to calculate only for the year 2010. We do not have Average Selling Price of Titan for year other than 2010. So we cannot calculate the domestic market size for any year other than 2010.

Hence option (b) is the answer.

6. We can find our require answer by calculating total sales for each company which is given as Average Price × Percentage of sales. We should focus on HMT, Rolex & Citizen only. As HMT has the lowest sales volume & lowest average price too. So, total sales (in ₹) must be the lowest for HMT. If we multiply the Average Price & Percentage of sales for Rolex & Citizen, we will conclude that sales (in ₹) for Rolex is lower than Citizen. So, Rolex has 2nd lowest sales (in ₹).
7. Now this is a no-brainer. You just have to calculate the percentage growth in the number of units sold of Titan.
2012 saw the minimum growth rate = 4.6%. Hence option (d) is the answer.
8. Using the data from A1,
So, total market value for Titan in 2010 = 32 million units × ₹900/watch = ₹28800 million
Titan has a market share of 38% in 2010.
Hence 38% = ₹28800 million
⇒ 100% = ₹75789.47 million = ₹7578.9 Crores.
Hence option (b) is the answer.

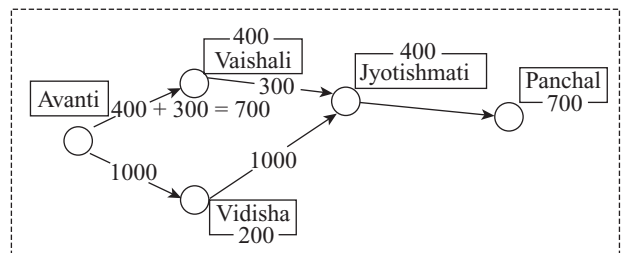
Solution and Explanation for 9 to 11

Following is the requirements at different cities:



Total requirement of Jyotishmati + Panchal = 700 + 400 = 1100. Out of this, 300 comes through Vaishali – Jyotishmati pipeline. So remaining 800 shall come through Vidisha – Jyotishmati pipeline. Now, requirement at Vidisha = 200. Hence Avanti Vidisha pipeline shall carry 200 (Requirement at Vidisha) + 800 (to be sent further to Jyotishmati) = 1000

So, this is the final situation:



Now all the questions can be answered.

9. Each pipeline can carry a maximum of 1000. Since Avanti-Vidisha pipeline carries 1000, free capacity in Avanti-Vidisha is zero. Hence option (d) is the answer.
10. Total free capacity at Avanti-Vaishali pipeline is 300. Capacity of each pipeline is 1000 and demand at Vidisha is 400 and 300 flows to Jyotishamti.
So, free capacity = {1000 – (400 + 300)} = 300. Hence option (d) is the answer.
11. Quantity flowed from Avanti to Vidisha = 200 + 100 + 700 = 1000. Hence option (d) is the answer.

PRACTICE EXERCISE 6

Directions for questions 1 to 3: Read the passage given below and solve the questions based on it.

In calendar year 2008, there was turbulence in the air as Jet Airways' Chairman pondered what course of action the airline should take. Air India was also struggling with the same dilemma. Two of India's largest airlines, Air India and Jet Airways, had sounded caution on their fiscal health due to mounting operational costs. A daily operational loss of \$2 million (₹8.6 crore) had in fact forced Jet Airways to put its employees on alert. Jet's senior General Manager had termed the situation as grave. Jet's current losses were \$2 million a day (including Jet-Lite). The current rate of Jet Airways' domestic losses was \$0.5 million (₹2.15 crore) and that of JetLite was another \$0.5 million. International business was losing over \$1 million (₹4.30 crore) a day.

The situation was equally grave for other national carriers. Driven by mounting losses of almost ₹10 crores a day, Air India, in its merged avatar, was considering severe cost-cutting measures like slashing employee allowances, reducing in-flight catering expenses on short-haul flights and restructuring functional arms. The airline also considered other options like cutting maintenance costs by stationing officers at hubs, instead of allowing them to travel at regular intervals. Jet Airways, Air India and other domestic airlines had reasons to get worried, as 24 airlines across the world had gone bankrupt in the year on account of rising fuel costs. In India, operating costs had gone up 30-40%. Fuel prices had doubled in the past one year to ₹70,000 per kilolitre, forcing airlines to increase fares. Consequently, passenger load had fallen to an average 55-60% per flight from previous year's peak of 70-75%. Other airlines faced a similar situation; some were even looking for buyers. Domestic carriers had lost about ₹4,000 crore in 2007-08 with Air India leading the pack. "As against 27% wage bill globally, our wage bill is 22% of total input costs. Even then we are at a loss," an Air India official said. Civil aviation ministry,

however, had a different take. "Air India engineers go to Dubai every fortnight to work for 15 days and stay in five star hotels. If they are stationed there, the airline would save ₹8 crore a year. This is just the tip of the iceberg. There are several things we can do to reduce operational inefficiency". According to analysts, Jet Airways could be looking at a combined annual loss of around ₹3,000 crore, if there were no improvement in operational efficiencies and ATF prices. Against this backdrop, the airline had asked its employees to raise the service bar and arrest falling passenger load.

1. Which of the following are the reasons for Jet Airways not doing well?
 1. Rising ATF prices
 2. Reduced passenger load
 3. Declining service quality
 4. Staff travelling to Dubai
 - (a) 1 and 2
 - (b) 2 and 3
 - (c) 1, 2 and 3
 - (d) 1, 2 and 4
2. The total loss for the airline industry was likely to be ₹10,000 crore. Jet Airlines lost ₹3,000 crore, Air India lost ₹"X" crore and "rest of the airlines" lost ₹"Y" crore. What was the loss for the "rest of the airlines", in 2008?
 - (a) Cannot be determined
 - (b) ₹3,350 crore
 - (c) ₹3,690 crore
 - (d) ₹3,340 crore
3. Suppose fuel constitutes 30% of the revenues, do you think airlines would be in a better situation by reducing their fare?
 - (a) Yes
 - (b) Data insufficient to reach decision
 - (c) No
 - (d) It would not matter

Directions for questions 4 to 7: *Go through the data set given below and solve the questions based on it.*

Year	Farm population, April		Farm employment (thousand)			Crops harvested (millions of kgs) acres)	Selected indexes of input use (1992=100)						
	No. (thousands)	As % of total population	Total	Self – employed unpaid workers	Hired Workers		Total	Farm labour	Farm real estate	Durable equipment	Energy	Agricultural Chemicals	Feed, seed and purchased live stock
2000	4591	1.9	2891	2000	892	322	101	102	101	105	100	95	99
2001	4632	1.9	2877	1968	910	318	102	106	100	103	101	100	99
2002	–	–	2810	1944	866	319	100	100	100	100	100	100	100
2003	–	–	2800	1942	857	308	101	96	97	97	100	105	101
2004	–	–	2767	1925	842	321	102	96	94	94	103	106	102

4. The average indices of input use from 2000 to 2004 for farm labour, durable equipment and energy, in their increasing order, can be arranged as.

- (a) farm labour, durable equipment, energy
(b) durable equipment, energy, farm labour
(c) durable equipment, farm labour, energy
(d) energy, durable equipment, farm labour

5. If hired workers include 80% locals and 20% migrants in 2000, and 75% locals and 25% migrants in 2001, what is the percentage rise or drop in migrant hired workers from 2000 to 2001?

- (a) drop 13.25%
(b) rise 13.23%
(c) drop 27.5%
(d) rise 27.5%

6. What is the ratio of the number of hired workers to that of self-employed unpaid workers for the duration 2001 to 2003?

- (a) 0.62:1 (b) 0.45:1
(c) 2.1:1 (d) 1.6:1

7. Which of the following is correct?

- I. In 2003, minimum area was harvested for crops but maximum agricultural chemicals were used.
II. In 2004, both the number of self-employed unpaid workers and the use of durable equipments fell by minimum.

- (a) I only (b) II only
(c) I and II (d) None of these

Directions for questions 8 to 10: *Go through the information given below and solve the questions based on it.*

Following is known about the members of Thumbs-up holidays who might have gone to Goa or Kashmir or both.

		Number of members who went to	
Number of children	Total number of members	Goa	Kashmir
Less than 3 children	150	80	60
3 to 5 children	400	275	225
More than 5 children	50	20	30

8. What is the least number of members who have 3 to 5 children and have gone to at least one of the destinations?

- (a) 225 (b) 275
(c) 100 (d) Cannot be determined

9. Minimum number of members for all the categories and have gone to at least one of the destinations is.
 (a) 385 (b) 375
 (c) 305 (d) 315
10. How many of the members have definitely not gone to any of the two destinations?
 (a) 0 (b) 10
 (c) 25 (d) Cannot be determined

ANSWER KEYS

1. (a) 2. (b) 3. (b) 4. (c) 5. (d) 6. (b) 7. (d) 8. (b) 9. (a) 10. (b)

HINTS AND EXPLANATIONS

Storyline of 1 to 3

This set is the combination of Reading Comprehension and Data Interpretation skills. One is supposed to find out the meaningful data within the passage mentioned.

Solution and Explanation for 1 to 3

- Only “Rising ATF prices” and “Reduced passenger Load” have been mentioned as the reasons for Jet Airways not doing well. Airlines has asked its employees to raise the service bar—but using this statement, this cannot be assumed that service standards is low. Staff travelling to Dubai has been mentioned in case of Air India.
Hence option (a) is the answer.
- Total loss for the airlines industry = ₹10,000 crores
 Loss of Jet Airlines = ₹3,000
 Loss to Air India = ₹10 crores × 365 days = ₹3650 crores (Air India’s daily loss is mentioned in the 2nd line of 2nd para).
 Hence total loss to all the other airlines = (₹10,000 – ₹3000 – ₹3650) crores = ₹3350 crores.
 Hence option (b) is the answer.
- Nothing can be said for sure regarding the revenue of Airlines. Reducing the fare may improve the passenger load, but nothing can be ascertained if this will increase the net revenue or not?
 Hence option (b) is the answer.
 Option (D) cannot be the answer because It does not matter is too casual a remark in this context. In fact “It matters to reduce the fare”.

Storyline of 4 to 7

Table presents the farm data for the years 2000 to 2004. Right hand side of the table has the index for input

use taking base year as 1992. In the base year 1992, index = 100. To solve the question set given ahead, you need not get into the technicalities of the question, be focused towards what is asked.

Solution and Explanations for 4 to 7

- Average of farm labor indices

$$= \frac{102 + 106 + 100 + 96 + 96}{5} = 100.$$
 And so on.
 Similarly average indices for other can also be calculated.
 Hence option (c) is the answer.
- In 2000, migrant hired workers = 178.5 (20% of 892)
 In 2001, migrant hired workers = 227.5 (25% of 910)
 So, % rise = $\frac{227.5 - 178.4}{178.4} \times 100 = 27.5\%$

Note from Author: I would suggest you to use approximation techniques instead of actual calculation. It can be clearly seen that there is increase in the number of migrant hired workers in the year 2001 over the year 2000, hence options (a) and (c) are eliminated.

Now take down the approximated values:

In 2000, migrant hired workers = 178.5 (20% of 892) = 180 (Approximately)
 In 2001, migrant hired workers = 227.5 (25% of 910) = 230 (Approximately)
 So, increase = 50 (Approximate). Since our base (or denominator) is the value of 2000 = 180, hence it can be clearly seen that 50 is above 20% and less than 30% of 180. Hence we eliminate option (b) as the answer. We are not left out with option (d) only.
 Hence option (d) is the answer.

6. In 2001-2003:
 Total hired workers = $910 + 866 + 857 = 2633$ thousand
 Total self-employed workers = $1968 + 1944 + 1942 = 5854$ thousand.
 Required ratio = $\frac{2633}{5854}$
 We'll again use the approximation techniques to get down to the answer.
 Obviously, the ratio $\frac{2633}{5854}$ is less than 1. Hence options (c) and (d) are eliminated.
 Further, 50% of 5854 = 2900 (Approximately). Numerator is less than this. So ratio would be less than 0.5. There is only one option fitting the criteria—option (b). Hence option (b) is the answer.
7. (I) is not correct because maximum agricultural chemical was used in 2003 where the index is 106. Even (II) is not correct.
 Hence option (d) is the answer.

Solution and Explanations to 8 to 10

8. In the category 3 to 5 children, there are 275 members who have gone to Goa. We are not sure about the 225 members who have gone to Kashmir that if they are different than the members who have gone to Goa.

So for these 225 families going to Kashmir, we are not sure about the extent of overlapping with the families going to Goa. It might be a possibility that these 225 members who have gone to Kashmir have also gone to Goa. Hence minimum number of members who have gone to at least one of the destinations = 275.

Hence option (b) is the answer.

9. Taking a cue from solution to 8, following numbers are to be added:

Number of members who went to	
Goa	Kashmir
80	60
275	225
20	30

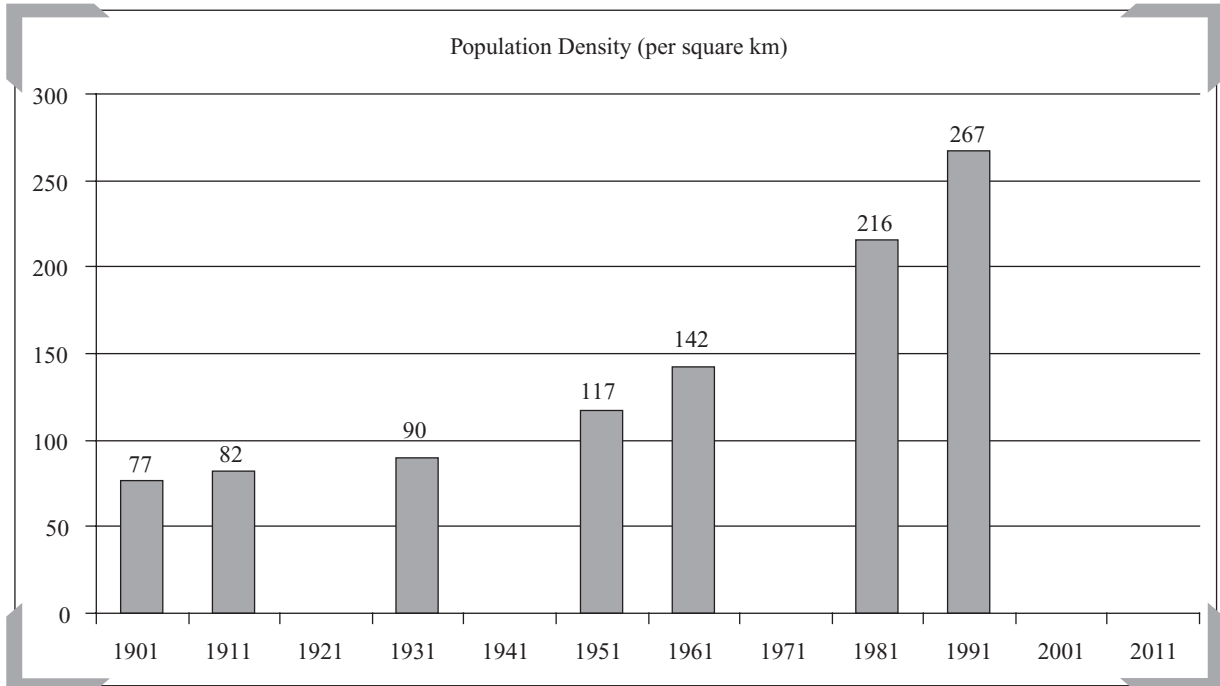
Answer to this question would be = $80 + 275 + 30 = 385$. Hence option (a) is the answer.

10. We are not sure of the members in the category '3 to 5 children' or 'more than 5 children' that any of these members have NOT gone to any of the destinations. Although we are sure of the fact that in the category 'Less than 3 children', there are at least $150 - (80 + 60) = 10$ members who have not gone to any of the destinations. Hence option (b) is the answer.

PRACTICE EXERCISE 7

Directions for questions 1 to 4: Go through the data set given below and solve the questions based on it.

Following bar chart and table provides the Census Data for India during the given period.



As it can be seen that in the bar chart, population density data for few years namely 1921, 1941, 1971, 2001 and 2011 have been omitted due to some technical fault. Assume these values to be equal to A, B, C, D and E respectively.

Following table provides the absolute increase in the density of the census year with respect to the previous census year.

Census year	Absolute increase from previous census
1901	NA
1911	5
1921	-1
1931	9
1941	13
1951	14

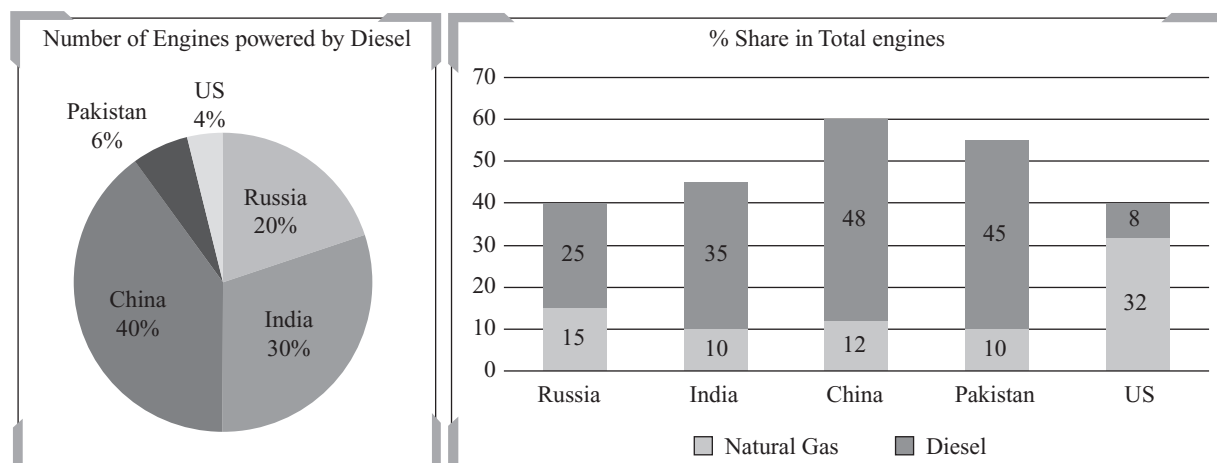
Census year	Absolute increase from previous census
1961	25
1971	35
1981	39
1991	51
2001	58
2011	Not mentioned

- Which of the following is the largest one?
 (a) B (b) C
 (c) D (d) cannot be determined
- Population density of census year 2011 increases by 17.5% over the population density of census year 2001. What is the value of E?
 (a) 372 (b) 382
 (c) 392 (d) 352

3. Which year shows the second largest percentage increase in the population density over the previous census year?
 (a) 1931 (b) 1941
 (c) 1971 (d) 1991
4. Population density of which year is closest to the average of population density of all the census years from 1901 to 2001?
 (a) 1931 (b) 1961
 (c) 1981 (d) 1991

Directions for questions 5 to 7: Go through the data set given below and solve the questions based on it.

In the five countries listed below, information with regard to mode of powering railway engines is provided. Railway engines can be powered only by one of the three modes-Natural Gas, Diesel or Electricity. A single railway engine will use only one of the three modes mentioned for whole of its life. Assume that all the data and questions given below pertain to the same time period.



Also given that the total number of engines powered by diesel in the given five countries above = 7030 (as given in the pie chart)

5. What is the number of engines in India that are powered by electricity?
 (a) 3300
 (b) 2700
 (c) 6000
 (d) Cannot be determined
6. If the number of engines in Russia accounts for 5% of the total number of engines in the world, then what percentage of the total engines in the world are powered by diesel?
 (a) 110,000 (b) 27,500
 (c) 14100 (d) cannot be determined
7. Amongst the five countries, what is the average percentage of engines that are powered by Electricity?
 (a) 52.4% (b) 47.6%
 (c) 55.8% (d) 44.2%

Directions for questions 8 to 11: Go through the data set given below and solve the questions based on it.

Name of Stock	Date of Auction	Date of Issue	Notified amount	Devolvement on PDs	Cut off price (in ₹)	Cut off yield (%)	Date of Maturity
7.56% GS 2014	02-Apr-09	06-Apr-09	8000	0	103.47	6.80	03-Nov-14
7.94% GS 2021	02-Apr-09	06-Apr-09	4000	567	102.5	7.62	24-May-21
6.05% GS 2019	09-Apr-09	13-Apr-09	8000	0	95.05	6.75	02-Feb-19
7.50% GS 2034	09-Apr-09	13-Apr-09	4000	0	97.35	7.74	10-Aug-34

Name of Stock	Date of Auction	Date of Issue	Notified amount	Devolvement on PDs	Cut off price (in ₹)	Cut off yield (%)	Date of Maturity
7.56% GS 2014	17-Apr-09	20-Apr-09	8000	0	106.75	6.10	03-Nov-14
8.24% GS 2027	17-Apr-09	20-Apr-09	4000	0	107.82	7.44	15-Feb-27
6.05% GS 2019	24-Apr-09	27-Apr-09	8000	0	99.38	6.13	02-Feb-19

8. For how many stocks, date of maturity is minimum 5 years ahead of date of auction?
 (a) All but 1 stock
 (b) All but 2 stocks
 (c) All but 3 stocks
 (d) None of these
9. Nomenclature of the stocks is done in the following way:
 7.56% GS 2014 - It means that desired yield from the Government stock (GS) in 2014 is 7.56%.
 For how many of the stocks desired yield is more than cut-off yield?
 (a) 3 (b) 4
 (c) 5 (d) 2
10. How many stocks with a cut-off price of more than ₹100 have their cut-off yield more than its desired yield (use definition from above question if required)?
 (a) 0 (b) 1
 (c) 2 (d) 3
11. Mr Robert is quite an ambitious person. He wants to obtain a minimum desired yield of 8%. For that to happen, he buys exactly two stocks in different ratio. How many combinations can he have, out of 7 stocks given, such that his minimum desired yield is at least 8% (use information from previous questions)?
 (a) Not possible (b) 6
 (c) 7 (d) None of these

ANSWER KEYS

1. (d) 2. (b) 3. (d) 4. (b) 5. (a) 6. (d) 7. (a) 8. (d) 9. (b) 10. (a)
 11. (b)

HINTS AND EXPLANATIONS

Storyline of 1 to 4

Barchart provides the population density of the census years—though data for some of the years is missing. To find out the missing values in the bar chart, table provides the absolute increase in the census year with respect to the previous census year. For example, census year of 1941 = 13 more from the population density of 1931 = 90 + 13 = 103.

Solution and Explanation for 1 to 4

1. It can be seen that density has increased in all the census years over the previous year except (a) in 1921 (b) in 2011 – we do not have information.

Hence population density for 2011 = E is not known to us.

So final answer is - cannot be determined. Hence option (d) is the answer.

2. Given that population density in 1991 = 267
 So population density of 2001 = 267 + 58 = 325.
 To calculate the population density of 2011, we have been given the clue in terms of percentage increase over 2001 population density.
 Population density of 2011 = Population density of 2001 + increase of 17.5% over this = 325 + 17.5% of 325

$$17.5\% = 20\% - 2.5\% = \frac{1}{5} - \frac{1}{40}$$

2.140 Data Interpretation

$\frac{1}{5}$ of 325 = 65 and $\frac{1}{40}$ of 325 = 8 (approximately)

So, $17.5\% = 65 - 8 = 57$

Hence population density of 2011 = $325 + 57 = 382$. Hence option (b) is the answer.

3. Following table gives the population density and percentage change:

Census year	Density (per sq.km)	% age Change
1901	77	
1911	82	6.5
1921	81	-1.2
1931	90	11.1
1941	103	14.4
1951	117	13.6
1961	142	21.4
1971	177	24.6
1981	216	22
1991	267	23.6
2001	325	21.7

Second largest percentage increase occurs in 1991. Hence option (d) is the answer.

4. Method 1: Using approximation

Since the population density is constantly on a rise, average would be accounted for by the years that lie midway—1951 or 1961 or 1971. Census year 1951 can be easily ruled out as population density in this year is too low. So either census year 1961 or 1971 will be the answer. Since 1971 is not in the options, hence 1961 is the answer.

Method 2: Using the actual calculation

Using the table drawn to solve 3, average population density of all the census years from 1901 to 2001 = 152. This is closest to the population density of the census year 1961.

Hence option (b) is the answer.

5. 45% of the engines in India are powered by Natural gas and Diesel. So, the balance 55% will be powered

by electricity. We know that 2100 engines are powered by diesel which accounts for 35% of the total engines. Therefore, 55% of the total engines

$$= \frac{2100}{35} \times 55 = 3300. \text{ Hence option (a) is the answer.}$$

6. We can find out the total number of engines in the world with the information available. But we do not know the makeup of the engines of the world in terms of their being powered by different modes. Hence cannot be determined.

Hence option (d) is the answer.

7. Average % of engines powered by electricity = $\frac{\text{Number of engines powered by electricity}}{\text{Total number of engines}} \times 100$

$$= \frac{1134000}{21625} \times 100 = 52.4\%. \text{ Hence option (a) is the answer.}$$

Storyline of 8 to 11

Best way to go through this set of questions is to take the questions on its face value without understanding the meanings attached to the terms (though they are self descriptive in nature, and one is not required to scratch one's head to make meaning out of it).

Solution and Explanations for 8 to 11

8. The least occurs in case of 7.56% GS 2014 which is more than 5 years. Hence answer is – all the years. Hence answer is option (d) None of these.
9. For 4 stocks, the desired yield is more than cut off yield. Hence option (b) is the answer.
10. Following stocks are having their cut-off price more than ₹100:

Name of Stock	Cut off price
7.56% GS 2014	103.47
7.94% GS 2021	102.5
7.56% GS 2014	106.75
8.24% GS 2027	107.82

None of these stocks have their cut-off yield more than its desired yield. Hence option (a) is the answer.

11. To obtain a minimum desired yield of 8%, Mr Robert has to take 8.24% GS, as for remaining all the stocks, minimum desired yield is 8%. (One

cannot have above 8% yield by mixing two stocks with less than 7% stock. It means that one stock has to be higher than 8 % and other has to be less than 8%).

He can mix 8.24% GS with any one of the remaining 6 stocks to obtain minimum 8% desired yield.

Hence option (b) is the answer.

PRACTICE EXERCISE 8

Directions for questions 1 to 4: Refer to the table given below and answer the questions that follow.

Following table gives some incomplete information on the marks obtained by four persons Amit, Binit, Charu and Dilip in four different subjects.

	Physics	Chemistry	Maths	English	Total
Amit	80	70	—	80	—
Binit	60	—	60	—	—
Charu	—	—	60	—	220
Dilip	90	—	70	60	—

Additional Information:

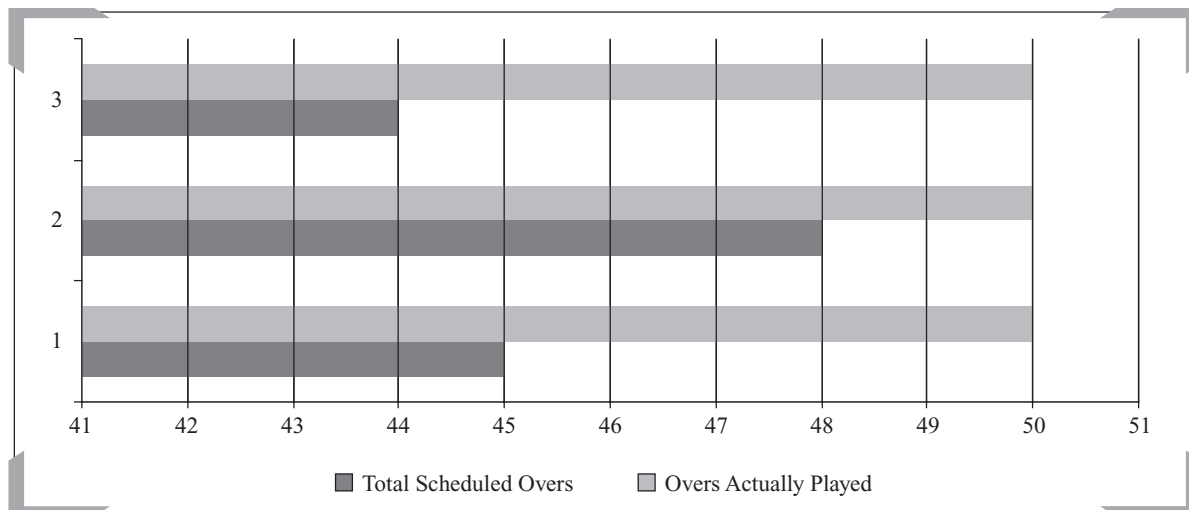
- Amit's average marks was 72.5, in all the four subjects.
- The average marks in Physics for all four persons was 67.5.
- Binit's Average marks for all four subjects was 1.5 times Charu's marks in physics.
- Binit and Dilip scored the same marks in English. The average English marks were the same as the average Physics marks.
- The total marks in Chemistry was 10 less than the total marks in physics for all four persons.

- Who scored the lowest total?
(a) Amit (b) Binit
(c) Charu (d) Dilip
- The average marks for all four persons (for all the four subjects) is (approx.)
(a) 65.625 (b) 81.225
(c) 99.5 (d) 105.6
- Who is the highest scorer in chemistry?
(a) Amit (b) Binit
(c) Charu (d) Dilip
- Who is the lowest scorer in physics?
(a) Amit (b) Binit
(c) Charu (d) Dilip

Directions for questions 5 to 8: Go through the chart given below and solve the questions based on it.

In the game of cricket, there are 11 batsmen who bat during the match of 50 overs. Two batsmen come to bat first and when any one of the two gets out, next batsman come to bat along with the one of the two batsmen left out. And so on, the next batsman comes to bat – in a fixed sequence for all the three matches. Only one batsman can get out for one ball. One over comprises of 6 balls—to be thrown one by one. Though if all the batsmen get out before scheduled 50 Overs, match ends at that point (known as Overs Actually Played).

Following bar chart shows total scheduled Overs and Overs actually played for first match (denoted by 1), second match (denoted by 2) and third match (denoted by 3).



Following table shows the runs scored in three matches series. Total runs scored = Runs Scored by first Five players + Runs scored by Remaining Last six players + Extra Runs.

India Vs Pakistan ODI Series 2012 – Runs Scored

	1st Match	2nd Match	3rd Match
Runs Scored by 1st Five Players	18	75	80
Runs Scored by Remaining Last Six Players	187	72	70
Extra Runs	22	18	17

$$\text{Average Runs per over} = \frac{\text{Total Runs Scored}}{\text{Overs Actually Played}}$$

5. In which of the matches, Indian Team's average runs per over is maximum?
 - (a) First match
 - (b) Second match
 - (c) Third match
 - (d) either first or second match
6. What would have the total runs scored in the third match if Indian team would have played 50 overs with the same average which it maintained till the overs actually played?
 - (a) 180
 - (b) 190
 - (c) 200
 - (d) 170
7. Mr Phani Ram, the team selector, has made following observations to improve the performance of the team:
 - (i) Performance of first five players has improved, whereas performance of last six players has gone down.

- (ii) Had there been no extra runs, runs in second match would have decreased by maximum percentage.
- (iii) If team would have played for full 50 overs, it would have scored maximum in first match.

How many of these observations are true?

- (a) Only I and II but not iii
- (b) Only ii and iii but not i
- (c) Only I and iii but not ii
- (d) All three

8. If extra runs are not considered, which match has the lowest average runs per over?

- (a) First match
- (b) Second match
- (c) Third match
- (d) either second or third match

Directions for questions 9 to 10: Go through the data set given below and solve the questions based on it.

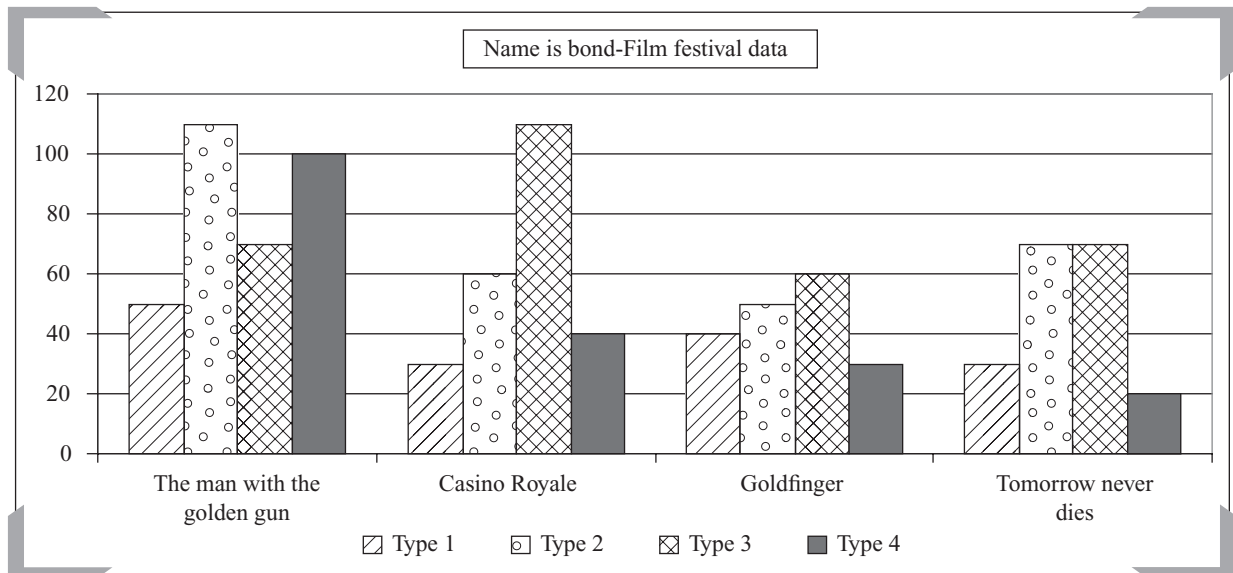
The following bar chart represents the detail regarding the number of persons who attended the James Bond film festival named "Name is Bond" where four movies – The man with the golden gun, Casino Royale, Goldfinger, and Tomorrow never dies were screened. Each person who attended the festival watched at least one of the four movies. Besides, there are four types of persons (out of which the first three types are characterized on the basis of their age):

Type 1 – Age > 60 years, who watched the movie.

Type 2 – Age > 30 years, but age not more than 60 years who watched the movie.

Type 3 – Age not more than 30 years who watched the movie.

Type 4 – Persons who watched only that movie.



All the data points are multiples of 10.

9. What could be the maximum number of persons who watched all the four movies?
 (a) 150 (b) 130
 (c) 140 (d) 120
10. What could be the maximum number of persons of age more than 60 years, who attended the festival?
 (a) 200 (b) 150
 (c) 130 (d) 140

ANSWER KEYS

1. (c) 2. (a) 3. (d) 4. (c) 5. (a) 6. (b) 7. (c) 8. (b) 9. (d) 10. (d)

HINTS AND EXPLANATIONS

1 to 4

From the given information the following table can be prepared:

	Physics	Chemistry	Maths	English	Total
Amit	80	70	60	80	290
Binit	60	60	60	60	240
Charu	40	50	60	70	220
Dilip	90	80	70	60	300

Storyline of 5 to 8

Question provides two sets of data – Overs and Runs scored. While Total scheduled Overs is fixed at 50, Overs actually played vary for all the three matches. Runs scored have been given in three parts - Runs Scored by 1st Five Players, Runs Scored by remaining Last Six Players and Extra Runs. Summation of these three components gives total runs. Further, Average runs per over has been defined.

5 to 8

5. Clearly it can be seen that runs scored in the first match is much more than the total runs scored in either second match or third match. Though number of Overs actually played is almost similar in all the three matches – 45 Overs in first match, 48 Overs in second match and 44 Overs in third match. Since numerator (Total runs scored) is maximum in case of 1st match whereas denominator is almost

similar, Average runs per over will be maximum for first match.

Hence option (a) is the answer.

6. Total number of overs actually played in third match = 44 overs

Total number of Runs scored in third match = $80 + 70 + 17 = 167$ runs

Method 1 – Through actual calculation method

Average Runs per over in third match = $\frac{167}{44}$
 = 3.8 runs per over

Total runs in 50 overs = $50 \times 3.8 = 190$ runs

Method 2 – Through Approximation method

44 overs $\xrightarrow{\text{Percentage Increase of } 12\% - 13\%}$ 50 overs

Hence runs scored will also increase by 12% - 13%. Now we will not go through the actual calculation. A quick look at the options shows that options are not close, so we can have a good approximation. Instead of increasing 167 runs (scored in 44 overs) by 12% - 13%, we increase it by ONLY 10% to find a quick range of our answer.

$167 \xrightarrow{\text{Percentage Increase of } 10\%} 167 + 16.7 \approx 184$. Our actual answer will be a bit more than this. Option (b) is the closest one.

Hence option (b) is the answer.

7. Evaluating the observations one by one:
 Observation I – Understand that you don't have to use your "Cricket" knowledge to answer this question. Taking the data on its face value, it can be clearly seen that Performance of 1st five players has improved whereas performance of last six players has gone down. Hence observation I is correct.

Observation ii – This is a close call. So let us go through the actual calculation.

Percentage decrease in case of

$$\text{Match 1} = \frac{22}{227} \times 100 = 9.69\%$$

Percentage decrease in case of

$$\text{Match 2} = \frac{18}{165} \times 100 = 10.9\%$$

Percentage decrease in case of

$$\text{Match 3} = \frac{17}{167} \times 100 = 10.17\%$$

So, maximum percentage decrease occurs in case of Match 3. Hence Observation (ii) is wrong.

Observation iii – Since the average runs per over is maximum in Match 1 (using answer to 5), hence runs scored in 50 Overs would have been maximum in match 1. So observation iii is true.

So, only observations I and iii are correct.

Hence option (c) is the answer.

8. This is simple calculation – similar to 5.
Option (a) can be easily eliminated as this has the maximum runs scored. Though to decide between match 2 and match 3, we are required to calculate the actual value.
Average Runs per Over for Match 2 = 3.06 runs per over and average runs per over for match 3 = 3.40 runs per over. Hence match 2 is the answer.
Hence option (b) is the answer.
9. The maximum number of people who watch all movies can be obtained by adding the minimum value of each age group from all movies. As the 4th bar shows people who watched only that movie. So, they would not watch all movies. For each age group, the maximum possible number of people who watched all movies is the minimum value it has among all 4 movies. For example, for people 760 years of age, the maximum number of people who can watch all 4 movies is 30, which shows people >60 years of age

who watched Casino Royale, as it is possible those 30 also watched other 3 movies.

So, for age group >60 year = 30

For age group 30–60 = 50

For age group <30 = 60

It adds to 30 + 50 + 60 = 140.

But, we must also consider for each movie, the number of people who watched only that movie must be less than the number obtained by adding the people for each age group & then subtracting the number of people who watched all 4 movies.

For movie, the man with the golden gun: (50 + 110 + 70) – 140 = 90. But, the people who watched only this movie is 100. So, the number of people who watched all 4 movies must be equal or smaller to 130.

For movie, Casino Royale: (30 + 60 + 110) – 140 = 60. But, the number of people who watched only this movie is 40. So, 140 is possible value.

For movie, Goldfinger: (40 + 50 + 60) – 140 = 10. But, the number of people who watched only this movie is 30. So, 120 can be the maximum value of people who watched all 4 movies.

For movie, Tomorrow never dies: (30 + 70 + 70) – 140 = 30. The number of people who watched only this movie is 20. So, here 140 is possible value for people who watched all 4 movies.

So, the maximum number of people who watched all 4 movies is 120.

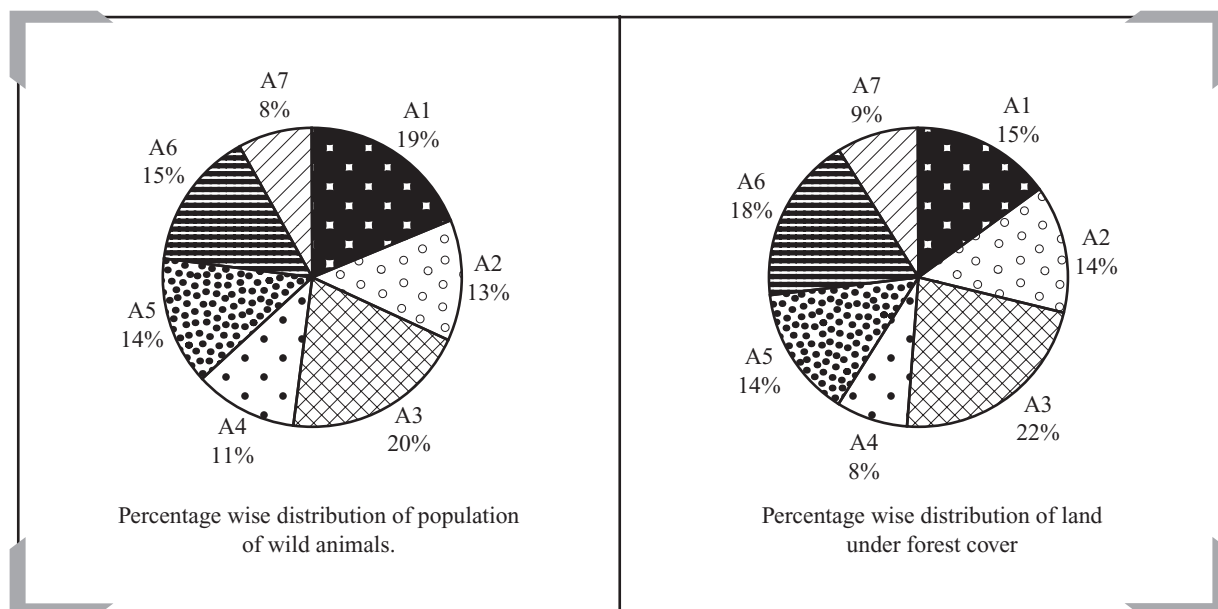
10. For maximum number of people of age group >60 year, we must assume that no person watches more than 1 movie. So, if the value of bar showing this age group is less than 4th bar (showing people who watched only that movie), we can use full value of that bar. But if it is not so, we must use value of 4th bar.

So, maximum possible number of people of >60 age who attended the festival
= 50 + 30 + 30 + 20
= 130

PRACTICE EXERCISE 9

Directions for questions 1 to 4: Go through the data set given below and solve the questions based on it.

Below given pie charts show the percentage population of wild animals and the percentage of land use under forest cover in different regions of the world in the year 2007.



Following are the geographical regions:

A1 – Asia, China, India, **A2** – Australia, **A3** – Africa, **A4** – Europe, **A5** – Russia, **A6** – North & South America, **A7** – Antarctica. Population density is obtained by dividing population by land.

$$\text{Population density} = \frac{\text{Percentage Number of Animals}}{\text{Percentage Land Area Under Forest Cover}}$$

- If the population density of wild animals in Russia is 1, then what is the combined population density of (Africa and North & South America)?
(a) 0.79 (b) 0.84
(c) 0.88 (d) 0.94
- Which among the following has the fourth highest population density of wild animals?
(a) A5 (b) A7
(c) A3 (d) A2
- Population density of wild animals in Europe is how many times that of the population density of wild animals in Russia?

- (a) 1.375 (b) 1.49
(c) 1.57 (d) 1.64

- If in the next 10 years, the population of wild animals in Antarctica will increase by 2.5% more than that in the rest of the world, what will be the percentage population of wild animals in Antarctica after 10 years?
(a) 9.5%
(b) 11.6%
(c) 15.7%
(d) Cannot be determined

Directions for questions 5 to 9: Go through the data set given below and solve the questions based on it.

In a “Chocolate Eating Competition” held at dueNorth Inc. Dehradun, 10 contestants ate different number of Chocolates from 1 to 10. The following table gives the ratio of some of their scores. For example, Sonu ate double chocolates than Deepak; or Deepak ate half the number of chocolates eaten by Sonu.

	Deepak	Sonu	Manoj	Naveen	Mak	Julie	Hemant	Mohit	Kajal	Prince
Deepak	–	1 : 2			2 : 1					
Sonu	2 : 1	–								
Manoj	4 : 1		–							
Naveen				–						2 : 1
Mak					–					
Julie						–			2 : 3	
Hemant							–		1 : 3	
Mohit								–		
Kajal						3 : 2			–	
Prince										–

5. What is the number of chocolate's eaten by Mohit?
 - (a) 3
 - (b) 7
 - (c) 5
 - (d) Cannot be determined
6. What is the number of chocolate's eaten by Kajal as a percentage of the number of chocolates eaten by Prince?
 - (a) 60%
 - (b) 55.55%
 - (c) 80%
 - (d) 180%
7. For how many out of 10 persons mentioned in this dataset, number of chocolates eaten cannot be determined?
 - (a) 0
 - (b) 1
 - (c) 2
 - (d) 4
8. Which of the following statement is true?
 - (a) Manoj ate more number of chocolates than Deepak.
 - (b) Combined number of chocolates of Sonu and Manoj is equal to the number of chocolates eaten by Deepak.
- (c) Combined number of chocolates of Hemant and Kajal is equal to number of chocolates eaten by Julie.
- (d) All are true
9. Number of chocolate's eaten by Sonu and Manoj together equals to which of the following?
 - (a) Kajal and Hemant together
 - (b) Deepak and Naveen together
 - (c) Twice the number of Julie's
 - (d) All are true
10. A husband and wife have a combined age of 91 years. The husband is now twice as old as his wife was when he was as old as she is now. What is the difference between husband's age and wife's age?
 - (a) 12
 - (b) 13
 - (c) 14
 - (d) 11

ANSWER KEYS

1. (c) 2. (d) 3. (a) 4. (d) 5. (b) 6. (d) 7. (a) 8. (a) 9. (d) 10. (b)

HINTS AND EXPLANATIONS

Storyline of 1 to 4

Pie charts given in the question present two different data for seven regions namely A1 to A7. Left hand piechart presents the population distribution of wild animals in seven regions whereas right hand pie chart presents the land under forest cover distribution in seven regions.

Population density

$$= \frac{\text{Percentage Number of Animals}}{\text{Percentage Land Area Under Forest Cover}}$$

1 to 4

1. This is a straight forward question. We need to add the percentage of animals and divide it by summation of percentage of land area under forest cover.

$$\text{Required population density} = \frac{20+15}{22+18} = 0.88.$$

Hence, option (c) is the answer.

2. If the question would have asked us 'maximum' or 'minimum', we could have solved it through process

of elimination. Since question asks us to evaluate "fourth highest population density", it is better that we calculate the density for each of the regions and identify the fourth highest.

The population densities of the areas are:

$$A1 = 1.266 \quad A2 = 0.928$$

$$A3 = 0.909 \quad A4 = 1.375$$

$$A5 = 1 \quad A6 = 0.833$$

$$A7 = 0.89$$

Alternatively, we can use some guesstimation skills to shorten the calculation process:

Three regions – namely A1, A4 and A5 are clearly greater than or equal to 1. So, fourth highest is a value closest AND lower than 1.

Hence, option (d) is the answer.

3. This is simple calculation.
Population density of Russia = 1 while population density of Europe = 1.375.
Hence, option (a) is the answer.
4. As the increase in the population of the rest of the world is not known, we cannot determine the increase in Antarctica's wild life population. Hence, option (d) is the answer.

5 to 9

Number of Chocolates eaten by all of them is following:

Name	Deepak	Sonu	Manoj	Naveen	Mak	Julie	Hemant	Mohit	Kajal	Prince
No.	2	4	8	10	1	6	3	7	9	5

5. Number of chocolates eaten by Mohit = 7. Hence option (b) is the answer.
6. Number of chocolates eaten by Kajal = 9 and number of chocolates eaten by Prince = 5. Hence number of chocolates eaten by Kajal as a percentage of the number of chocolates eaten by Prince = $\frac{9}{5} \times 100 = 180\%$. Hence, option (d) is the answer.
7. As given in the above table, it can be calculated for all of them. Hence option (a) is the answer.
8. It can be seen that only option (a) is true.
9. Number of chocolate's eaten by Sonu and Manoj together = 12, which is equal to the number calculated in options (a), (b) and (c). Hence option (d) is the answer.
10. Husband's age = 52 years and wife's age = 39 years. Hence difference in between their ages = 13 years. Hence option (b) is the answer.

PRACTICE EXERCISE 10

Directions for questions 1 to 3: Answer the questions on the basis of the information given below.

Spam that enters our electronic mailboxes can be classified under several spam heads. The following table shows the distribution (out of 100%) of such spam worldwide over time. The total number of spam e-mails received during December 2002 was larger than the number received in June 2003. The total number of spam emails received during September 2002 was larger than the number received in March 2003. The figures in the table represent the percentage of all spam emails received during that period, falling into those respective categories.

Category	Sep-02	Dec-02	Mar-03	Jun-03
Adult	38	33	19	17
Health	25	30	37	45
Financial	11	19	5	18
Internet	5	3	10	6
Products	3	7	10	11
Scams	5	6	11	2
Others	13	2	8	1

- In which category was the percentage of spam e-mails increasing but at a decreasing rate?
(a) Financial (b) Scams
(c) Products (d) None of the above
- In the health category, the number of spam e-mails received in December 2002 as compared to June 2003
(a) was larger (b) was smaller
(c) was equal (d) Cannot be determined
- In the financial category, the number of spam e-mails received in September 2002 as compared to March 2003
(a) was larger (b) was smaller
(c) was equal (d) cannot be determined

Directions for questions 4 to 5: Answer the questions on the basis of the information given below.

An industry comprises of four firms (A, B, C, and D). Financial details of these firms and of the industry as a

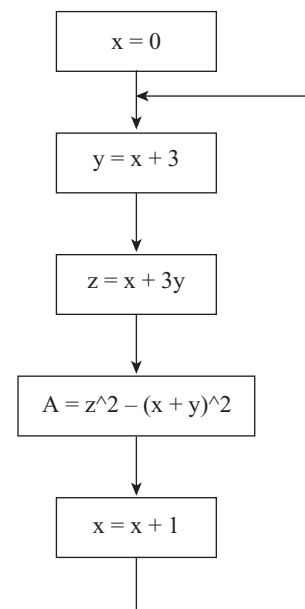
whole for a particular year are given below. Profitability of a firm is defined as profit as a percentage of sales.

Figures in ₹	A	B	C	D	Total
Sales	24568	25468	23752	15782	89570
Operating costs	17198	19101	16151	10258	62708
Interest costs	2457	2292	2850	1578	9177
Profit	4914	4075	4750	3946	17684

- Which firm has the highest profitability?
(a) A (b) B
(c) C (d) D
- If firm A acquires firm B, approximately what percentage of the total market (total sales) will they corner together?
(a) 55% (b) 45%
(c) 35% (d) 50%

Directions for questions 6 to 8: Answer the questions on the basis of the information given below.

A computer program follows an algorithm as shown by the following flow chart:



Answer the following questions on the basis of the information given below.

6. When the cumulative value of Z will be 270, what would be the absolute difference between the cumulative value of $x + y$ up to this point and the cumulative value of z up to this point?
 (a) 110 (b) 150
 (c) 170 (d) 210
7. What will be the value of A, when the cumulative value of z becomes 85?
 (a) 672 (b) 864
 (c) 360 (d) 504
8. What will be the difference in values between z and $x + y$ when $A = 672$?
 (a) 11 (b) 13
 (c) 16 (d) 18

Directions for questions 9 to 10: Answer the questions on the basis of the information given below.

The head of a newly formed government desires to appoint five of the six elected members A, B, C, D, E and F to portfolio of Home, power, Defense, Telecom

and Finance. F does not want any portfolio if D gets one of the five. C wants either Home or Finance or no portfolio. B says that if D gets either Power or Telecom then she must get the other one. E insists on a portfolio if A gets one.

9. Which is valid assignment?
 (a) A-Home, B-Power, C-defense, D-Telecom, E-Finance
 (b) C-Home, D-Power, A-defense, B-Telecom, E-Finance
 (c) A-Home, B-Power, E-defense, D-Telecom, F-Finance
 (d) B-Home, F-Power, E-defense, C-Telecom, A-Finance
10. If A gets Home and C gets Finance, then which is NOT a valid assignment of defense and Telecom?
 (a) D-Defense, B-Telecom
 (b) F-Finance, B-Telecom
 (c) B-Defense, E-Telecom
 (d) B-Defense, D-telecom

ANSWER KEYS

1. (c) 2. (d) 3. (a) 4. (d) 5. (a) 6. (b) 7. (d) 8. (c) 9. (b) 10. (d)

HINTS AND EXPLANATIONS

1 to 5

1. In case of products, percentage of spam e-mails is increasing but at decreasing rate, from Sep 2002 to Dec 2002 products increased by $[(7 - 3)/3] \times 100 = 133.33\%$ and in march 2003 about $[(7 - 4)/7] \times 100 = 43\%$ and in June 2003, $[(11 - 10)/10] \times 100 = 10\%$.
2. Since percentage of spam in Dec 2002 is higher than June 2003, and the number of total e-mails received is higher, hence cannot be determined.
3. In September 2002, percentage is higher as compared to March 2003, however, the total number of e-mails received in Sept 2003 is higher than that in March 2002.
4. Profitability is defined as percentage of sales. Approximately Firm A has 25% profit, B has 16.66%, C has 20% and D has approximately 30% profit.

5. If firm A acquires firm B, then their combined sale is $24568 + 25468 = ₹50,036$. The total sale (in ₹) of industry is ₹89,570.

So, the market share will be $\frac{50036}{89570} \times 100\% = 55\%$.

6 to 8

Following is the grid:

x	0	1	2	3	4	5	6	7	8	9
y	3	4	5	6	7	8	9	10	11	12
z	9	13	17	21	25	29	33	37	41	45
A	72	144	240	360	504	672	864	1080	1320	1584

6. $x + y = 120$. Summation of all $Z = 270$. The required difference $= 270 - 120 = 150$. Hence, option (b) is correct.

7. When the cumulative value of z becomes 85, $A = 504$. Hence, option (d) is correct.
8. When $A = 672$, $z = 29$, $y = 8$ & $x = 5$. Hence, $29 - (8 + 5) = 16$. Hence, option (c) is correct.

9 and 10

If D gets portfolio F does not and vice-versa.
 C wants only Home or Finance or none.
 If D gets Power B must get Telecom or D- Telecom
 then B must get Power
 If A gets a portfolio E should get.

9. Go through options:
 (a) is eliminated because C can have either home or finance.
 (c) is eliminated because F and D cannot be in the same team
 (d) is eliminated because C cannot have telecom portfolio
 Hence (b) is correct.
10. B-Defence, D-Telecom because if D gets Telecom then B must get power.

PRACTICE EXERCISE 11

Directions for question 1 to 3: Answer the questions on the basis of the information given below.

Rang Barsey Paint Company (RBPC) is in the business of manufacturing paints. RBPC buys RED, YELLOW, WHITE, ORANGE, and PINK paints. ORANGE paint can also be produced by maxing RED and YELLOW paints in equal proportions. Similarly, PINK paint can also produced by mixing equal amounts of RED and WHITE paints. Among other paints, RBPC sells CREAM paint, (formed by mixing WHITE and YELLOW in the ratio of 70:30) AVOCADO paint (formed by mixing equal amounts of ORANGE and PINK paint) and WASHEDORANGE paint (formed by mixing equal amounts of ORANGE and WHITE paint). The following table provides the price at which RBPC buys paints.

Colour	₹/Litre
RED	20
YELLOW	25
WHITE	15
ORANGE	22
PINK	18

- The cheapest way to manufacture AVOCADO paint would cost
 - ₹19.50 per litre
 - ₹19.75 per litre
 - ₹20.00 per litre
 - ₹20.25 per litre
- WASHEDORANGE can be manufactured by mixing
 - CREAM and RED in the ratio 14:10
 - CREAM and RED in the ratio 3:1
 - YELLOW and PINK in the ratio 1:1
 - RED, YELLOW and WHITE in the ratio 1:1:2
- Assume that AVOCADO, CREAM and WASHED-ORANGE each sells for the same price. Which of the three is the most profitable to manufacture?
 - AVOCADO
 - CREAM

- WASHERDORANGE
- Sufficient data is not available

Directions for questions 4 to 6: Answer the questions on the basis of the information given below.

Seven varsity basketball players (A, B, C, D, E, F and G) are to be honored at a special luncheon. The players will be seated on the dais in a row. A and G have to leave the luncheon early and so must be seated at the extreme right. B will receive the most valuable player's trophy and so must be in the centre to facilitate presentation. C and D are bitter rivals and therefore must be seated as far apart as possible.

- Which of the following cannot be seated at either end?
 - C
 - D
 - F
 - G
- Which of the following pairs cannot be seated together?
 - B and D
 - C and F
 - D and G
 - E and A
- Which of the following pairs cannot occupy the seats on either side of B?
 - F and D
 - D and E
 - E and G
 - C and F

Directions for questions 7 to 8: Answer the questions on the basis of the information given below.

Some children were taking free throws at the basketball court in school during lunch break. Below are some facts about how many baskets these children shot.

- Ganesh shot 8 baskets less than Ashish
 - Dhanraj and Ramesh together shot 37 baskets.
 - Jugraj shot 8 baskets more than Dhanraj.
 - Ashish shot 5 baskets more than Dhanraj
 - Ashish and Ganesh together shot 40 baskets.
- Which of the following statement is true?
 - Ramesh shot 18 baskets and Dhanraj shot 19 baskets.
 - Ganesh shot 24 baskets and Ashish shot 16 baskets.
 - Jugraj shot 19 baskets and Dhanraj shot 27 baskets.
 - Dhanraj shot 11 baskets and Ashish shot 16 baskets.

8. Which of the following statement is true?
 (a) Dhanraj and Jugraj together shot 46 baskets
 (b) Ganesh shot 18 baskets and ramesh shot 21 baskets.
 (c) Dhanraj shot 3 more baskets than ramesh
 (d) Ramesh and Jugraj together shot 29 baskets.

Directions for questions 9 and 10: Read the passage below and solve the questions based on it.

There is an automobile company making two models of cars – C1 and C2. C1 and C2 give the profits of INR 3600 and INR 5400 per unit respectively.

Monthly resources available for the production of these two models are given below:

Labor hours available = 48000 labor hours

Doors available = 20,000 units (Left and right side doors are identical and can be used interchangeably in both the cars. Both the cars use the same door).

Monthly Resources used - C1 is a four door car where as C2 is a two door car.

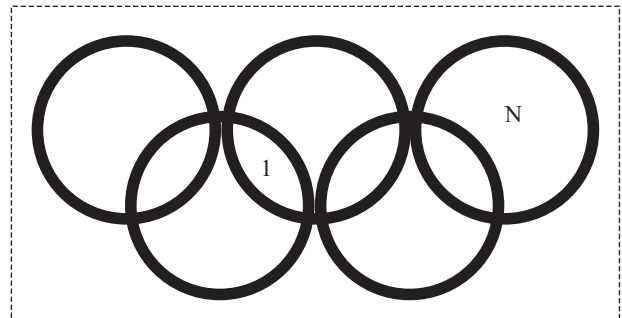
It takes 6 labour hours to assemble C1 and 10.5 hours to assemble C2.

Further it is also known that demand for C2 is limited to 3500 only per month whereas demand for C1 is unlimited.

9. How many C1 and C2 respectively should be produced in this particular month?
 (a) 3800, 2400 (b) 2400, 3800
 (c) 3100, 3100 (d) 4400, 1800

10. Sales dept. knows that it can raise the demand of C2 by 20% by just spending a mere sum of ₹1,00,000. Should the company go through this expenditure?
 (a) Yes
 (b) No
 (c) cannot be determined

Directions for questions 11 to 12: Place digits 1 through 9 into each closed area so that the sum of the digits inside every circle is the same. 1 is already placed, as shown in the picture below.



11. What is the sum of the numbers placed in each of the circles?
 (a) 9 (b) 11
 (c) 13 (d) 7
12. What is the value of N?
 (a) 9 (b) 11
 (c) 13 (d) 7

ANSWER KEYS

1. (b) 2. (d) 3. (b) 4. (c) 5. (d) 6. (c) 7. (a) 8. (a) 9. (a) 10. (b)
 11. (b) 12. (a)

HINTS AND EXPLANATIONS

1 to 3

1. Paint AVOCADO is made by mixing ORANGE and PINK in equal quantities.
 If ORANGE is made using RED and YELLOW, then the cost of ORANGE would be $(20 + 25)/2 = 22.5$ which is greater than the cost of the ORANGE. If we make PINK by RED and WHITE, the cost of PINK would be $(20 + 15)/2 = 17.5$ and it is less than the cost of the PINK paint.

Hence, the cost of the paint AVOCADO is $(22 + 17.5)/2 = 19.75$

2. The ratio of RED, YELLOW and WHITE is 1:1:2.
3. If cost of AVOCADO paint is ₹19.75. The cost of the CREAM is $(7 \times 15 + 3 \times 75)/10 = ₹18$
 And cost of WASHERDORANGE is ₹18.50.
 Hence CREAM is most profitable.

4 to 6

Let us 1st tabulate the given data:

1	2	3	4	5	6	7
C			B	D	A	G
D			B	C	A	G
D			B	C	G	A
D			B	C	G	A

4. From the given options F is the only possibility.
5. Looking at the options, D and G can sit together, C and F can sit together, B and D can sit together and E and A is the only option which is not possible.
6. E and G is the only possibility.

7 to 8

$G = A - 8$

$O + R = 37$

$J = D + 8$

$A = D + 5$

$A + G = 40$

So, Adding (1) & (4) & equaling to (5)

$= (A - 8) + (D + 5) = 40$

Using (4) we get

$(D + 5 - 5) + (D + 5) = 40$

$D = 19$

So, $A = 24$, $J = 27$, $G = 16$ & $R = 18$

9 and 10

	C1	C2	Supply
Profit	3600	5400	

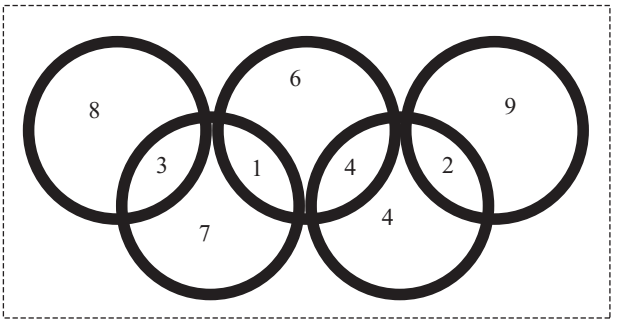
Doors	4	2	20000
Labor	6	10.5	48000
Demand	unlimited		3500

Maximize $3600x_1 + 5400x_2$
 $4x_1 + 2x_2 \leq 20000$
 $6x_1 + 10.5x_2 \leq 48000$
 $x_2 \leq 3500$

9. $C1 = 3800$, $C2 = 2400$.
10. Since there is still unfulfilled demand of C2, hence advt. campaign should not be run.

11 and 12

Following is the diagram:



11. Sum of numbers in each of the circles = 11. Hence option (b) is the answer.
12. $N = 9$. Hence option (a) is the answer.

Chapter

22

ADVANCED EXERCISES

PRACTICE EXERCISE 1

Directions for questions 1 to 2: *Read the following passage and solve the questions based on it.*

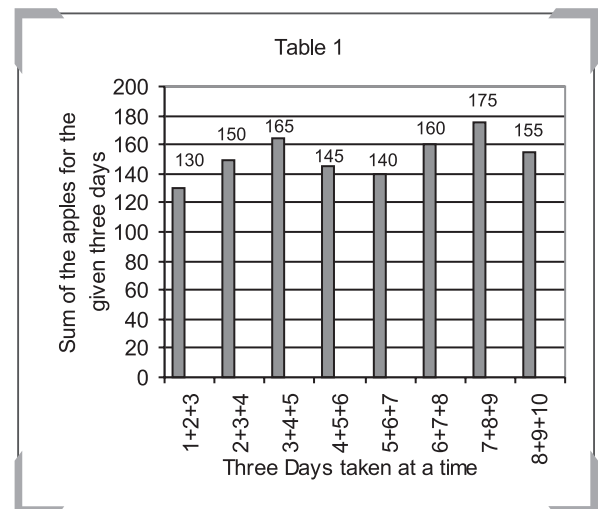
You are the head of a mutual fund, responsible for investing the available money in different funds/securities. From the market trends you find that blue-chip companies and government stocks will generally not do as well as corporate bonds, in the coming year. However, government regulations require that at least one-third of your mutual fund's capital must be in blue-chip stocks and another third in corporate bonds.

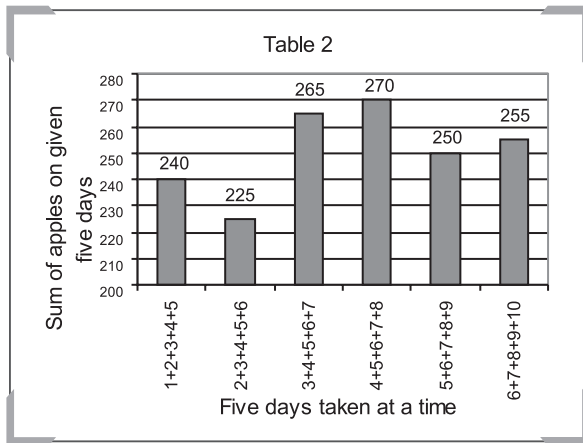
1. Under current regulations, what seems to be the best way for you to invest your funds so as to maximize profit?
 - (a) two third government stocks, one-third blue-chip stocks
 - (b) two third government. stocks, one-third corporate bonds
 - (c) one third government. stocks, two-third corporate bonds
 - (d) one third each of government stocks, blue-chip stocks and corporate bonds
2. If the return on government stocks suddenly goes up by 5%, you would probably:
 - (a) sell blue-chip stocks to buy government stocks.
 - (b) sell corporate bonds to buy government stocks.

- (c) sell both corporate bonds and blue-chip stocks to buy government stocks
- (d) no conclusive action can be taken

Directions for questions 3 to 8: *Read the following passage and solve the questions based on it.*

Munu, an intelligent baby girl, plucks apples from her father's orchard on ten consecutive days. When asked by her mother as to how many apples has she plucked from the orchard daily, she gives the following sheet to her mother:





3. What is the number of apples plucked on day 6?
 - (a) 45
 - (b) 35
 - (c) 25
 - (d) Cannot be determined
4. For how many days, is it possible to determine the exact number of apples plucked by Munu?
 - (a) 0
 - (b) 5
 - (c) 3
 - (d) None of these
5. Disregarding table 2, how many of the following statements are definitely true?
 - I. Number of apples plucked on day 2 is more than the number of apples plucked on day 5.
 - II. Number of apples plucked on day 3 is more than the number of apples plucked on day 5.
 - III. Sum of the apples plucked on day 1 and day 2 is less than the sum of the apples plucked on day 4 and day 5.
 - IV. Sum of the apples plucked on day 2 and day 3 is less than the sum of the apples plucked on day 3 and day 4.
 - (a) 0
 - (b) 1
 - (c) 2
 - (d) 3
6. In the above question, how many of the statements can be verified for being right or wrong (using table 1 only)?
 - (a) 0
 - (b) 1
 - (c) 2
 - (d) 3
7. Disregarding table 2; using how many of the following statements individually can we find the number of apples plucked each day by Munu?
 - I. Total number of apples plucked from day 1 to day 10.
 - II. Sum of the number of apples plucked on all the possible pairs of days.

III. Difference in the number of apples plucked in between all the two consecutive days.

IV. Sum of the number of apples plucked in all the four consecutive day periods.

- (a) 0
- (b) 1
- (c) 2
- (d) 3

8. Disregarding table 1; using how many of the following statements individually can we find the number of apples plucked each day by Munu?

I. Total number of apples plucked from day 1 to day 10.

II. Sum of the number of apples plucked on all the possible pairs of days.

III. Difference in the number of apples plucked in between all the two consecutive days.

IV. Sum of the number of apples plucked in all the four consecutive day periods.

- (a) 0
- (b) 1
- (c) 2
- (d) 3

Directions for questions 9 to 14: Read the following passage and solve the questions based on it.

A company 'Y' is engaged in the manufacturing and selling of instant breakfast food. It has a long standing in the consumer market and has captured a large share of the instant food market. As the company enjoys a long standing, and is quality oriented, it has over the years increased its overhead expenses substantially. However, as it has a large market share, it is surviving with good monetary results. The factory is situated in Jagroaonbad which is very far away from the main consumer market (which are the country's capital town and other bigger towns in the vicinity). This distance from the main consumer market has further attributed to an increased cost of the product, being marketed by company 'Y'.

Another company 'X' has come up a few years back, with its factory situated near Ambalpur, a few kilometers from the main capital town and other bigger towns in the area. The product being manufactured by this company is more or less the same in taste, favour, etc. as that of company 'Y'. In view of its proximity with the consumer market, the transportation cost being incurred by company 'X' is comparatively less. Furthermore, being a new enterprise, it has controlled overhead expenses. With this advantage to its credit, it has priced its product a little less than that of company 'Y' and has it slowly penetrated into the market share of company, 'Y'.

The company 'Y' is now faced with the problem of competing with this new company 'X' without, of

course decreasing the quality of its product. Company 'Y' however, cannot reduce the price of its product that as will lower the image of the company in the market and it will also reduce its profits. In the present state the company cannot afford to do this. The chief executive of the company is now faced with the problem of competing with company 'X' without lowering the market reputation of his company and influencing its profits.

The chief executive has decided to undertake a detailed market survey and study all types of instant breakfast foods being marketed in the country. By examining the competitor's products it was revealed that the product being marketed by company 'Y' was a quick consumption item of the highest quality, having a much longer shelf life as compared to other products available in the market. This product was packed in tin containers which after consumption of the contents became scrap without any resale value. The chief executive therefore, decided upon a pre-project study to go in for some different type of packing. The study revealed that they can either go in for glass jars or flexi-packs, or both. As the product is of a high quality and has a longer shelf life, it can withstand climatic conditions in flexi-packs. This, thereby drastically reduces the expenditure on packaging costs (in tin containers this is nearly 38 percent of the total cost of the product and by going in for flexi-packs, the same can be reduced to nearly 15 percent). The saving made in packaging costs can then be released to the consumers by way of reducing the price of the product. This reduction in price will not lower the image of the company as the price reduction will be given along with the background of regarding the change in packaging.

9. Company 'Y', however, cannot outrightly reduce the price of its product because:
 - I. of the company's policy
 - II. it lowers its image in the market
 - III. it will reduce its profit

(a) I only (b) III only
(c) I and II (d) II and III
10. The selling price of the product manufactured by company 'X' was low because:
 - I. of less transportation costs
 - II. they had less overheads as compared to company 'Y'
 - III. the quantity per unit was less than that of their competitors

(a) I only (b) III only
(c) I and II (d) II and III
11. Why did company 'Y' go for flexi-packs?
 - I. to be in tune with marketing trends
 - II. easy to handle on filling lines
 - III. to save on packaging costs

(a) I only (b) III only
(c) I and II (d) II and III
12. Savings made in cost of packaging
 - I. helped reduce cost of production
 - II. helped reduce selling price
 - III. allow more production

(a) I only (b) III only
(c) I and II (d) II and III
13. Why was company 'Y' selling the same type of product at a rate higher than that of company 'X'?
 - (I) Before company 'X' entered the market, company 'Y' enjoyed a monopoly in the market and took advantage of the same.
 - (II) As company 'Y' had a long standing, its overheads were comparatively higher.
 - (III) Their total cost of production was higher.

(a) I only
(b) III only
(c) I and II
(d) I, II and III
14. The market survey conducted by company 'Y' revealed that their product was a quick consumption item of a higher quality with a longer shelf-life. What was the conclusion drawn from the survey?
 - I. Being a quick consumption item, it can have a cheaper packaging, as the problem of aging will not be there.
 - II. Longer shelf-life shows that the product has durability and therefore can stand for a longer period in the market without changes in the quality of the product.
 - III. Their product enjoyed better reputation than that of company 'X'.

(a) I only
(b) III only
(c) I and II
(d) II and III

Directions for questions 15 to 17: Read the following passage and solve the questions based on it.

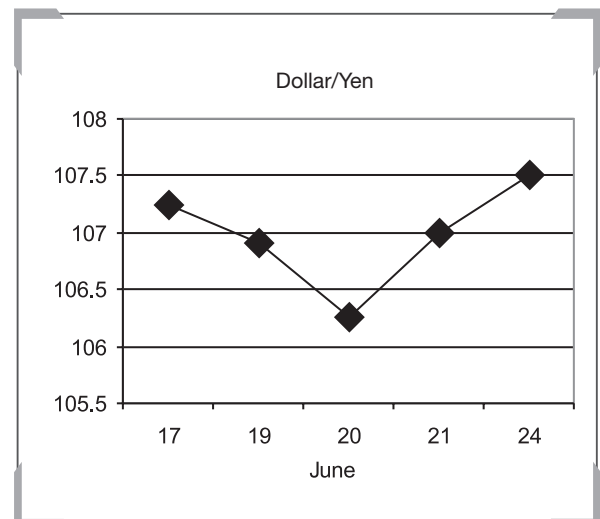
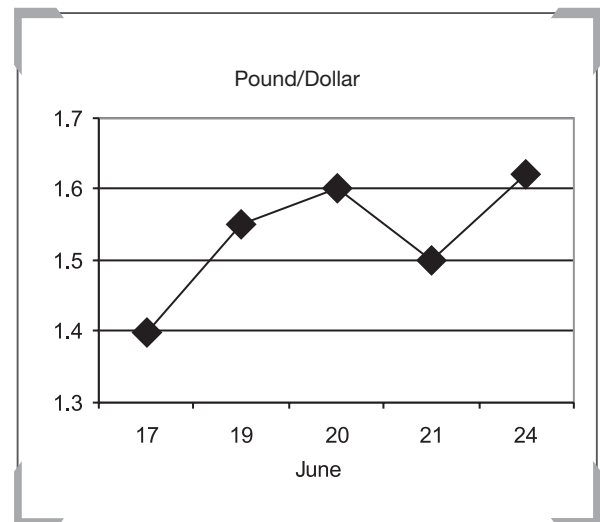
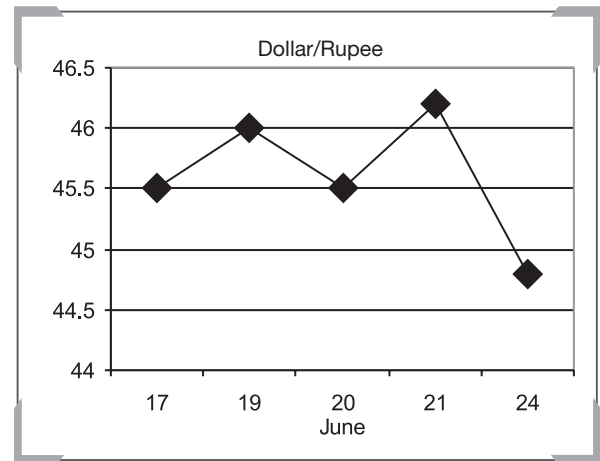
The table below shows the total number of students who enrolled for five marketing courses over the last four years in a B-school. Answer the following questions based on the table.

Courses	1999	2000	2001	2002
Brand Management (BM)	24	29	30	33
Sales Management (SM)	25	30	26	29
Marketing Research (MR)	43	39	38	40
International Marketing (IM)	29	33	34	32
Consumer Behaviour (CB)	21	19	23	24

15. If it is mandated that a student who wishes to enroll for BM or CB has to take MR, then which of the followings statements is necessarily true?
- In 1999, only one student must have enrolled for both BM and CB.
 - In 2001, not more than 7 students could have enrolled both for BM and CB.
 - In 2000, at least 9 students must have enrolled for both BM and CB.
 - In 2002, not more than 5 students could have enrolled both for BM and CB.
16. It is mandated that those who enroll for IM should take SM or CB. Then, which of the statements is necessarily true?
- In 1999, the number of students who enrolled for SM, CB and IM is at least 4.
 - In 2000, the number of students who enrolled for IM and CB and not SN is not more than 10.
 - If at least four students who took IM and SM also took CB, then the maximum number of students who took CB but not IM is 17.
 - In 2002, the number of students who enrolled for SM, CB and IM is at least 3.
17. If the rules of this school prescribe that a student should take 3 and not more than 3 marketing area courses to specialize in the marketing stream, which of the following statements cannot be true?
- In 1999, all those who took CB also took BM and MR.
 - In 2000, all those who took BM also took SM and IM.
 - In 2001, all those who took BM also took SM and IM.
 - all the above

Directions for questions 18 to 21: Refer to the following line charts and solve the questions based on it:

The following line charts show the currency ratio from 17th June to 24th June:



18. On 19th June how much Yen would ₹8000 amount to?
 (a) 18600 (b) 19970
 (c) 20200 (d) 17200
19. If the Dollar/Yen ratio follows the same trend from 24th to 27th as from 21st to 24th, then what will be the value of \$ 50 on 27th June?
 (a) ₹2000 (b) ₹5400 Yen
 (c) 6000 Yen (d) ₹3000
20. A jacket costs \$ 400. Mohan has ₹18,200, £ 225 and ₹ 35000 with him. If he can use only one currency to buy the jacket, he would be able to buy the jacket on 20th June using:
 (a) ₹18,200 (b) £225
 (c) ₹ 35000 (d) Cannot be determined
21. On 15th June the Dollar/Rupee ratio was 46.5. On that day ₹5000 would fetch _____ Pounds.
 (a) 80.06 (b) 71.68
 (c) 74.15 (d) Cannot be determined

Directions for questions 22 to 25: Read refer to the following table and solve the questions based on it.

The following table shows the highest and the average marks obtained by students in subjects over the years.

The maximum mark in each subject is 100.

22. What were the grand average marks of the five subjects in 1996?
 (a) 63 (b) 64
 (c) 65 (d) 68
23. The difference in the average marks in History between 1994 and 1995 was exactly equal to the

difference in the highest marks in Hindi between which of the following pair of years?

- (a) 1992 and 1995 (b) 1993 and 1995
 (c) 1992 and 1996 (d) none of these
24. What was the approximate percentage increase in average marks in history from 1992 and 1993?
 (a) 20% (b) 25%
 (c) 24% (d) 16%
25. The average highest marks in English in 1992, 1993 and 1996 were exactly equal to the highest marks in Hindi in which of the following years?
 (a) 1996 (b) 1997
 (c) 1994 (d) 1993

SUBJECTS

	English		Hindi		Maths		Sciences		History	
	High	Avg	High	Avg	High	Avg	High	Avg	High	Avg
1992	85	62	75	52	98	65	88	72	72	46
1993	80	70	80	53	94	60	89	70	65	55
1994	82	65	77	54	85	62	95	64	66	58
1995	71	56	84	64	92	68	97	68	68	49
1996	75	52	82	66	91	64	92	75	70	58
1997	82	66	81	57	89	66	98	72	74	62

ANSWER KEYS

1. (d) 2. (a) 3. (b) 4. (d) 5. (b) 6. (c) 7. (b) 8. (c) 9. (d) 10. (c)
 11. (b) 12. (c) 13. (b) 14. (c) 15. (c) 16. (a) 17. (b) 18. (a) 19. (b) 20. (a)
 21. (d) 22. (a) 23. (a) 24. (a) 25. (d)

HINTS AND EXPLANATIONS

1. Among all 4 options, only (d) is feasible as all other deviates the conditions given for mutual fund portfolio.
2. As blue chip is not giving good results as compared to corporate bond & so it is better to sell blue chips & buy government bonds.
3. Do $(1 + 2 + 3) + (4 + 5 + 6)$ in table 1 and then subtract $(1 + 2 + 3 + 4 + 5)$ from it. Therefore, the correct answer is option (b) 35 apples.
4. We can find it out for all the days starting from day 1. See the solution of Q 3. For example for the 1st day: $(1 + 2 + 3) + (4 + 5 + 6)$ from 1st table = $130 + 145 = 275$.

$(2 + 3 + 4 + 5 + 6)$ from table 2 = 225

So, 1st day = $275 - 225 = 50$ & similarly for any other case too we can find.

5. Only statement III is correct. To find the veracity of statement III, compare $(1 + 2 + 3)$ with $(3 + 4 + 5)$
6. Only statement I and statement III can be verified.
7. Only statement II and III can give us the solution.
9. It is clearly given that company 'Y' cannot reduce the price as it lowers the image and reduces its profit also. Therefore, option (d) is the correct answer.
10. Transportation cost of company 'X' is comparatively less. Besides being a new entrant, it has kept its overhead expenses low. Therefore, option (c) is the correct answer.
11. Flexi-packs reduce the cost of packaging. Therefore, option (b) is the correct answer.
12. The savings made can be trickled down to the customers by way of reducing the price of the product. Therefore, option (c) is the correct answer.
13. Neither statement I nor II can be verified. However, statement III is mentioned very clearly. Therefore, option (b) is the correct answer.
14. Only statement I and II can be verified. It is given that quality of product 'Y' was better than all others, but it cannot be concluded from here that it enjoyed better reputation than company 'X'. Therefore, option (c) is the correct answer.
15. $(29 + 19) - 39 = 9$. Hence in 2000, at least 9 students must have enrolled for both BM and CM courses.
16. In 1999, difference of students in IM and SM = $29 - 25$
In SM and CB = $25 - 21 = 4$
Hence, at least 4 students enrolled for SM, CB and IM.

17. Since, in 2001, number of students in BM > number of students in SM

18 to 21

18. ₹8000 can be changed to Yen by 1st converting ₹ to Dollar & then Dollar to Yen

$$46 \text{ ₹} = 1 \text{ \$}$$

$$8000 \text{ ₹} = \frac{1}{46} \text{ \$}$$

$$1 \text{ \$} = 106.75 \text{ Yen}$$

$$8000 \text{ ₹} = \frac{1}{46} \times 8000 \times 106.75 \text{ Yen} = 18600 \text{ Yen}$$

19. If Dollar/Yen ratio follows same trend from 24th to 27th, then Dollar/Yen = 108

$$\text{So, } 1 \text{ \$} = 108 \text{ Yen}$$

$$50 \text{ \$} = 50 \times 108 \text{ Yen} = 5400 \text{ Yen}$$

20. Converting all amounts to Dollar

$$18200 \text{ ₹} = 18200/45.5 \text{ \$} = 400 \text{ \$}$$

$$225 \text{ £} = 225 \times 1.6 \text{ \$} = 360 \text{ \$}$$

$$35,000 \text{ Yen} = 35000/106.25 \text{ \$} = 329.4 \text{ \$}$$

So, ₹18,200 can be used to buy the Jacket.

21. We can convert ₹ to \$ but not in £. We need ratio for ₹ & £ or \$ & £ to solve it. So, it cannot be determined.

$$22. \text{ Average} = \frac{52 + 66 + 64 + 75 + 58}{5} = \frac{315}{5} = 63$$

23. The difference is 9. Therefore the correct answer is option (a)

$$24. \text{ Percentage Increase} = \frac{55 - 46}{46} \times 100 = 20\%$$

25. Average highest marks

$$\frac{85 + 80 + 75}{3} = \frac{240}{3} = 80$$

Therefore the correct answer is option (d)

PRACTICE EXERCISE 2

Directions for questions 1 to 4: Refer to the following table and solve the questions based on it.

Table A
Manpower Costs for a Building Project in Narhi (All costs in ₹)

Project Phase	Managers	Engineers	Skilled Workers	Unskilled Workers	Supervisors
Design	1	3	--	--	--
Foundation	1	2	5	23	2
Construction	1	2	12	43	4
Finishing (Internal)	1	3	15	31	6
Painting	1	0	5	23	3

Table B
Cost per month for Select Category of Workers

Manpower	Cost (in ₹)
Managers	10,000
Engineers	8,000
Supervisors	5,000
Skilled Workers	3,000
Unskilled Workers	1,800

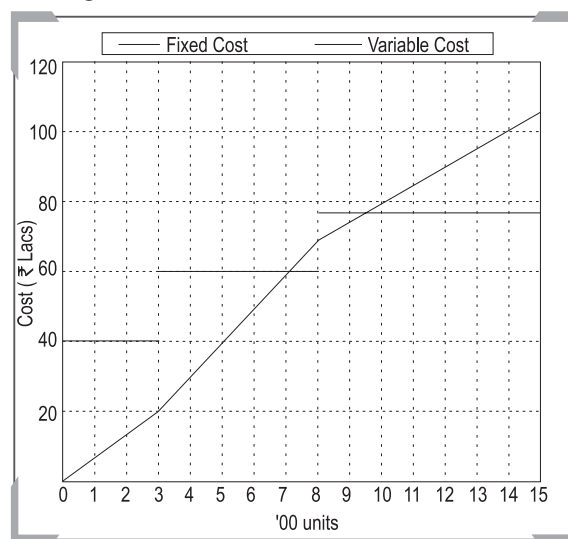
Table C
Estimated Time and the Actual Time Required for Each Phase of the Project in Months

	Design	Foundation	Construction	Finishing	Painting
Actual	5	3	8	4	2
Estimated	3	2	6	3	2

- In which phase there was the highest absolute increase between the estimated and the actual cost?
(a) Foundation (b) Design
(c) Construction (d) Cannot be determined
- For which phase of the project was the highest percentage increase in cost (as compared to the estimated cost)?
(a) Foundation (b) Design
(c) Construction (d) Cannot be determined
- What is the approximate value of the percentage overflow in costs during construction?
(a) 50% (b) 33%
(c) 66% (d) None of these
- If internal finishing and painting can be started simultaneously at the end of construction, then what is the overflow of the project as a percentage of the estimated total time for completion of the project?
(a) 1.27% (b) 33%
(c) 42% (d) Cannot be determined

Directions for questions 5 to 9: Read the following passage and solve the questions based on it.

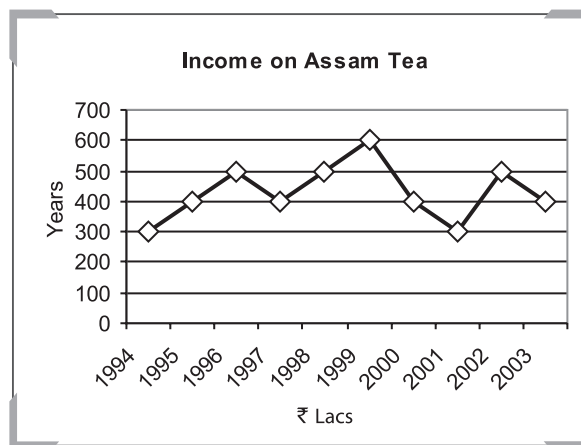
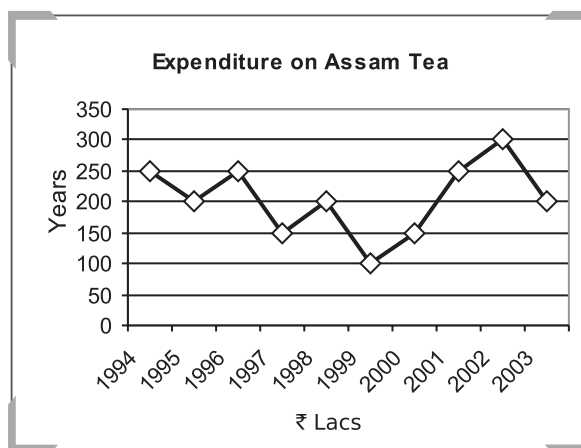
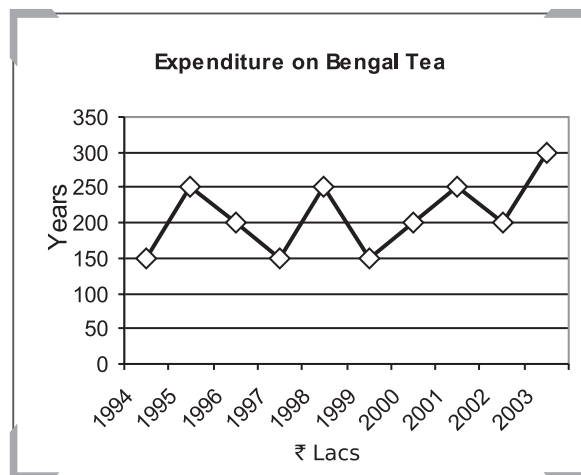
The following graph shows the variation in the variable and fixed cost of production of a TV. The fixed cost remains fixed in that particular slab and the variable cost varies according to the units produced. It can be seen that the fixed cost remains fixed for the first 300 units, then for the next 500 units and then, for any higher level of units produced. The total production cost is equivalent to the sum of the variable and the fixed cost. It is to be assumed that there is no other cost involved in producing the TVs.

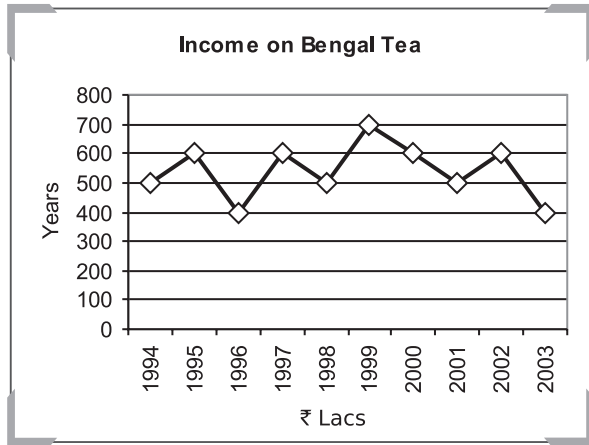


5. At a production level of 500 TVs, the selling price per unit is such that there is a net profit of 20%. What will be the impact on the net profit if the selling price per unit is reduced by 16.66% and the total number of units produced is increased by 40%?
- it will increase by less than 20% but more than 10%
 - it will increase by less than 30% but more than 20%
 - it will decrease by less than 15% but more than 5%
 - none of these
6. For production levels of less than 1500 units, the variation of the average cost of production per unit has the following relationship with the volume of production:
- decreases uniformly
 - increases uniformly
 - decreases, then increases and then increases again
 - None of these
7. The highest production cost per unit will be observed at the following level of production:
- 0 – 100
 - 300 – 400
 - 800 – 900
 - 1400 – 1500
8. What should be the selling price per unit (in ₹) To achieve a break-even if the total number of units produced is 1000?
- 12500
 - 15500
 - 17500
 - cannot be determined
9. What is the approximate additional cost for producing a TV after 920 units have been produced?
- 4000
 - 5000
 - 6000
 - 7500

Directions for questions 10 to 14: Refer to the following line charts and solve the questions based on them.

The line charts given below give the expenditure and income of Tata Tea which produces and sells only two variants of its tea—Assam tea and Bengal tea.



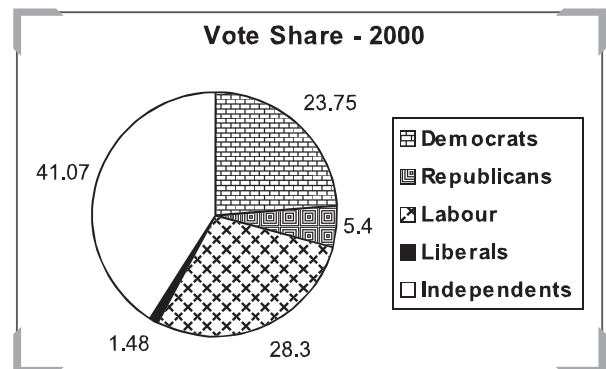
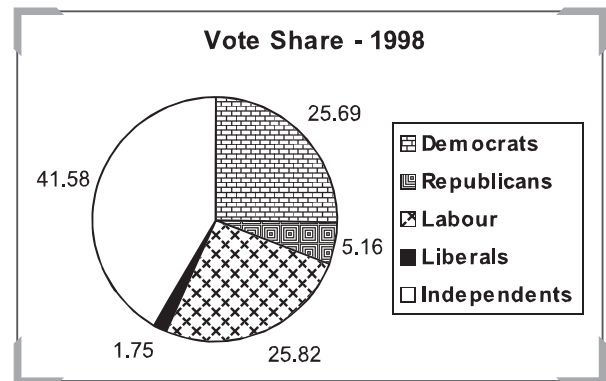
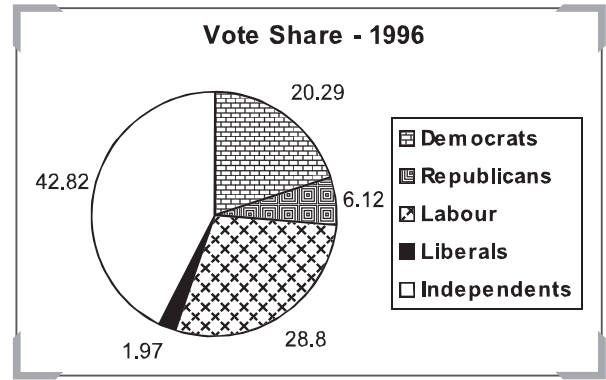


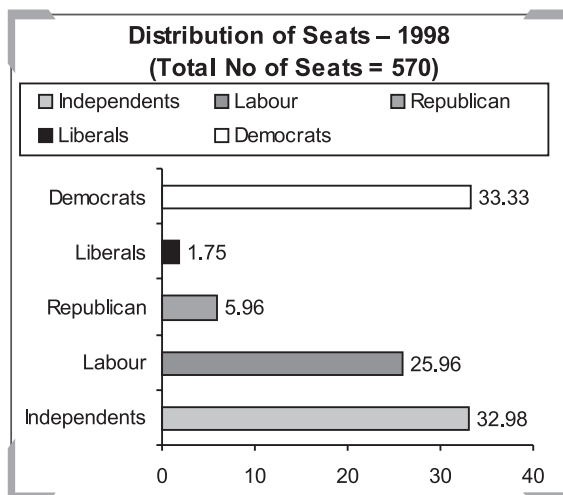
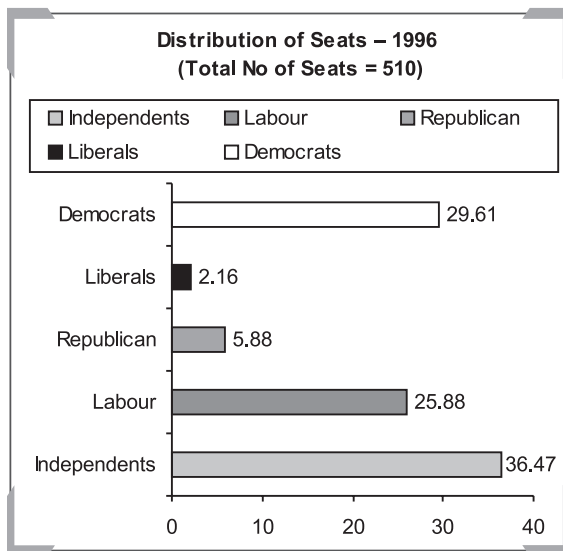
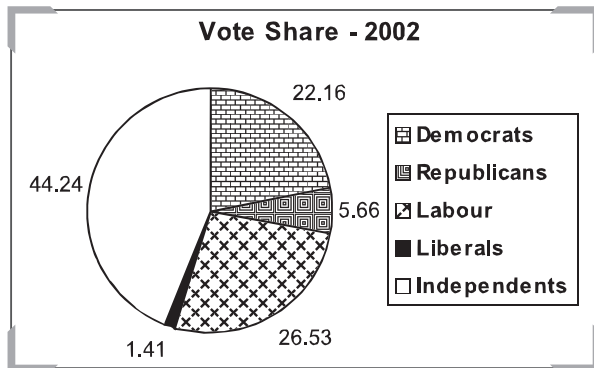
$$\text{Profit} = \text{Income} - \text{Expenditure}$$

10. In which of the following years, is the total profit of Tata Tea the highest?
- (a) 1997
(b) 1999
(c) 2002
(d) 1994
11. For how many years during the period 1995 to 2003, for at least one of the two teas did the income and expenditure not follow the same trend, i.e., both of them did not decrease or did not increase together over the previous year?
- (a) 5
(b) 7
(c) 8
(d) 9
12. In which of the following years was the percentage increase in the income of Bengal Tea over the previous year, the highest?
- (a) 1995
(b) 1997
(c) 1999
(d) 2002
13. For how many years during from 1995 to 2003, was there a growth in income compared to that of the previous year but there is a decrease in the income from the year to the next year for each of the two teas?
- (a) 1
(b) 2
(c) 3
(d) 4
14. In which of the following years during 1995 to 2003, did the profit of Assam Tea decrease by the maximum amount when compared to that of the previous year?

- (a) 1999
(b) 2000
(c) 2001
(d) 2003

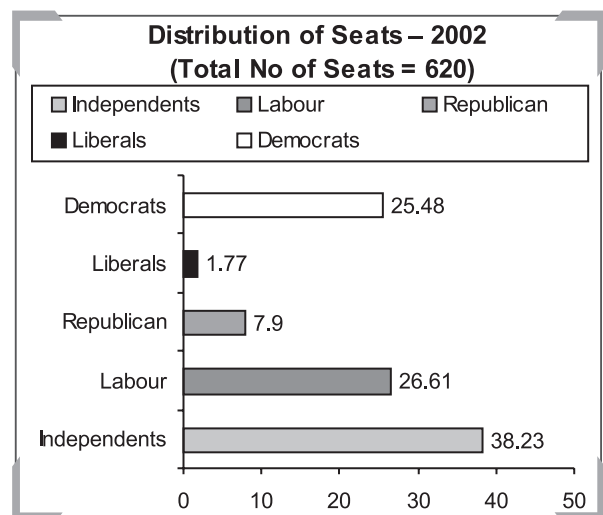
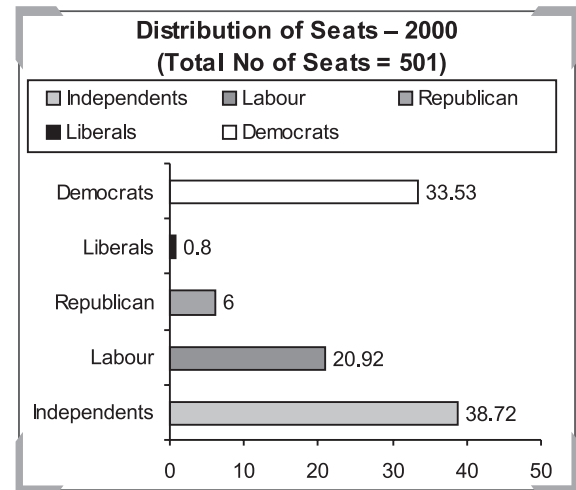
Directions for questions 15 to 18: Refer to the following graphs and solve the questions based on them.





The given graphs show the vote share and distribution of seats of different parties in the election years during the period 1996-2002. Study the graphs and answer the questions, taking into account the following:

- (i) Independents may be considered as a separate party



15. How many of the following statements are correct?
- I. In terms of vote share, Labour and Liberal parties taken together lost 3.2 percent in 1998 but gained a total of 16 seats in the same period.

II. Democrats, Republicans and 35% of the Independents could have formed the government only in two election years.

III. No party increased its vote share in every succeeding election.

IV. In the 2000 elections, as compared to the 1996 elections, Republicans and Democrats taken together, gained more in terms of vote share than in terms of percentage of seats.

- (a) 0 (b) 1
(c) 2 (d) 3

16. How many of the following statements are incorrect?

I. In the year 2002, in terms of percentage of seats obtained, Democrats and Labour together lost the maximum.

II. Liberals and Republicans taken together lost both in terms of vote share and the number of seats obtained in the year 2000.

III. In the 2000 elections, all the parties lost in terms of number of seats.

IV. The highest gain in the number of seats for Labour was in the year 2002.

- (a) 0 (b) 1
(c) 2 (d) 3

17. How many of the following statements are correct?

I. Democrats and Labour together improved their vote share by a larger margin in 1998 over 1996 as compared to the one in 2002 over 1996.

II. The number of seats lost by the Democrats in the 2002 elections was less than the number of seats gained by the Republicans in the same year.

III. In 2002, the Independents gained the most, both in terms of vote share and the number of seats obtained.

IV. If 70% of the Independents had joined Labour, they could have formed a government in 2002 but not in 1996.

- (a) 0 (b) 1
(c) 2 (d) 3

Directions for questions 18 to 22: Refer to the following table and answer the questions based on it.

Unless otherwise stated, all changes (increases, decreases) indicated in the questions must be calculated over the immediately preceding year.

18. Which of the following statements is not correct?

(a) Wipro's share in the total sales of the electronic sector was lower than the share of Tata Steel in the total sales of the iron and steel sector in each of the given years.

(b) From the group consisting of the textiles and the iron and steel sector, there were five companies whose salaries and wages as a percentage of the total salaries and wages of their respective sectors increased in 2007 as compared to 2005.

(c) Tata Steel's R & D expenditure in each of the given years as a percentage of the sales was lower than that of the iron and steel sector as a whole.

(d) From the group consisting of the pharmaceutical and the electronic sectors, there were five companies which experienced a decline in the growth rate of sales in 2007.

19. In this question, a few statements given is/are right and a few statements is/are wrong. What is the ratio of the right to the wrong among the following statements?

(₹crores)

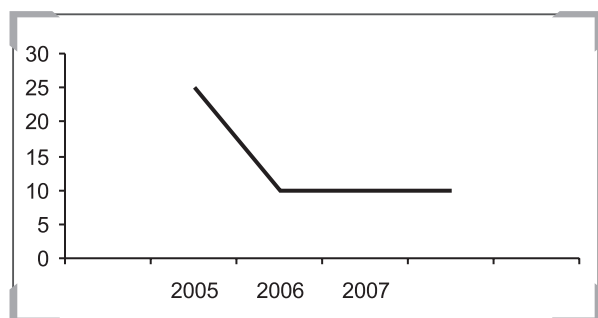
Sector/Companies	Sales			Salaries and Wages			R & D			Profit/Loss		
	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007
Textiles (Total)	53145	50184	52616	4296	4360	4315	26	36	39	−3770	−3437	−2441
Indo Rama Synthetics Ltd	2000	1953	2224	48	50	33	0	0	0	19	41	138
Arvind Mills Ltd	1970	740	1552	136	46	102	0	0	0	−499	20	129
Raymond Ltd	1477	992	1035	160	167	168	0	0	1	332	88	90
Century Enka Ltd	960	892	946	32	34	35	0	0	1	70	35	58

Sector/Companies	Sales			Salaries and Wages			R & D			Profit/Loss		
	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007
Pharmaceuticals (Total)	25245	30273	34731	2009	2291	2716	538	820	993	1758	2586	3069
Ranboxy Laboratory Ltd	2363	3461	4243	167	197	255	77	192	276	262	478	795
Dr Reddy's Laboratories Ltd	991	1712	1705	83	121	137	42	102	163	144	460	392
Cipla Ltd	1064	1401	1573	50	63	73	41	47	0	179	208	248
Glaxosmithkline Ltd	1143	1197	1242	139	139	139	4	4	4	49	98	172
Electronic (Total)	26944	29323	30022	2164	2218	2323	200	263	247	830	692	-287
Infosys Technologies Ltd	1901	2604	3623	718	1119	1678	17	15	14	629	808	958
Videocon International Ltd	3244	4974	3602	43	63	53	0	0	0	155	156	-100
Bharat Electronic Ltd	1722	1947	2517	394	364	368	89	90	109	155	200	261
Iron and Steel (Total)	54396	55582	70341	5367	5643	6377	73	64	74	-2983	-4604	310
Steel Authority of India Ltd	17320	16624	20665	3135	3255	3728	52	50	55	-729	-1707	-304
Tata Steel Ltd	8491	8277	10517	922	1099	1218	10	8	16	553	205	1012
Rashtriya Ispat Nigam Ltd	3585	4200	5187	408	376	407	0	3	0	-291	-75	521
Ispat Industries Ltd	3217	2812	4658	45	40	9	9	0	0	-312	-443	83

- I. Total salaries wages for 2005-2007 as a percentage of the total sales of the same period had been the highest for the iron and steel sector.
 - II. In the year 2007, if all the companies were ranked in a descending order in terms of salaries and wages as a percentage of sales; Videocon International would have been ranked the lowest.
 - III. In the year 2006, if all the companies were ranked in a descending order in terms of R&D as a percentage of sales; Bharat Electronics Limited would have been ranked third.
 - IV. Of all the companies that made profits every year during 2005-2007, Wipro registered the highest growth in profits for the given period.
- (a) 3:1
(b) 1:1

- (c) 1:3
(d) All the statements are correct
20. How many of the statements given below is/are correct?
- I. Salaries and wages of each company in the iron and steel sector were up to 13 times its losses reported in each of the loss-making years.
 - II. Total salaries and wages during 2005-2007 as a percentage of the total sales in the same period was minimum for the pharmaceutical sector.
 - III. Total salaries and wages during 2005-2007 as a percentage of the total sales in the same period for only two companies exceeded 20 per cent.
 - IV. Total profits/Total sales for all the four sectors taken together was higher in 2006 than in 2005.
- (a) 0
(b) 1
(c) 2
(d) 3

21. Which of the following statements is incorrect?
- Cipla experienced the highest percentage decline in its R&D expenditure in any single year during the given period.
 - Of all companies which incurred R&D expenditure every year during 2005-2007, the total R&D expenditure/total sales was the highest for Dr Reddy's Laboratories.
 - During 2005-2007, in terms of sales growth, the best performer in the pharmaceutical sector fared better than the best performer in the iron and steel sector.
 - Videocon International Ltd experienced the second largest percentage decline in salaries and wages in any single year during the given period.
22. How many of the situations described in the options below, when plotted closely resemble the figure?



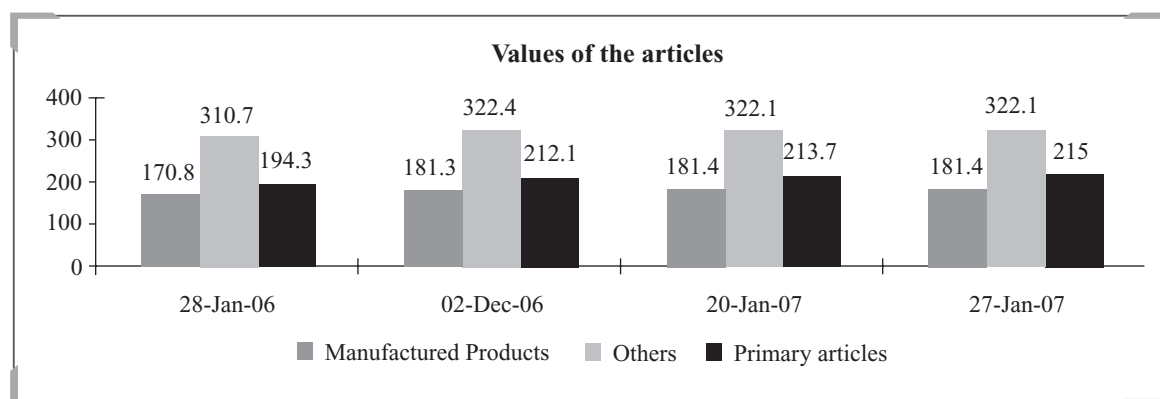
- Raymond Limited's share in the total sales of the textile sector
 - Tata Steel's share in the total sales of the iron and steel sector
 - Glaxo Smithkline Ltd's salaries and wages as a percentage of sales
 - Raymond Limited's profit as a percentage of sales
- 1
 - 2
 - 3
 - 4

Directions for questions 23 to 25: Go through the graphs below and solve the questions based on it.

Inflation is calculated on the basis of the wholesale price index. This index contains three groups of articles— Manufactured products, Primary articles and Others.

Following table represents the weightage of these three groups while calculating the inflation:

	Manufactured Products	Primary Articles	Others
Weightage	63.75%	22.02%	14.23%



23. What is the rate of inflation on 20th Jan 07 over the previous given day?
- 5.21%
 - 6.11%
 - 6.91%
 - 7.81%
24. What is the rate of inflation on 27th Jan 07 over the previous given day?
- 5.12%
 - 6%
 - 6.58%
 - cannot be determined
25. What is the rate of inflation on 28th Jan 06 over the previous given day?
- 5.12%
 - 2.6%
 - 6.58%
 - 7.91%

ANSWER KEYS

1. (c)	2. (b)	3. (b)	4. (c)	5. (d)	6. (d)	7. (a)	8. (b)	9. (b)	10. (b)
11. (c)	12. (b)	13. (b)	14. (c)	15. (c)	16. (c)	17. (c)	18. (c)	19. (b)	20. (b)
21. (d)	22. (d)	23. (b)	24. (c)	25. (d)					

HINTS AND EXPLANATIONS

1. The highest absolute difference between estimated & actual cost will be maximum for the phase for which manpower & difference between estimated & actual time is maximum among Design, Foundation & Construction. We can observe the manpower requirement in design is too low as compared to Foundation & construction, so it must not be the required answer. Manpower requirement is close between Foundation & Construction. However it is more for construction. The difference between estimated & actual time required for Foundation & Construction are 1 & 2 months. So, it's clear that the absolute difference between estimated & actual cost must be more in Construction phase. Correct option is (c).

We must avoid solving such questions by actual calculations.

2. The percentage increase in actual cost as compared to estimated cost depends only on the percentage increase in estimated time as compared to the actual time.

Percentage increase in estimated time as compared to actual time for Design = $(5 - 3)/3 \times 100\% = 66\%$

Percentage increase in estimated time as compared to actual time for Foundation = $(3 - 2)/2 \times 100\% = 50\%$

Percentage increase in estimated time as compared to actual time for Construction = $(8 - 6)/6 \times 100\% = 33\%$

So, the highest percentage increase in cost is for Design phase of the project. Correct option is (b)

3. The percentage overflow in costs during construction is the percentage increase in the actual time in completion of construction phase as compared to estimated time for it. Percentage increase in estimated time as compared to actual time for Construction = $(8 - 6)/6 \times 100\% = 33\%$. So, correct option is (b)
4. The estimated time for project is sum of estimated time for all 5 phases which is $3 + 2 + 6 + 3 + 2 = 16$

months. The actual time for project is sum of actual time for all 5 phases which is $5 + 3 + 8 + 4 + 2 = 22$ months. But, if internal finishing & painting can be started simultaneously after construction, then actual time = $5 + 3 + 8 + 4 = 20$ (time needed for both internal finishing & painting must be 4) & estimated time = $3 + 2 + 6 + 3 = 14$ (estimated time needed for both internal finishing & painting must be 3).

Percentage increase in estimated time as compared to actual time for Project = $(20 - 14)/14 \times 100\% = 42\%$.

Correct option is (c)

5. For $n = 500$, $CP/\text{unit} = ₹20,000$
 $SP/\text{unit} = ₹24,000$
 $\text{Profit}/\text{unit} = ₹4000$
Hence total profit = ₹20 lacs
Now, if the production is increased by 40%, then the total number of units produced = 7000 units.
 $CP/\text{unit} = ₹120000/7$
 $SP/\text{unit} = ₹24000$
Total profit = ₹20 lacs
So, the net profit will be the same.
Therefore, the correct answer is option (d)
6. It can be calculated that the average cost decreases from 0 to 300 units, then increases for the 301st unit, then decreases till the 800th unit and then increases till the 801st unit and then decreases again. Therefore, the correct answer is option (d)
7. From the solution of Q 6. We can see that option (a) is the correct answer.
8. Total cost of production for 1000 units = 155×105 . Hence, to obtain the break even, the $SP/\text{unit} = ₹15,500$. Therefore option (b) is the correct answer
9. The additional cost of producing each item after 920 items were produced is only the variable cost as fixed cost is constant from 800 to 1500 items produced. The variable cost 800 to 1500 is represented by linear graph with x-axis show 800 to 1500 (items produced) & y-axis show amount from 70 lakh to 105 lakh

So, the additional cost per item produced for this range (i.e. 800 to 1500) & so also for item produced after 920 were produced is the slope of this line showing the variable cost curve.

Required additional cost = $(105 \text{ lakh} - 70 \text{ lakh}) / (1500 - 800) = ₹35 \text{ lakh} / 700 = ₹5,000$

Correct option is (b)

10 to 14

10. Expenditure for 1997 = 150 lakh + 150 lakh = 300 lakh
Income for 1997 = 400 lakh + 600 lakh = 1000 lakh
Profit for 1997 = Income – Expenditure = 1000 lakh - 300 lakh = ₹700 lakh
Expenditure for 1999 = 150 lakh + 100 lakh = 250 lakh
Income for 1999 = 600 lakh + 700 lakh = 1300 lakh
Profit for 1997 = Income – Expenditure = 1300 lakh - 250 lakh = ₹1050 lakh
Expenditure for 2002 = 200 lakh + 300 lakh = 500 lakh
Income for 2002 = 500 lakh + 600 lakh = 1100 lakh
Profit for 1997 = Income – Expenditure = 1100 lakh - 500 lakh = ₹600 lakh
Expenditure for 1994 = 150 lakh + 250 lakh = 400 lakh
Income for 1994 = 300 lakh + 500 lakh = 800 lakh
Profit for 1997 = Income – Expenditure = 800 lakh - 400 lakh = ₹400 lakh
The total profit of Tata Tea is highest for the year 1999
Correct option is (b)
11. This can be done by observing all the 4 graphs. This happened for all the years leaving just 1995–96. So, it happened for 8 years. Correct option is (c)
12. The percentage increase in income of Bengal Tea in 1995 over past year
 $= (600 - 500) / 500 \times 100 \% = 20\%$
 The percentage increase in income of Bengal Tea in 1997 over past year
 $= (600 - 400) / 400 \times 100 \% = 50\%$
 The percentage increase in income of Bengal Tea in 1999 over past year
 $= (700 - 500) / 500 \times 100 \% = 40\%$
 The percentage increase in income of Bengal Tea in 2002 over past year
 $= (600 - 500) / 500 \times 100 \% = 20\%$

The percentage increase in income of Bengal Tea over the previous year is highest in 1997

Correct option is (b)

13. This can be done by observing the graphs for Income for both the Teas. This happened for 1998–99 & 2001–02. So, correct option is (b)
14. The profit of Assam tea for 1998 & 1999 is ₹300 lakh & ₹500 lakh
So, it increased in 1999
The profit of Assam tea for 1999 & 2000 is ₹500 lakh & ₹250 lakh
So, decrease in 2000 over 1999 = $(250 - 500) / 500 \times 100\% = -50\%$ (–ve show decrease)
The profit of Assam tea for 2000 & 2001 is ₹250 lakh & ₹50 lakh
So, decrease in 2001 over 2000 = $(50 - 250) / 250 \times 100\% = -80\%$ (–ve show decrease)
The profit of Assam tea for 2002 & 2003 is ₹200 lakh & ₹200 lakh
So, it didn't changed in 2003
The decrease in profit of Assam tea over past year is maximum for 2001

15 to 17

15. Statement I: Incorrect
Vote share of Labour and Liberal party taken together in the year 1996 = $28.8 + 1.97 = 30.77$
Vote share of Labour and Liberal party taken together in the year 1998 = $25.82 + 1.75 = 27.57$
 $\therefore$ Loss of vote share = 3.2%
Number of seats won by Labour and Liberal in the year 1996 = 143
Number of seats won by Labour and Liberal in the year 1998 = 158
 $\therefore$ Gain is 15 seats.
Statement II: Correct
Democrats, Republicans and 35% of the Independents could have formed the government in two elections 1998 and 2000.
Statement III: Correct
By observation, we find that no party increased its vote share in every succeeding election.
Statement IV: Incorrect
In 1996, vote share of the Republicans and Democrats = $(20.29 + 6.12) = 26.41\%$
In 2000, vote share of the Republicans and Democrats = $(23.75 + 5.4) = 29.15\%$
In 1996, percentage of seats of the Republicans and Democrats = $(29.61 + 5.88) = 35.49\%$
In 2000, percentage of seats of the Republicans and Democrats = $(33.53 + 6.00) = 39.53\%$.

Difference in the vote share = 2.74%
 Difference in the percentage of the seats = 4.04%
 So, two statements are correct (II & III).

16. Statement I: Incorrect

Percentage of seats obtained by Democrats and Labour together in years 1996, 1998, 2000 and in 2002 were 55.49%, 59.29%, 54.45% and 52.09% respectively. In 2002, they lost only 2.36% but in 2000 elections, they lost 4.84%. Hence, (A) is incorrect.

Statement II: Correct

Vote share of the Liberals and Republicans together in the year 1998 = 6.91%.

Vote share of the Liberals and Republicans together in the year 2000 = 6.88%.

Number of seats obtained by the Liberals and Republicans together in the year 1998 = 44.

Number of seats obtained by the Liberals and Republicans together in the year 2000 = 34.

Statement III: Incorrect

Difference in the number of seats won by Independents in 2000 and 1998 = +6

Difference in the number of seats won by Labour in 2000 and 1998 = -43

Difference in the number of seats won by Republican in 2000 and 1998 = -4

Difference in the number of seats won by Liberals in 2000 and 1998 = -6

Difference in the number of seats won by Democrats in 2000 and 1998 = -22

Statement IV: Correct

Number of seats won by Labour party in the year 1996 = 132

Number of seats won by Labour party in the year 1998 = 148

Number of seats won by Labour party in the year 2000 = 105

Number of seats won by Labour party in the year 2002 = 165.

So, 2 statements are incorrect (I & III)

17. Statement I: Correct

From graphs, we can conclude that the vote share of Democrats and Labour party in 1998 is greater than their combined vote share in 2002.

Statement II: Correct

Number of seats lost by Democrats in 2002 elections = $(33.53 \times 5.01 - 25.48 \times 6.20) = 168 - 158 = 10$

Number of seats gained by the Republicans in 2002 = $(7.9 \times 6.2 - 6 \times 5.01) = 49 - 30 = 19$.

Statement III: Incorrect

Independents gained the most in terms of vote share but in terms of the number of seats, labour gained the most over the 2000 election as they increased their seats from 105 in 2000 election to 165 in 2002 election.

Statement IV: Incorrect.

In the year 2002 as well as in the year 1996, 70% of Independents and Labour are eligible to form the Government as their share in the seats won is greater than 50% in each of the years.

So, 2 statements are correct (I & II)

18 to 22

22.

Statement	2005	2006	2007
I (Raymond Ltd share in total sales of textile sector)	2.78%	1.98%	1.96%
II (Tata Steel share in total sales of Iron & Steel sector)	15.61%	14.89%	14.95%
III (Glaxo Smithkline Ltd Salaries & wages as % of sales)	12.16%	11.61%	11.19%
IV (Raymond Ltd share profit as % of sales)	22.47%	8.83%	8.69%

So, if we make graph for these values for I, II, III & IV we get the shape as shown in figure for I & IV only (after change of scale). The shape shown in question can be obtained in values for 2006 & 2007 are almost equal & value for 2005 is greater than them by good margin. Correct option is (b)

23 to 25

WPI (Wholesale Price Index) for 28 Jan, 2006 = $0.6375 \times 170.8 + 0.1423 \times 310.7 + 0.2202 \times 194.3 = 195.88$

WPI (Wholesale Price Index) for 02 Dec, 2006 = $0.6375 \times 181.3 + 0.1423 \times 322.4 + 0.2202 \times 212.1 = 208.16$

WPI (Wholesale Price Index) for 20 Jan, 2007 = $0.6375 \times 181.4 + 0.1423 \times 322.1 + 0.2202 \times 213.7 = 208.53$

WPI (Wholesale Price Index) for 27 Jan, 2007 = $0.6375 \times 181.4 + 0.1423 \times 322.1 + 0.2202 \times 215.0 = 208.82$

25. We are not given any day before 28th Jan, 2006 & so we cannot determine the rate of inflation on 28th Jan, 2006 over its previous given day. So, it cannot be determined. Correct option is (d)

PRACTICE EXERCISE 3

Directions for questions 1 to 4: Refer to the following tables and solve the questions based on them.

Table 1 gives the transportation cost of a product from six factories F1, F2, F3, F4, F5 and F6 to five warehouses W1, W2, W3, W4 and W5.

	W1	W2	W3	W4	W5
F1	60	25	45	40	80
F2	85	40	45	60	75
F3	80	20	45	50	90
F4	90	40	55	25	70
F5	95	20	40	45	80
F6	85	35	50	50	75

Table 2 gives the transportation cost of the same product from five warehouses W1, W2, W3, W4 and W5 to six retailers R1, R2, R3, R4, R5 and R6.

	R1	R2	R3	R4	R5	R6
W1	40	20	40	30	85	25
W2	50	50	45	60	70	30
W3	20	10	50	50	80	35
W4	40	30	45	40	90	40
W5	50	30	50	40	70	30

- What is the minimum transportation cost incurred in transferring the product from any factory to any retailer?
(a) ₹45 (b) ₹50
(c) ₹55 (d) ₹60
- What is the maximum transportation cost incurred in transferring the product from any factory to any retailer?
(a) ₹175 (b) ₹180
(c) ₹170 (d) None of these
- What is the minimum transportation cost at which the product can be supplied to R4 from any factory?

- ₹45
- ₹50
- ₹65
- ₹70

- What is the maximum transportation cost at which the product can be supplied to R3 from any factory?
(a) ₹145 (b) ₹150
(c) ₹140 (d) None of these

Directions for questions 5 to 10: Answer the questions based on the following information:

In addition to the above tables given, the following table gives the transportation cost incurred for transferring products from different retailers to the five different colonies C1, C2, C3, C4 and C5.

	C1	C2	C3	C4	C5
R1	10	25	10	10	10
R2	15	10	15	10	15
R3	10	20	10	15	10
R4	20	10	15	15	10
R5	15	10	20	20	20
R6	10	15	15	15	15

- What is the minimum transportation cost incurred in transferring the product from any factory to any colony?
(a) ₹45 (b) ₹65
(c) ₹55 (d) none of these
- What is the minimum transportation cost incurred in transferring the product from any factory to the colony C2?
(a) ₹45 (b) ₹60
(c) ₹55 (d) None of these
- What is the maximum transportation cost incurred in transferring the product from any factory to the colony C5?
(a) ₹175 (b) ₹180
(c) ₹185 (d) None of these
- If one unit produced in each of the factories is to be sent to each of the colonies, then what will be the total transportation cost incurred?
(a) ₹1705 (b) ₹1980
(c) ₹2185 (d) None of these

9. $F_i W_j R_k C_l$ represents that the product has moved in this cycle – Factory i to Warehouse j to Retailer k to Colony l . If $i = 2$ and $k = 2$, then what is the sum of $(j + l)$ for the lowest transportation cost incurred in one product transferred from $i = 2$ to any of the colonies?
- (a) 4 (b) 5
(c) 7 (d) Cannot be determined
10. In the above question, if $j = 2$, then how many different value/s of $(i + k + l)$ is/are possible for the lowest transportation cost incurred in one product transferred from any of the factories to any of the colonies?
- (a) 1 (b) 2
(c) 3 (d) Cannot be determined

Directions for questions 11 to 15: Refer to the following table and solve the questions based on it.

Given below are the forecasts of the world and Asian energy demand for the years 1991, 2001 and 2011. The demand is given in million barrels per day, crude oil equivalent.

	1991		2001		2011	
	World	Asia	World	Asia	World	Asia
Petrol	50.0	4.0	70.0	10.0	80.0	15.0
Naphtha	30.0	0.5	40.0	2.5	50.0	5.0
Solid Fuels	50.0	4.0	60.0	5.0	75.0	10.0
Nuclear Fuel	10.0	0.5	20.0	1.0	25.0	1.3
Hydro Energy	10.0	1.0	10.0	1.5	20.0	2.0
Total	150.0	10.0	200.0	20.0	250.0	33.3

11. What can be inferred from the given table?
- (a) Percentage increase in the number of petrol using vehicles/agents has increased in Asia rather than the world, in the decade 1991-2001.
(b) Exploration of Naphtha is low in Asia as compared to the exploration of Naphtha in the world throughout the period.
(c) Both (a) and (b)
(d) None of these
12. During 1991-2011, which two fuels meet more than 60% of the total energy demand of both the world and Asia?

- (a) Petrol and Naphtha
(b) Petrol and Solid fuels
(c) Naphtha and Solid fuels
(d) None of these

13. Which fuel's proportion in the total energy demand increases over the decade 1991-2001 and decreases over the decade 2001-2011 for both the world and Asia?
- (a) Petrol (b) Naphtha
(c) Solid fuels (d) Nuclear fuel
14. In Asia for which fuel does the proportion in the total energy demand decrease continuously over the period 1991-2011?
- (a) Naphtha (b) Solids fuels
(c) Nuclear fuel (d) Hydro energy
15. For which fuel does the proportion in the total energy demand of the world remain constant over the period 1991-2011; but its proportion increases in the total energy demand in Asia?
- (a) Solid fuels (b) Nuclear fuel
(c) Hydro energy (d) Naphtha

Directions for questions 16 to 20: Refer to the following table and solve the questions based on it.

The following table gives some incomplete information on the marks obtained by four persons Amit, Binit, Charu and Dilip in four different subjects.

	Physics	Chemistry	Maths	English	Total
Amit	80	70	—	80	—
Binit	60	—	60	—	—
Charu	—	—	60	—	220
Dilip	90	—	70	60	—

- (i) Amit's average marks were 72.5, in all the four subjects.
(ii) The average marks in Physics for all four persons were 67.5.
(iii) Binit's average marks for all four subjects were 1.5 times of Charu's marks in Physics.
(iv) Binit and Dilip scored the same marks in English. The average English marks were the same as the average Physics marks.
(v) The total marks in Chemistry were 10 less than the total marks in Physics for all four persons.

16. Who scored the lowest total?
 (a) Amit (b) Binit
 (c) Charu (d) Dilip
17. The approximate average marks for all four persons (for all the four subjects) are
 (a) 65.625 (b) 81.225
 (c) 99.5 (d) 105.6
18. Who is the highest scorer in Chemistry?
 (a) Amit (b) Binit
 (c) Charu (d) Dilip
19. Who is the lowest scorer in Physics?
 (a) Amit (b) Binit
 (c) Charu (d) Dilip
20. Who is the highest scorer in English?
 (a) Amit (b) Binit
 (c) Charu (d) Dilip

Directions for questions 21 to 23: Refer to the following data-set and solve the questions based on it.

The following table gives the price of petrol and diesel in India for the given period.

Date	Petrol Change (+/-)	Diesel Change (+/-)
May 2004	33.70	21.74
16 June 2004	35.71	22.74
1 August 2004	36.81	24.16
5 November 2004	39.00	26.28
16 November 2004	37.84	
1 April 2005 (VAT)	37.99	28.22
5 May 2005 (VAT on diesel)		26.45
21 June 2005	40.49	28.45
7 September 2005	43.49	30.45
1 April 2006	43.51	30.39
5 June 2006	47.51	32.47
June 16, 2006	46.85	32.25

Date	Petrol Change (+/-)	Diesel Change (+/-)
November 30, 2006	44.85	31.25
February 15, 2007	42.85	30.25

21. How many times did the price of petrol increase during the given period?
 (a) 7 (b) 8
 (c) 9 (d) 10
22. How many times did the price of diesel increase during the given period?
 (a) 7 (b) 8
 (c) 9 (d) 10
23. For how many times is the percentage increase in the price of petrol more than the percentage increase in the price of diesel over their respective previous date?
 (a) 4 (b) 5
 (c) 6 (d) 7

Directions for questions 24 to 25: Refer to the following data-set and solve the questions based on it.

REDUCTION IN FUEL PRICES (₹Per Litre)				
Feb 16, 2007	Petrol		Diesel	
	Old	New	Old	New
Delhi	44.85	42.85	31.25	30.25
Mumbai	50.85	48.85	36.11	34.97
Kolkata	48.99	46.91	33.92	32.88
Chennai	49.67	47.51	34.41	33.22

24. In which city out of the given four cities has the price of petrol decreased by the maximum percentage?
 (a) Delhi (b) Mumbai
 (c) Kolkata (d) Chennai

25. In which city out of the given four cities has the price of diesel decreased by the maximum percentage?
 (a) Delhi (b) Mumbai
 (c) Kolkata (d) Chennai

ANSWER KEYS

1. (b) 2. (b) 3. (c) 4. (c) 5. (b) 6. (b) 7. (d) 8. (d) 9. (d) 10. (d)
 11. (d) 12. (b) 13. (a) 14. (d) 15. (d) 16. (c) 17. (a) 18. (d) 19. (c) 20. (a)
 21. (b) 22. (a) 23. (b) 24. (a) 25. (d)

HINTS AND EXPLANATIONS

1. F3 or F5 to W2 to R6 is the lowest. Therefore, option (b) is the correct answer.
2. F5 to W1 to R5 is the maximum. Therefore, option (b) is the correct answer.
3. F4 to W4 to R4 is the lowest. Therefore, option (c) is the correct answer.
4. F3 to W5 to R3 is the maximum. Therefore, option (c) is the correct answer.
5. F3 to W2 to R2 to C1 is the lowest. Therefore, option (b) is the correct answer.
6. F3 to W2 to R6 to C2 is the minimum. Therefore, option (c) is the correct answer.
7. F5 to W1 to R5 to C5. The lost = $90 + 85 + 20 = 200$
8. There are 6 factories & 5 colonies & so there can be 30 cases. For each case we can have any choice for warehouse & retailers. So, there are many possibilities. So, it cannot be determined.
9. F2 – W3 – R2 – either C2/ C4. Hence two different values are possible. Therefore, option (d) is the correct answer.
10. There can be two values of $i = 3/5$, one value of $j = 2$, one value of $k = 6$ and one value of $l = 1$. Hence, two different sums are possible. Therefore, option (d) is the correct answer.
11. Option (b) is obviously cannot be inferred. Option (a) seems to be probable, but number of vehicles/agents need not be increasing. There can be other reasons also like reduction in the efficiency of the vehicle etc. Therefore option (d) is the correct answer.
- 12.

		1991		200		2011	
		World	Asia	World	Asia	World	Asia
Total energy		150	10	200	20	250	33.3
Naphtha	Value	30	0.5	40	2.5	50	5
	Proportion	20%	5%	20%	12.50%	20%	15.01
Solid fuels	Value	50	4	60	5	75	10
	Proportion	33.30%	40%	30%	25%	30%	30.03
Petrol	Value	50	4	70	10	80	15
	Proportion	33.30%	40%	35%	50%	32%	45.04

Hence, solid fuels and petrol combined constitute more than 60 per cent of the total energy in both the world and Asia for the given period.

13. It can be seen from the table that Petrol is the fuel whose proportion in the total energy demand
- increases during 1991-2001 and decreases during 2001-2011 for both the world and Asia. Therefore option (a) is the correct answer
14. For the answer choices given and for Asia we can make the following table.

		1991	2001	2011
	Total energy	10	20	33
Naphtha	Value	0.5	2.5	5
	Proportion	5%	12.50%	15.15%
Solid Fuels	Value	4	5	10
	Proportion	40%	25%	30.30%
Nuclear Fuel	Value	0.5	1	1.3
	Proportion	5%	5%	3.90%
Hydro Energy	Value	1	1.5	2
	Proportion	10%	7.50%	6.06%

Hence, we can see that the proportion of Hydro Energy goes on decreasing over the given period.

15. For the answer choices given and for the world, we can make the following table.

		1991	2001	2011
	Total energy	150	200	250
Naphtha	Value	30	40	50
	Proportion	20%	20%	20%
Solid Fuels	Value	50	60	75
	Proportion	33%	30%	30%
Nuclear Fuel	Value	10	20	25
	Proportion	6.66%	10%	10%
Hydro Energy	Value	10	10	20
	Proportion	6.66%	5%	8%

Hence, we can see that the proportion of Naphtha remains constant over the given period.

From the given information the following table can be prepared.

16 to 20

Using the given information, the table for the marks obtained by Amit, Binit, Charu & Dilip can be completed as:-

	Physics	Chemistry	Maths	English	Total
Amit	80	70	60	80	290
Binit	60	60	60	60	240
Charu	40	50	60	70	220
Dilip	90	80	70	60	300

21 to 25

Following is the complete list:

Date	Petrol Change (+/-)	Diesel Change (+/-)
May 2004	33.70	21.74
16 June 2004	35.71 +2.01	22.74 (+1.00)
1 August 2004	36.81 +1.10	24.16 (+1.42)
5 November 2004	39.00 +2.19	26.28 +2.12
16 November 2004	37.84 -1.16	
1 April 2005 (VAT)	37.99 + 0.15	28.22 + 1.94
5 May 2005 (VAT on diesel)		26.45 (-1.77)
21 June 2005	40.49 + 2.50	28.45 (+2.00)
7 September 2005	43.49 +3.00	30.45 (+2.00)
1 April 2006	43.51 +0.02	30.47 (+0.02)
5 June 2006	47.51 +4.00	32.47 (+2.00)

16 June 2006	46.85	32.25
	-0.66	(-0.22)
30 November 2006	44.85	31.25
	-2.00	(-1.00)
15 February 2007	42.85	30.25
	-2.00	(-1.00)

21. Petrol prices increased 8 times.

22. Diesel prices increased 7 times.

23. For 5 times, the % increase of petrol was more than that of diesel.

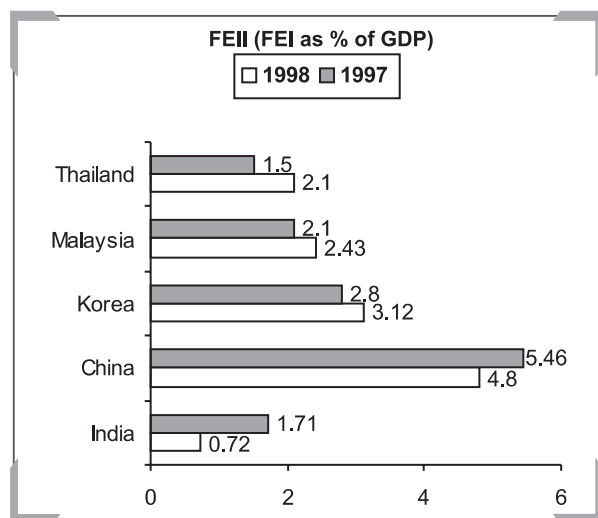
24. By simple observation we can realize in each case the decrease is almost by ₹2. So, the maximum % decrease will be for the city for which price was minimum & that city is Delhi (try to solve without actual calculation).

25. We can observe the maximum absolute change is in Chennai of ₹2.19 which is almost twice as compared to other cities & original prices were very close. So, maximum % decrease is in Chennai. (Try to solve without actual calculation).

PRACTICE EXERCISE 4

Directions for questions 1 to 5: Refer to the following data set and solve the questions based on it.

The following graph gives the data on the foreign equity inflow index (FEII) for five countries during 1997 and 1998. FEII is taken as the ratio of the foreign equity inflow (FEI) to the country's GDP. FEII is expressed as percentage in the graph.



- Which country has shown the maximum percentage change in FEII in 1998 relative to 1997?
 - India
 - China
 - Korea
 - Malaysia
- If China's FEI is 10 times that of India in the year 1998, which of the following is true for 1998?
 - China's GDP is 70% more than India's GDP
 - China's GDP is 40% more than India's GDP
 - China's GDP is 50% more than India's GDP
 - Nothing can be inferred
- If the GDP of India increased by 5%, GDP of China increased by 7% and that of Korea decreased by 2% 1997 to 1998, which of the following is/are true?
 - FEI to China was higher in 1998 than in 1997
 - FEI to China was lower in 1998 than in 1997
 - India's FEI has increased from 1997 to 1998
 - FEI to Korea was lower in 1998 than in 1997
 - Korea's FEI has increased in 1998 from 1997
 - I and III
 - II and V
 - II, III and V
 - All of the above
- Which of the following can be inferred from the given data?
 - China's GDP is more than India's GDP
 - China's GDP is less than India's GDP

- India's GDP is less than Malaysia's GDP
- Nothing can be deduced

- For how many countries has the FEI increased from 1997 to 1998?
 - 1
 - 2
 - 3
 - Indeterminate

Directions for questions 6 to 10: Refer to the following data-set and solve the questions based on it.

The following graph represents the variables, cost of widgets as a function of quality produced. The cost of production has two components, variable cost which is given in the graph, and fixed cost, which is ₹800 for the first shift in which 30 widgets can be produced. If production required is more than 30 then a second shift, which can produce 30 widgets, is started and the fixed cost of the second shift is ₹1200.

Average cost = Total cost/Total number of the widgets

Marginal cost = Change in total cost/Change in number of widgets produced.

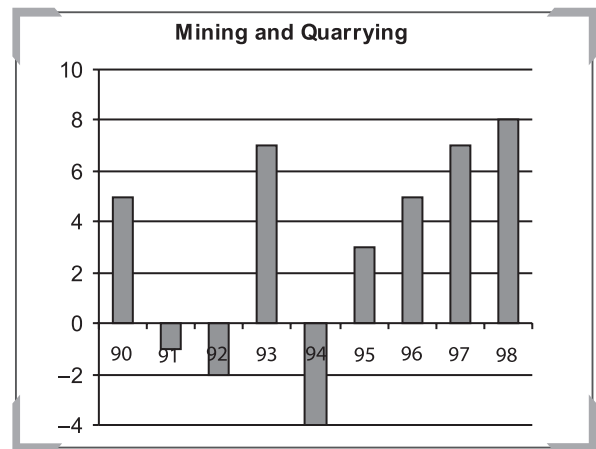
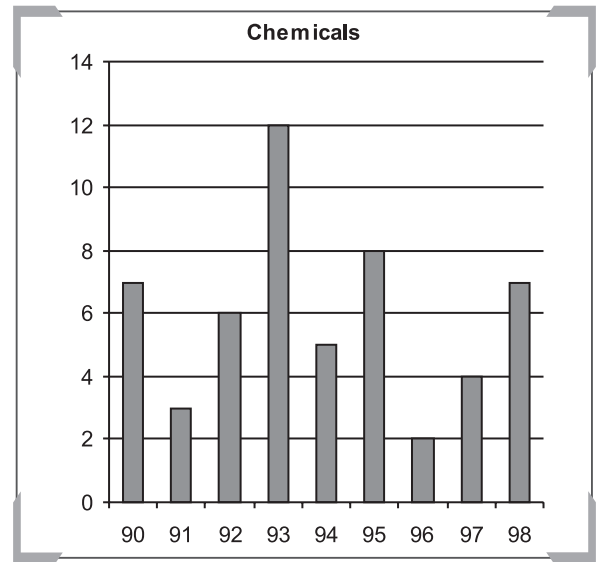
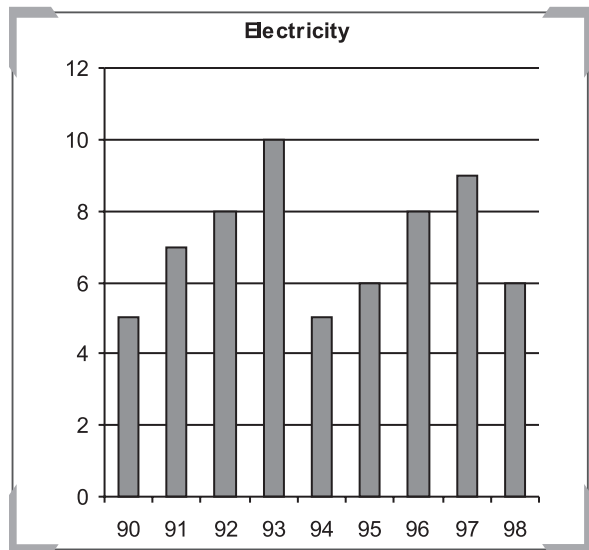
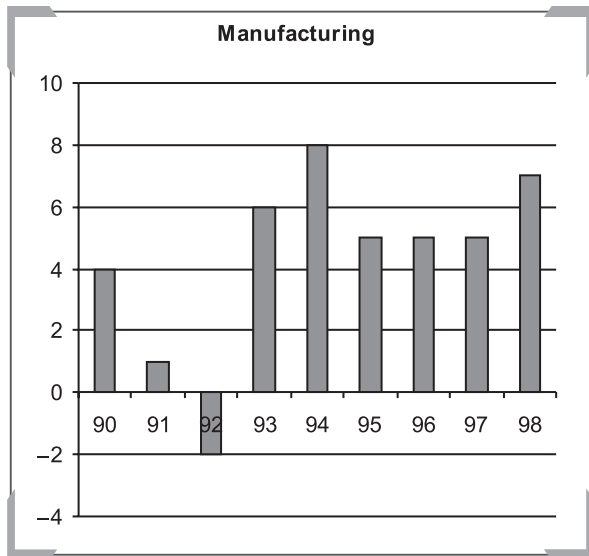
One may assume the variable cost of production to behave linearly between two consecutive points of production shown in the graph.

- What is the appropriate average cost of a widget for a production of 40 widgets?
 - ₹110
 - ₹140
 - ₹360
 - ₹180
- If the number of widgets to be produced increases from 40 to 41, what is the approximate marginal cost?
 - ₹110
 - ₹135
 - ₹175
 - ₹200
- What is the approximate total cost of production for 50 widgets?
 - ₹5100
 - ₹7000
 - ₹6250
 - ₹6000
- If each widget/produced is sold for ₹150, how many widgets give the maximum profit per widget produced amongst the following options? Assume that Profit = Sales revenue – Total cost of production
 - 30
 - 15
 - 25
 - 60
- For a production of less than 60, which of the following is true?
 - the average cost increases consistently
 - the average cost decreases consistently

- (c) the average cost decreases to a minimum and then increases
 (d) the average cost increases to a maximum then decreases

Directions for questions 11 to 17: Refer to the following data-set and solve the questions based on it.

The following graphs provide the data on four industrial sectors in the Republic of Repesia. Manufacturing constitutes 20%, Mining and Quarrying 15%, Electricity 15% and Chemicals 10% of the Republic's total industrial production in 1989. For the period 1990-1998, the graphs give the percentage change in production over the previous year's production. 1989 production values have been assigned an index of 100 for each of the four sectors.



11. What was the average annual growth rate in production for all four sectors combined between 1989 and 1998?
 (a) 1.2% (b) 6%
 (c) 56.6% (d) 104%
12. During the given period, when was the maximum production level in the electricity sector achieved?
 (a) 1989 (b) 1993
 (c) 1995 (d) 1998
13. During the given period, when was the minimum production level in the manufacturing sector achieved?
 (a) 1989 (b) 1990
 (c) 1993 (d) 1998
14. For the given period, which sector showed the highest growth rate?
 (a) Electricity (b) Manufacturing
 (c) Chemical (d) Mining and Quarrying

15. In 1992, the index for the Chemical sector as compared to the index for the Electricity sector was
 (a) greater by 6 (b) less by 5
 (c) greater by 20 (d) less by 20
16. By what percentage was the output of the Manufacturing sector more than that of the Chemical sector in 1991?
 (a) 84% (b) 91%
 (c) 98% (d) Indeterminate
17. When did the maximum percentage change in the production levels of the Mining and Quarrying sector take place?
 (a) 1993-1994 (b) 1992-1993
 (c) 1996-1997 (d) 1997-1998

Directions for questions 18 to 22: Refer to the following data-set and solve the questions based on it.

The following table gives the break-up of the revenue earned by Phistream Private Limited over a period of five years. All figures in the table are in ₹crores.

	1994-95	1995-96	1996-97	1997-98	1998-99
Hardware					
(a) Domestic	68	54	52	66	35
(b) Exports	540	600	730	1770	1827
Software					
(a) Domestic	142	127	150	320	422
(b) Exports	1100	1200	1339	2500	2215
Peripherals	25	10	25	20	37
Training	140	106	160	240	161
Maintenance	21	19	25	92	126
Others	12	10	19	40	24
Total	2048	2126	2500	5048	4847

18. In which years did the hardware exports lie between 35%-40% of the total revenues for Phistream?
 (a) 1997-1998, 1998-1999
 (b) 1998-1999, 1995-1996
 (c) 1997-1998, 1994-1995
 (d) 1995-1996, 1996-1997

19. Which of the following is true?
 (a) The revenues from training consistently increased over the given period
 (b) Hardware exports consistently increased over the given period
 (c) Software exports consistently increased over the given period
 (d) none of the above
20. For how many years during the given period, was the total revenue from Training and maintenance less than 10% of the total revenue for the corresponding years?
 (a) 2 (b) 3
 (c) 4 (d) 5
21. In which of the following years was the revenue from the hardware business more than 50% of that from the software business?
 (a) 1994-1995
 (b) 1995-1996, 1996-1997
 (c) 1997-1998, 1994-1995
 (d) None of these
22. If in 1999-2000, the total revenue earned by Phistream decreases by 5% from the previous year but the revenue from software increases to ₹2437 crores; then what is the approximate percentage decrease in the combined revenue from the rest of the heads(excepting software) in 1999-2000?
 (a) 1.0% (b) 1.8%
 (c) 2.1% (d) 3.3%

Directions for questions 23 to 28: Refer to the following data-set and solve the questions based on it.

Data Pertains to Maruti Udyog Ltd.

Sector	Factories	Employment	Fixed Capital	Variable Cost	Value Added
Government	18	15	14	22	25
Central	8	6	5	7	10
State	4	6	4	8	3
Central/State	6	3	5	7	12
Public	12	8	6	19	8
Private	55	65	72	54	62

Sector	Factories	Employment	Fixed Capital	Variable Cost	Value Added
Joint	15	12	8	5	5
Total	100	100	100	100	100

All data is percentage.

23. If the total work force was 76 million, whereas the total values added were 225 million, then which of the following had the maximum value addition per worker?
- (a) Central (b) State
(c) Central/State (d) Public
24. Which of the following sectors has the maximum fixed capital invested per factory?
- (a) Central (b) State
(c) Central/State (d) Public
25. If the variable is proportional to the number of employees and the production per employee, then for which of the following is the production highest?
- (a) Government (b) Private
(c) Joint (d) Public
26. If the government has a fixed capital of \$ 200 million in the Iron and Steel industry, which corresponds to 20.012% of its total investment as fixed capital, then how much did the government invest (in ₹million) in Maruti Udyog Ltd which forms 25% of the investment in the joint sector ? (1US \$ = ₹45)
- (a) 6500 (b) 2500
(c) 143 (d) 145
27. Maruti Udyog Ltd is a joint project of the Indian Government and Suzuki Motors, Japan; each having equal stake. One fine day, the Indian government decides to disinvest from the venture due to losses occurring from labour problems. How much money will be disinvested?
- (a) ₹246 million
(b) ₹6500 million
(c) \$ 246 million
(d) \$ 6500 million
28. Which of the following statements is true?
- (a) The number of government employees is more than the number of factories in the joint sector
(b) The number of employees in the public sector is the same as the fixed capital of the joint sector
(c) Both (a) and (b)
(d) Cannot say

ANSWER KEYS

1. (a) 2. (c) 3. (b) 4. (d) 5. (d) 6. (b) 7. (b) 8. (b) 9. (c) 10. (c)
11. (b) 12. (d) 13. (a) 14. (a) 15. (b) 16. (b) 17. (d) 18. (a) 19. (b) 20. (d)
21. (d) 22. (c) 23. (c) 24. (b) 25. (b) 26. (a) 27. (b) 28. (d)

HINTS AND EXPLANATIONS

1. Percentage change for India

$$= \frac{0.72 - 1.71}{1.71} > 50\%$$

Percentage change for China

$$= \frac{5.46 - 4.8}{5.46} \approx 12\%$$

Percentage change for Korea

$$= \frac{3.12 - 2.8}{2.8} \approx 11\%$$

Percentage change for Malaysia

$$= \frac{0.33}{2.1} \approx 15\%$$

Hence, maximum % change is for India

2. For the year 1998

$$\text{For China, } \frac{\text{FEI}_{\text{China}}}{\text{GDP}_{\text{China}}} = 0.048 \quad \dots\dots\dots(1)$$

$$\text{For India, } \frac{\text{FEI}_{\text{India}}}{\text{GDP}_{\text{India}}} = 0.0072 \quad \dots\dots\dots(2)$$

$$\frac{\text{FEI}_{\text{China}}}{\text{FEI}_{\text{India}}} = 10$$

⇒ on dividing (1) by (2):

$$\frac{\text{GDP}_{\text{India}}}{\text{GDP}_{\text{China}}} \times 10 = \frac{0.048}{0.0072} = \frac{20}{3}$$

$$\Rightarrow \frac{\text{GDP}_{\text{China}}}{\text{GDP}_{\text{India}}} = \frac{3}{2} = 1.5$$

So, percentage difference between China's GDP and India's GDP = 50%

3. Since the comparisons are for the same country in each case, assume the GDP as 100 in 1997 in all cases. So, GDP of China, India and Korea in 1998 is 105, 107 and 98 respectively.

$$\frac{\text{FEI}_{1998}}{\text{FEI}_{1997}} = \frac{\text{FEI}_{1998} \times \text{GDP}_{1998}}{\text{FEI}_{1997} \times \text{GDP}_{1997}}$$

$$\text{For China: } \frac{\text{FEI}_{1998}}{\text{FEI}_{1997}} = \frac{4.8 \times 107}{5.46 \times 100} < 1$$

$$\text{For India: } \frac{\text{FEI}_{1998}}{\text{FEI}_{1997}} = \frac{0.72 \times 105}{1.71 \times 100} < 1$$

$$\text{For Korea: } \frac{\text{FEI}_{1998}}{\text{FEI}_{1997}} = \frac{3.12 \times 98}{2.8 \times 100} > 1$$

So, II and V are correct. Therefore option (b) is the correct answer

4. It can be seen that all the values (FEI) are expressed as a ratio of FEI to GDP, the absolute values of GDP cannot be determined.
5. Since only the ratios of GDP and FEI are known, the increase in one independent of the other cannot be determined.
6. 40 widgets will incur a fixed cost of 2 shifts
i.e., FC = 800 + 1200 = ₹2000
variable cost, VC ≈ ₹3560 (the value corresponding to a production of 40 from the graph)
So, total cost = 2000 + 3560 = ₹5560
Average cost = 5560/40 = ₹139
The nearest value is ₹40

7. If number of widgets changed from 40 to 41, the fixed cost remains the same. Only the variable cost changes from ₹3560 to ₹3700 (from the graph)

$$\Rightarrow \text{Marginal cost} = 3700 - 3560 \approx ₹140$$

The nearest value is ₹135

8. For production of 50 widgets,
Fixed Cost FC = ₹2000
Variable Cost VC ≈ ₹5000
So, total cost ≈ ₹7000.

- 9.

Production	30	25	60	15
FC	800	800	1200	800
VC	2400	1800	6650	940
Total cost	3200	2600	7850	1740
Revenue	4500	3750	9000	2250
Profit	1300	1150	1150	510
Profit/Widget	43.3	46	19.2	34

So, maximum profit per widget produced is for the production of 25 widgets. You may note that the profit is maximum when the average cost is minimum (since the revenue per widget is fixed).

10. For the first 30 units, fixed cost = ₹800
The average cost will decrease till marginal cost < 800/30 = ₹26.67. you may note from the above question that the average cost decreases to a minimum for a production of 25 and then increases again.
11. You may note that apart from a few years for manufacturing and mining and quarrying, the annual growth rates in most years have been positive and near the 5%–6% mark for all the sectors. The other options (a), (c), and (d) are too far away to be considered. Alternatively, for ease of calculation take the 1989 values for Manufacturing as 400, mining and Quarrying and Electricity as 300 each and Chemicals as 200. then, the final value for manufacturing would be nearly 580; for Mining and Quarrying would be about 365; for Electricity would be around 550; and for chemicals would be around 335.
- ⇒ Initial value of production
= 400 + 300 + 300 + 200 = 1200
Final value of production
= 580 + 365 + 550 + 335 = 1830
⇒ Overall % increase ≈ 52.5%
⇒ Average annual growth = 52.5/9 = 5.85%

12. Electricity production has increased throughout (as growth rates are positive throughout) and the maximum production would be achieved in the last year, i.e., 1998.

13. The production for manufacturing can be minimum either in 1989 or in 1992 (when the growth rate is negative).

If manufacturing started with a production of 100 in 1989, then production in 1992 will be $100 \times 1.04 \times 1.01 \times 0.97 > 1$

So, the production in 1989 was the least.

14. Electricity has shown the highest growth rate in all the years and therefore, would have the highest growth rate for the entire period.

15. Electricity in 1992:

$$100 \times 1.05 \times 1.07 \times 1.08 = 121.4$$

Chemicals in 1992:

$$100 \times 1.07 \times 1.03 \times 1.06 = 116.8$$

⇒ In 1992, the index of Chemicals is less than that of Electricity by approximately 5.

16. Let manufacturing in 1989 = 200 and

Chemicals in 1989 = 100

⇒ Manufacturing in 1991:

$$200 \times 1.04 \times 1.01 = 210$$

and Chemicals in 1991:

$$100 \times 1.07 \times 1.03 = 110$$

$$\text{Required \%} = \frac{210 - 110}{110} \times 100 = 90.91\%$$

17. As can be seen directly from the graph, the highest increase (that of 8%) for Mining and Quarrying was in the year 1998, relative to 1997.

18. Hardware exports as a percentage of total revenues for corresponding years are:

$$1994 - 1995: \frac{540}{2048} \times 100 < 33\%$$

$$1995 - 1996: \frac{600}{2126} \times 100 < 33\%$$

$$1996 - 1997: \frac{730}{2500} \times 100 < 33\%$$

$$1997 - 1998: \frac{1770}{5048} \times 100 = 35.06\%$$

$$1998 - 1999: \frac{1827}{4847} \times 100 = 37.7\%$$

So, hardware exports lie between 35%–40% of total revenue in the last 2 years.

19. Checking the values from the tables, you can verify that option (b) is true.

20. The combined revenue from training and maintenance is never greater than 10% of total revenue for the corresponding year throughout the given period.

21.

Year	50% of software Revenue	Hardware Revenue
1994-95	$1242 \times 0.5 = 621$	608
1995-96	$1327 \times 0.5 = 663$	654
1996-97	$1484 \times 0.5 = 744$	782
1997-98	$2820 \times 0.5 = 1410$	1836
1998-99	$2637 \times 0.5 = 1318$	1862

⇒ Hardware business provides revenues > 50% of the revenue from software business in 1996-1997, 1997-1998 and 1998-1999.

22. In 1999-2000:

$$\text{Total revenue} = 0.95 \times 4847 = 4600$$

$$\text{Software revenue} = 2437$$

$$\text{Remaining revenue} = 4600 - 2437 = 2163$$

In 1998-1999, revenue from heads other than software = $4847 - 2637 = 2210$

$$\% \text{ decrease} = \frac{2210 - 2163}{2210} \times 100 = 2.12\%$$

23. Values added per worker for various sectors will be proportional to the following ratios:

Central	10/6
State	3/6
Central/state	12/3
Public	8/8

24. Fixed capital per factory will be proportional to the following ratios:

Central	5/8
State	4/4
Central/state	5/6
Public	6/12

25. If the variable is proportional to the number of employees and the production per employees, then we can say that the variable cost is directly proportional to the production. Since the variable cost is maximum for the private sector, it will also have the maximum production.
26. If 20% of the government fixed capital is equal to \$ 200 million $\Rightarrow$ Total government sector fixed capital = \$ 1000 million which is equivalent to 14% of the total fixed capital. Now, 25% of government investment in joint sector i.e., 25% of the 8% of the total = 2% of total fixed capital will be given by:
 $(1000 \times 2) / 14 = \$ 143$ million
 Value in ₹ is given by:
 $143 \times 45 = ₹6450$ million $\approx ₹6500$ million
27. From the above answer the money disinvested will be ₹6450 million.
28. Neither of the statements (a) or (b) can be inferred, as we know only the percentages and not the actual values of the employees, factories or fixed capital.

Chapter

23

MASTERING DATA INTERPRETATION

PRACTICE EXERCISE 1

Directions for questions 1 to 4: *Refer to the following chart and solve the questions based on it.*

The following table gives the career record in the One-Day Internationals of few of the Indian batsmen:

Name	Matches Played	Innings Played	Runs Scored	Average
Yuvraj	50	48	1800	40
Sachin	50	50	2034	45.2
Kapil	46	46	1679	36.5
Saurav	44	44	1539	40.5
Rahul	40	38	1806	51.6
Sehwag	42	40	1445	42.5

The average is calculated by dividing the total runs scored by the total number of matches in which the batsman got out.

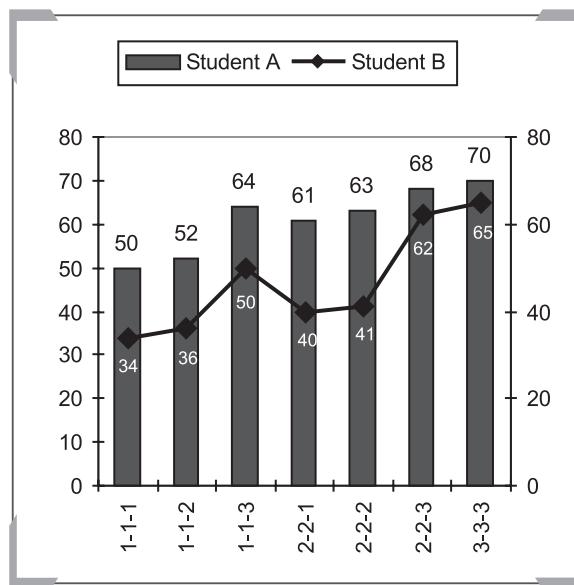
- Who among the following did not get out for the maximum amount of time in the total innings played?
(a) Yuvraj (b) Sachin
(c) Kapil (d) Sehwag
- To reflect the performance of the players better, it was decided that the average would be calculated on the basis of the total innings played. Whose average will see the maximum change due to this?
(a) Yuvraj (b) Sachin
(c) Kapil (d) Sehwag

3. How many of the batsmen got out in all the innings played?
 (a) 0 (b) 1
 (c) 2 (d) Cannot be determined
4. To reflect the performance of the players better, it was decided that the average would be calculated on the basis of the total matches played. Whose average will see the minimum change due to this?
 (a) Yuvraj (b) Sachin
 (c) Kapil (d) Schwag

Directions for questions 5 to 10: Refer to the following chart and solve the questions based on it.

The bar chart given below represents the performance of two students A and B while studying three different subjects with different groups of teachers. Ratings given to the teachers are 1, 2, 3 with 1 being the lowest and 3 being the highest.

The bar chart also represents the percentage marks obtained by A and B in three subjects. Each subject carries 100 marks. Students always get integral marks in each subject. For example, if A studies all the three subjects from a group of teachers so that all the three teachers have 1 rating (low rating); then he gets 50% marks of the total marks of the three subjects.

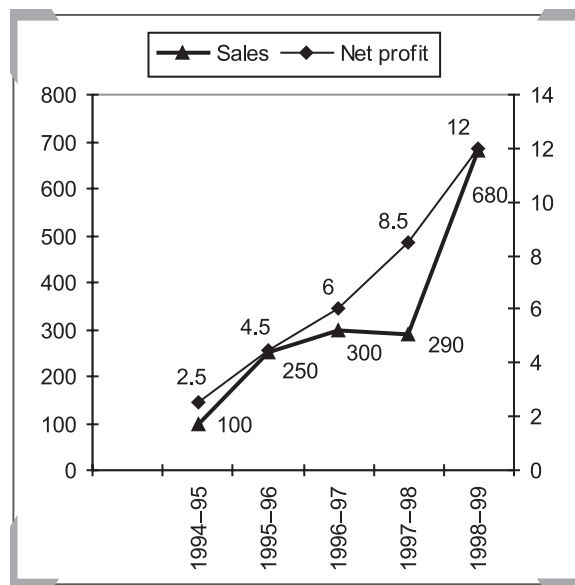


5. What would be the change in the total marks obtained by student A when we compare the combination 1-1-1 and 1-1-3?
 (a) 32 (b) 42
 (c) 62 (d) Cannot be determined
6. What is the percentage change in the total marks obtained by student B when we compare the combination 1-1-3 and 2-2-2?
 (a) 15% (b) 16%
 (c) 17% (d) 18%
7. What can be the maximum marks obtained by student A in any of the three subjects with the combination of teachers being 1-1-3?

- (a) 92 (b) 96
(c) 100 (d) None of these
8. For which of the following options is the difference in the marks scored by student B the maximum?
(a) 1-1-1 and 3-3-3 (b) 1-1-1 and 1-1-3
(c) 1-1-1 and 2-2-3 (d) 1-1-2 and 3-3-3
9. For which of the following options are the marks scored by student A and student B the maximum?
(a) 1-1-1 (b) 1-1-3
(c) 2-2-3 (d) 2-2-2
10. It is allowed to choose two different bars from the above given bars, and the percentage marks obtained become weighted average of the percentage marks obtained, in the ratio of the presence of 3-rating teacher in the bar. In the absence of 3-rating teacher, weighted average should be calculated in the ratio of the presence of 2-rating teachers. For example, if we mix the third bar and 7th bar, we will have to find out the weighted average of 64% and 70% in the ratio 1 : 3 for student A. What would be the percentage marks obtained by the student B if he opts for 4th bar and 5th bar?
(a) 40.2% (b) 40.6%
(c) 40.8% (d) None of these

Directions for questions 11 to 14: Refer to the following chart and solve the questions based on it.

The figure below represents sales and net profit (in ₹crore) of IVP Ltd, for five years from 1994-1995 to 1998-1999. During this period, the sales increased from ₹100 crore to ₹680 crore. Correspondingly, the net profit increased from ₹2.5 crore to ₹12 crore. (Net profit is defined as the excess of sales over total costs.)



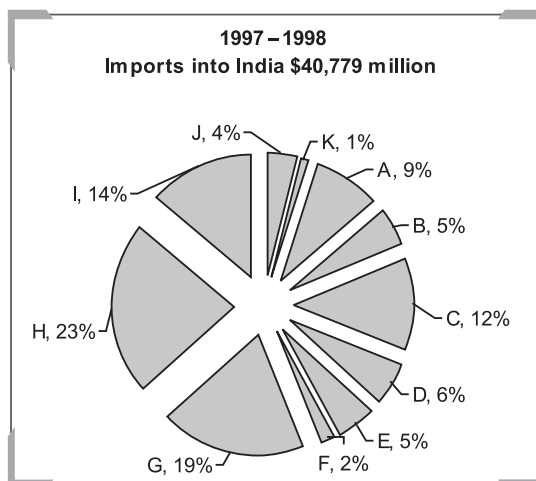
11. The highest percentage growth in sales, relative to the previous year occurred in
(a) 1995-1996 (b) 1996-1997
(c) 1997-1998 (d) 1998-1999

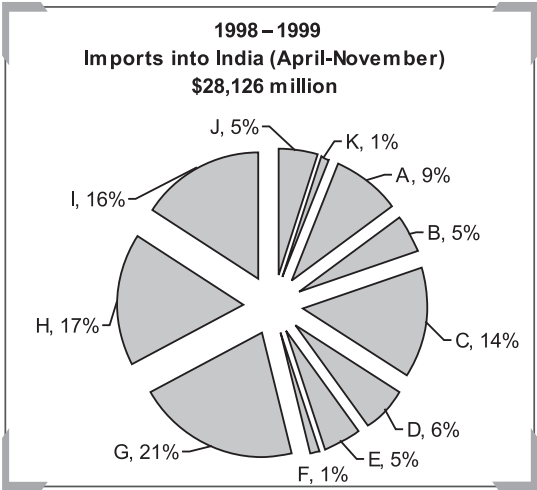
12. The highest percentage growth in net profit, relative to the previous year, was achieved in
- 1998-1999
 - 1997-1998
 - 1996-1997
 - 1995-1996
13. Defining profitability as the ratio of net profit to sales, IVP Ltd recorded the highest profitability in
- 1998-1999
 - 1997-1998
 - 1994-1995
 - 1996-1997
14. With profitability as defined in question 3, it can be concluded that
- Profitability is non-decreasing during the five years from 1994-1995 to 1998-1999.
 - Profitability is non-decreasing during the five years from 1994-1995 to 1998-1999.
 - Profitability remains constant during the five years from 1994-1995 to 1998-1999
 - None of above

Directions for questions 15 to 18: Refer to the following chart and solve the questions based on it.

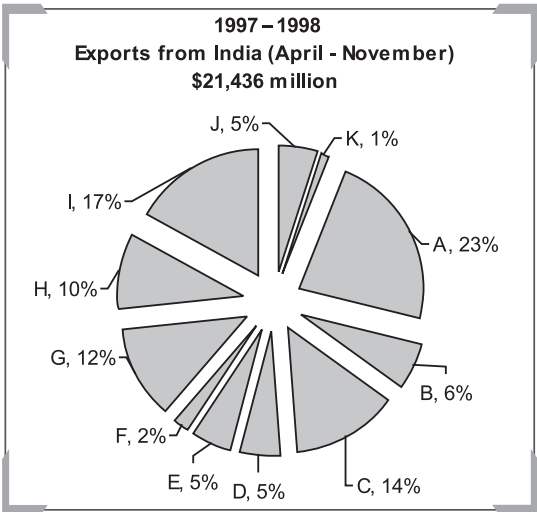
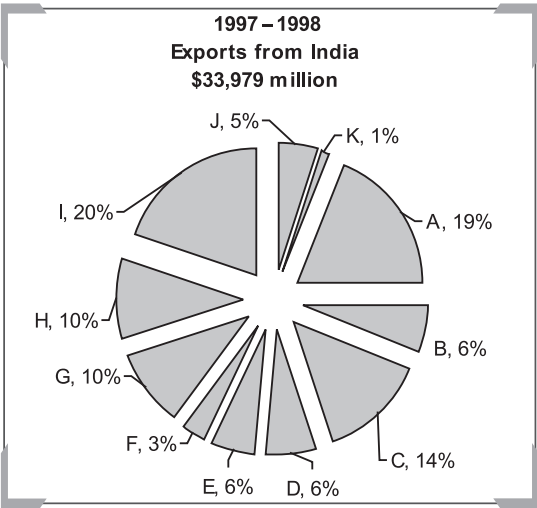
Consider the information provided in the figure below relating to India's foreign trade in 1997-1998 and the first eight months of 1998-1999. Total trade with a region is defined as the sum of exports and imports from that region. Trade deficit is defined as the excess of imports over exports; and it may be negative.

A. USA	B. Germany
C. Other EU	D. UK
E. Japan	F. Russia
G. Other East-European countries	
H. OPEC	I. Asia
J. Other LDCs	
K. Other Source of Imports	





Destination of exports



15. With which region does India have the highest total trade in 1997-1998?
 (a) USA (b) Other EU countries
 (c) OPEC (d) Others
16. In 1997-1998, the amount of Indian exports (in million US \$) to the region with which India has the lowest total trade, is approximately:
 (a) 750 (b) 340
 (c) 220 (d) 440
17. In 1997-1998, the trade deficit (in billion US \$) for the region with which India has the highest trade deficit is approximately equal to
 (a) 6.0 (b) 3.0
 (c) 4.5 (d) 7.5
18. Which region has the lowest trade deficit with India in 1997-1998?
 (a) USA (b) Asia
 (c) Others (d) Other EU countries

Directions for questions 19 and 20: *Answer the questions based on the following information:*

Assume that the average monthly exports and imports to India during the remaining four months of 1998-1999 are the same as that for the first eight months of the year.

19. To which region did India's exports register the highest percentage growth between 1997-1998 and 1998-1999?
 (a) Other East-European countries
 (b) USA
 (c) Asia
 (d) Exports have declined, therefore no growth
20. What is the percentage growth rate in India's total trade deficit between 1997-1998 and 1998-1999?
 (a) 43% (b) 47%
 (c) 50% (d) 40%

Directions for questions 21 to 25: *Refer to the following chart and solve the questions based on it.*

The table below presents the data on the percentage of population covered by drinking water and sanitation facilities in select Asian countries.

Percentage Population Covered by Drinking Water and Sanitation Facilities

	Drinking Water			Sanitation Facilities		
	Urban	Rural	Total	Urban	Rural	Total
India	85	79	81	70	14	29
Bangladesh	99	96	97	79	44	48
China	97	56	67	74	7	24
Pakistan	82	69	74	77	22	47
Philippines	92	80	86	88	66	77

	Drinking Water			Sanitation Facilities		
	Urban	Rural	Total	Urban	Rural	Total
Indonesia	79	54	62	73	40	51
Sri Lanka	88	52	57	68	62	63
Nepal	88	60	63	58	12	1

Country A is said to dominate B or $A > B$ as A has a higher percentage in total coverage for both drinking water and sanitation facilities; and B is said to be dominated by A, or $B < A$.

A country is said to be on the coverage frontier if no other country dominates it. Similarly, a country is not on the coverage frontier if it is dominated by at least one other country.

21. Which countries are on the coverage frontier?
 - (a) India and China
 - (b) Sri Lanka and Indonesia
 - (c) Philippines and Bangladesh
 - (d) Nepal and Pakistan
22. Which of the following statements are true?
 - I. India $>$ Pakistan and India $>$ Indonesia
 - II. India $>$ China and India $>$ Nepal
 - III. Sri Lanka $>$ China
 - IV. China $>$ Nepal
 - (a) I and III
 - (b) II and IV
 - (c) I, II and III
 - (d) II, III and IV
23. Using only the data presented under the 'Sanitation facilities' columns, it can be concluded that the rural population in India, as a percentage of its total population is approximately:
 - (a) 76
 - (b) 70
 - (c) 73
 - (d) Cannot be determined
24. Again, using only the data presented under the 'Sanitation facilities' columns, China, Indonesia and Philippines are sequenced in an ascending order of the rural population as a percentage of their respective total population. The correct order is:
 - (a) Philippines, Indonesia, China
 - (b) Indonesia, China, Philippines
 - (c) Indonesia, Philippines, China
 - (d) China, Indonesia, Philippines
25. India is not on the coverage frontier because
 - I. It is lower than Bangladesh in terms of the coverage of drinking water facilities.
 - II. It is lower than Sri Lanka in terms of the coverage of sanitation facilities.
 - III. It is lower than Pakistan in terms of the coverage of sanitation facilities.
 - IV. It is dominated by Indonesia.
 - (a) I and II
 - (b) I and III
 - (c) IV
 - (d) None of these

ANSWER KEYS

1. (d) 2. (d) 3. (b) 4. (c) 5. (b) 6. (d) 7. (a)
 8. (a) 9. (d) 10. (b) 11. (a) 12. (d) 13. (b) 14. (d)
 15. (c) 16. (b) 17. (a) 18. (a) 19. (b) 20. (b) 21. (c)
 22. (b) 23. (c) 24. (a) 25. (d)

HINTS AND EXPLANATIONS

- Yuvraj – $1800/40 = 45$.
Hence, not-out in 3 innings.
Sachin – $2034/45.2 = 45$.
Hence, not-out in 5 innings.
Kapil – $1679/36.5 = 46$.
Hence, not-out in 0 inning.
Sehwag – $1445/42.5 = 34$.
Hence, not-out in 6 innings.
Therefore, option (d) is the correct answer.
- The difference is maximum in case of Sehwag.
- Only Kapil got out in all the innings played. Take the help of the solution to Q 1.
- Again, the difference is maximum in case of Sehwag & minimum for Kapil as he has played in all the innings & got out in all the matches. So, there will be no change in the average of Kapil by the new rule of calculating the average..
- The difference in the total score = $64 \times 3 - 50 \times 3 = 42$ (Difference is caused by the teacher of the high rating only).
- Marks obtained by student B in 1-1-3 & 2-2-2 are 50 & 41 respectively. So, % change is = $\frac{50-41}{50} \times 100\% = 18\%$.
- A got average of 64 in 1-1-3. So, total marks in these 3 subjects is $3 \times 64 = 192$ marks. He must get 50 in 2 subjects of teachers of rating 1. So, he got 100 marks in 2 subjects & 92 in the 3rd subject.
- Clearly the lowest & highest marks were obtained in 1-1-1 & 3-3-3.
- Look at the bars for the maximum difference. It is the maximum in case of 2-2-2.
- We would be required to find the weighted average of 40 and 41 in the ratio 2 : 3.
Hence $(40 \times 2 + 41 \times 3)/5 = 40.6\%$
- Using the graph, the percentage growth in sales are:

	Previous Sales	Current Sales	Difference	Percentage
1995-96	100	250	150	150%
1996-97	250	300	50	20%
1997-98	300	290	-10	-3.33%
1998-99	290	680	390	134.5%

It is but obvious from the above table that the maximum percentage increase relative to previous year occurred in 1995–1996.

12. We can again calculate the growth in profits.

	Previous Profit	Current Profit	Difference	Percentage
1995-96	2.5	4.5	2	80%
1996-97	4.5	6	1.5	33.33%
1997-98	6.0	8.5	2.5	41.66%
1998-99	8.5	12	3.5	41.2%

The highest percentage growth in net profit relative to the previous year was achieved in 1995-1996.

- 13.

	Net Profit	Net Sales	Ratio
1994-95	2.5	100	0.025
1995-96	4.5	250	0.02
1996-97	6	300	0.02
1997-98	8.5	290	0.03
1998-99	12	680	0.018

Therefore, profitability is maximum for 1997-1998.

14. It can be seen that profitability does not follow a fixed pattern and the first three statements try to generalize the profitability. Therefore, they are not applicable and option (d) is the correct answer.
15. Total trade with a region = Sum of exports and imports from that region. From the pie charts for 1997-1998, we have the following sectors occupying the maximum area.

	Country	Exports	Imports	Trade
H	OPEC	3397.9	9379.2	12795.1
I	Asia	6796	5709	12505
G	East Europe	3397	7748	11145.9
C	EU	4757	4893.5	9650.5
A	USA	6456	3670	10126

Therefore, H-OPEC has the maximum trade with India in 1997-1998

16. Using the pie chart, the region having the lowest trade is K =
 1% of imports + 1% of exports
 So, Indian exports are 1% of 3397.9 which is roughly 340 million US \$.

17.

	Imports	Exports	Trade Deficit
A	3670.11	6456.01	-2785.9
B	2038.95	2038.74	0.21
C	4893.48	4757.06	136.42
D	2446.74	2038.74	408
E	2038.95	2038.74	0.21
F	815.58	1019.37	-203.79
G	7748.01	3397.9	4350.11
H	9379.17	3397.9	5981.27
I	5709.06	6795.8	-1086.74
J	1631.16	1698.95	-67.79

So, it can be seen that region H has the highest trade deficit of approximately \$ 6,000 million or \$ 6 billion.

18. Using the pie chart for 1997-1998, we can see that USA which is region A, has the lowest trade deficit.
(9% of imports – 19% of total exports)
(9/100 × 40779 – 19/100 × 33979)
19. Using the pie chart, we know that the exports have increased from three regions A, G and H as follows.

	Country	1998-99	1997-98
A	USA	7395.4	6456
G	East European Countries	3858.5	3397.9
H	OPEC	3215.4	3397.9

Now, the exports for 8 months have been given. According to new directions, we need to calculate exports for 12 months.

$$\frac{21436 \times 12}{8} = \$ 32,154 \text{ million}$$

So, maximum percentage increase is from region A (USA).

20. Following is India's total trade deficit:

	Imports	Exports	Deficit
1997-98	40779	33979	6800
1998-99	42189	32154	10035

Total imports for 1998-1999

$$= 28126 \times 12/8$$

$$= \$ 42,189 \text{ million}$$

Similarly, exports for 1998-1999

$$= 28126 \times 12/8$$

$$= \$ 32,154 \text{ million}$$

Percentage growth rate

$$= 10035 - 6800/6800 \times 100$$

$$= 47.6\%$$

Therefore, option (b) is the correct answer.

21. Also, Bangladesh > Philippines (97 > 86) for drinking water.
And Philippines > any other country for sanitation facilities. Thus, countries are on the coverage frontier for two facilities.
22. A > B only if A has higher percentage in total coverage for both drinking water and sanitation facilities taken independently and not as a total of the two facilities.
Thus, only statement II and statement IV are true
India > China
(81 > 67 and 29 > 24)
India > Nepal
(81 > 63 and 29 > 18)
Also China > Nepal (67 > 63 and 24 > 18)
23. Let the urban population be x and rural population be y.
Using the sanitation column, we have
 $0.7x + 0.14y = 0.29(x + y)$
 $0.41x = 0.15y$
So $x = 15/41y$
So, percentage of rural population
 $= y/x + y \times 100$
 $= y/15/41y + y \times 100$
 $= 41/56 \times 100$
 $= 73.2\%$
24. Use the method given in the last question to find the percentage of rural population for Philippines, Indonesia and China.

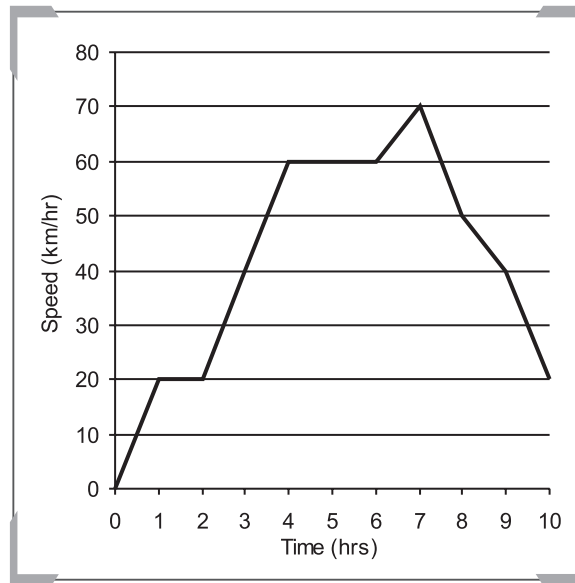
P	50%
I	66.66%
C	79.8%

Thus, $P < I < C$

25. India is not on the coverage frontier because
- It is below Bangladesh and Philippines for drinking water.
 - For sanitation facilities it is below Philippines, Sri Lanka, Indonesia and Pakistan.

PRACTICE EXERCISE 2

Directions for questions 1 to 5: Go through the data set given below and solve the questions based on it.



- What is the average speed represented in the above graph?
 (a) 32 km/h (b) 37 km/h
 (c) 43 km/h (d) None of these
- Considering two-hour slots from the beginning, the second highest distance covered in a two-hour slot was between
 (a) 0 – 2 h (b) 2 – 4 h
 (c) 4 – 6 h (d) 6 – 8 h
- What is the highest rate of acceleration achieved during the whole period?
 (a) 25 km/h² (b) 20 km/h²
 (c) 15 km/h² (d) 10 km/h²
- If the rate of deceleration of the 8th hour had continued further, the speed would have become zero in
 (a) 9 hrs 10 mins (b) 10 hrs 30 mins
 (c) 11 hrs 10 mins (d) None of these
- For which of the given hours in the graph was the rate of change of speed **minimum**?
 (a) 1st–2nd (b) 4th–5th
 (c) 5th–6th (d) All of these

Directions for questions 6 to 9: Go through the data set given below and solve the questions based on it.

In a management course, students of 2nd year are asked to select four optional subjects from the given list of seven optional subjects. There are ten students whose roll numbers are from 1 to 10. They have selected four optional subjects each. Their subjects selected are indicated by “X” marks.

Courses	Roll Number									
	1	2	3	4	5	6	7	8	9	10
TA	X		X	X		X		X	X	X
MBC		X	X		X	X		X		
YCA			X			X	X		X	X
DMBC	X	X		X	X		X	X		
XA		X					X		X	X
PG	X		X	X	X		X	X		
PM	X	X		X	X	X			X	X

6. Which of the following triple courses have maximum number of students in common?
 (a) TA, MBC, YCA (b) DMBC, TA, PG
 (c) YCA, PM, XA (d) DMBC, PG, XA
7. Which roll numbers have the maximum common number of optional subjects?
 (a) 1 and 8 (b) 3 and 6
 (c) 9 and 10 (d) None of these
8. Which optional subject was chosen by maximum number of students?
 (a) XA (b) TA
 (c) MBC (d) DMBC
9. Which roll numbers have the same optional subjects?
 (a) 3 and 6 (b) 1 and 3
 (c) 6 and 8 (d) 9 and 10

Directions for questions 10 to 14: Go through the data set given below and solve the questions based on it.

A rating company rates the performance of three companies producing shoes. The points are allotted according to their sales. The point index (PI) of each of the companies = The number of lakh units sold during the month $\times$ points allotted.

Table 1

The number of lakh units sold = y	Points allotted
$y < 5$	3
$5 < y < 8$	4
$8 < y < 11$	5
$y > 11$	6

The following table shows the number of lakh units sold of each of the brands—Moon, Warle and Enivi—from Jan 07 to June 07.

Table 2

Name of month	Moon	Warle	Enivi	Rank of months according to PI
Jan 07	7	4	—	4
Feb 07	—	13	—	1
Mar 07	—	—	—	5
Apr 07	—	—	—	6
May 07	—	—	—	2
Jun 07	—	—	10	3

Note:

- The number of lakh units sold by all the three companies in each of the months is identical.
 - The sum of the number of lakh units sold by each of the companies in all the six months together is identical.
 - The number of lakh units sold by any of the companies in any one of the months is at least 1.
 - The number of lakh units sold by exactly two companies in each of the months Feb 07, Mar 07 and Apr 07 is identical.
 - The Point Index of Jan 07 and May 07 is 26 and 17 less than Feb 07 respectively. Also, the PI in Jan 07 is one more than that of March 07.
 - The number of lakh units sold by Moon in Mar 07 and Apr 07 together is equal to that in May 07.
 - The sum of PI in any month is not greater than 100.
 - The least possible Point Index (PI) is in Apr 07 for the sum of lakh units sold by all three companies.
- What is the number of lakh units sold by Enivi in Mar 07?
 (a) 5 (b) 6
 (c) 4 (d) 7
 - Find the PI of all the three companies in Apr 07.
 (a) 59 (b) 60
 (c) 61 (d) 58
 - What is the number of lakh units sold by Moon in all the six months together?
 (a) 34 (b) 32
 (c) 36 (d) 38
 - What is the number of lakh units sold by Enivi in May 07?
 (a) 7 (b) 4
 (c) 5 (d) 8
 - What is the PI of Warle in all the six months together?
 (a) 139 (b) 153
 (c) 138 (d) 148

Directions for questions 15 to 20: *Go through the passage given below and solve the questions based on it.*

Five cricket coaches B, D, J, L and W were being judged for the award of best coach of the year. The selection committee ranked them on five different parameters viz., Empathy, Vision, Focus, Creativity, and Intuitions. The five coaches were given points on these five parameters. The best coach gets 5 points and the worst coach gets 1 point. There are no ties. The coach with highest total gets the award of best coach. B gets the award by scoring 24 points. W gets 5 points in Creativity and 3 points in Intuition. J got same score in four of the given five parameters. Their final standings were in alphabetical order of their names.

15. What is the overall score of J?
(a) 12 (b) 13
(b) 14 (c) Indeterminable
16. What is the rank of D in Creativity?
(a) 1st (b) 2nd
(c) 5th (d) Indeterminable
17. What are the points scored by J in Intuition?
(a) 1 (b) 2
(c) 4 (d) Indeterminable
18. If L scored his highest points in Empathy then what is the score of D in Vision?
(a) 1 (b) 2
(c) 3 (d) 4
19. For how many of the coaches given above, is it possible to determine the exact points obtained in different parameters?
(a) 2 (b) 3
(c) 4 (d) 5
20. If L gets a score of 2 in each—Empathy, Vision and Focus, then what is the rank of D in intuition?
(a) 2nd (b) 4th
(c) 3rd (d) 5th

ANSWER KEYS

1. (c) 2. (d) 3. (b) 4. (b) 5. (d) 6. (b) 7. (c)
 8. (b) 9. (d) 10. (b) 11. (d) 12. (a) 13. (c) 14. (d)
 15. (b) 16. (d) 17. (a) 18. (d) 19. (b) 20. (b)

HINTS AND EXPLANATIONS

1 to 5

1. The average speed in first hour = 10 km/hr
 Average speed represented by the graph

$$= \frac{10 + 20 + 30 + 50 + 60 + 60 + 65 + 60 + 45 + 30}{10}$$

$$= \frac{430}{10} = 43 \text{ km/h.}$$
2. Distance covered in 0–2 hrs slot = $10 + 20 = 30 \text{ km}$
 Distance covered in 2–4 hrs slot = 80 km
 Distance covered in 4–6 hrs slot = 120 km
 Distance covered in 6–8 hrs slot = 125 km
3. Acceleration = Change in velocity/h
 = 20 km/h² in 1st, 3rd and 4th h
4. Deceleration in 8th hour = 20 km/h²
 Speed at the end of 8th hour = 50 km/h
 Speed will be zero after 't' h where $0 = 50 - 20 \times t$

$$= t = \frac{50}{20} = \frac{5}{2} \text{ hours} = 2\frac{1}{2} \text{ hrs.}$$

 = Speed will be zero at 10 h 30 mts.
5. For all the given options, the change of speed = 0

6 to 9

6. (1) Roll nos 3 and 6
 (2) Roll nos 1, 4 and 8
 (3) Roll nos 9, 10
 (4) Roll no 7
7. (1) Roll nos 1 and 8 have TA, DMBC and PG as common.
 (2) Roll nos 3 and 6 have TA, MBC, YCA as common.
 (3) Roll nos 9 and 10 have all the four common options.
 (4) Roll nos 2 and 5 have MBC, DMBC and PM as common.
8. TA → 7 students
 XA → 4 students
 MBCA → 5 students
 DMBC → 6 students
9. We can observe from the given table that roll no. 9 & 10 have same set of optional subjects.

15 to 20

Following table can be formed with the data given in the question:

	B	D	J	L	W
Empathy	5				
Vision	5				
Focus	5				
Creativity	4				5
Intuition	5				3
Total	24		Sum = $75 - 24 = 51$		

We can see now that the minimum possible sum for W = 11.

Sum of points of the coaches are in the following order – $B > D > J > L > W$

And sum of the points of $(D + J + L + W) = 5(1 + 2 + 3 + 4 + 5) - 24$ (points of B) = 51

Hence, the point obtained by the remaining four coaches D, J, L and W will be 11, 12, 13, 15 respectively.

(Points obtained by any of J, L and W can not be other than 11, 12 and 13 because in that case, the sum of the points of the four coaches will be more than 51.)

Hence, the final points tally will be:

	B	D	J	L	W
Empathy	5	2/4	3	2/4	1
Vision	5	2/4	3	2/4	1
Focus	5	2/4	3	2/4	1
Creativity	4	1/2	3	1/2	5
Intuition	5	2/4	1	2/4	3
Total	24	15	13	12	11

Now all the questions can be answered.

15. Overall score of J is 13.
16. D scored 1 or 2 points in Creativity. So, his rank is either 4 or 5.
17. J scored 1 in Intuition.
18. If L scored 4 in Empathy, he must have scored 2 in all other areas as his total score is 12. So, D got 4 in vision.
19. There are 3 coaches B, J & W for whom it is possible to exactly determine the points obtained in different parameters.
20. If L score 2 each in Empathy, Vision & Focus. The score of L in Creativity & Intuition must be 2 & 4 respectively. So, D must have scored 2 in Intuition. So, rank of D in Intuition is 4th.

PRACTICE EXERCISE 3

Directions for questions 1 to 7: Refer to the following table and solve the questions based on it.

The following tables and charts show the details of the advertising expenses and corresponding results for XYZ Ltd.

During 2000–2004, the company issues ads in three different newspapers—TOI, HT and others.

Table 1 shows the year wise cost incurred by XYZ Ltd during the given period.

Table 2 shows the number of advertisements released in each publication during the given period.

Chart 1 shows the total number of enquiries generated at XYZ Ltd in response to the advertisements in each publication during the given period.

Chart 2 gives the number of clients (out of the total who enquire) who finally provide business to XYZ Ltd, as a result of its advertising in each publication during the given period.

Table 3 shows the average amount of business per new client for XYZ Ltd as a result of its advertising in each publication in during the given period. (Assume that all new clients in a year are a result of the advertising in that specific year only and the clients responding to advertising in different publications are mutually exclusive)

Table 1

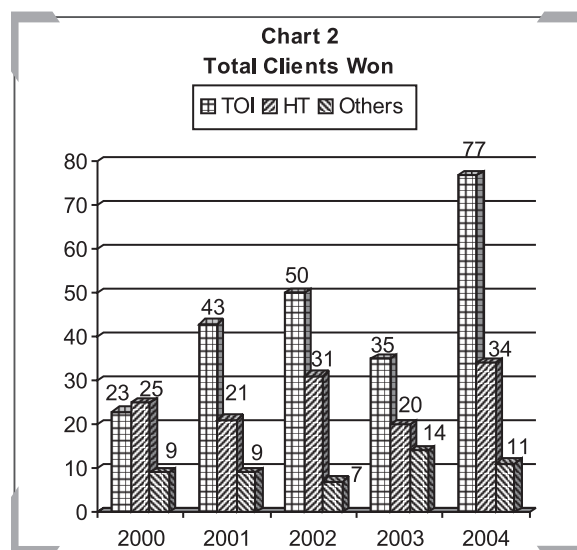
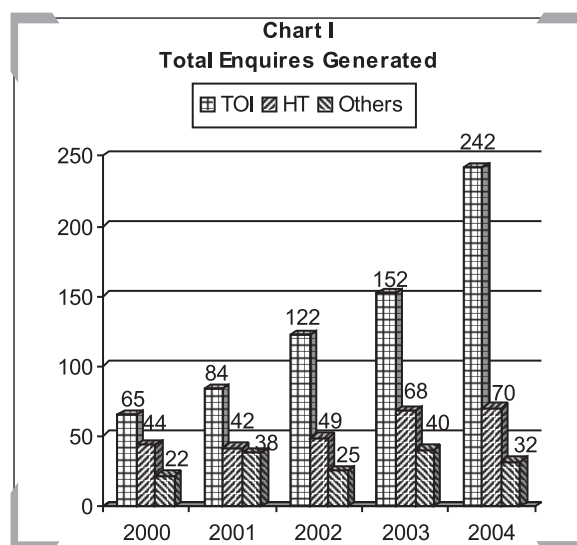
Total Money Spent (₹Lacs)			
Year	TOI	HT	Others
2000	3.5	3.2	2
2001	5	3.4	2.8
2002	6.2	4	5.2
2003	8	4.8	4.4
2004	14	3.5	3.1

Table 2

Number of Ads			
Year	TOI	HT	Others
2000	10	12	15
2001	12	15	17
2002	15	20	36
2003	19	24	22
2004	38	18	30

Table 3

Average Business/Client (₹lacs)			
Year	TOI	HT	Others
2000	0.25	0.19	0.12
2001	0.19	0.28	0.09
2002	0.28	0.15	0.18
2003	0.31	0.55	0.22
2004	0.44	0.38	0.15



For advertising in any publication in any year (or period):

- (i) Response ratio is the average number of enquiries generated per advertisement.
 - (ii) Conversion ratio is the percentage of clients who provide business out of those who enquire.
 - (iii) Success ratio is the average number of clients won per advertisement.
 - (iv) Return ratio is the ratio of business generated to the money spent on advertising.
1. During the given period, the average cost per advertisement for XYZ Ltd was highest in
 - (a) TOI (b) HT
 - (c) Others (d) Cannot be determined
 2. The response ratio in a single year during the given period was highest for advertising in
 - (a) TOI in 2003 (b) HT in 2004
 - (c) Others in 2001 (d) TOI in 2002
 3. The response ratio during the given period was the lowest in which of the publications?
 - (a) TOI (b) HT
 - (c) Others (d) Cannot be determined
 4. The lowest conversion ratio for advertising by XYZ Ltd in HT was observed in
 - (a) 2001 (b) 2003
 - (c) 2002 (d) 2000
 5. Which of the following shows the correct order of the conversion ratios for advertising by XYZ Ltd in the three publications during the given period?
 - (a) TOI > HT > Others (b) HT > Others > TOI
 - (c) HT < TOI < Others (d) Others < TOI < HT
 6. For XYZ Ltd, the success ratio for advertising in the TOI during the given period was approximately what percentage of the success ratio for advertising in others in 2003?
 - (a) 525% (b) 425%
 - (c) 350% (d) 285%
 7. In how many years during the given period was the success ratio for advertising in the TOI greater than the success ratio for advertising in the HT?
 - (a) 5 (b) 4
 - (c) 3 (d) 2

Directions for questions 8 to 13: Refer to the following table and solve the questions based on it.

The tables given below show the currency exchange rates in April 2005 and April 2004 respectively. For any currency row, the value corresponding to each column shows that currency's exchange rate with the currency column. For example, in April 2005, one dollar was equivalent to ₹43.750

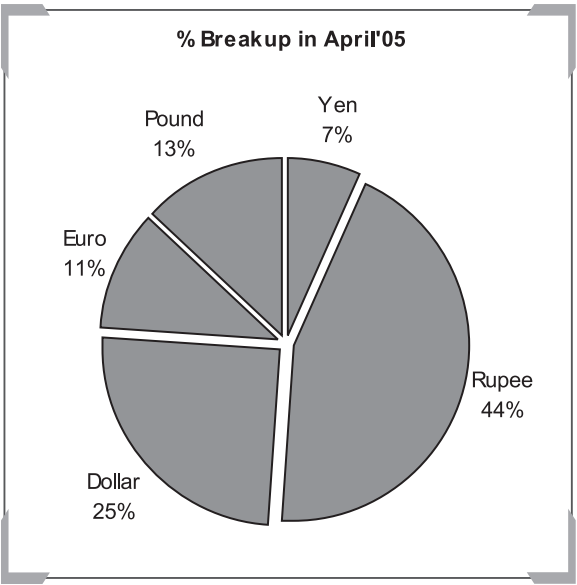
Chart 3 and Chart 4 show the percentage break-up of rupee equivalent of currency reserves of a company in April 2005 and April 2004 respectively. The rupee equivalent reserves of a currency are the currency reserves calculated in rupee terms based on the prevalent exchange rate between the rupee and that currency. For example, reserves of 1000 euros in April 2004 would constitute rupee equivalent reserves of ₹53,000. The rupee equivalent of currency reserves for the company was ₹5 crores in April 2004, and grew by 40% in the next one year.

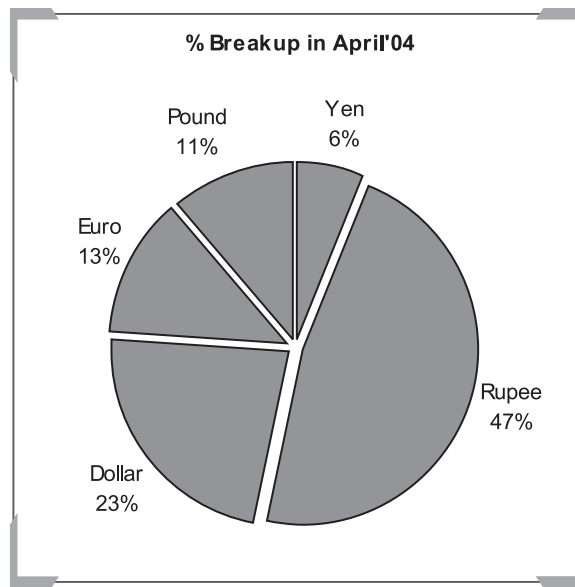
Table 1

Currency Rates (April 2005)					
Currency	Rupee	Dollar	Euro	Pound	Yen
Rupee	----	0.023	0.018	0.012	0.024
Dollar	43.750	----	0.770	0.535	1.065
Euro	56.790	1.298	----	0.695	1.382
Pound	81.750	1.869	1.440	----	1.990
Yen	41.090	0.939	0.724	0.503	----

Table 2

Currency Rates (April 2004)					
Currency	Rupee	Dollar	Euro	Pound	Yen
Rupee	----	0.020	0.019	0.013	0.029
Dollar	50.000	----	0.880	0.612	1.217
Euro	53.000	1.211	----	0.648	1.290
Pound	75.000	1.714	1.321	----	1.825
Yen	35.000	0.800	0.616	0.428	----

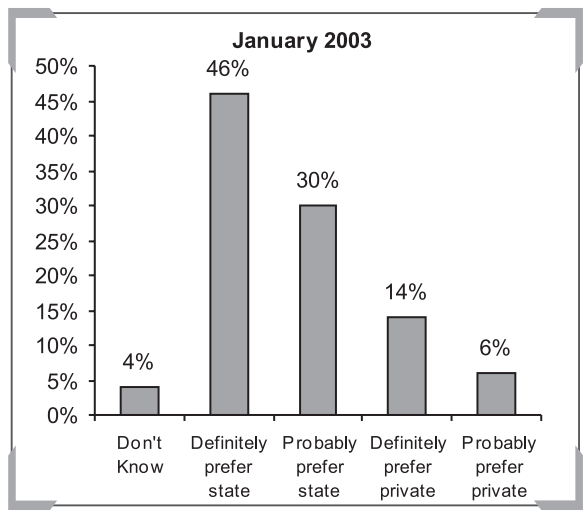
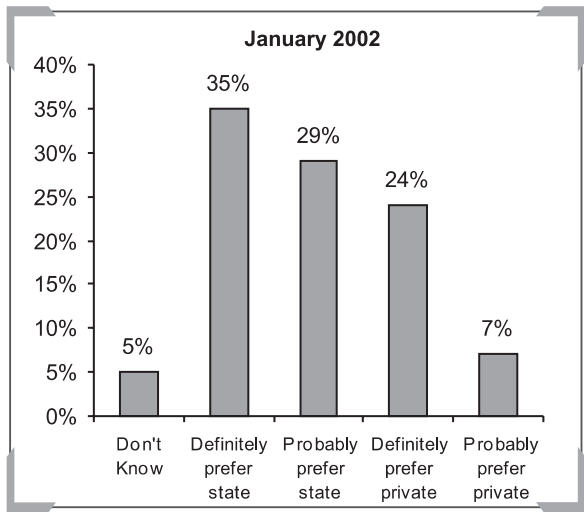


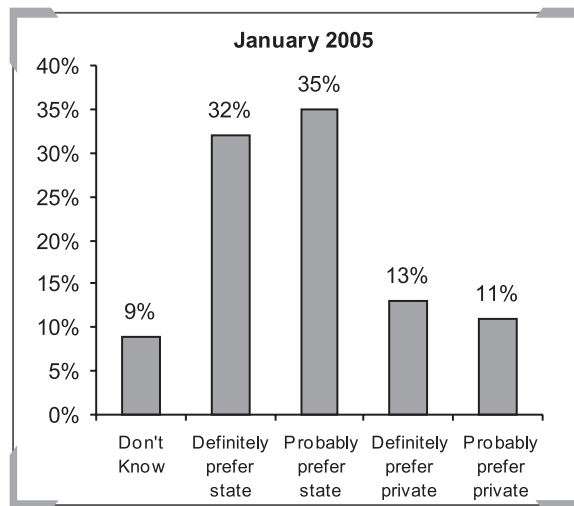
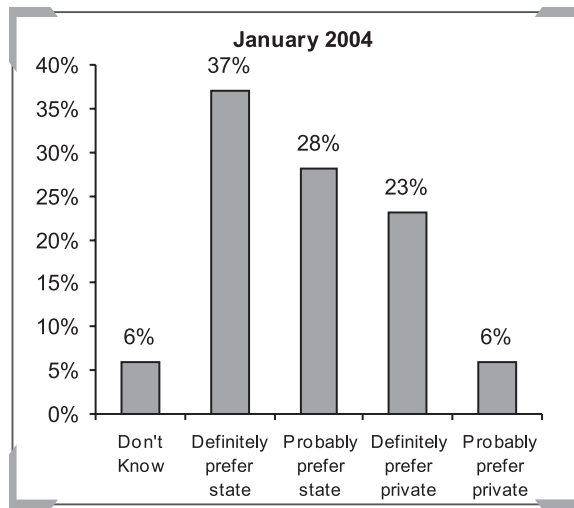


8. The dollar currency reserves for the company (in \$ million) in April 2004 was closest to
 - (a) 11.5
 - (b) 4.0
 - (c) 2.3
 - (d) 0.25
9. The rupee equivalent (in rupees million) of the Yen reserves for the company in April 2005 was closest to
 - (a) 49
 - (b) 1.3
 - (c) 5
 - (d) 0.12
10. The ratio of money in dollar reserves to the money in euro reserves for the company in April 2004 was
 - (a) 7 : 4
 - (b) 3 : 5
 - (c) 9 : 4
 - (d) Cannot be determined
11. The money in pound reserves in April 2005 was how many times the money in Yen reserves in April 2004?
 - (a) 1.65
 - (b) 1.82
 - (c) 3
 - (d) Cannot be determined
12. Between April 2004 and April 2005, by what percentage did the rupee reserves grow?
 - (a) 22%
 - (b) 31%
 - (c) 49%
 - (d) Cannot be determined
13. Between April 2004 and April 2005, the company's reserves of which currency saw the maximum absolute increase (in rupee equivalent terms)?
 - (a) Dollar
 - (b) Euro
 - (c) Pound
 - (d) Rupee

Directions for questions 14 to 20: *Refer to the following table and solve the questions based on it.*

The following charts show the responses of the population of the state of ABC over a four-year period, to the question—“Is State ownership the best way to run an enterprise OR an enterprise is best run by private entrepreneurs?” The eligible voting population of ABC was 2.4 million in January 2003 and can be assumed to have grown by 20% each year during the period January 2002–January 2005. The entire eligible population voted in each of the four years and every person casted a vote in favour of only one of the five options shown each year.



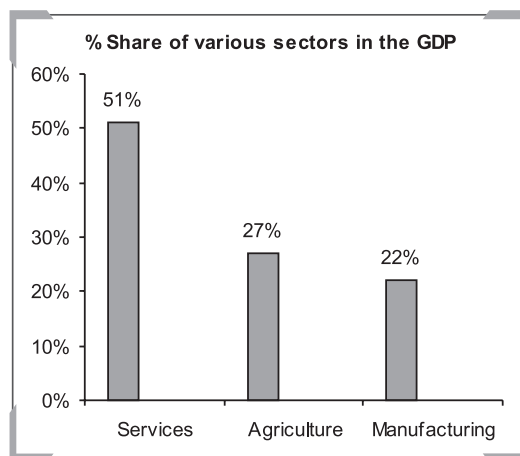


14. For how many options during the given period did the number of people voting in favour of the options, increase in each year, relative to the the previous year?
 - (a) 2
 - (b) 3
 - (c) 1
 - (d) None
15. For how many options during the given period did the number of people voting in favour of the options, decrease in each year, relative to the previous year.
 - (a) 2
 - (b) 3
 - (c) 1
 - (d) None
16. The greatest absolute increase, between January 2002 and January 2005, in the number of people voting for an option was observed for:
 - (a) Definitely prefer private
 - (b) Probably prefer state
 - (c) Probably prefer private
 - (d) Don't know

17. For which option did the number of people casting their vote decrease between January 2002 and January 2005?
- (a) Definitely prefer state
 - (b) Probably prefer state
 - (c) Definitely prefer private
 - (d) None
18. The greatest percentage increase, between January 2002 and January 2005, in the number of people voting for an option took place for
- (a) Definitely prefer private
 - (b) Probably prefer state
 - (c) Probably prefer private
 - (d) Don't know
19. The greatest number of votes cast in favour of an option in a single year were for
- (a) Definitely prefer state
 - (b) Probably prefer private
 - (c) Probably prefer state
 - (d) Don't know
20. What is (most nearly) the cumulative difference, over the entire period, between the number of votes in favour of 'state ownership'(definitely/probably) and the number of votes in favour of 'private ownership'(definitely/probably)?
- (a) 2.2 million
 - (b) 5.4 million
 - (c) 3.3 million
 - (d) 6.3 million

Directions for questions 21 to 25: Refer to the following table and solve the questions based on it.

The following charts show the sectorwise percentage break-up of \$ 650 billion, which is the GDP of the country with a population of 12 billion people. 70% of the population of the country constitutes its working population, engaged in the various sectors of the economy and contributing to the GDP.



Productivity is defined as the average amount contributed to the GDP per person in that group or sector.

-
21. Which of the following groups/sectors has the lowest productivity?
- (a) Agriculture sector workers
 - (b) Manufacturing sector workers
 - (c) Services sector workers
 - (d) Non-working population
22. What is the approximate difference in the number of people involved in the agriculture sector and the services sector?
- (a) 1.8 billion
 - (b) 2.5 billion
 - (c) 4 billion
 - (d) 5.7 billion
23. What percentage of the country's total population is engaged in the manufacturing sector?
- (a) 17.5%
 - (b) 35.7%
 - (c) 25%
 - (d) Indeterminate
24. The productivity for how many sectors is more than the productivity of the entire population of the country?
- (a) 0
 - (b) 1
 - (c) 2
 - (d) 3
25. In the next year, the work force engaged in each of the sectors maintains its productivity at the same level. If there is an increase of 5% in the work-force for each of the sectors, then the productivity of the country has:
- (a) Increased
 - (b) Decreased
 - (c) Remained same
 - (d) Cannot be determined

ANSWER KEYS

1 (a)	2 (d)	3 (c)	4 (b)	5 (d)	6 (d)	7 (a)
8 (d)	9 (c)	10 (a)	11 (c)	12 (b)	13 (d)	14 (a)
15 (d)	16 (b)	17 (c)	18 (d)	19 (c)	20 (b)	21 (d)
22 (c)	23 (a)	24 (c)	25 (d)			

HINTS AND EXPLANATIONS

Table 1

Total Money Spent (₹Lacs)			
Year	TOI	HT	Others
2000	3.5	3.2	2
2001	5	3.4	2.8
2002	6.2	4	5.2
2003	8	4.8	4.4
2004	14	3.5	3.1
Total	36.7	18.9	17.5

Table 2

Average of Ads			
Year	TOI	HT	Others
2000	10	12	15
2001	12	15	17
2002	15	20	36
2003	19	24	22
2004	38	18	30
Total	94	89	120

Table 3

Average Business/Client (₹Lacs)			
Year	TOI	HT	Others
2000	0.25	0.19	0.12
2001	0.19	0.28	0.09
2002	0.28	0.15	0.18
2003	0.31	0.55	0.22
2004	0.44	0.38	0.15
Total	1.47	1.55	0.76

Table 4

Total Client Won			
Year	TOI	HT	Others
2000	23	25	9
2001	43	21	9
2002	50	31	7
2003	35	20	14
2004	77	34	11
Total	228	131	50

Table 5

Total Enquiries Generated			
Year	TOI	HT	Others
2000	65	44	22
2001	84	42	38
2002	122	49	25
2003	152	68	40
2004	242	70	32
Total	665	273	157

1 to 7

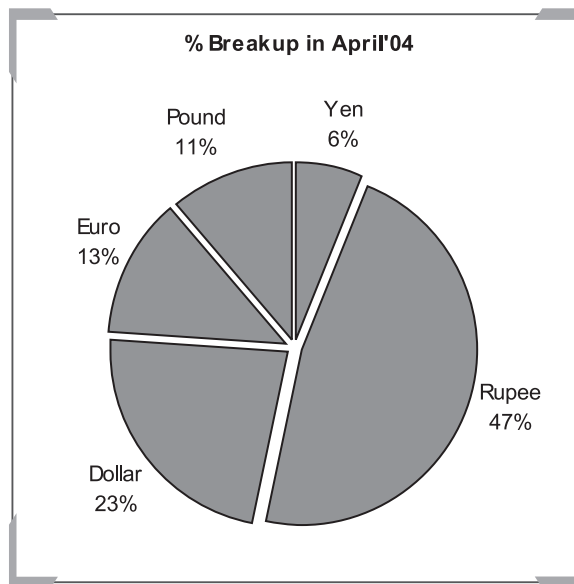
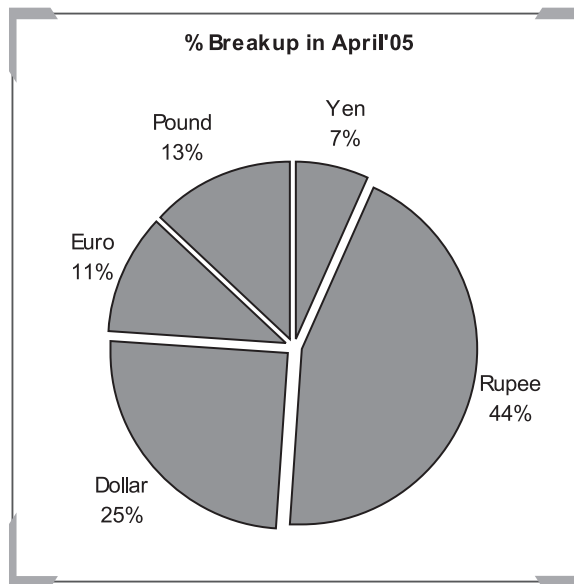
1. While the amount of money spent on ads in TOI is the maximum (nearly twice as that on ads in HT or others), the number of ads is nearly the same as that in HT and less than that in others.
2. Response ratio: Average number of enquiries generated (Table 4) per advertising (Table 2)
 - (a) TOI in 2003: $152/19 = 8$
 - (b) HT in 2004: $70/18 < 4$
 - (c) Others in 2001: $38/17 < 2.5$
 - (c) TOI in 2002: $122/15 > 8$So, amongst the given options, TOI in 2002 had the highest response ratio.
3. Amongst the three publications, the total number of clients (Table 5) to the number of enquiries generated was the least while the number of ads was the higher for others. So, the response ratio for others was the lowest during the given period.
4. Conversion ratio: Ratio of number of clients (Table 5) to the number of enquires generated (Table 4)
For HT:
 $2001: 21/42 = 50\%$ $2003: 20/68 < 33\%$ $2002: 31/49 > 60\%$
 $2000: 25/44 > 55\%$
So, amongst the given options, HT had the lowest conversion ratio in 2003.
5. Conversion ratio: Ratio of number of clients (Table 5) to the number of enquiries generated (Table 4) over the entire period
TOI: $228/665 > 33\%$ HT: $131/273 = 48\%$ Others: $50/157 < 33\%$
So, the conversion ratios are in the order: Others < TOI < HT
6. Success ratio of number of clients (Table 5) to number of ads (Table 2)
Success ratio for TOI over the entire period = $228/94 = 2.43$; Success Ratios for others in 2003 = $14/22 = 0.63$
Required percentage = $2.43 - 0.63/0.63 \times 100 = 285\%$ (You can see that it is < 300%)
7. You need not calculate the success Ratios in 2001, 2002 and 2003 to compare since the number of clients won by TOI is higher than HT and the number of ads in TOI is lower than HT in each of these years. So, the success ratio for TOI is higher than for HT in these 3 years. Comparing the success ratios for 2000 (when number of clients is less for TOI) and 2004 (when number of ads in TOI is more):

2000: Success ratio for TOI = $23/10 = 2.3$;
 Success ratio for HT = $25/12 = 2.083 < 2.3$

2004: Success ratio for TOI = $77/38 > 2$;
 Success ratio for HT = $34/18 < 2$

So, the success ratio for TOI > the success ratio for HT in each of the 5 years.

8 to 13



8. Dollar reserves in April 2004 = $0.23 \times 5 = ₹1.15$ crores = ₹11.5 million
= \$ 11.5/50 million = \$ 0.23 million $\approx$ 0.25 million
9. Yen reserves in April 2005 = 7% of ₹7 crores = ₹0.49 crores
= ₹4.9 million $\approx$ 5 million
10. The ratio of the amount of reserves in dollar to that in euro is the same as the ratio of their respective percentages in rupee equivalent terms i.e., 23 : 13 which is very close to 7 : 4.
11. Rupee equivalent in pound reserves in April 2005 = 13% of 7 crores = 0.91 crores
Rupee equivalent Yen reserves in April 2005 = 6% of 5 crores = 0.3 crores
 $\Rightarrow$ the money in pound reserves in April 2005 is nearly three times the money in Yen reserves in April 2004.

12. Rupee reserves in April 2004 = 47% of 5 crores = 2.35 crores
 Rupee reserves in April 2005 = 44% of 7 crores = 3.08 crores
 Percentage increase in Rupee reserves = $308 - 235 / 235 \times 100$
 $= 73 / 235 \times 100 = 31\%$
 The following table summarizes the status of reserves of various currencies (in Lacs)

	2004	2005	Absolute Increase	% Increase
Rupee	235.00	308.00	73.00	31.06
Dollar	2.30	4.00	1.70	73.91
Euro	1.23	1.36	0.13	10.56
Pound	0.73	1.11	0.38	51.79
Yen	0.86	1.19	0.34	39.13

13. Absolute change for Dollar reserves
 $= 0.25 \times 700 - 0.23 \times 500 = ₹60$ lacs
 Absolute change for Euro reserves
 $= 0.11 \times 700 - 0.13 \times 500 = ₹12$ lacs
 Absolute change for Pound reserves
 $= 0.13 \times 700 - 0.11 \times 500 = ₹36$ lacs
 Absolute change for Rupee reserves
 $= 0.44 \times 700 - 0.47 \times 500 = ₹73$ lacs
 Absolute change for Yen reserves
 $= 0.07 \times 700 - 0.06 \times 500 = ₹19$ lacs
 ⇒ The maximum absolute increase is for the Rupee (change of 73 lacs)

14 to 20

The population of ABC in January 2002 was $2.4 / 1.2 = 2$ million; in January 2003 was 2.4 million;

In January 2004 was $2.4 \times 1.2 = 2.88$ million; in January 2005 was $2.4 \times (1.2)^2 = 3.46$ million

14. Since the voting population increases by 20% each year, an increase in the number of people choosing an option would take place between any two years if:
- the percentage of people choosing an option would remain the same or increase between the two years
 - $1.2 \times \text{percentage in the second year} \geq \text{percentage in the first year}$
- Increase in each year, from 2003 to 2005, happens only for 'probably prefer state' and 'probably prefer private'
15. Using the reverse of the above conditions, you can see that the actual percentage voting for each one of the options increased in at least one of the years. Hence, none of the options saw a continuous decrease over the period.
16. Assume that P_1 and P_2 are the percentage votings for an option in January 2002 and January 2005 respectively. Then, the greatest absolute increase in the number of people would be for the option for which $(3.46P_2 - 2P_1)$ is the highest. This is the highest for the option 'probably prefer state'.

17. Assume that P_1 and P_2 are the percentage voting for an option in January 2002 and January 2005 respectively. A decrease in the number of people would take place for the option for which $(3.46 P_2 - 2 P_1) < 0$. This is so for the option 'definitely prefer private'.
18. Assume that P_1 and P_2 are the percentage votings for an option in January 2002 and January 2005 respectively. Then, the greatest percentage increase in the number of people would be for the option for which $3.46P_2 - 2 P_1/2P_1$ is the highest or $1.73 P_2/P_1$ or P_2/P_1 is the highest. This is clearly the case for the option 'don't know'.
19. For 2002, 2003 & 2004 the highest percentage is for D.P.S. (Definitely Prefer State). The maximum was 46% in 2003 & the number of voter for this, must be more than 2002 & 2004 clearly which has 35% & 37% respectively.
 Number of voter for D.P.S. in 2003 = 46% of $2.4 \times 1.2 = 1.32$ million. In 2005, the highest percentage is for P.P.S. (Preferably Prefer State).
 Number of voter for P.P.S. in 2005 = 35% of $1.2 \times 1.2 \times 1.2 \times 2.4 = 1.45$ million. So, the highest voter in 1 year were obtained by P.P.S.
20. In 2002 the population is 2.4 million
 Number of voter for state ownership = $35\% + 29\% = 64\%$ of 2.4 million = 1.53 million.
 Number of voter for private ownership = $24\% + 7\% = 31\%$ of 2.4 million = 0.74 million.
 In 2003, the population is 2.4 million + 20% of 2.4 million = 2.88 million.
 Number of voter for state ownership = $46\% + 30\% = 76\%$ of 2.88 million = 2.19 million.
 Number of voter for private ownership = $14\% + 6\% = 20\%$ of 2.88 million = 0.58 million.
 In 2004, the population is 2.88 million + 20% of 2.88 million = 3.45 million.
 Number of voters for state ownership = $37\% + 28\% = 65\%$ of 3.46 million = 2.25 million.
 Number of voters for private ownership = $23\% + 6\% = 29\%$ of 3.46 million = 1.00 million.
 In 2005, the population is 3.46 million + 20% of 3.46 million = 4.15 million.
 Number of voters for state ownership = $32\% + 35\%$ of 4.15 million = 2.78 million.
 Number of voters for private ownership = $13\% + 11\%$ of 4.15 million = 1.00 million. Required difference = 5.4 million.

21 to 25

Population = 12 billion $\Rightarrow$ working population = $0.7 \times 12 = 8.4$ billion.

	Contribution to GDP (\$ billion)	Number of People (billion)	Productivity (\$/person)
Agriculture	= 0.27 of 650 = 175.5	= (22/36) of 8.4 = 5.13	34.2
Manufacturing	= 0.22 of 650 = 143	= (9/36) of 8.4 = 2.1	68.1
Services	= 0.51 of 650 = 331.5	= (5/36) of 8.4 = 1.17	284.1
Working population	650	= 0.7 of 12 = 8.4	77.4
Total population	650	12	54.2

21. Non-working population contributes nothing to the GDP; hence, its productivity is zero.
22. Required difference = $5.13 - 1.17 = 3.96$ billion ≈ 4 billion
23. Required percentage = $2.1/12 \times 100 = 17.5\%$
24. The productivity of total population = 54.2. The productivity of the manufacturing & services sectors is more than 54.2.
Correct option is (c)
25. Since we do not know anything about the non-working population, we cannot determine the answer.

PART 3

BENCHMARKING TESTS

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BENCHMARKING TEST 1

Instructions

There are 25 questions in this test.

Each question carries 4 marks. There is 25% negative marking.

Time Limit = 50 minutes

Total Marks = 100 marks

Qualifying Marks = 68 marks

Break-up of the expected Percentile (Assuming this to be CAT paper):

Marks	76	74	72	68	66	64	61	56	51
Percentile	99	98	97	94	92	90	85	75	65

Directions for questions 1 to 4: *Go through the data set given below and solve the questions based on it.*

Following table gives the top 7 sectors attracting FDI equity inflow during the period 2001–02 to 2010–11 (as given in cumulative inflows which is the summation of all the equity inflows during the period 2001–02 to 2010–11 in that sector).

Sectors attracting maximum FDI Equity Inflows (₹Crores)					
Rank	Sector	2008–09	2009–10	2010–11	Cumulative Inflows
1	SERVICES SECTOR	28,516	20,776	15,539	120,771
2	COMPUTER	7,329	4,351	3,571	48,400
3	TELECOM	11,727	12,338	7,546	48,220
4	REAL ESTATE	12,621	13,586	5,149	43,192
5	CONSTRUCTION	8,792	13,516	5,077	40,770

(Continued)

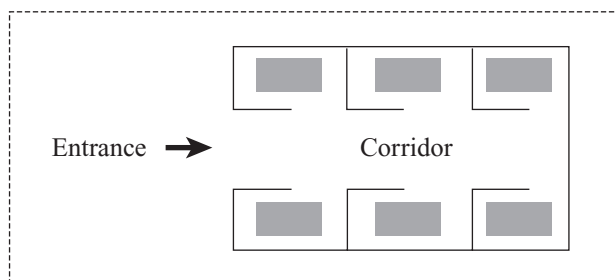
3.4 Benchmarking Tests

Sectors attracting maximum FDI Equity Inflows (₹Crores)

Rank	Sector	2008–09	2009–10	2010–11	Cumulative Inflows
6	AUTOMOBILES	5,212	5,754	6,008	26,831
7	POWER	4,382	6,908	5,709	26,712

- Which sector has attracted third highest FDI equity inflows from the year 2001–02 to 2007–08?
(a) Computer (b) Telecom
(c) Real Estate (d) Power
- Telecom sector accounts for 8% of total cumulative inflows during the whole period. What percentage of total cumulative inflows is accounted for by Services sector during the whole period?
(a) 23% (b) 20%
(c) 18% (d) cannot be determined
- Out of the mentioned sector, how many sectors have seen a consistent rise or consistent decline across the years from 2008–09 to 2010–11?
(a) 2 (b) 3
(c) 4 (d) 1
- For the year 2008–09, which sector accounts for the maximum percentage of the total FDI equity inflows of that particular sector for the whole period 2001–02 to 2010–11?
(a) Computer (b) Telecom
(c) Real Estate (d) Services Sector

Directions for questions 5 to 8: Answer the questions on the basis of following information.



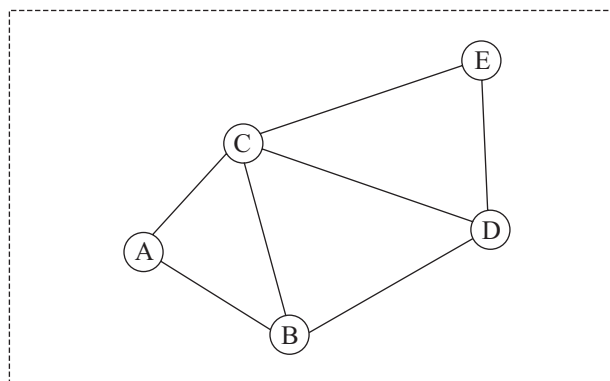
The plan above shows an office block for six officers, A, B, C, D, E and F. Both B and C occupy offices to the right of corridor (as one enters the office block) and A occupies an office to the left of the corridor. E and F occupy offices on opposite sides of the corridor but their offices do not face each other. The offices of C and D face each other. E does not have a corner office.

F's office is further down the corridor than A's, but on the same side.

- If E sits in his office and faces the corridor, whose office is to his left?
(a) A (b) B
(c) C (d) D
- Whose office faces A's office?
(a) B (b) C
(c) D (d) E
- Who is/are F's neighbour(s)?
(a) A only (b) A and D
(c) C only (d) B and C
- D was heard telling someone to go further down the corridor to the last office on the right. To whose room was he trying to direct that person?
(a) A (b) B
(c) C (d) F

Directions for questions 9 and 10: Answer the questions on the basis of following information.

Shown below is a layout of major streets in a city:



Two days (Thursday and Friday) are left for campaigning before a major election, and the city administration has received requests from five political parties for taking out their processions along the following routes.

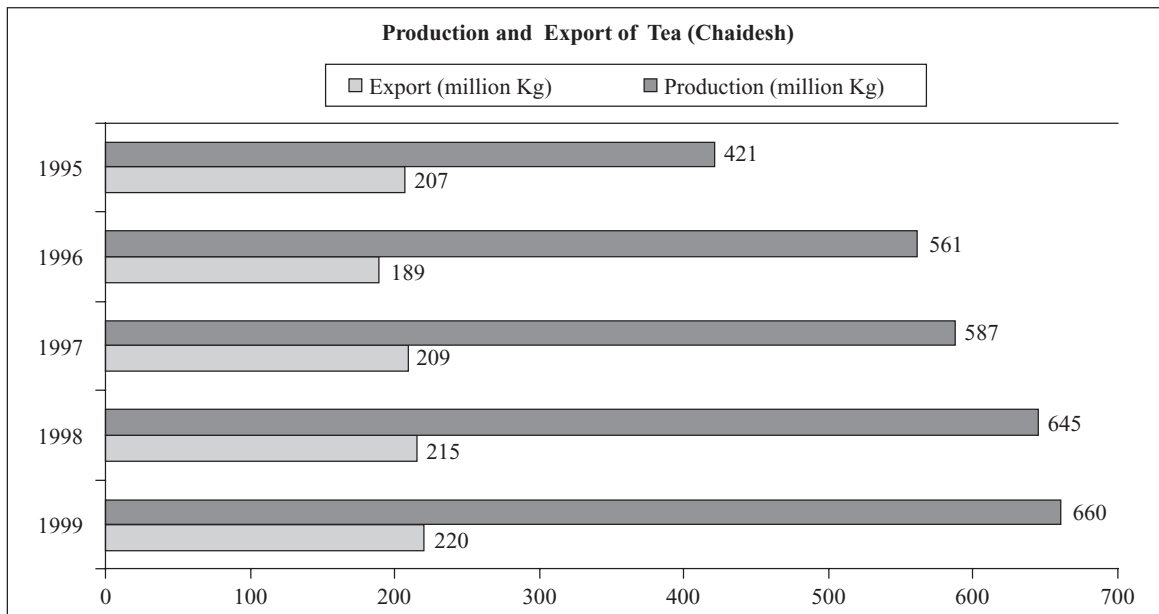
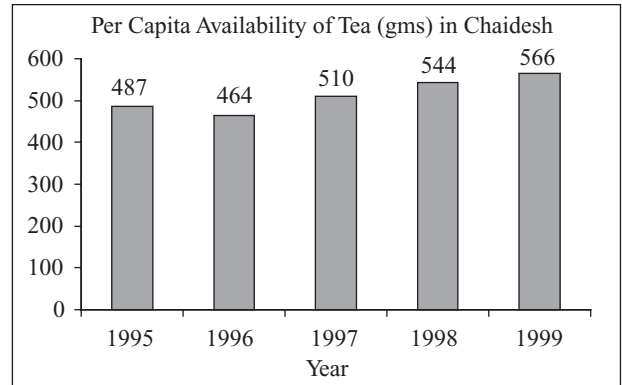
Congress : A-C-D-E
 BJP : A-B-D-E
 SP : A-B-C-E
 BSP : B-C-E
 CPM : A-C-D

Street B-D cannot be used for a political procession on Thursday due to a religious procession. The district administration has a policy of not allowing more than one procession to pass along the same street on the same day. However, the administration must allow all parties to take out their procession during these two days.

9. Congress procession can be allowed
 - (a) only on Thursday
 - (b) only on Friday.
 - (c) on either day.
 - (d) only if the religious procession is cancelled.
10. Which of the following is not true?
 - (a) Congress and SP can take out their processions on the same day.

- (b) The CPM procession cannot be allowed on Thursday.
- (c) The BJP procession can only take place on Friday.
- (d) Congress and BSP can take out their processions on the same day.

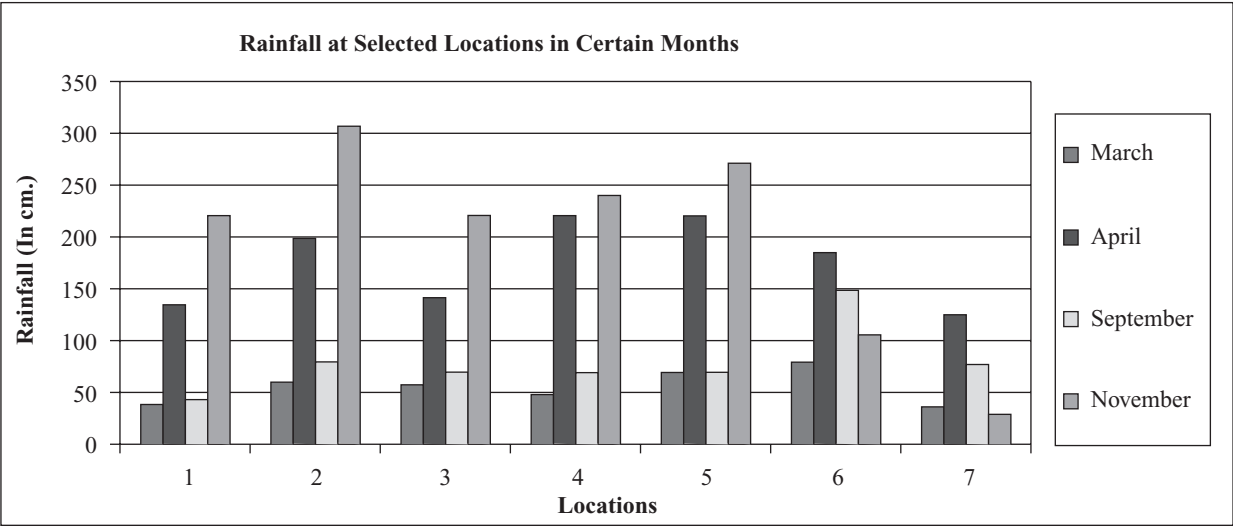
Directions for questions 11 to 13: Answer the questions on the basis of the following charts.



(Note: Availability is defined as production less export.)

11. In which year during the period 1996–1999 was Chaidesh's export of tea, as a proportion of tea produced, the highest?
 - (a) 1996
 - (b) 1997
 - (c) 1998
 - (d) 1999
12. In which of the following years was the population of Chaidesh the lowest?
 - (a) 1995
 - (b) 1996
 - (c) 1997
 - (d) 1999
13. The area under tea cultivation continuously decreased in all four years from 1996 to 1999, by 10%, 7%, 4% and 1% respectively. In which year was tea productivity (production per unit of area) the highest?
 - (a) 1999
 - (b) 1998
 - (c) 1997
 - (d) 1996

Directions for questions 14 and 15: Answer the questions on the basis of the data presented in the figure below.



14. Which of the following statements is correct?
- (a) November rainfall exceeds 100 cm in each location.
 - (b) September rainfall exceeds 50 cm in each location.
 - (c) March rainfall is lower than September rainfall in each location.
 - (d) None of the above.
15. Locations 6 and 7 differ from all the rest because only in these two locations:
- (a) April rainfall exceeds March rainfall.
 - (b) Peak rainfall occurs in April.
 - (c) November rainfall is lower than March rainfall.
 - (d) April rainfall is less than 20 cm.

Directions for questions 16 to 18: Answer the questions on the basis of following information.

In a Decathlon, the events are:100 m race, 400 m race, 100 m hurdles race, 1500 m race, High jump, Pole vault, Long jump, Discus, Shot put and Javelin. The performance in the first four of these events is consolidated into Score 1, the next three into Score 2, and the last three into Score 3. Each such consolidation is obtained by giving appropriate positive weights to individual events. The final score is simply the total of these three scores. The athletes with the highest, second highest and the third highest final scores receive the gold, silver and bronze medals, respectively. The table given below gives the scores and performance of nineteen top athletes in this event.

Name	Country	Final Score	Score-1	Score-2	Score-3	100 m	High jump	Pole-vault
Eduard Hamalainen	BLS	8802	491	5322	2989	10.74	2.1	4.8
Michael Smith	CAN	8855	174	5274	3407	11.23	2.0	4.9
Tomas Dvorak	CZE	8796	499	5169	3128	10.63	1.9	4.7
Uwe Fririmuth	DDR	8799	441	5491	3124	11.06	2.0	4.8
Torsten Voss	DHK	8880	521	5234	5868	10.69	2.1	5.1
Erki Nool	EST	8768	408	5553	2808	10.71	2.0	5.4
Christian Plaziat	FRG	8775	563	5430	2781	10.72	2.1	5.0

Name	Country	Final Score	Score-1	Score-2	Score-3	100 m	High jump	Pole-vault
Jurgen Hingsen	FRG	8792	451	5223	3033	10.95	2.0	4.9
Siegfried Wentz	FRG	8856	470	5250	3137	10.85	2.1	4.8
Guido Kratschmer	FRG	8861	575	5308	3064	10.58	2.0	4.6
Daisy Thompson	GBR		582		3003	10.55	2.1	4.6
Frank Busemann	GER	8905	568	5392	2945	10.60	2.0	4.8
Alexandr Apaichev	SOV	8803	492	5370	3115	10.92	2.0	4.8
Grigory Degtyarov	SOV	8823	339	5196	3114	11.05	2.1	4.9
Robert Zmelik	TCH	8832	494	5455	2883	10.78	2.1	5.1
Dave Johnson	USA	8811	366	5370	3114	10.78	2.1	5.0
Steve Fritz	USA	8827	427	5163	3119	10.75	2.0	5.0
Bruce Jenner	USA	8846	483	5280	3200	10.94	2.0	4.8
Dan O'Brien	USA	8897	408	5331	3120	10.36	2.1	4.8

16. The athletes from FRG and USA decided to run a 4 x 100 m relay race for their respective countries with the country having three athletes borrowing the athlete from CZE. Assume that all the athletes ran their stretch of the relay race at the same speed as in Decathlon event. How much more time did the FRG relay team take as compared to the USA team?
 (a) 0.18 (b) 0.28
 (c) 0.78 (d) None of these
17. What is the least that Daisy Thompson must get in Score 2 that ensures him a bronze medal?
 (a) 5309 (b) 5296
 (c) 5271 (d) 5270
18. At least how many competitors (excluding Daisy Thompson) must Michael Smith have out-jumped in the long jump event?

- (a) 1 (b) 2
 (c) 3 (d) 4

Directions for questions 19 to 22: Answer the questions on the basis of the following information.

The following is the Wholesale Price Index (WPI) of a select list of items with the base year of 1993–94. In other words, all the item prices are made 100 in that year (1993–94). Prices in all other years for an item are measured with respect to its price in the base year. For instance, the price of cement went up by 1% in 1994–95 as compared to 1993–94. Similarly, the price of power went up by 3% in 1996–97 as compared to 1993–94.

	1993–94	1994–95	1995–96	1996–97	1997–98	1998–99	1999–2000	2000–01	2001–02	2002–03
All Items	100	102.0	102.5	104.00	103.00	105.00	106.00	108.00	107.00	106.00
Cement	100	101.0	100.5	103.00	102.50	103.50	103.10	103.80	103.70	104.00
Limestone	100	102.0	102.5	102.75	102.25	103.00	104.00	105.00	104.50	105.00
Power	100	101.5	102.5	103.00	103.50	104.00	106.00	107.00	107.50	108.00

(Continued)

3.8 Benchmarking Tests

	1993–94	1994–95	1995–96	1996–97	1997–98	1998–99	1999–2000	2000–01	2001–02	2002–03
Steel	100	101.5	101.0	103.50	104.00	104.25	105.00	105.50	106.00	105.50
Timber	100	100.5	101.5	102.00	102.50	102.00	103.00	103.50	104.00	104.50
Wages	100	101.5	103.0	103.50	104.00	104.25	104.00	104.75	104.90	105.30

19. Let us suppose that one bag of cement (50 kg) consumes 100 kg of limestone and 10 units of power. The only other cost item in producing cement is in the form of wages. During 1993–94, limestone, power and wages contribute, respectively, 20%, 25%, and 15% to the cement price per bag. The average operating profit (% of price per cement bag) earned by a cement manufacturer during 2002–03 is closest to
 (a) 40 % (b) 39.5%
 (c) 38.5 % (d) 37.5 %
20. Steel manufacturing requires the use of iron ore, power and manpower. The cost of iron ore has followed the All Item Index. During 1993–94 power accounted for 30% of the selling price of steel, iron ore for 25%, and wages for 10% of the selling price of steel. Assuming the cost and price data for cement as given in the previous question, the operating profit (% of selling price) of an average steel manufacture in 2002–03:
 (a) is more than that of a cement manufacturer.
 (b) is less than that of a cement manufacturer.
 (c) is the same as that of a cement manufacturer
 (d) cannot be determined
21. Which item experienced continuous price rise during the ten-year period?
 (a) Power (b) Cement
 (c) Wages (d) Limestone
22. Which item(s) experienced only one decline in price during the ten-year period?
 (a) Steel and Limestone
 (b) Steel and Timber
 (c) Timber
 (d) Timber and Wages
- Directions for questions 23 to 25: Answer the question on the basis of the table given below.**

	1901	1911	1921	1931	1941	1951	1961	1971	1981	1991	2001
AP	985	992	993	987	980	986	981	977	975	972	978
Assam	919	915	896	874	875	868	869	896	910	923	932
Bihar	1061	1051	1020	995	1002	1000	1005	957	948	907	921
Goa	1091	1108	1120	1088	1084	1128	1066	981	975	967	960
Gujarat	954	946	944	945	941	952	940	934	942	934	921
Haryana	867	835	844	844	869	871	868	867	870	865	861
HP	884	889	890	897	890	912	938	958	973	976	970
J&K	882	876	870	865	869	873	878	878	892	896	900
Karnataka	983	981	969	965	960	966	959	957	963	960	964
Kerala	1004	1008	1011	1022	1027	1028	1022	1016	1032	1036	1058
MP	972	967	949	947	946	941	932	920	921	912	920

	1901	1911	1921	1931	1941	1951	1961	1971	1981	1991	2001
Maharashtra	978	966	950	947	949	941	936	930	937	934	922
Orissa	1037	1056	1086	1067	1053	1022	1001	988	981	971	972
Punjab	832	780	799	815	836	844	854	865	879	882	874
Rajasthan	905	908	896	907	906	921	908	911	919	910	922
TN	1044	1042	1029	1027	1012	1007	992	978	977	974	986
UP	938	916	908	903	907	998	907	876	882	876	898
WB	945	925	905	890	852	865	878	891	911	917	934
India	972	964	955	950	945	946	941	930	934	927	933

23. Each of the following statements pertains to the number of states with females outnumbering males in a given census year.
Which of these statements is NOT correct?
- (a) This number never exceeded 5 in any census year.
(b) This number registered its sharpest decline in the year 1971.
(c) The number of consecutive censuses in which this number remained unchanged never exceeded.
(d) Prior to the 1971 census, this number was never less than 4.
24. The two states which achieved the largest increase in sex ratio over the period 1991–2001 are
(a) Punjab and HP
(b) HP and Kerala
(c) Assam and J & K
(d) Kerala and J & K
25. Among the states which have a sex ratio exceeding 1000 in 1901, the sharpest decline over the period 1901–2001 was registered in the state of
(a) Goa (b) TN
(c) Bihar (d) Orissa

ANSWER KEYS

1. (b) 2. (b) 3. (b) 4. (c) 5. (c) 6. (d) 7. (a) 8. (b) 9. (a) 10. (d)
11. (b) 12. (a) 13. (a) 14. (d) 15. (b) 16. (a) 17. (b) 18. (d) 19. (c) 20. (b)
21. (a) 22. (d) 23. (c) 24. (b) 25. (c)

HINTS AND EXPLANATIONS

1 to 4

1. To solve this question, we need to add the FDI equity inflows from 2008–09 to 2010–11 and subtract this from cumulative inflows. We are not required to do the actual calculation. We'll just take the Thousands value of all the years. We can also observe that answer has to be either Computer or Telecom (after doing preliminary observation of data).

	2008–11	Remaining Years
SERVICES SECTOR	63	57
COMPUTER	14	32
TELECOM	30	17

3.10 Benchmarking Tests

	2008–11	Remaining Years
REAL ESTATE	30	11
CONSTRUCTION	26	13
AUTOMOBILES	16	10
POWER	16	10

Third highest is for Telecom. Hence option (b) is the answer.

- This is a simple calculation based question.
Given that $8\% = 48,220 \Rightarrow 1\% = 6000$ (Approx.)
So, $120,771 = 20\%$
Hence (b) is the answer.
- Following are the sectors:
SERVICES SECTOR, COMPUTER, AUTOMOBILES
Hence option (b) is the answer.
- We have to choose one of these four options. Since options do not mention “none of these”, we will focus upon these four options only.

Percentage to total FDI equity in case of

$$\text{Computer} = \frac{7329}{47700}$$

$$\begin{aligned} &\text{Percentage to total FDI equity in case of Telecom} \\ &= \frac{11727}{48220} \end{aligned}$$

$$\begin{aligned} &\text{Percentage to total FDI equity in case of Real} \\ \text{Estate} &= \frac{12621}{43192} \end{aligned}$$

$$\begin{aligned} &\text{Percentage to total FDI equity in case of Services} \\ \text{Sector} &= \frac{28516}{120771} \end{aligned}$$

Let us first go through elimination:

In case of three options namely Computer, Telecom, Real Estate, Base (Denominator i.e., Cumulative Inflows) is approximately same. Numerator of Real Estate is maximum, hence out of these three options, Real estate is maximum.

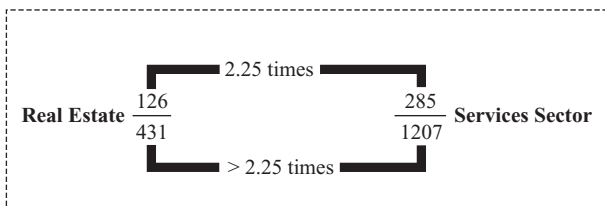
So now we have to compare Real Estate with Services sector:

$$\text{Real Estate } \frac{12621}{43192} \quad \frac{28516}{120771} \text{ Services Sector}$$

First of all, let us eliminate last two digits from the numerator and denominator from both the sectors:

$$\text{Real Estate } \frac{126}{431} \quad \frac{285}{1207} \text{ Services Sector}$$

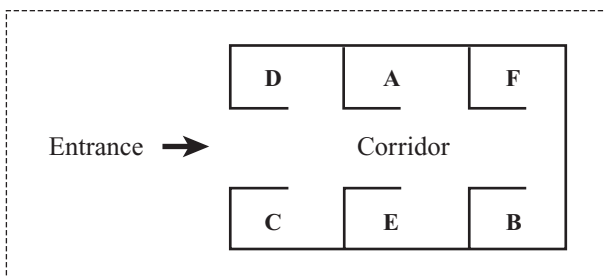
It can be seen that numerator of Services sector is approximately 2.25 times of the numerator of Real Estate, but denominator of Services sector is more than 2.25 times of denominator of Real Estate (we just want to know if it is more than 2.25 or less than 2.25, we don't need the exact value).



Hence Real Estate is the answer. Hence option (c) is the answer.

5 to 8

After analysing the given information, we can draw the following diagram.



So, answer to all these questions can be easily obtained.

9 and 10

After examining the information given to us, we can assign days for the parties in the following manner:

Congress	Thursday
BJP	Friday
SP	Thursday
BSP	Friday
CPM	Friday

11 to 13

11. In the year 1997, there is highest export of tea as a proportion of total production. (approx.35%).
12. To find the population we have to calculate (Availability of Tea) $\div$ (Per capita Availability of Tea). On finding the values for the given years, value for the year 1995 is seen to be the lowest.
13. In the year 1999, there is highest tea productivity because in the year 1999, production is the maximum and area under cultivation is the minimum.

14 and 15

14. Option (a) November rainfall exceeds 100 cm in each location $\Rightarrow$ This does not happen in case of location 7.
Option (b) September rainfall exceeds 50 cm in each location $\Rightarrow$ This does not happen in case of location 1.
Option (c) March rainfall is lower than September rainfall in each location $\Rightarrow$ This does not happen in case of location 5, as they are equal.
Hence option (d) is the answer.
15. Option (a) April rainfall exceeds March rainfall $\Rightarrow$ It happens at all the locations.
Option (b) Peak rainfall occurs in April $\Rightarrow$ It is true as none of the other locations has a peak rainfall in April. Hence option (b) is the answer.
Though we are not required now to check other options, still to be absolutely sure, we check option (c) and (d).
Option (c) November rainfall is lower than March rainfall $\Rightarrow$ It is not true in case of location 6. Hence not the answer.
Option (d) April rainfall is less than 20 cm $\Rightarrow$ It is not true in case of locations 6 and 7.

16 to 18

16. Total time taken by FRG team = $(10.95 + 10.85 + 10.58 + 10.63) = 43.01$
Total time taken by USA team = $(10.78 + 10.75 + 10.94 + 10.36) = 42.83$
Difference = 0.18.
17. The score of person who obtained 1st rank is 8905 and that of the 2nd rank holder is 8897. Therefore

he must get a score of greater than 8880 but less than 8897. His present score is $582 + 3003 = 3585$. Now if he gets a score of 5296, his total score would become $3585 + 5296 = 8881$, and that would entitle him for a bronze medal.

18. There were four competitors namely Torsten Voss, Jurgen Hingsen, Grigory Degtyarov and Steve Fritz in which Michael Smith has performed better than his competitors in Long jump.

19 to 21

19. Total cost = ₹63.795

Cement Cost	WPI	Weights	Cost
Limestone	105	0.2	21
Power	108	0.25	27
Wages	105.3	0.15	15.795

Thus, operating profit per bag of cement = $\{(104 - 63.795) \times 100\} \div 104 = 38.5\%$.

21. It can be observed from the table that "Power" experiences continuous price rise during the ten-year period.
22. It can be observed from the table that "Timber" & "Wages" experience only one decline in price during the ten-year period.

23 to 25

24. Since options mention Punjab, HP, Kerala, Assam and J&K only, we will check for only these values. Out of the options mentioned, HP and Kerala show maximum increase. Hence option (b) is the answer.
25. States that had a sex ratio exceeding 1000 in 1901 are Bihar, Goa, Kerala, Orissa and TN. Clearly, Kerala, can be ruled out because there is increase in case of Kerala. Even Orissa and TN can be ruled out because decline is not as sharp as Bihar or Goa in this case. So answer will be one of Goa or Bihar.
Decrease in case of Bihar = 140
Decrease in case of Goa = 131
Hence option (c) is the answer.

BENCHMARKING TEST 2

Instructions

There are 25 questions in this test.
Each question carries 4 marks. There is 25% negative marking.
Time Limit = 50 minutes
Total Marks = 100 marks
Qualifying Marks = 64 marks
Break-up of the expected Percentile (Assuming this to be CAT paper):

Marks	74	72	69	65	62	60	57	52	47
Percentile	99	98	97	94	92	90	85	75	65

Directions for questions 1 to 4: *Go through the data set given below and solve the questions based on it.*

Table given below presents the collections/business done by the top 12 movies in India. Column 3 gives the year in which movie was released, column 4 given the gross

collection by the movie over the period of time since its release, column 5 gives the distributor’s share out of the gross collection.

Answer the questions based on the data given in the table below.

All India (Figures in ₹)

Rank	Movie Name	Release Year	Gross collection (₹Crores)	Distributor Share (₹Crore)	Verdict
1	Three Idiots	2009	269	99	All Time Blockbuster
2	Dabangg	2010	187	77	All Time Blockbuster
3	Ghajini	2008	155	60	All Time Blockbuster
4	Golmaal 3	2010	144	58	Blockbuster

All India (Figures in ₹)

Rank	Movie Name	Release Year	Gross collection (₹Crores)	Distributor Share (₹Crore)	Verdict
5	Gadar Ek Prem Katha	2001	130	57	All Time Blockbuster
6	Hum Aapke Hain Kaun	1994	123	53	All Time Blockbuster
7	Raajneeti	2010	124	49	Blockbuster
8	Dhoom 2	2006	111	46	Blockbuster
9	Dilwale Dulhania Le Jayenge	1995	106	46	All Time Blockbuster
10	Rab Ne Bana Di Jodi	2008	117	44	Blockbuster
11	Om Shanti Om	2007	110	40	Blockbuster
12	Krishh	2006	97	40	Blockbuster

*Adapted from data available at boxofficeindia.com.

- For how many movies, distributor's share is more than 40% of the gross collection?
(a) 5 (b) 6
(c) 7 (d) 8

- How many movies released in a non-leap year have been declared a Blockbuster?
(a) 5 (b) 6
(c) 7 (d) 8

- Since value of money across the years is not constant, we use Money Value Parity Unit (MVP) to compare the value of money across the year. Assuming 1990 as the base year with MVP = 100, all the years have been assigned a MVP. For example, MVP of 2000 = 58. It means that:

Value of ₹100 of the year 2000 = Value of ₹58 of 1990. So revenue of ₹100 collected in the year 2000 is same as revenue of ₹58 collected in the year 1990. Higher the collection, more successful is the movie.

Consider the data given below regarding the MVP of different years:

1990	100
1995	80
2001	60
2010	40

Assume that the all the collection occur in the same year as that of release year. Converting the collections on the base year 1990, arrange the following movies in descending order of success:

Dabangg, Golmaal 3, Gadar Ek Prem Katha, Dilwale Dulhania Le Jayenge

- Dabangg, Golmaal 3, Gadar Ek Prem Katha, Dilwale Dulhania Le Jayenge
- Dabangg, Golmaal 3, Dilwale Dulhania Le Jayenge, Gadar Ek Prem Katha
- Dilwale Dulhania Le Jayenge, Gadar Ek Prem Katha, Dabangg, Golmaal 3
- Dilwale Dulhania Le Jayenge, Dabangg, Gadar Ek Prem Katha, Golmaal 3

- How many All Time Blockbuster movies have surpassed gross collection of ₹100?
(a) 5 (b) 6
(c) 4 (d)

Directions for questions 5 and 6: Answer the questions based on the following information.

A boy is asked to put one mango in a basket when ordered 'One', one orange when ordered 'Two', one apple when ordered 'Three', and is asked to take out from the basket one mango and an orange when ordered 'Four'. A sequence of orders is given as: 1 2 3 3 2 1 4 2 3 1 4 2 2 3 3 1 4 1 1 3 2 3 4

5. How many total oranges were in the basket at the end of the above sequence?
 (a) 1 (b) 4
 (c) 3 (d) 2
6. How many total fruits will be in the basket at the end of the above order sequence?
 (a) 9
 (b) 8
 (c) 11
 (d) 10

Directions for questions 7 to 10: Answer the question based on the information given below.

A country has following types of traffic signals.

3 red lights = Stop

2 red light = turn left

1 red light = turn right

3 green lights = go at 100 km/h speed

2 green lights = go at 40 km/h speed

1 green light = go at 20 km/h speed

A motorist starts at a point on a road and follow all traffic signals. His car is heading towards the north. He encounters the following signals (the time mention in each case below is applicable after crossing the previous signal).

Starting point—1 green light

After half an hour, first signal—2 red and 2 green lights.

After 15 minutes, second signal—1 red light

After half an hour, third signal—1 red and 3 green lights

After 24 minutes, fourth signal—2 red and 2 green lights

After 15 minutes fifth signal—3 red lights

7. The total distance travelled by the motorists from the starting point till the last signal is
 (a) 90 km
 (b) 100 km
 (c) 120 km
 (d) None of these
8. What is the position (Radial distance) of the most motorists when he reaches the last signal?
 (a) 45 km directly north of the starting point
 (b) 30 km directly to the east of the starting point
 (c) 50 km away to the north-east of the starting point.
 (d) 45 km away to the north-west of the starting point

9. After the starting point if the first signal were one red and 2 green light, what would be the final position of the motorist?
 (a) 30 km to the west and 20 km to the south.
 (b) 30 km to the west and 40 km to the north
 (c) 50 km to the east and 40 km to the north
 (d) Directly 30 km to the east
10. If at the starting point, the car was heading towards south, what would be the final position of the motorist?
 (a) 30 km to the east and 40 km to the south
 (b) 50 km to the east and 40 km to the south
 (c) 30 km to the west and 40 km to the south
 (d) 50 km to the west and 20 km to the north

Directions for questions 11 to 14: Answer the questions on the basis of the following information.

Seven faculty members at a management institute frequent a lounge for strong coffee and stimulating conversation. On being asked about their visit to the lounge last Friday, we got the following responses.

JC - I came in first, and the next two persons to enter were SS and SM. When I left the lounge, JP and VR were present in the lounge. DG left with me.

JP - When I entered the lounge with VR, JC was sitting there. There was someone else, but I cannot remember who it was.

SM - I went to the lounge for a short while, and met JC, SS and DG in the lounge on that day.

SS - I left immediately after SM left.

DG - I met JC, SS, SM, JP and VR during my first visit to the lounge. I went back to my office with JC. When I went to the lounge the second time, JP and VR were there.

PK - I had some urgent work, so I did not sit in the lounge that day, but just collected my coffee and left. JP and DG were the only people in the lounge while I was there.

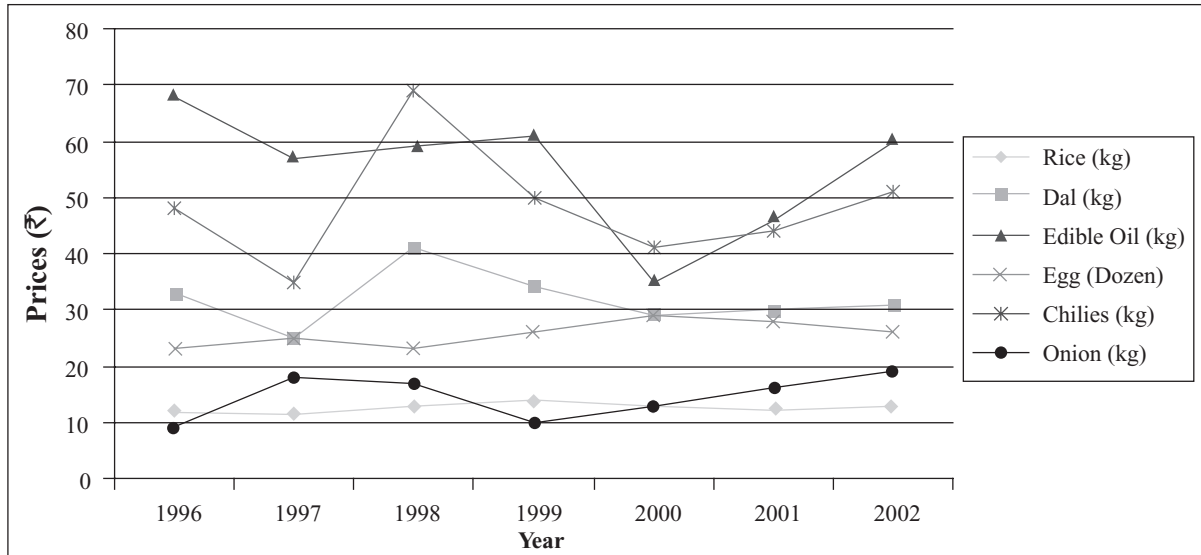
VR - No comments.

11. Based on the responses, which of the two JP or DG, entered the lounge first?
 (a) JP
 (b) DG
 (c) Both entered together
 (d) Cannot be determined
12. Who was sitting with JC when JP entered the lounge?
 (a) SS (b) SM
 (c) DG (d) PK

13. How many of the seven members did VR meet on Friday in the lounge?
 (a) 2 (b) 3
 (c) 4 (d) 5
14. Who were the last two faculty members to leave the lounge?

- (a) JC and DG
 (b) PK and DG
 (c) JP and PK
 (d) JP and DG

Directions for questions 15 to 17: Answer the questions on the basis of the data presented in the chart given below.



15. During 1996–2002, the number of commodities that exhibited a net overall increase and a net overall decrease, respectively, were
 (a) 3 and 3 (b) 2 and 4
 (c) 4 and 2 (d) 5 and 1
16. The number of commodities that experienced a price decline for two or more consecutive years is
 (a) 2 (b) 3
 (c) 4 (d) 5
17. For which commodities did a price increase immediately follow a price decline only once in this period?
 (a) Rice, Edible oil and Dal
 (b) Egg and Dal
 (c) Onion only
 (d) Egg and Onion

Directions for questions 18 to 22: Answer the questions on the basis of the following information.

Recently, the answers of a test held nationwide were leaked to a group of unscrupulous people. The

investigative agency has arrested the mastermind and nine other people A, B, C, D, E, F, G, H and I in this matter. Interrogating them, the following facts have been obtained regarding their operation.

Initially, the mastermind obtains the correct answer-key. All the others create their answer-key from one or two people who already possess the same. These people are called his/her “sources”. If the person has two sources, then he/she compares the answer keys obtained from both sources. If the key to a question from both sources is identical, it is copied, otherwise it is left blank. If the person has only one source, he/she copies the source’s answers into his/her copy. Finally, each person compulsorily replaces one of the answers (not a blank one) with a wrong answer in his/her answer key.

The paper contained 200 questions; so the investigative agency has ruled out the possibility of two or more of them introducing wrong answers to the same question. The investigative agency has a copy of the correct answer key and has tabulated the following data. These data represent question numbers.

Name	Wrong Answer(s)	Blank Answer(s)
A	46	---
B	96	46, 90, 25
C	27, 56	17, 46, 90
D	17	---
E	46, 90	---
F	14, 46	92, 90
G	25	---
H	46, 92	---
I	27	17, 26, 90

18. Which one among the following must have two sources?
 (a) A (b) B
 (c) C (d) D
19. How many people (excluding the mastermind) needed to make answer keys before C could make his answer key?
 (a) 2 (b) 3
 (c) 4 (d) 5
20. Both G and H were sources to
 (a) F
 (b) B
 (c) I
 (d) None of them
21. Which of the following statements is true?
 (a) C introduced the wrong answer to question 27.
 (b) E introduced the wrong answer to question 46.
 (c) F introduced the wrong answer to question 14.
 (d) H introduced the wrong answer to question 46.
22. Which of the following two groups of people has identical sources?
 (I) A, D and G
 (II) E and H
 (a) Only (I)
 (b) Only (II)

- (c) Neither (I) nor (II)
 (d) Both (I) and (II)

23. I started climbing up the hill at 6 AM and reached the temple at the top at 6 PM. Next day, I started climbing down at 6 AM and reached the foothill at 6 PM. I walked on the same road. The road is so narrow that only one person can walk on it at a time. Although I didn't follow a constant speed, I never stopped on my way. Which of the following must be true?
 (a) My average speed downhill was greater than that uphill.
 (b) At noon, I was at the same spot both days.
 (c) There must be a point where I reached at the same time on both the days.
 (d) There cannot be a spot where I reached at the same time on both the days.

Directions for questions 24 to 25: Answer the questions on the basis of the following information.

A statement is followed by three conclusions. Select the answer from the following options.

- A. Using the given statement, only conclusion I can be derived.
 B. Using the given statement, only conclusion II can be derived.
 C. Using the given statement, only conclusion III can be derived.
 D. Using the given statement, none of the three conclusions I, II and III can be derived.
24. An operation “#” is defined by

$$a \# b = 1 - \frac{b}{a}$$

Conclusion I. $(2 \# 1) \# (4 \# 3) = -1$

Conclusion II. $(3 \# 1) \# (4 \# 2) = -2$

Conclusion III. $(2 \# 3) \# (1 \# 3) = 0$

25. A, B, C and D are whole numbers such that $A + B + C = 118$; $B + C + D = 156$; $C + D + A = 166$; $D + A + B = 178$
 Conclusion I. A is the smallest number and $A = 21$.
 Conclusion II. D is the largest number and $D = 88$.
 Conclusion III. B is the largest number and $B = 56$.

ANSWER KEYS

1. (c) 2. (a) 3. (c) 4. (b) 5. (d) 6. (c) 7. (a) 8. (c) 9. (c) 10. (c)
 11. (b) 12. (c) 13. (b) 14. (d) 15. (c) 16. (d) 17. (d) 18. (b) 19. (c) 20. (d)
 21. (c) 22. (d) 23. (c) 24. (d) 25. (d)

HINTS AND EXPLANATIONS

1 to 4

1. At first, it might appear that this question is a real calculation nightmare. Though for most of the movies, we can get away without doing actual calculation and get a Yes/No answer (if more than 40%) by just observing the data – through approximation.

Start calculating 10% of the gross collection and see if 4 times of this value (40%) is more than distributor's share.

For example, first approximate the gross collection data for Three Idiots = ₹270 crores. 40% of this collection data = 40% of ₹270 crores = ₹108 crores. In the table, distributor's share is given as ₹99 crores, which is way below ₹108 crores. Hence, distributor's share is LESS than 40% of the gross collection.

Similarly, for Dabangg, approximate value of total collection can be taken as ₹190 crores and 40% of this = ₹76 crores. In the table, distributor's share is given as ₹77 crores, which is more than ₹76 crores. Since distributor's share is more than 40% of a larger approximated value (₹190 crores), it will be more for a smaller real value (= ₹187 crores). Hence, distributor's share is MORE than 40% of the gross collection.

Doing a similar analysis gives the following table:

Rank	Film	Year	% Share
1	Three Idiots	2009	36.8
2	Dabangg	2010	41.18
3	Ghajini	2008	38.71
4	Golmaal 3	2010	40.28
5	Gadar Ek Prem Katha	2001	43.85
6	Hum Aapke Hain Kaun	1994	43.09
7	Raajneeti	2010	39.52
8	Dhoom 2	2006	41.44
9	Dilwale Dulhania Le Jayenge	1995	43.4
10	Rab Ne Bana Di Jodi	2008	37.61

Rank	Film	Year	% Share
11	Om Shanti Om	2007	36.36
12	Krissh	2006	41.24

Grey cells show the movies that have distributor's share more than 40% of total collection. Hence, there are 7 movies. Hence, option (c) is the answer.

2. Golmaal 3, Raajneeti, Dhoom 2, Om Shanti Om, Krissh are the five movies. Hence, option (a) is the answer.

3. Value of money has depreciated over the period (gone down). So if collection is ₹100 in 2010 will be equal to collection of ₹40 in 1990. So a collection of ₹187 crores in 2010 would be equal to $\frac{40 \times 187}{100}$ = ₹74.8 crores of 1990.

Movie Name	Release Year	MVP	Gross Collection	Value (On Base Year 1990)
Dabangg	2010	40	187	74.8
Golmaal 3	2010	40	144	57.6
Gadar Ek Prem Katha	2001	60	130	78
Dilwale Dulhania Le Jayenge (DDLJ)	1995	80	106	84.8

Hence, the order is – DDLJ > Gadar Ek Prem Katha > Dabangg > Golmaal 3. Hence, option (c) is the answer.

4. Answer is 6 movies. Hence, option (b) is the answer.

5 to 6

5. Number of oranges at the end of the sequence = Number of 2s – Number of 4s = 6 – 4 = 2. Hence, option (d) is the answer.
6. Number of (1s + 2s + 3s) - 2(Number of 4s) = 19 – 8 = 11. Hence, option (c) is the answer.

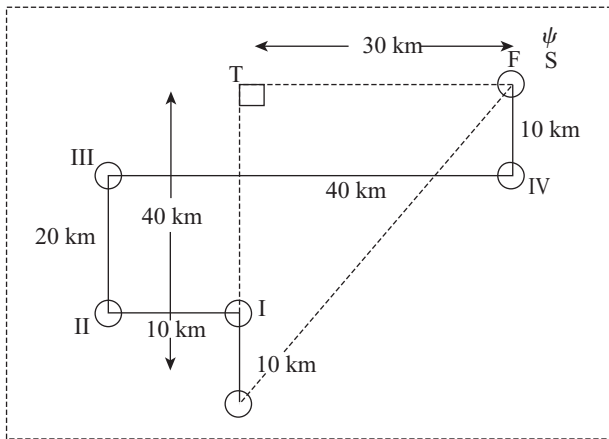
7 to 10

7. D = Distance covered; S = Speed (km/h); T = Time taken;

We know that Distance (D) = Speed (S) $\times$ Time (T)

The total distance travelled by the motorists from the starting point till last signal is $10 + 10 + 20 + 40 + 10 = 90$ km. Hence, option (a) is the answer.

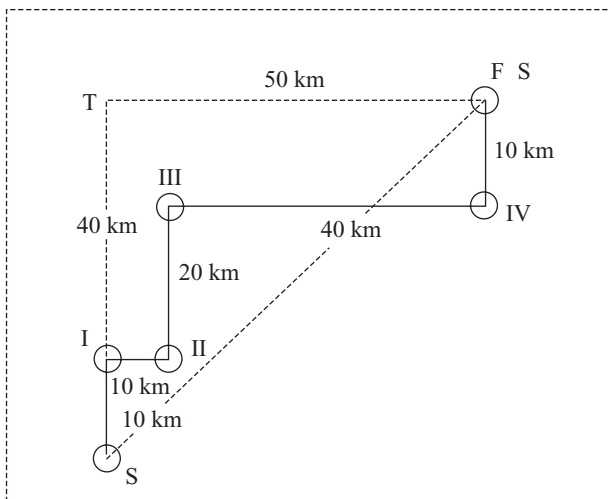
8. Applying Pythagoras theorem for a right-angled triangle.



$$\text{Required distance} = \sqrt{30^2 + 40^2} = 50 \text{ km.}$$

Hence, option (c) is the answer.

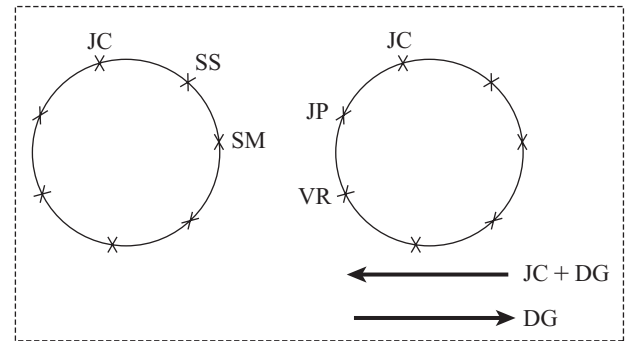
9. When first signal was 1 red and 2 green lights, the diagram will be as given below:



$$TF = 50 \text{ km; } ST = 40 \text{ km}$$

Going by the above figure, option (c) is correct, 50 km to the east and 40 km to the north.

11 to 14



11. The first one to enter the lounge was JC followed by SS and SM. Thereafter SM and SS left the lounge and JP, VR entered. Now, people to leave the lounge together were JC and DG and DG came back and met PK. Therefore, DG was the first to enter between JP or DG. Hence, option (b) is the answer.
12. DG was sitting when JP entered. Hence, option (c) is the answer.
13. VR met DG, JC and JP and the last two faculties to leave the lounge are JP & DG. Hence, option (b) is the answer.
14. Hence, option (d) is the answer.

15 to 17

15. Onion, rice, egg and chilies exhibited net overall increase and the ones that exhibited net overall decrease were dal and edible oil. Hence, option (c) is the answer.
16. Rice, egg, onion, dal and chilies experienced a price decline for two or more consecutive years. Hence, option (d) is the answer.
17. Onion and eggs satisfy the given condition. Hence, option (d) is the answer.

18 to 21

18. Hence, option (b) is the answer.
19. D, E (source from where C gets its blank answers) and I (source where C gets Q.27 wrong) must have prepared their answers before C could mark the answers. E can prepare its answer key only by using the data from A. So, four people must have made

their answer keys before C could make it. Hence, option (c) is the answer.

20. Only G got Q.25 wrong (as none of the other 9 people got the same question wrong), and the same is true for H. So, G and H were the sources to none of them. Hence, option (d) is the answer.
21. It can be seen that C got Q.56 wrong (27 wrong obtained from I), E got Q.90 wrong (46 obtained from A), H got Q.92 wrong (46 obtained from A). Hence, the only answer can be option (c). Hence, option (c) is the answer.
22. Both E and H both got Q.46 wrong (90 and 92 were compulsorily wrong). So, both of them should have the same sources. Now A, D and G had just one wrong question each and had no blank answers. So, they should also have the same source. Hence, option (d) is the answer.
23. Let us verify the options:
- Average speed is calculated by dividing the total distance by total time. Since total time is same in both upward journey and downward journey, hence average speed downhill is same as average speed uphill. Hence, option (a) is false.
 - This may happen, but not definitely true.
 - For the sake of understanding this option well, let us assume that one person starts downhill at 6 AM towards uphill, and other person starts uphill at 6 AM towards downhill. Since they are on the same path, they will meet at some point. It means both of them are at the same point same time (only then two persons can meet). Hence, option (c) is definitely true. Hence, option (c) is the answer.
 - It is in contradiction with option (c).
24. Checking conclusion (1):

$$2 \# 1 = 1 - \frac{1}{2} = \frac{1}{2}$$

$$4 \# 3 = 1 - \frac{3}{4} = \frac{1}{4}$$

$$\text{Hence, } (2 \# 1) \# (4 \# 3) = \frac{1}{2} \# \frac{1}{4} = 1 - \frac{0.25}{0.5} = \frac{1}{2}$$

Hence, conclusion (1) cannot be derived.

Checking conclusion (2):

$$3 \# 1 = 1 - \frac{1}{3} = \frac{2}{3}$$

$$4 \# 2 = 1 - \frac{2}{4} = \frac{1}{2}$$

$$\text{Hence, } (3 \# 1) \# (4 \# 2) = \frac{2}{3} \# \frac{1}{2} = 1 - \frac{1/2}{2/3} = \frac{1}{4}$$

Hence, conclusion (2) cannot be derived.

Checking conclusion (3):

$$2 \# 3 = 1 - \frac{3}{2} = -\frac{1}{2}$$

$$1 \# 3 = 1 - \frac{3}{1} = -2$$

Hence, $(2 \# 3) \# (1 \# 3)$

$$= \left(-\frac{1}{2}\right) \# (-1) = 1 - \frac{(-2)}{-1/2} = 1 - \frac{2}{1/2} = -3$$

Hence, conclusion (3) cannot be derived.

25. Adding all the four equations, we get:

$$3(A + B + C + D) = 118 + 156 + 166 + 178 = 618$$

$$\text{Hence, } (A + B + C + D) = 206 \quad (4)$$

Subtracting 1st equation from equation 4, we get: $D = 206 - 118 = 88$

Subtracting 2nd equation from equation 4, we get: $A = 206 - 156 = 50$

Subtracting 3rd equation from equation 4, we get: $B = 206 - 166 = 40$

Subtracting 4th equation from equation 4, we get: $C = 206 - 178 = 28$

Hence, none of the conclusions can be derived.

Hence, option (d) is the answer.

BENCHMARKING TEST 3

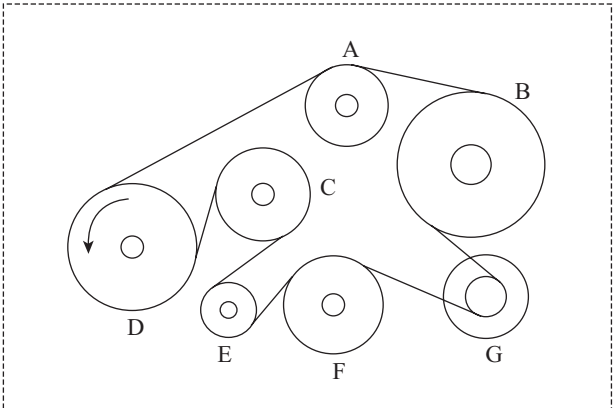
(Based upon SNAP Paper)

Instructions

There are 30 questions in this test.
Each question carries 2 marks. There is 25% negative marking.
Time Limit = 40 minutes
Total Marks = 60 marks
Qualifying Marks = 42 marks
Break-up of the expected Percentile (Assuming this to be SNAP paper):

Marks	50	46	43	40	38	35	32	30	28
Percentile	99	98	97	94	92	90	85	75	65

1. A band passes around all the wheels so that they can be turned by the driving wheel. When the driving wheel turns in the direction shown, which way will the wheel B turn?
- (a) Clockwise (b) Cannot move
(c) Anti-clockwise (d) Either way



2. In a certain language, (A) ‘Sun shines brightly’ is written ‘ba lo sul’; (B) ‘Houses are brightly lit’ is written as ‘kado udo ari ba’; and (C) ‘Light comes from sun’ as ‘dapi kup lo nro’. What words will be written for ‘sun’ and ‘brightly’ respectively?
- (a) Lo, ba
(b) ba, lo
(c) snl, lo
(d) ba, sul

3. Given are the following three equations:

1.  = 

2.  = 

3.  = 

How many circles are equivalent to a square, as per the ratios in the three given equations?

- (a)  = 
- (b)  = 
- (c)  = 
- (d)  = 

4. Each child in a family has at least 4 brothers and 3 sisters. What is the smallest number of children the family might have?
- (a) 7 (b) 8
(c) 9 (d) 10
5. In the following question, two statements are followed by two conclusions numbered I and II. Assume the two statements are true even if they are at variance with commonly known facts. Then pick the correct answer from the choices given below.
- (a) Only conclusion I follows
(b) Only conclusion II follows
(c) Both conclusions I and II follow
(d) Neither conclusion I nor conclusion II follows

Statements:

Some doctors are fools.

Joshi is a doctor.

Conclusions:

I. Joshi is a fool.

II. Some fools are doctors.

- (a) A (b) B
(c) C (d) D
6. Debu walks towards east then towards North and turning 45° right walks for a while and lastly turns towards left. In which direction is he walking now?
- (a) North
(b) East
(c) North-West
(d) North-East

Directions for questions 7 to 9: Read the following information and solve the questions based on it.

- I. There is a rectangular wooden block of length 4 cm, height 3 cm and breadth 3 cm.
- II. The two opposite surfaces of $4 \text{ cm} \times 3 \text{ cm}$ are painted yellow on the outside.
- III. The other two opposite surfaces of $4 \text{ cm} \times 3 \text{ cm}$ are painted red on the outside.
- IV. The remaining two surfaces of $3 \text{ cm} \times 3 \text{ cm}$ are painted green on the outside.

- V. Now, the block is cut in such a way that cubes of $1 \text{ cm} \times 1 \text{ cm} \times 1 \text{ cm}$ are created.

7. How many cubes will have only one colour?
- (a) 10 (b) 12
(c) 14 (d) 18
8. How many cubes will have no colour?
- (a) 1 (b) 2
(c) 4 (d) 8
9. How many cubes will have any two colours?
- (a) 34 (b) 24
(c) 16 (d) 12
10. Replace the question mark with the right option.
4, 32, 288, ?, 31680
- (a) 25600 (b) 2880
(c) 7420 (d) 10000
11. In the Sunday bazaar, Jamuna sells her lemons at ₹0.50 for two. Her neighbour Seema has a little smaller lemons; she sells hers at ₹0.50 for three. After a while, when both ladies have the same number of lemons left, Seema is called away. She asks her neighbour to take care of her goods. To make things simple, Jamuna puts all lemons in one big pile, and starts selling five lemons per one rupee. When Seema returns at the end of the day, all lemons have been sold. But when they start dividing the money, there appears to be a shortage of ₹3.50. Supposing they divide the money equally, how much does Jamuna lose with deal?
- (a) ₹10.50
(b) ₹11.50
(c) ₹42.00
(d) ₹52.50
12. There are two cups, one containing orange juice and one containing an equal amount of lemonade. One teaspoon of the orange juice is taken and mixed with the lemonade. Then a teaspoon of this mixture is mixed back into the orange juice. Is there more lemonade in the orange juice or more orange juice in the lemonade?
- (a) More orange juice in the lemonade
(b) More lemonade in the orange juice
(c) Equal amount of each juice between the two cups
(d) None of the above

13. Consider the statement and decide which of the assumptions are implicit:

In the present period of economic hardships, education and small family norm may lead the nation to progress and prosperity.

Assumptions:

- (a) Education and small family norms are directly related to nation's progress.
 - (b) Big families find it difficult to bear the cost of education.
 - (a) Only A is implicit.
 - (b) Only B is implicit.
 - (c) Both A and B are implicit
 - (d) Neither A nor B is implicit.
14. Beautiful beaches attract people, no doubt about that. Just look at the city's most beautiful beaches, which is amongst the most overcrowded places in the state. Which of the following exhibits a pattern of reasoning similar to the one exhibited in the argument above?
- (a) Moose and bear usually appear at the same drinking hole at the same time of the day. Therefore, moose and bear must be feeling thirsty at about the same time.
 - (b) Children who are scolded severely tend to misbehave more often than other children. Hence if a child is not scolded severely, that child is less likely to misbehave.
 - (c) During warm weather my dog suffers more fleas than during cool weather. Therefore, fleas must thrive in a warm environment.
 - (d) Tally accounting software helps increase the work efficiency of its users. As a result, these users have more time for other activities.
15. Abdul, Mala and Chetan went bird watching. Each of them saw one bird that none of the others did. Each pair saw one bird that the third did not. And one bird was seen by all three. Of the birds Abdul saw, two were yellow. Of the birds mala saw, three were yellow. Of the birds Chetan saw, four were yellow. How many yellow birds were seen in all? How many non-yellow birds were seen in all?
- (a) 7 yellow birds and 3 non-yellow birds
 - (b) 5 yellow birds and 2 non-yellow birds
 - (c) 4 yellow birds and 2 non-yellow birds
 - (d) 3 yellow birds and 2 non-yellow birds
16. A, B, C and D are standing on the four corners of a square field as shown in the figure. From the positions shown in the figure, A walks to north position and B walks to the east position while C decides to walk two sides in anti-clockwise direction. B walks to north and then changes his mind to take

the previous position. Identify the choice with correct positions.



- (a) A and B occupy the same position.
 - (b) C and D occupy the same position.
 - (c) D and B are in their original positions.
 - (d) B and C are diagonally opposite positions.
17. A gambler bets on a horse race, but the bookie wouldn't tell him the results of the race. The bookie gave clues as to how the five horses finished—which may have included some ties—and wouldn't pay the gambler off unless the gambler could determine how the five horses finished based on the following clues:
- Penn Fe finished before Night Marvel and after Wish Bones.
 - Wish Bones tied with Penn Fe if and only if Hallelujah did not tie with Sundae.
 - Penn Fe finished as many places after Sundae as Sundae finished after Wish Bones if and only if Wish Bones finished before Night Marvel.
- The gambler thought for a moment, then answered correctly. How did the five horses finish the race?
- (a) Sundae came in first. Wish Bones and Hallelujah tied for second place. Penn Fe came fourth. Night Marvel came in fifth.
 - (b) Wish Bones came in first. Sundae and Penn Fe tied for second place. Hallelujah came in fourth. Night Marvel came in fifth.
 - (c) Wish Bones came in first. Sundae and Hallelujah tied for second place. Penn Fe came in fourth. Night Marvel came in fifth.
 - (d) Penn Fe came in first. Night Marvel and Hallelujah tied for second place. Wish Bones came in fourth. Sundae came in fifth.
18. In a school drill, a number of children are asked to stand in a circle. They are evenly spaced and the 6th child is diametrically opposite the 16th child. How many children are made to stand in the circle?
- (a) 16
 - (b) 20
 - (c) 22
 - (d) None of the above

19. In this question, insert the missing number at (?).

8	4	9	5
5	7	3	4
3	4	5	8
39	44	60	?

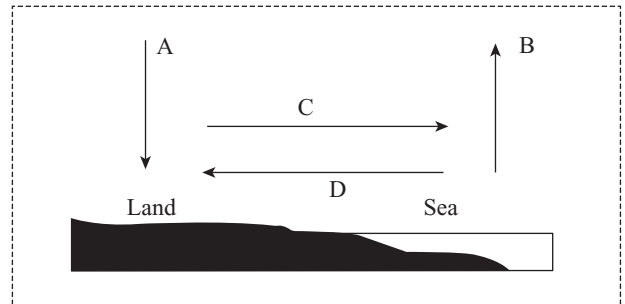
- (a) 62 (b) 72
(c) 60 (d) 70

Directions for questions 20 to 22: Use the information given below to answer.

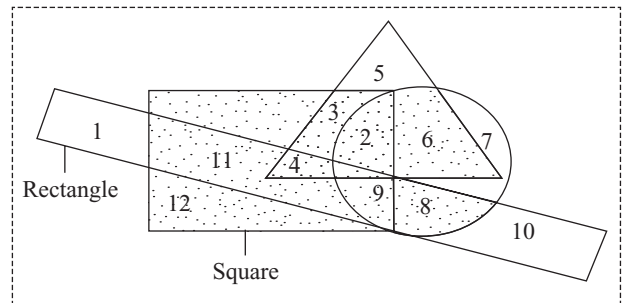
- There is a group of 5 persons A, B, C, D and E
 - In the group there is one badminton player, one chess player and one tennis player
 - A and D are unmarried ladies and they do not play any games
 - No lady is a chess player or a badminton player
 - There is a married couple in the group of which E is the husband
 - B is the brother of C and is neither a chess player nor a tennis player
20. Which of the groups has only ladies?
(a) ABC
(b) BCD
(c) CDE
(d) None of the above
21. Who is the tennis player?
(a) B
(b) C
(c) D
(d) E
22. Who is the wife of E?
(a) A
(b) B
(c) D
(d) None of the above
23. Consider the following statements and answer the question.
M, N, O and P are all different individuals. M is the daughter of N. N is the son of O. O is the father of P. Which among the following statements is contradictory to above premises?
(a) P is the father of M.
(b) O has three children.

- (c) M has one brother.
(d) M is the daughter of O.

24. The drawing shows a cross-section where the land meets the sea. The section covered is 5 kilometers. On a hot day, in which direction, indicated by four arrows, is the wind most likely to blow?
(a) A
(b) B
(c) C
(d) D

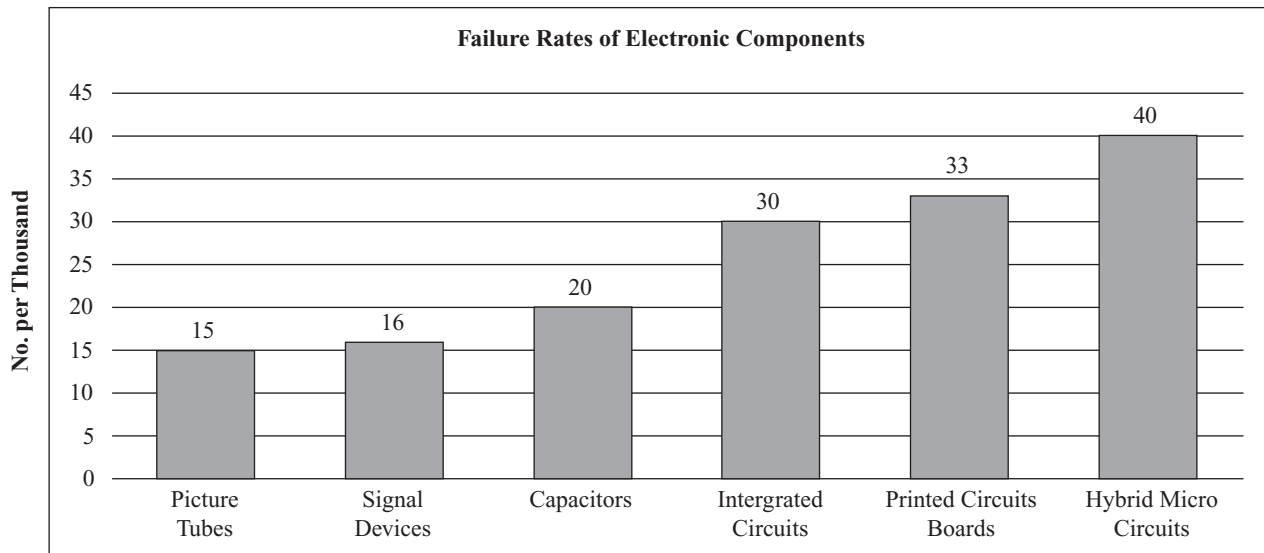


Directions for questions 25 and 26: In the diagram below, circle stands for “educated”, square stands for ‘hard working’, triangle for ‘urban people’ and rectangle for ‘honest’. The different regions of the diagram are numbered from 1 to 12. Study the diagram carefully and answer the questions:



25. Uneducated urban hard-working and honest people are indicated by
(a) 3
(b) 11
(c) 9
(d) 4
26. Non-urban educated people who are neither hard-working nor honest are indicated by
(a) 5 (b) 7
(c) 10 (d) 11

Directions for questions 27 to 30: Study the following chart carefully and answer the questions.



27. From the failure data of electronics components presented here, which statement is true?
- Integrated circuits and printed circuit boards are more reliable.
 - Capacitors are more reliable than picture tubes.
 - Higher number of components failures is likely to be due to picture tubes.
 - The least reliable component is hybrid micro circuits.
28. Which of the following components has a failure rate 25 per cent more than that of signal devices?
- Pictures tubes
 - Capacitors
 - Integrated circuits
 - Printed circuits boards
29. Lowest priority for investing in any changes or additions to the component manufacturing units, in the company's investment plans, may be given to the following:
- Printed circuits boards and hybrid micro circuits.
 - Capacitors and integrated circuits.
 - Pictures tubes and signal devices
 - Signal devices and capacitors
30. For the equipments using Integrated Circuit Board: 400, Capacitors: 240 and Printed Circuits boards: 120 to run with minimum downtime, how many spares should be kept in the store respectively?
- 2, 4, 3
 - 12, 3, 4
 - 5, 12, 3
 - None of these

ANSWER KEYS

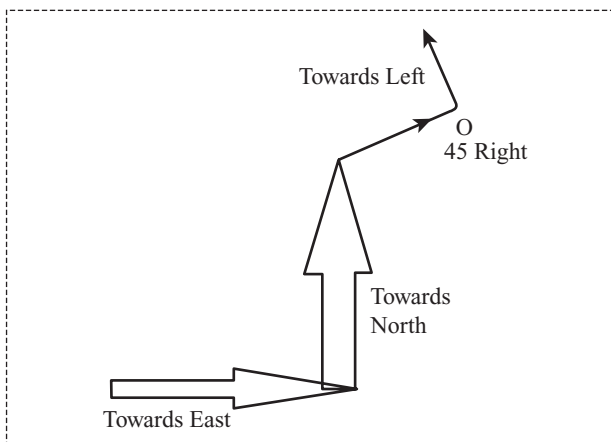
1. (b)	2. (a)	3. (a)	4. (c)	5. (b)	6. (d)	7. (a)	8. (b)	9. (c)	10. (b)
11. (a)	12. (c)	13. (a)	14. (d)	15. (b)	16. (a)	17. (d)	18. (c)	19. (b)	20. (d)
21. (d)	22. (d)	23. (d)	24. (a)	25. (d)	26. (b)	27. (d)	28. (b)	29. (c)	30. (d)

HINTS AND EXPLANATIONS

1. How cogged wheels move: If one wheel is moving clockwise, then the wheels directly attached to it will move anti-clockwise and vice versa. In this case, given that D moves anti-clockwise $\Rightarrow$ A will move clockwise $\Rightarrow$ B will move anti-clockwise $\Rightarrow$ G will move clockwise $\Rightarrow$ F will move anti-clockwise $\Rightarrow$ E will move clockwise $\Rightarrow$ C will move anti-clockwise $\Rightarrow$ D will move clockwise $\Rightarrow$ which is a contradiction.

Hence option (b) is the answer.

2. Sun shines brightly = ba lo sul
Houses are brightly lit = kado udo ari ba
Observing above two statements, brightly is common on left hand side, and ba is common on right hand side. Hence brightly = ba.
We are not required to check for others, as only option (a) satisfies this. Hence option (a) is the answer.
4. Number of brothers and sisters in the family respectively = 5 and 4. Hence number of children = 9. Hence option (c) is the answer.
5. Had it been all doctors are fools, and Joshi is a doctor $\Rightarrow$ then we could have concluded that Joshi is a fool. Given that only some doctors are fool, and Joshi may not be a part of that 'some'. Hence conclusion (I) cannot be derived.
Some doctors are fools $\Rightarrow$ it means that some fools are doctors. Hence conclusion (ii) can be certainly derived.
Hence option (b) is the answer.
6. Following is the direction diagram:



He is in north-west with respect to his initial position.
Hence option (c) is the answer.

7 to 9

For any cuboid of dimension $L \times B \times H$:

Three colour painted cubes = 8

Two colours painted cubes = $4 [(L-2) + (B-2) + (H-2)]$

One colour painted cubes = $2 [(L-2)(B-2) + (B-2)(H-2) + (H-2)(L-2)]$

No colour painted cubes = $(L-2)(B-2)(H-2)$

In this question, $L = 4$, $B = 3$ and $H = 3$.

[See Miscellaneous chapter to read more on this]

7. Only one colour painted = $2 [(L-2)(B-2) + (B-2)(H-2) + (H-2)(L-2)]$
Or, $2[(L-2)(B-2) + (B-2)(H-2) + (H-2)(L-2)] = 2 [(4-2)(3-2) + (3-2)(3-2) + (3-2)(4-2)] = 10$.
Hence option (a) is the answer.
8. No colour painted = $(L-2)(B-2)(H-2) = (4-2)(3-2)(3-2) = 2$. Hence option (b) is the answer.
9. Two colours painted cubes = $4 [(L-2) + (B-2) + (H-2)] = 4 [(4-2) + (3-2) + (3-2)] = 16$. Hence option (c) is the answer.
10. Logic is:
 $32 = 4 \times 8$
 $288 = 32 \times 9$
 $? = 288 \times 10 = 2880$
 $31680 = 2880 \times 11 = 31680$. Hence option (b) is the answer.
11. Let us assume that each one of them had x lemons before Jamuna decided to mix it.
Total revenue earned if each of them would have sold it individually = $\frac{x}{4} + \frac{x}{6} = ₹ \frac{5x}{12}$
Total revenue earned if sold @ five lemons per rupee = $₹ \frac{2x}{5}$
Loss in revenue = $\frac{5x}{12} - \frac{2x}{5} = ₹ \frac{x}{60}$
According to the question, $₹ \frac{x}{60} = ₹ 3.5 \Rightarrow x = 210$

So, total revenue earned if sold @ five lemons per rupee = $\text{₹} \frac{2x}{5} = \text{₹}84$

Out of this, share of Jamuna = ₹42 [they divide ₹84 equally]

Total revenue earned by Jamuna if she would have sold her lemons individually = $\frac{210}{4} = \text{₹}52.5$

Net loss to Jamuna = ₹52.5 – ₹42 = ₹10.5

Hence option (a) is the answer.

12. It can be seen by assuming some values that in such cases, percentage of one liquid in other remains same. Hence option (c) is the answer.

14. Statement given in the question provides a general situation – a reason is provided [Beautiful beaches attract people] and then an example illustrating that. Option (a) is ruled out because it does not provide a general situation. Rather it is too specific.

Option (b) is ruled out because it talks about circumventing the logic. It tries to conclude from the opposite direction.

Option (c) is ruled out because it cannot be said for sure that if dog suffers more fleas during warm weather, then fleas must thrive in warm environment. It might be a possibility that for some external reasons, fleas are attracted towards the dog in the warm weather, and not as much in cool weather.

This leaves us with option (d). Hence option (d) is the answer.

19. Sequence goes like:

$$(8 + 5) \times 3 = 39$$

$$(4 + 7) \times 4 = 44$$

$$(9 + 3) \times 5 = 60$$

$(5 + 4) \times 8 = ? = 72$. Hence option (b) is the answer.

20 to 22

Using point (III)			
	Badminton	Chess	Tennis
A	No	No	No
B			
C			
D	No	No	No
E			

So, B, C and D are playing Badminton, Chess and Tennis, not respectively.

Using point (VI) now:

Using point (VI)			
	Badminton	Chess	Tennis
A	No	No	No
B	Yes	No	No
C	No		
D	No	No	No
E	No		

Since B does not play Chess or Tennis, it means he plays Badminton.

Now, A and D are unmarried ladies, E is male (he is husband in the 'married couple'), B is male (as he is the brother of C), so we are left out with C only to be the wife in the 'married couple'.

Again, for tennis and chess, we are left out with C and E. It is given in point (iv) that no lady is a chess player or a badminton player. Since C is female, so C is a tennis player.

This completes the table:

	Badminton	chess	Tennis
A	No	No	No
B	Yes	No	No
C	No	Yes	No
D	No	No	No
E	No	No	Yes

20. We could have answered this question without solving the whole puzzle. As A and D are ladies (point (iii)), and none of the first three options mentions these two ladies. Hence option (d) is the answer.

21. E is the tennis player. Hence option (d) is the answer.

22. C is wife. Hence option (d) is the answer.

25. Uneducated Urban = 3, 4, 5. Rectangle is for honest. Out of 3, 4, and 5, only 4 is inside the rectangle. Hence option (d) is the answer.

26. Non-urban educated people = 7, 8 and 9
Out of this, neither hardworking nor honest = 7.
Hence option (b) is the answer.
27. Greater the number of failure, less reliable is the component. Maximum failure data is for Hybrid Micro Circuits. Hence option (d) is the answer.
28. Failure rate of signal devices = 16.
25% more than 16 = 20 = Capacitors. Hence option (b) is the answer.
29. Lowest priority should be given to the components that manufacture least number of defective items: Picture tubes and Signal Devices. Hence option (c) is the answer.

BENCHMARKING TEST 4

(Based upon XAT Paper)

Instructions

There are 26 questions in this test.

Each question carries 1 mark. There is 1/3rd negative marking.

Time Limit = 50 minutes

Total Marks = 26 marks

Qualifying Marks = 13 marks

Directions for questions 1 to 4: Read the information given below and solve the questions based on it.

Six square states having equal area in a country are located in North-South direction in two columns next to each other. States are located in the given order, State 1, State 3, and State 5 are on the western side and State 2, State 4, and State 6 are on the eastern side. Within the six states, there are exactly four medical institutes, two management institutes, and two technical institutes. These eight institutions are located as follows:

No institution is in more than one of the states.

None of the states contain more than one management institute, and none contains more than one technical institute.

None of the states contain both a management institute and a technical institute.

Each management institute is located in a state that contains at least one medical institute.

The technical institutes are located in two states that do not share a common boundary. State 3 contains a technical institute and State 6 contains a management institute.

1. Which one of the following could be true?
 - (a) State 1 contains exactly one technical institute
 - (b) State 1 contains exactly one medical institute
 - (c) State 2 contains exactly one management institute
 - (d) State 5 contains exactly one technical institute
 - (e) State 6 contains exactly one technical institute
2. A complete and accurate list of the states, any one of which could contain the management institute that is not in State 6, would be _____.
 - (a) 1, 4
 - (b) 2, 4
 - (c) 4, 5
 - (d) 1, 4, 5
 - (e) 1, 2, 4, 5
3. If each of the six states contains at least one of the eight institutions, then which one of the following must be true?
 - (a) There is a management institute in State 1.
 - (b) There is a medical institute in State 2.
 - (c) There is a medical institute in State 3.
 - (d) There is a medical institute in State 4.
 - (e) There is a management institute in State 4.

4. If one of the states contains exactly two medical institutes and exactly one technical institute, then which combination of three states might contain no medical institute?

(a) 1, 3, 5 (b) 1, 4, 5
(c) 2, 3, 5 (d) 2, 4, 6
(e) 4, 5, 6

Directions for questions 5 to 8: Read the information given below and solve the questions based on it.

There are exactly ten stores and no other buildings on a straight street in Bistupur Market. On the northern side of the street, from West to East, are stores 1, 3, 5, 7, and 9; on the southern side of the street, also from West to East, are stores 2, 4, 6, 8, and 10. The stores on the northern side are located directly across the street from those on the southern side, facing each other in pairs, as follows: 1 and 2; 3 and 4; 5 and 6; 7 and 8; 9 and 10. Each store is decorated with lights in exactly one of the following colours: green, red, and yellow. The stores have been decorated with lights according to the following conditions:

No store is decorated with lights of the same colour as those of any store adjacent to it.

No store is decorated with lights of the same colour as those of the store directly across the street from it.

Yellow lights decorate exactly one store on each side of the street.

Red lights decorate store 4.

Yellow lights decorate store 5.

5. Which one of the following could be an accurate list of the colours of the lights that decorate stores 2, 4, 6, 8 and 10, respectively?
- (a) Green, red, green, red, green
(b) Green, red, green, yellow, red
(c) Green, red, yellow, red, green
(d) Yellow, green, red, green, red
(e) Yellow, red, green, red, yellow
6. If green lights decorate store 7, then each of the following statements could be false EXCEPT:
- (a) Green lights decorate store 2
(b) Green lights decorate store 10
(c) Red lights decorate store 8
(d) Red lights decorate store 9
(e) Yellow lights decorate store 2
7. Which one of the following statements MUST be true?
- (a) Green lights decorate store 10
(b) Red lights decorate store 1

(c) Red lights decorate store 8
(d) Yellow lights decorate store 8
(e) Yellow lights decorate store 10

8. Suppose that yellow lights decorate exactly two stores on the south side of the street and exactly one store on the north side. If all other conditions remain the same, then which one of the following statements MUST be true?

(a) Green lights decorate store 1
(b) Red lights decorate store 7
(c) Red lights decorate store 10
(d) Yellow lights decorate store 8
(e) Yellow lights decorate store 2

Directions for questions 9 to 12: Read the information given below and solve the questions based on it.

During a four-week period, each one of seven previously unadvertised products—G, H, J, K, L, M and O—will be advertised. A different pair of these products will be advertised each week. Exactly one of the products will be a member of two of these four pairs. None of the other products gets repeated in any pair. Further, the following constraints must be observed:

J is not advertised during a given week unless H is advertised during the immediately preceding week.

The product that is advertised twice is advertised during week 4 but is not advertised during week 3.

G is not advertised during a given week unless either J or O is also advertised that week.

K is advertised during one of the first two weeks.

O is one of the products advertised during week 3.

9. Which one of the following could be the schedule of the advertisements?
- (a) Week 1: G, J; week 2: K, L; week 3: O, M; week 4: H, L
(b) Week 1: H, K; week 2: J, G; week 3: O, L; week 4: M, K
(c) Week 1: H, K; week 2: J, M; week 3: O, L; week 4: G, M
(d) Week 1: H, L; week 2: J, M; week 3: O, G; week 4: K, L
(e) Week 1: K, M; week 2: H, J; week 3: O, G; week 4: L, M
10. If L is the product that is advertised during two of the weeks, which one of the following is a product that MUST be advertised during one of the weeks in which L is advertised?
- (a) G (b) H
(c) J (d) K
(e) M

11. Which one of the following is a product that could be advertised in any of the four weeks?
- (a) H (b) J
(c) K (d) L
(e) O
12. Which one of the following is a pair of products that could be advertised during the same week?
- (a) G and H (b) H and J
(c) H and O (d) K and O
(e) M and O

Directions for questions 13 to 16: Read the information given below and solve the questions based on it.

Professor Mukhopadhyay works only on Mondays, Tuesdays, Wednesdays, Fridays, and Saturdays. She performs four different activities—Lecturing, Conducting quizzes, evaluating quizzes and working on consultancy projects. Each working day she performs exactly one activity in the morning and exactly one activity in the afternoon. During each week, her work schedule MUST satisfy the following restrictions:

She conducts quizzes on exactly three mornings.

If she conducts quizzes on Monday, she does not conduct a quiz on Tuesday.

She lectures in the afternoon on exactly two consecutive calendar days.

She evaluates quizzes on exactly one morning and three afternoons.

She works on consultancy project on exactly one morning.

On Saturday, she neither lectures nor conducts quizzes.

13. On Wednesdays, the professor could be scheduled to?
- (a) Work on a consultancy project in the morning and conduct a quiz in the afternoon
(b) Lecture in the morning and evaluate quizzes in the afternoon.
(c) Conduct a quiz in the morning and lecture in the afternoon
(d) Conduct a quiz in the morning and work on consultancy project in the afternoon.
(e) Evaluate quizzes in the morning and evaluate quizzes in the afternoon.
14. Which of the following statements must be true?
- (a) There is one day on which she evaluates quizzes both in the morning and in the afternoon.
(b) She works on the consultancy project on one of the days on which lectures.

- (c) She works on consultancy project on one of the days on which she evaluates quizzes.
(d) She lectures on one of the days on which evaluates quizzes.
(e) She lectures on one of the days on which she conducts quiz

15. If the Professor conducts a quiz on Tuesday, then her schedule for evaluating quizzes could be?
- (a) Monday morning, Monday afternoon, Friday morning, Friday afternoon
(b) Monday morning, Friday afternoon, Saturday morning, Saturday afternoon
(c) Monday afternoon, Wednesday morning, Wednesday afternoon, Saturday afternoon
(d) Wednesday morning, Wednesday afternoon, Friday afternoon, Saturday afternoon
(e) Wednesday afternoon, Friday afternoon, Saturday morning, Saturday afternoon.
16. Which one of the following must be a day on which professor lectures?
- (a) Monday (b) Tuesday
(c) Wednesday (d) Friday
(e) Saturday

Directions for questions 17 to 19: Read the information given below and solve the questions based on it.

Alex Company has its office at the third floor of a multi- storied building in Mumbai. There are 5 rooms to be allotted to 5 managers (designated M1 to M5) each of whom will occupy one room. Each room has its own advantages and disadvantages. Some have the sea view, while others are closer to either the lift or the dining room, while some are more spacious. Each of the five managers was asked to rank the room preferences amongst the rooms 301, 302, 303, 304 and 305. Their preferences were recorded as follows:

Preference	M1	M2	M3	M4	M5
First	302	302	303	302	301
Second	303	304	301	305	302
Third	304	305	304	304	305
Fourth		301	305	303	
Fifth			302		

Some managers did not indicate any preference for some rooms, as they did want to be there under

any condition. The company decided to allot rooms to managers in such a way that the managers get rooms as per their best preference or close to that.

17. How many managers would get their rooms as per their best preference?

(a) 1	(b) 2
(c) 3	(d) 4
(e) 5	
18. If manager X gets his/her first choice, then his/her preference ranking is 1 and so on. Management decided to allot rooms so that the sum of the preference ranking of all the managers is minimized. What is the total preference ranking for the rooms allotted to all the managers?

(a) 5	(b) 6
(c) 7	(d) 8
(e) 9	
19. Suppose that manager M2 decides not to join the new zonal office and manager M6 takes his place. Manager M6 has the following preference ranking in decreasing order: 301, 302, 303, 304—in this case what would be the sum of the preference ranking allotted to all five managers?

(a) 5	(b) 6
(c) 7	(d) 8
(e) 9	

Directions for questions 20 to 21: Read the information given below and solve the questions based on it.

Every Saturday, the members of Raja Harish Chandra Club meet in the evening. All the members of the club are honest and never lie. Last Saturday, the following conversation was heard at one of the table with five members sitting around it.

Satya Sadhan: In this club, not all members are friends with each other.

Satyabrata: None of the pair of friends in this club has any common friend.

Satyajit: Every pair of member who is not friends has exactly two common friends in this club.

20. How many members are there in the club?

(a) 5	(b) 7
(c) 15	(d) 16
(e) 20	
21. How many friends does Satya Sadhan have in the club?

(a) 2	(b) 3
(c) 5	(d) 7
(e) 8	

Directions for questions 22 to 24: Read the information given below and solve the questions based on it.

On a certain day, six passengers from Chennai, Bengaluru, Kochi, Kolkata, Mumbai, and Hyderabad boarded the New Delhi bound Rajdhani Express from TataNagar. Following facts are known about these six passengers:

The persons from Kochi and Chennai are less than 36 years of age.

Person Z, the youngest among all is a doctor.

The oldest person is from Kolkata and his/her profession is same as that of the person who got down at Mughal Sarai.

The person from Bengaluru, Chennai, Hyderabad and Mumbai got down at four different stations.

The eldest among these four got down at Koderma and the youngest at Kanpur. The person who got down at New Delhi is older than the person who got down at Mughal Sarai.

The engineer from Bengaluru is older than the engineer from Chennai.

While arranging the teachers in increasing order of age it was observed that the middle person is as old as the engineer from Chennai.

Person Y who got down at Mughal Sarai is less than 34 years old.

The teacher from Kochi is four year older than the 31 year old doctor who is not from Mumbai.

In the past, three of the travellers have served in the Indian Army.

22. Which of the following options is true?

(a) The person from Chennai is older than the person from Kochi.
(b) The oldest teacher is from Mumbai.
(c) The person from Mumbai is older than at least one of the engineers.
(d) The person from Kochi got down at Mughal Sarai, and was an engineer.
(e) The person who got down at New Delhi is older than Y, who in turn is older than the person from Hyderabad.
23. All six travellers are working in the same organization for at least one year. The organization recruits two categories of employees—fresh graduates and those who have at least five years of experience in the Indian Army. In both cases, a new recruit should be less than 30 years of age. Among the travellers from same profession, those with military background are at least five years older than the travellers who joined as fresh graduates. Identify the travellers who joined the organization as fresh graduate(s).

- (a) Only Y
- (b) The person Y and the traveller from Chennai.
- (c) The person Y and the travellers from Kochi and Hyderabad.
- (d) The travellers from Kochi and Hyderabad.
- (e) The teacher from Mumbai, the traveller from Kochi and the younger engineer.

24. If W is neither the youngest nor the oldest among the travellers from her profession, which of the following is true about her?

- (a) She got down at Koderma
- (b) She is 36 years of age
- (c) She got down at Mughal Sarai
- (d) She is from Kochi
- (e) None of the above

Directions for questions 25 to 26: Read the information given below and solve the questions based on it.

Mrs Sharma has a house which she wants to convert to a hostel and rent it out to students of a nearby women's college. The house is a two storey building and each floor has eight rooms. When one looks from the outside, three rooms are found facing north, three found facing east, three found facing west and three found facing south. Expecting a certain number of students, Mrs Sharma wanted to follow certain rules while giving the sixteen rooms on rent.

All sixteen rooms must be occupied.

No room can be occupied by more than three students.

Six rooms facing north is called north wing. Similarly, six rooms facing east, west and south are called as east wing, west wing and south wing. Each corner room would be in more than one wing. Each of the wings must have exactly 11 students. The first floor must have twice as many students as the ground floor.

However Mrs Sharma found that three fewer students have come to rent the rooms. Still Mrs Sharma could manage to allocate the rooms according to the rules.

25. How many students turned up for renting the rooms?

- (a) 24
- (b) 27
- (c) 30
- (d) 33
- (e) None of these

26. If Mrs Sharma allocates the north-west corner room on the ground floor to 2 students, then the number of students in the corresponding room on the first floor, and the number of students in the middle room in the first floor of the east wing are:

- (a) 2 and 1 respectively
- (b) 3 and 1 respectively
- (c) 3 and 2 respectively
- (d) Both should have 3 students
- (e) Such an arrangement is not possible

ANSWER KEYS

1. (b)	2. (d)	3. (d)	4. (a)	5. (b)	6. (d)	7. (b)	8. (e)	9. (b)	10. (e)
11. (e)	12. (e)	13. (c)	14. (e)	15. (e)	16. (b)	17. (c)	18. (c)	19. (e)	20. (d)
21. (e)	22. (e)	23. (e)	24. (d)	25. (b)	26. (b)				

PART 4

PREVIOUS YEARS' PAPERS

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CAT 2017—SLOT I

INSTRUCTIONS

- ☐ Directions for answering the questions are given before each group of questions. Read these directions carefully and answer the questions by darkening the appropriate circles on the Answer Sheet. Each question has only one correct answer.
 - ☐ All questions carry three marks each. Each wrong answer will attract a penalty of one mark.
 - ☐ Do your rough work only on the Test Booklet and NOT on the Answer Sheet.
-

Direction for the questions 1–4: *Read the information given below and answer the question that follows.*

Healthy Bites is a fast food joint serving three items: burgers, fries and ice cream. It has two employees Anish and Bani who prepare the items ordered by the clients. Preparation time is 10 minutes for a burger and 2 minutes for an order of ice cream. An employee can prepare only one of these items at a time. The fries are prepared in an automatic fryer which can prepare up to 3 portions of fries at a time, and takes 5 minutes irrespective of the number of portions. The fryer does not need an employee to constantly attend to it, and we can ignore the time taken by an employee to start and stop the fryer; thus, an employee can be engaged in preparing other items while the frying is on. However fries cannot be prepared in anticipation of future orders.

Healthy Bites wishes to serve the orders as early as possible. The individual items in any order are served as and when ready; however, the order is considered to be completely served only when all the items of that order are served.

The table below gives the orders of three clients and the times at which they placed their orders;

Client No.	Time	Order
1	10:00	1 burger, 3 portions of fries, 1 order of ice cream
2	10:05	2 portions of fries, 1 order of ice cream
3	10:07	1 burger, 1 portion of fries

1. Assume that only one client's order can be processed at any given point of time. So, Anish or Bani cannot start preparing a new order while a previous order is being prepared.

At what time is the order placed by Client 1 completely served?

- (a) 10:17 (b) 10:10
(c) 10:15 (d) 10:20

2. Assume that only one client's order can be processed at any given point of time. So, Anish or Bani cannot start preparing a new order while a previous order is being prepared.

At what time is the order placed by Client 3 completely served?

- (a) 10:35 (b) 10:22
(c) 10:25 (d) 10:17

3. Suppose the employees are allowed to process multiple orders at a time, but the preference would be to finish orders of clients who placed their orders earlier.

At what time is the order placed by Client 2 completely served?

- (a) 10:10 (b) 10:12
(c) 10:15 (d) 10:17

4. Suppose the employees are allowed to process multiple orders at a time, but the preference would be to finish orders of clients who placed their orders earlier.

Also assume that the fourth client came in only at 10:35. Between 10:00 and 10:30, for how many minutes is exactly one of the employees idle?

- (a) 7 (b) 10
(c) 15 (d) 23

Direction for the questions 5–8: Study the table/s given below and answer the question that follows.

A study to look at the early teaming of rural kids was carried out in a number of villages spanning three states, chosen from the North East (NE), the West (W) and the South (S). 50 four-year old kids each were sampled from each of the 150 villages from NE, 250 villages from W and 200 villages from S. It was found that of the 30,000 surveyed kids 55% studied in primary schools run by government (G), 37% in private schools (P) while the remaining 8% did not go to school (O).

The kids surveyed were further divided into two groups based on whether their mothers dropped out of school before completing primary education or not. The table below gives the number of kids in different types of schools for mothers who dropped out of school before completing primary education:

	G	P	O	Total
NE	4200	500	300	5000
W	4200	1900	1200	7300
S	5100	300	300	5700
Total	13,500	2700	1800	18,000

It is also known that:

- In S, 60% of the surveyed kids were in G. Moreover, in S, all surveyed kids whose mothers had completed primary education were in school.
- In NE, among the O kids, 50% had mothers who had dropped out before completing primary education.
- The number of kids in G in NE was the same as the number of kids in G in W.
- What percentage of kids from S were studying in P?
(a) 37% (b) 6%
(c) 79% (d) 56%
- Among the kids in W whose mothers had completed primary education, how many were not in school?
(a) 300 (b) 1200
(c) 1050 (d) 1500
- In a follow up survey of the same kids two years later, it was found that all the kids were now in school. Of the kids who were not in school earlier, in one region, 25% were in G now, whereas the rest were enrolled in P; in the second region, all such kids were in G now; while in the third region, 50% of such kids had now joined G while the rest had joined P. As a result, in all three regions put together, 50% of the kids who were earlier out of school had joined G. It was also seen that no surveyed kid had changed schools.
What number of the surveyed kids now were in G in W?
(a) 6000 (b) 5250
(c) 6750 (d) 6300
- In a follow up survey of the same kids two years later, it was found that all the kids were now in school. Of the kids who were not in school earlier, in one region, 25% were in G now, whereas the rest were enrolled in P; in the second region, all such kids were in G now; while in the third region, 50% of such kids had now joined G while the rest had joined P. As a result, in all three regions put together, 50% of the kids who were earlier out of school had joined G. It was also seen that no surveyed kid had changed schools.

What percentage of the surveyed kids in S, whose mothers had dropped out before completing primary education, were in G now?

- (a) 94.7%
(b) 89.5%
(c) 93.4%
(d) Cannot be determined from the given information

Direction for the questions 9–12: Read the information given below and answer the question that follows.

Applicants for the doctoral programmes of Ambi Institute of Engineering (AIE) and Bambi Institute of Engineering (BIE) have to appear for a Common Entrance Test (CET). The test has three sections: Physics (P), Chemistry (C), and Maths (M). Among those appearing for CET, those at or above the 80th percentile in at least two sections, and at or above the 90th percentile overall, are selected for Advanced Entrance Test (AET) conducted by AIE. AET is used by AIE for final selection.

For the 200 candidates who are at or above the 90th percentile overall based on CET, the following are known about their performance in CET:

1. No one is below the 80th percentile in all 3 sections.
2. 50 are at or above the 80th percentile in exactly two sections.
3. The number of candidates at or above the 80th percentile only in P is the same as the number of candidates at or above the 80th percentile only in C. The same is the number of candidates at or above the 80th percentile only in M.
4. Number of candidates below 80th percentile in P: Number of candidates below 80th percentile in C: Number of candidates below 80th percentile in M = 4:2:1.

BIE uses a different process for selection. If any candidate is appearing in the AET by AIE, BIE considers their AET score for final selection provided the candidate is at or above the 80th percentile in P. Any other candidate at or above the 80th percentile in P in CET, but who is not eligible for the AET, is required to appear in a separate test to be conducted by BIE for being considered for final selection. Altogether, there are 400 candidates this year who are at or above the 80th percentile in P.

9. What best can be concluded about the number of candidates sitting for the separate test for BIE who were at or above the 90th percentile overall in CET?
(a) 3 or 10 (b) 10
(c) 5 (d) 7 or 10
10. If the number of candidates who are at or above the 90th percentile overall and also at or above the 80th percentile in all three sections in CET is actually a multiple of 5, what is the number of candidates who are at or above the 90th percentile overall and at or above the 80th percentile in both P and M in CET?
(Non-MCQ question)
11. If the number of candidates who are at or above the 90th percentile overall and also at or above the 80th percentile in all three sections in CET is actually a multiple of 5, then how many candidates were short-listed for the AET for AIE? (Non-MCQ question)
12. If the number of candidates who are at or above the 90th percentile overall and also are at or above the 80th percentile in P in CET, is more than 100, how many candidates had to sit for the separate test for BIE?
(a) 299 (b) 310
(c) 321 (d) 330

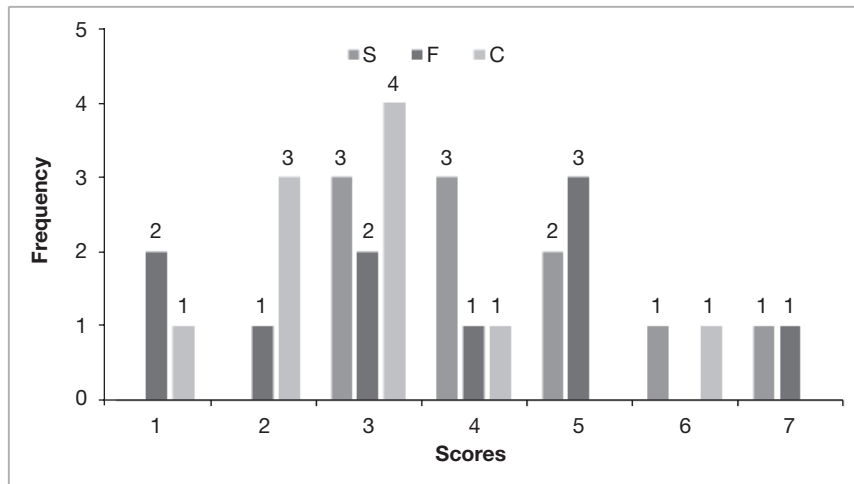
Direction for the questions 13–16: Analyse the graph/s given below and answer the question that follows.

Simple Happiness Index (SHI) of a country is computed on the basis of three parameters: social support (S), freedom to life choices (F) and corruption perception (C). Each of these three parameters is measured on a scale of 0 to 8 (integers only). A country is then categorized based on the total score obtained by summing the scores of all the three parameters, as shown in the following table:

Total Score	0–4	5–8	9–13	14–19	20–24
Category	Very Unhappy	Unhappy	Neutral	Happy	Very Happy

Following diagram depicts the frequency distribution of the scores in S, F and C of 10 countries -

Amda, Benga, Calla, Delma, Eppa, Varsa, Wanna, Xanda, Yanga and Zooma.



Further, the following are known:

1. Amda and Calls jointly have the lowest total score 7, with identical scores in all the three parameters.
2. Zooma has a total score of 17.
3. All the 3 countries, which are categorised as happy, have the highest score in exactly one parameter.

13. What is Amda's score in F? *(Non-MCQ question)*
14. What is Zooma's score in S? *(Non-MCQ question)*
15. Benga and Delma, two countries categorized as happy, are tied with the same total score. What is the maximum score they can have?
(a) 14 (b) 15
(c) 16 (d) 17
16. If Benga scores 16 and Delma scores 15, then what is the maximum number of countries with a score of 13?
(a) 0 (b) 1
(c) 2 (d) 3

Direction for the questions 17–20: Read the information given below and answer the question that follows.

There are 21 employees working in a division, out of whom 10 are special-skilled employees (SE) and the remaining are regular-skilled employees (RE). During the next five months, the division has to complete five projects every month. Out of the 25 projects, 5 projects are “challenging”, while the remaining ones are “standard”. Each of the challenging projects has to be completed in

different months. Every month, five teams - T1, T2, T3, T4 and T5, work on one project each. T1, T2, T3, T4 and T5 are allotted the challenging project in the first, second, third, fourth and fifth month, respectively. The team assigned the challenging project has one more employee than the rest.

In the first month, T1 has one more SE than T2, T2 has one more SE than T3, T3 has one more SE than T4, and T4 has one more SE than T5. Between two successive months, the composition of the teams changes as follows:

1. The team allotted the challenging project, gets two SE from the team which was allotted the challenging project in the previous month. In exchange, one RE is shifted from the former team to the latter team.
2. After the above exchange, if T1 has any SE and T5 has any RE, then one SE is shifted from T1 to T5, and one RE is shifted from T5 to T1. Also, if T2 has any SE and T4 has any RE, then one SE is shifted from T2 to T4, and one RE is shifted from T4 to T2.

Each standard project has a total of 100 credit points, while each challenging project has 200 credit points. The credit points are equally shared between the employees included in that team.

17. The number of times in which the composition of team T2 and the number of times in which composition of team T4 remained unchanged in two successive months are:
(a) (2, 1) (b) (1, 0)
(c) (0, 0) (d) (1, 1)

18. The number of SE in T1 and T5 for the projects in the third month are, respectively:
 (a) (0, 2) (b) (0, 3)
 (c) (1, 2) (d) (1, 3)
19. Which of the following CANNOT be the total credit points earned by any employee from the projects?
 (a) 140 (b) 150
 (c) 170 (d) 200
20. One of the employees named Aneek scored 185 points. Which of the following CANNOT be true?
 (a) Aneek worked only in teams T1, T2, T3, and T4
 (b) Aneek worked only in teams T1, T2, T4, and T5
 (c) Aneek worked only in teams T2, T3, T4, and T5
 (d) Aneek worked only in teams T1, T3, T4, and T5

Direction for the questions 21–24: Read the information given below and answer the question that follows.

In a square layout of size $5\text{m} \times 5\text{m}$, 25 equal sized square platforms of different heights are built. The heights (in metres) of individual platforms are as shown below:

6	1	2	4	3
9	5	3	2	8
7	8	4	6	5
3	9	5	1	2
1	7	6	3	9

Individuals (all of same height) are seated on these platforms. We say an individual A can reach at individual B if all the three following conditions are met:

1. A and B are in the same row or column
2. A is at a lower height than B
3. If there is/are any individual(s) between A and B, such individual(s) must be at a height tower than that of A.

Thus in the table given above, consider the individual seated at height 8 on 3rd row and 2nd column. He can be reached by four individuals. He can be reached by the individual on his left at height 7, by the two individuals on his right at heights of 4 and 6 and by the individual above at height 5.

Rows in the layout are numbered from top to bottom and columns are numbered from left to right.

21. How many individuals in this layout can be reached by just one individual?
 (a) 3 (b) 5
 (c) 7 (d) 8
22. Which of the following is true for any individual at a platform of height 1 m in this layout?

- (a) They can be reached by all the individuals in their own row and column.
- (b) They can be reached by at least 4 individuals.
- (c) They can be reached by at least one individual.
- (d) They cannot be reached by anyone.

23. We can find two individuals who cannot be reached by anyone in
 (a) the last row
 (b) the fourth row
 (c) the fourth column
 (d) the middle column
24. Which of the following statements is true about this layout?
 (a) Each row has an individual who can be reached by 5 or more individuals.
 (b) Each row has an individual who cannot be reached by anyone.
 (c) Each row has at least two individuals who can be reached by an equal number of individuals.
 (d) All individuals at the height of 9 m can be reached by at least 5 individuals.

Direction for the question 25: Read the information given below and answer the question that follows.

25. A new airlines company is planning to start operations in a country. The company has identified ten different cities which they plan to connect through their network to start with. The flight duration between any pair of cities will be less than one hour. To start operations, the company has to decide on a daily schedule.

The underlying principle that they are working on is the following:

Any person staying in any of these 10 cities should be able to make a trip to any other city in the morning and should be able to return by the evening of the same day.

If the underlying principle is to be satisfied in such a way that the journey between any two cities can be performed using only direct (non-stop) flights, then the minimum number of direct flights to be scheduled is:

- (a) 45 (b) 90
- (c) 180 (d) 135

Direction for the question 26: Read the information given below and answer the question that follows.

26. A new airlines company is planning to start operations in a country. The company has identified ten

different cities which they plan to connect through their network to start with. The flight duration between any pair of cities will be less than one hour. To start operations, the company has to decide on a daily schedule.

The underlying principle that they are working on is the following:

Any person staying in any of these 10 cities should be able to make a trip to any other city in the morning and should be able to return by the evening of the same day.

Suppose three of the ten cities are to be developed as hubs. A hub is a city which is connected with every other city by direct flights each way, both in the morning as well as in the evening. The only direct flights which will be scheduled are originating and/or terminating in one of the hubs. Then the minimum number of direct flights that need to be scheduled so that the underlying principle of the airline to serve all the ten cities is met without visiting more than one hub during one trip is:

(a) 54	(b) 120
(c) 96	(d) 60

Direction for the question 27: Read the information given below and answer the question that follows.

27. A new airlines company is planning to start operations in a country. The company has identified ten different cities which they plan to connect through their network to start with. The flight duration between any pair of cities will be less than one hour. To start operations, the company has to decide on a daily schedule.

The underlying principle that they are working on is the following:

Any person staying in any of these 10 cities should be able to make a trip to any other city in the morning and should be able to return by the evening of the same day.

Suppose the 10 cities are divided into 4 distinct groups 01, 02, 03, 04 having 3, 3, 2 and 2 cities respectively and that G1 consists of cities named A, B and C. Further, suppose that direct flights are allowed only between two cities satisfying one of the following:

1. Both cities are in G1
2. Between A and any city in G2
3. Between B and any city in G3
4. Between C and any city in G4

Then the minimum number of direct flights that satisfies the underlying principle of the airline is:

(Non-MCQ question)

Direction for the question 28: Read the information given below and answer the question that follows.

28. A new airlines company is planning to start operations in a country. The company has identified ten different cities which they plan to connect through their network to start with. The flight duration between any pair of cities will be less than one hour. To start operations, the company has to decide on a daily schedule.

The underlying principle that they are working on is the following:

Any person staying in any of these 10 cities should be able to make a trip to any other city in the morning and should be able to return by the evening of the same day.

Suppose the 10 cities are divided into 4 distinct groups G1, G2, G3, G4 having 3, 3, 2 and 2 cities respectively and that G1 consists of cities named A, B and C. Further, suppose that direct flights are allowed only between two cities satisfying one of the following:

1. Both cities are in G1
2. Between A and any city in G2
3. Between B and any city in G3
4. Between C and any city in G4

However, due to operational difficulties at A, it was later decided that the only flights that would operate at A would be those to and from B. Cities in G2 would have to be assigned to G3 or to G4.

What would be the maximum reduction in the number of direct flights as compared to the situation before the operational difficulties arose?

(Non-MCQ question)

Direction for the question 29: Read the information given below and answer the question that follows.

29. Four cars need to travel from Akala (A) to Bakala (B). Two routes are available, one via Mamur (M) and the other via Nanur (N). The roads from A to M, and from N to B, are both short and narrow. In each case, one car takes 6 minutes to cover the distance, and each additional car increases the travel time per car by 3 minutes because of congestion. (For example, if only two cars drive from A to M, each car takes 9 minutes.) On the road from A to N, one car takes 20 minutes, and each additional car increases the travel time per car by 1 minute. On the road from M to B, one car takes 20 minutes, and each additional car increases the travel time per car by 0.9 minute.

The police department orders each car to take a particular route in such a manner that it is not possible for any car to reduce its travel time by not following the order, while the other cars are following the order.

How many cars would be asked to take the route A-N-B, that is Akala-Nanur-Bakala route, by the police department? *(Non-MCQ question)*

Direction for the question 30: *Read the information given below and answer the question that follows.*

30. Four cars need to travel from Akala (A) to Bakala (B). Two routes are available, one via Mamur (M) and the other via Nanur (N). The roads from A to M, and from N to B, are both short and narrow. In each case, one car takes 6 minutes to cover the distance, and each additional car increases the travel time per car by 3 minutes because of congestion. (For example, if only two cars drive from A to M, each car takes 9 minutes.) On the road from A to N, one car takes 20 minutes, and each additional car increases the travel time per car by 1 minute. On the road from M to B, one car takes 20 minutes, and each additional car increases the travel time per car by 0.9 minute.

The police department orders each car to take a particular route in such a manner that it is not possible for any car to reduce its travel time by not following the order, while the other cars are following the order.

If all the cars follow the police order, what is the difference in travel time (in minutes) between a car which takes the route A-N-B and a car that takes the route A-M-B?

- (a) 1 (b) 0.1
(c) 0.2 (d) 0.9

Direction for the question 31: *Read the information given below and answer the question that follows.*

31. Four cars need to travel from Akala (A) to Bakala (B). Two routes are available, one via Mamur (M) and the other via Nanur (N). The roads from A to M, and from N to B, are both short and narrow. In each case, one car takes 6 minutes to cover the distance, and each additional car increases the travel time per car by 3 minutes because of congestion. (For example, if only two cars drive from A to M, each car takes 9 minutes.) On the road from A to N, one car takes 20 minutes, and each additional car increases the travel

time per car by 1 minute. On the road from M to B, one car takes 20 minutes, and each additional car increases the travel time per car by 0.9 minute.

The police department orders each car to take a particular route in such a manner that it is not possible for any car to reduce its travel time by not following the order, while the other cars are following the order.

A new one-way road is built from M to N. Each car now has three possible routes to travel from A to B: A-M-B, A-N-B and A-M-N-B. On the road from M to N, one car takes 7 minutes and each additional car increases the travel time per car by 1 minute. Assume that any car taking the A-M-N-B route travels the A-M portion at the same time as other cars taking the A-M-B route, and the N-B portion at the same time as other cars taking the A-N-B route.

How many cars would the police department order to take the A-M-N-B route so that it is not possible for any car to reduce its travel time by not following the order while the other cars follow the order? (Assume that the police department would never order all the cars to take the same route.)

(Non-MCQ question)

Direction for the question 32: *Read the information given below and answer the question that follows.*

32. Four cars need to travel from Akala (A) to Bakala (B). Two routes are available, one via Mamur (M) and the other via Nanur (N). The roads from A to M, and from N to B, are both short and narrow. In each case, one car takes 6 minutes to cover the distance, and each additional car increases the travel time per car by 3 minutes because of congestion. (For example, if only two cars drive from A to M, each car takes 9 minutes.) On the road from A to N, one car takes 20 minutes, and each additional car increases the travel time per car by 1 minute. On the road from M to B, one car takes 20 minutes, and each additional car increases the travel time per car by 0.9 minute.

The police department orders each car to take a particular route in such a manner that it is not possible for any car to reduce its travel time by not following the order, while the other cars are following the order.

A new one-way road is built from M to N. Each car now has three possible routes to travel from A to B: A-M-B, A-N-B and A-M-N-B. On the road

from M to N, one car takes 7 minutes and each additional car increases the travel time per car by 1 minute. Assume that any car taking the A-M-N-B route travels the A-M portion at the same time as other cars taking the A-M-B route, and the N-B portion at the same time as other cars taking the A-N-B route.

If all the cars follow the police order, what is the minimum travel time (in minutes) from A to B? (Assume that the police department would never order all the cars to take the same route.)

- (a) 26 (b) 32
(c) 29.9 (d) 30

ANSWER KEYS

1. (a)	2. (c)	3. (a)	4. (b)	5. (a)	6. (a)	7. (a)	8. (a)	9. (a)	10. (60)
11. (170)	12. (a)	13. (1)	14. (6)	15. (e)	16. (b)	17. (b)	18. (a)	19. (b)	20. (e)
21. (c)	22. (d)	23. (c)	24. (c)	25. (c)	26. (c)	27. (40)	28. (4)	29. (2)	30. (b)
31. (2)	32. (b)								

HINTS AND EXPLANATIONS

1 to 4

1. Client 1 entered at 10:00 am. He is also the 1st client to enter. So, his order must be started at 10:00 am. The item which takes the maximum time is Burger which is completed in 10:00 minutes. So, the order of client 1 will be served at 10:10 am.

Hence, option (a) is the answer.

2. Using the solution of Q1 we know the order of Client 1 is ready at 10:10 am. So, order for client 2 will start at 10:10 am. The time required for it to be finish is 5 minutes as fries need 5 minutes (ice cream will be prepared in 2 minutes in parallel). So, the order of 3rd client will be started at 10:15 am. It would require 10 minutes as burger can be prepared in 10 minutes only (ice cream will be prepared in 5 minutes on parallel). So, the order placed by client 3 will be served at 10:25 am.

Hence, option (c) is the answer.

3. We know the order placed by client 1 will be started at 10:00 am. One of the 2 employees (say Anish) will prepare burger by 10:10 am. Other person (say Bani) will prepare the ice-cream by 10:02. The fries will be ready by 10:05 am. The fries for client 2 can be ready by 10:10 am (5 minutes time starting at 10:05 am). Ice cream can be prepared in the duration of 10:02 to 10:10 am. So, the order for client 2 will be ready by 10:10 am (he may be prepared just after client 1).

Hence, option (a) is the answer.

4. Using solution for 3, we know that the client 1 & 2 will be served their respective orders at 10:10 am. The order by client 3 is placed at 10:07 am. So, it can be started at 10:07 am if any of the 2 employees will be free at that time.

From 10 to 10:07 am the 2 employee can be engaged as-

Employee 1 (say Anish) – 10:00 to 10:10 am-preparing burger for client 1- so must be busy for entire time from 10:00 to 10:07 am

Employee 2 (say Bani) – 10:00 to 10:07 am-preparing ice-creams for client 1 & client 2- so she need to work for 4 minutes & she will be idle for 3 minutes

At 10:07 am, Bani will start preparing burger for client 3. This will be complete at 10:17 am. So, Anish will remain free for 7 minutes from 10:10 to 10:17 am. From 10:17 to 10:30 am, both the employees will be idle.

So, exactly one of them will be free for 3(Bani) + 7(Anish) = 10 minutes.

Hence, option (b) is the answer.

General solution for 5 to 8

Total number of kids = 30,000

The number of kids surveyed from each village is 50. The number of villages surveyed from NE, W & S are 150, 250 & 200 respectively.

The number of kids surveyed from NE = $50 \times 150 = 7500$

The number of kids surveyed from W = $50 \times 250 = 12,500$

The number of kids surveyed from S = $50 \times 200 = 10,000$

The number of kids who studied in Government schools (G) = 55% of 30,000 = 16,500

The number of kids who studied in private schools (P) = 37% of 30,000 = 11,100

The number of kids who did not go to school (O) = 8% of 30,000 = 2,400

These kids are of 2 kinds-

1. Whose mother dropped out of school before completing primary education
2. Whose mother completed primary education

We are given a table for 18,000 kids of 1st kind (whose mother dropped out the school) as

	G	P	O	Total
NE	4200	500	300	5000
W	4200	1900	1200	7300
S	5100	300	300	5700
Total	13,500	2700	1800	18,000

Let the kids whose mother did not dropped out of school are as:

A = Kids from NE who studied in G

B = Kids from W who studied in G

C = Kids from S who studied in G

D = Kids from NE who studied in P

E = Kids from W who studied in P

F = Kids from S who studied in P

G = Kids from NE who did not go to school (O)

H = Kids from W who did not go to school (O)

I = Kids from S who did not go to school (O)

The table we get is as follows-

	G	P	O	Total
NE	4200 + A	500 + D	300 + G	7500 (= 5000 + 2500)
W	4200 + B	1900 + E	1200 + H	12,500 (= 7300 + 5200)
S	5100 + C	300 + F	300 + I	10,000 (= 6000 + 4000)
Total	13,500 + 3000 = 16,500	2700 + 8400 = 11,100	1800 + 600 = 2400	30,000

Further it is known that:

1. In S, all surveyed kids whose mothers had completed primary education were in school. So, I=0
2. In S, 60% of the surveyed kids were from G. Therefore, the numbers of kids in S, who are from G are 60% of 10,000 = 6000. So, $5100 + C = 6000$. So, $C = 900$

3. In NE, among the O kids, 50% had mothers who had dropped out before completing primary education. So, G is 50% of 300 + G. Therefore $G = 300$
4. The number of kids in G in NE was the same as the number of kids in G in W. So, $4200 + A = 4200 + B$. So, $A = B$. Now, from table above we can see that $4200 + A + 4200 + B + 5100 + C = 16500$. We know $A + B$ & we also know that $C=900$. So, $A = B = 1050$. So, the table can be modified as:

	G	P	O	Total
NE	4200 + 1050	500 + D	300 + 300	7500 (=5000 + 2500)
W	4200 + 1050	1900 + E	1200 + H	12,500 (=7300 + 5200)
S	5100 + 900	300 + F	300 + 0	10,000 (=6000 + 4000)
Total	13,500 + 3000 = 16,500	2700 + 8400 = 11,100	1800 + 600 = 2400	30,000

4.12 Previous Years' Papers

Now, all the unknown values can be easily calculated from the table as $H = 300$, $E = 3850$, $D = 1150$ & $F = 3400$

	G	P	O	Total
NE	4200 + 1050	500 + 1150	300 + 300	7500 (=5000 + 2500)
W	4200 + 1050	1900 + 3850	1200 + 300	12,500 (=7300 + 5200)
S	5100 + 900	300 + 3400	300 + 0	10,000 (=6000 + 4000)
Total	13,500 + 3000 = 16,500	2700 + 8400 = 11,100	1800 + 600 = 2400	30,000

5. The percentage of kids from S who were studying in P is = $(3700/10,000) \times 100\% = 37\%$.

Hence, option (a) is the answer.

6. The total number of kids in W whose mother had completed the primary education = $1050 + 3850 + 300 = 5200$

Among those 300 are not in school (who belong to O).

Hence, option (a) is the answer.

7. In a follow up survey of the same kids two years later, it was found that all the kids were now in school. So, now we have no kid in O. Of the kids who were not in school earlier, in one region, 25% were in G now, whereas the rest were enrolled in P; in the second region, all such kids were in G now; while in the third region, 50% of such kids had now joined G while the rest had joined P. As a result, in all three regions put together, 50% of the kids who were earlier out of school had joined G. It was also seen that no surveyed kid had changed schools.

There were total 2400 students who were not going to school. There were 600, 1500 & 300 of them belonging to NE, W and S respectively. Now, 50% of them i.e., 1200 have joined G. In 1st region 25%, 2nd region all & 50% from 3rd region joined G. It is possible if 1st region is NE, 2nd region is S & 3rd region is W

So, the table from general solution can be modified for this problem as no differentiation on basis of mother of such kids is done. (as it is not needed here)

	G	P	O	
NE	5400	2100	0	7500
W	6000	6500	0	12,500
S	6300	3700	0	10,000
Total	16,500	11,100	2400	30,000

There are 6000 of surveyed kids in G in W.

Hence, option (a) is the answer.

8. The table obtained for kids whose mother left school before primary:

	G	P	O	Total
NE	4200	500	300	5000
W	4200	1900	1200	7300
S	5100	300	300	5700
Total	13,500	2700	1800	18,000

Among the kids who were surveyed on S, there were 5700 whose mother dropped before completing primary education. All 300 who were not going to school earlier are now going to G. There were no kids who were not going to school whose mother had completed primary education. So, now there are 5400 in G from this total of 5700. So, required percentage = $(5400/5700) \times 100\% = 94.7\%$.

Hence, option (a) is the answer.

General solution for 9 to 12

We know there are 200 candidates who are at or above the 90th percentile overall in CET. It is also known that-

1. No one is below the 80th percentile in all 3 sections.
2. 150 are at or above the 80th percentile in exactly two sections.
3. The number of candidates at or above the 80th percentile only in P is the same as the number of candidates at or above the 80th percentile only in C. The same is the number of candidates at or above the 80th percentile only in M.
4. Number of candidates below 80th percentile in P: Number of candidates below 80th percentile in C: Number of Candidates below 80th percentile in M = 4:2:1.

Let us show the given scenario by using Venn diagram for these 200 candidates who are at or above the 90th percentile overall in CET. It is known that none of them got less than 80 percentile in all 3 sections. So, let them be shown as figure below. In this figure we have

1' = the students who got at least 80 percentile only in P

2' = the students who got at least 80 percentile only in C

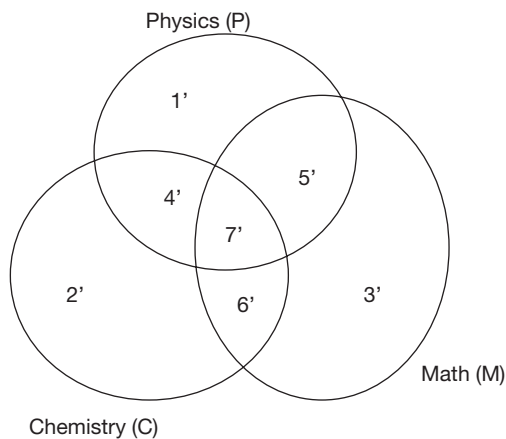
3' = the students who got at least 80 percentile only in M

4' = the students who got at least 80 percentile in exactly 2 sections- P & C

5' = the students who got at least 80 percentile in exactly 2 sections- P & M

6' = the students who got at least 80 percentile in exactly 2 sections- C & M

7' = the students who got at least 80 percentile in each of the 3 sections



- As, none of them got less than 80 percentile in all 3, so

$$\text{The value of } n(\text{PUCUM}) = 1' + 2' + 3' + 4' + 5' + 6' + 7' = 200 \quad (1)$$

- As, 150 are at or above the 80th percentile in exactly two sections.

$$4' + 5' + 6' = 150 \quad (2)$$

- It is given that,

Number of students who got more than 80 percentile in only P = number of students who got more than 80 percentile in only C = number of students who got more than 80 percentile in only M

$$\text{So, } 1' = 2' = 3' = x \text{ (say)} \quad (3)$$

$$\text{As, } 1' + 2' + 3' + 4' + 5' + 6' + 7' = 200$$

Using (2) & (3) in (1), we get

$$3x + 150 + 7' = 200$$

$$3x + 7' = 50 \quad (4)$$

But, it is also given that, number of candidates below 80th percentile in P: Number of candidates below 80th percentile in C: Number of candidates below 80th percentile in M = 4:2:1

$$\text{The number of students below 80 percentile in P} = 2' + 3' + 6' = 2x + 6'$$

$$\text{The number of students below 80 percentile in C} = 1' + 3' + 5' = 2x + 5'$$

$$\text{The number of students below 80 percentile in M} = 1' + 2' + 4' = 2x + 4'$$

$$\text{So, } (2x + 6') : (2x + 5') : (2x + 4') = 4:2:1 \quad (5)$$

From (5) we can conclude that $2x + 6' + 2x + 5' + 2x + 4' = 7k$ (k is an integral constant)

$$\text{So, } 6x + (4' + 5' + 6') = 7k$$

$$6x + 150 = 7k$$

So, $6x + 150$ must be divisible by 7. Hence, $6x + 3$ is also divisible by 7 (150 divided by 7 gives 3 as remainder)

So, the possible values of x are 3, 10, 17,...(and so on)

We also know that from (4) that $3x + 7' = 50$

So, x must be less than 17. So, there are only 2 feasible values of x , which are 3 & 10

The

Case 1- If $x = 3$

Then, we can find all the values as,

$$1' = 2' = 3' = 3, 7' = 41, 4' = 18, 5' = 42 \text{ \& } 6' = 90$$

Case 2- If $x = 10$

Then, we can find all the values as,

$$1' = 2' = 3' = 10, 7' = 20, 4' = 10, 5' = 40 \text{ \& } 6' = 100$$

- Selection in AET-** The candidates selected for AET are those who are at or above 90th percentile overall with 80th or above percentile in at least two sections in CET. These candidates are shown by 4', 5' & 6' (total 150 in number)

Selection in BIE- If any candidate is appearing in the AET, BIE considers their AET score for final selection provided the candidate is at or above the 80th percentile in P. BIE will conduct a separate test for the other students who are at or above 80th percentile in P in CET

So, selection in BIE is of 2 types-

- Candidates who scored 80 or more in P but their overall was less than 90 in CET - they will appear in separate test by BIE

2. Candidates who got 80 or above in P & also got 90 or more overall - These are shown by 1', 4', 5' & 7' [As, $n(P) = 1' + 4' + 5' + 7'$].

These can be further divided into 2 parts as-

(a) Candidates who were selected for AET- 4', 5' & 7' represent the students who got 80 or more in at least 2 sections. So, they are selected for AET. Their score of AET will also be used for selection in BIE

(b) Candidates who were rejected by AET- 1' represent such students. As, they are those who got 90 or more overall, but got 80 or more in P only. They will have to appear in separate test for BIE. These are the candidates sitting for separate test for BIE who were at or above 90th percentile in AET

So, the number of students sitting for separate test for BIE who were at or above 90th percentile in AET is shown by 1' (i.e. x). The number of such candidates is 3 or 10

Hence, option (a) is the answer.

10. As per the given condition, the number of candidates who are at or above the 90th percentile overall and also at or above the 80th percentile in all 3 sections in CET is actually a multiple of 5. So, the value of 7' must be multiple of 5. But we know from general solution that there are 2 possible values of 7' & those are 41 & 20. So, 7' must be 20. So, we have to consider case 2 (i.e. $x=10$) in this solution as the only feasible solution.

So, we have $1' = 2' = 3' = 10$, $7' = 20$, $4' = 10$, $5' = 40$ & $6' = 100$

The number of candidates at or above 90th percentile overall and at or above 80th percentile in both P and M = $5' + 7' = 40 + 20 = 60$.

So, the correct answer is 60 (*non-MCQ question*)

11. Using the solution for 10, $7' = 20$. So, we have to consider case 2 (i.e. $x = 10$) in this solution as the only feasible solution.

So, we have $1' = 2' = 3' = 10$, $7' = 20$, $4' = 10$, $5' = 40$ & $6' = 100$

Number of candidates shortlisted for AET = $4' + 5' + 6' + 7' = 10 + 40 + 100 + 20 = 170$

So, the correct answer is 170 (*non-MCQ question*)

12. It is given that the number of candidates, who are at or above the 90th percentile overall and also are at or above the 80th percentile in P in CET, is more than 100. So, we will check both the cases to see which 1 is feasible here.

Case 1- If $x=3$

Then, we can find all the values as,

$$1' = 2' = 3' = 3, 7' = 41, 4' = 18, 5' = 42 \text{ \& } 6' = 90$$

Now, number of candidates who are at or above the 90th percentile overall and also are at or above the 80th percentile in P in CET = $n(P) = 1' + 4' + 5' + 7' = 3 + 18 + 42 + 41 = 104$. So, this gives feasible case

Case 2- If $x=10$

Then, we can find all the values as,

$$1' = 2' = 3' = 10, 7' = 20, 4' = 10, 5' = 40 \text{ \& } 6' = 100$$

Now, number of candidates who are at or above the 90th percentile overall and also are at or above the 80th percentile in P in CET = $n(P) = 1' + 4' + 5' + 7' = 10 + 10 + 40 + 20 = 80$. So, this is non-feasible case

So, we must obtain our solution by considering Case 1 as feasible case.

We know there are total 400 candidates who got 80 or more in P. Out of these 104 are those who are at or above the 90th percentile overall. So, the candidates who got 80 or more in P but got overall less than 90 are $400 - 104 = 296$. Now, these candidates must appear for BIE. There are 3 candidates represented by 1' who got overall 90 or more but 80 or more in P only. So, these candidates will also appear in BIE (as they will be rejected for AET). We know $1'=3$. So, the required number of candidates = $296 + 3 = 299$

Hence, option (a) is the answer.

General solution for 13 to 16

The information given in bar graph can be tabulated as-

Frequency of score	S (Social support)	F(Freedom of choice)	C(Corruption Perception)
0	0	0	0
1	0	2	1
2	0	1	3
3	3	2	4
4	3	1	1
5	2	3	0

6	1	0	1
7	1	1	0
8	0	0	0
Total (frequency)	10	10	10

Further, the following are known:

1. Amda(A) and Calls(C) jointly have the lowest total score, 7, with identical scores in all the three parameters.
2. Zooma has a total score of 17.
3. All the 3 countries, which are categorised as happy, have the highest score in exactly one parameter.

Using 1, A(Amda) & C(calls) have total score of 7 with identical score in all 3 parameters. From the table above we can conclude that they must have got score of:

- (a) 1 in F, 2 in C & 4 in S.
- (b) 1 in F, 3 in S & 3 in C

Else, no possible combination of total score of 7 with identical scores in S, F & C can be made for the A & C with identical scores

Using 2 & 3 we know that 3 countries are categorised as happy & Z (Zooma) is 1 of these 3 countries with total score of 17. It is also given that all the 3 countries, which are categorised as happy, have the highest score in exactly one parameter.

Now from frequency table (not considering point 3) we can observe that the score of 17 can be obtained as-

- (a) 7, 7 & 3
- (b) 7, 6 & 4
- (c) 7, 5 & 5
- (d) 6, 6 & 5

Now, using point 3, we need to check the feasibility of these 3 possibilities

- (a) 7, 7 & 3- It has only 1 possibility
 1. 7 in S, 7 in F & 3 in C- It is not feasible by point 3 as then it will have highest score in S and F
- (b) 7, 6 & 4- It has 3 possibilities
 1. 7 in S, 6 in C & 4 in F – not feasible by point 3 as then it will have highest score in S and C
 2. 7 in F, 6 in S & 4 in C- feasible
 3. 7 in F, 6 in C & 4 in S- not feasible by point 3 as then it will have highest score in F and C
- (c) 7, 5 & 5- It has 2 possibilities
 1. 7 in S, 5 in C & 5 in F- not possible as no country has score of 5 in C

2. 7 in F, 5 in S & 5 in C- not possible as no country has score of 5 in C

- (d) 6, 6 & 5- It has only 1 possibility
 1. 6 in S, 6 in C & 5 in F- It is feasible

So, there are 2 feasible cases for scores of Zooma

- (i) 7 in F, 6 in S & 4 in C
- (ii) 6 in S, 6 in C & 5 in F

13. Amda's score in F must be 1. As in both feasible cases for Amda & Calls, they must have identical score of 1 in F.

Correct answer is 1 (**non-MCQ question**)

14. Zooma's score in S must be 6. As in both feasible cases for Zooma, its score in S is 6.

Correct answer is 6 (**non-MCQ question**)

15. We are given that Benga and Delma, two countries categorized as happy, are tied with the same total score. We can check the possibilities for their same total score in accordance to the 2 possible cases for Zooma which is the 3rd country to be categorised as happy.

i) Zooma's score is - 7 in F, 6 in S & 4 in C

Using the table from general solution

Frequency of score	S (Social support)	F (Freedom of choice)	C (Corruption Perception)
0	0	0	0
1	0	2	1
2	0	1	3
3	3	2	4
4	3	1	1
5	2	3	0
6	1	0	1
7	1	1	0
8	0	0	0
Total (frequency)	10	10	10

Now, the best (i.e. highest) possible score for Benga & Dolma can be obtained by giving them scores using point number 3. One of them (say Benga) must get 7 in S & other one (say Dolma) must get 6

in C. Now, Benga can score maximum 3 in C & 5 in F. On the other hand, Dolma can score maximum of 5 in S & 5 in F. So, the maximum possible scores for Benga & Dolma (or vice versa) are 15 & 16 respectively. So, the best possibility is both get 15

With one of them say Benga getting- 7 in S, 3 in C & 5 in F. The other (say Dolma) getting- 6 in C, 5 in S & 4 in F.

ii) Zooma's score is - 6 in C, 6 in S & 5 in F

Using the table from general solution

Frequency of score	S (Social support)	F (Freedom of choice)	C (Corruption Perception)
0	0	0	0
1	0	2	1
2	0	1	3
3	3	2	4
4	3	1	1
5	2	3	0
6	1	0	1
7	1	1	0
8	0	0	0
Total (frequency)	10	10	10

Now, the best (i.e. highest) possible score for Benga & Dolma can be obtained by giving them scores using point number 3. One of them (say Benga) must get 7 in S & other one (say Dolma) must get 7 in F. Now, Benga can score maximum 5 in F. On the other hand, Dolma can score maximum of 5 in S. So, for 2 parameters their scores can be 12. But for the 3rd parameter i.e. C, 1 of them (say Benga) can get maximum score of 4 & the other one (say Dolma) can get maximum of 3 in C. So, the maximum possible scores for Benga & Dolma (or vice versa) are 15 & 16 respectively. So, the best possibility is both get 15.

With one of them say Benga getting- 7 in S, 5 in F & 3 in C. The other (say Dolma) getting- 7 in F, 5 in S & 3 in C.

So, in both the cases the maximum possible score for both Benga & Dolma is 15.

Hence, option (b) is the answer.

- 16.** We are given that the scores of Benga and Delma are 16 and 15. We can solve this question on basis of 2 possible cases of Zooma's scores in 3 sections.

i) Zooma's score is - 7 in F, 6 in S & 4 in C

Using solution 15, the maximum possible scores of other 2 happy countries were 16 & 15. Let the country scored 16 is Benga & Dolma scored 15.

So, Benga scored 6 in C, 5 in S & 5 in F. Dolma scored 7 in S, 3 in C & 5 in F. Now, using the table from general solution by removing the values used by Zooma, Benga & Dolma

Frequency of score	S (Social support)	F (Freedom of choice)	C (Corruption Perception)
0	0	0	0
1	0	2	1
2	0	1	3
3	3	2	3
4	3	1	0
5	1	1	0
6	0	0	0
7	0	0	0
8	0	0	0
Total (frequency)	7	7	7

From the modified table above we can say that only 1 country can get score of 13 by getting scores of 5 in S, 5 in F & 3 in C

ii) Zooma's score is - 6 in C, 6 in S & 5 in F

Using solution 15, the maximum possible scores of other 2 happy countries were 16 & 15. Let the country scored 16 is Benga & Dolma scored 15. So, Benga scored 7 in F, 5 in S & 3 in C. Dolma scored 7 in S, 5 in F & 3 in C. Using the table from general solution by removing the values used by Zooma, Benga & Dolma

Frequency of score	S (Social support)	F (Freedom of choice)	C (Corruption Perception)
0	0	0	0
1	0	2	1

2	0	1	3
3	3	2	2
4	3	1	1
5	1	1	0
6	0	0	0
7	0	0	0
8	0	0	0
Total (frequency)	7	7	7

From the modified table above we can say that only 1 country can get score of 13 by getting scores of 5 in S, 5 in F & 3 in C.

Please note that the question is not about maximum possible score which would have been 14. But, it is about number of countries which can get total of 13. There is only 1 country which could get score of 13.

Hence, option (b) is the answer.

General solution for 17 to 20

There are 21 employees working in a division, out of whom 10 are special-skilled employees (SE) and the remaining 11 are regular skilled employees (RE). So, there are 10 SE & 11 RE. In the 1st month the number of SEs in T1, T2, T3, T4 and T5 must be 4, 3, 2, 1 and 0. It is so because T1 has one more SE than T2, who in turn has one more SE than T3, ... till T5 (for 1st month).

It is also known that the challenging project is assigned to the team that has one more employee than the rest. So, the team which is assigned the challenging project will have 5 employees, while the other teams will have 4 employees. We know that the team T1 is assigned the challenging project in the 1st month. So, T1 has 5 employees.

We have to check scenario for composition of all 5 teams for each of the 5 months separately.

A- Scenario for 1st month

So, now we can also find the team composition for each team for 1st month. T1 has total 5 employees, out of which 4 are SE. So, it has 1 RE. The team T2 has total 4 employees & it has 3 SE, so it has 1 RE & similarly the team composition for other teams can also be obtained.

So, we can show the team composition for each team for the 1st month as-

Team	SE	RE	Total
T1	4	1	5
T2	3	1	4
T3	2	2	4
T4	1	3	4
T5	0	4	4

Between two successive months (i.e. from 1st to 2nd month or from 2nd to 3rd month & so on)

The composition of the teams changes as follows:

- The team allotted the challenging project, gets two SE from the team which was allotted the challenging project in the previous month. In exchange, one RE is shifted from the former team to the latter team.
- After the above exchange, if T1 has any SE and T5 has any RE, then one SE is shifted from T1 to T5, and one RE is shifted from T5 to T1. Also, if T2 has any SE and T4 has any RE, then one SE is shifted from T2 to T4, and one RE is shifted from T4 to T2.

B- Scenario for 2nd month

We also know that T2 will be assigned the challenging project in the 2nd month. It is also known that-

- 2 SEs will be transferred from T1 to T2 (point a)
- 1 RE is transferred from T2 to T1 (point a)
- 1 SE will be transferred from T1 to T5 (point b)
- 1 RE will be transferred from T5 to T1 (point b)
- 1 SE will be transferred from T2 to T4 (point b)
- 1 RE will be transferred from T4 to T2 (point b)

So, we can show the team composition for each team for the 2nd month as-

Team	SE	RE	Total
T1	1	3	4
T2	4	1	5
T3	2	2	4
T4	2	2	4
T5	1	3	4

C- Scenario for 3rd month

We also know that T3 will be assigned the challenging project in the 3rd month. It is also known that-

- (i) 2 SEs will be transferred from T2 to T3 (point a)
- (ii) 1 RE is transferred from T3 to T2 (point a)
- (iii) 1 SE will be transferred from T1 to T5 (point b)
- (iv) 1 RE will be transferred from T5 to T1 (point b)
- (v) 1 SE will be transferred from T2 to T4 (point b)
- (vi) 1 RE will be transferred from T4 to T2 (point b)

So, we can show the team composition for each team for the 3rd month as-

Team	SE	RE	Total
T1	0	4	4
T2	1	3	4
T3	4	1	5
T4	3	1	4
T5	2	2	4

D- Scenario for 4th month

We also know that T4 will be assigned the challenging project in the 4th month. It is also known that-

- (i) 2 SEs will be transferred from T3 to T4 (point a)
- (ii) 1 RE is transferred from T4 to T3 (point a)
- (iii) There can be no transfer between T1 & T5 as T1 has no employee in SE in 3rd month.
- (iv) There can be no transfer between T2 & T4 as T4 has no employee in RE in 3rd month.

So, we can show the team composition for each team for the 4th month as-

Team	SE	RE	Total
T1	0	4	4
T2	1	3	4
T3	2	2	4
T4	5	0	5
T5	2	2	4

E- Scenario for 5th month

We also know that T5 will be assigned the challenging project in the 5th month. It is also known that-

- (i) 2 SEs will be transferred from T4 to T5 (point a).
- (ii) 1 RE is transferred from T5 to T4 (point a).
- (iii) There can be no transfer between T1 & T5 as T1 has no employee in SE in 4th month.
- (iv) There can be no transfer between T2 & T4 as T4 has no employee in RE in 4th month.

So, we can show the team composition for each team for the 4th month as-

Team	SE	RE	Total
T1	0	4	4
T2	0	4	4
T3	2	2	4
T4	4	0	4
T5	4	1	5

17. The composition of T2 remained unchanged for the 3rd and 4th months. So, composition of T2 remains unchanged in successive months for once. The composition of T4 changed for each month. So, our required answer is (1,0).

Hence, option (b) is the answer.

18. The number of SE in T1 in the 3rd month = 0
Number of SE in T5 in the 3rd month = 2.
So, our required answer is (0, 2).

Hence, option (a) is the answer.

19. We know that challenging projects and standard projects has 200 credits & 100 credits respectively. It is also known that in each type of project, the credits are equally shared by the employees in the team.

So, for a challenging project an employee earns = $200/5 = 40$ credits

For a standard project, an employee earns = $100/4 = 25$ credits.

For any employee the possibility of engagement to project for 5 months has following possibilities-

1. An employee can work in 5 challenging projects. So, he can earn 200 credits.
2. An employee can work in 4 challenging projects and 1 standard project. So, he can earn 185 credits.
3. An employee can work in 3 challenging projects and 2 standard projects. So, he can earn 170 credits.

4. An employee can work in 2 challenging projects & 3 challenging projects. So, he can earn 155 credits.
5. An employee can work in 1 challenging project and 4 standard projects. So, he can earn 140 credits.
6. An employee can work in 5 standard projects. So, he can earn 125 credits.

So, it is not possible for an employee to earn 150 credits.

Hence, option (b) is the answer.

20. We know that the employee named Aneek earned 185 credits. So, he must have worked in 4 challenging & 1 standard projects.

Now, we can check each option as-

(A) Aneek worked only in teams T1, T2, T3, and T4

Aneek could have worked in T1 in 1st month (in challenging project), T2 in 2nd month (in challenging project), T3 in 3rd month (in challenging project) and T4 in 4th month (in challenging project) and T4 in 5th month (in standard project). Hence, this is possible.

(B) Aneek worked only in teams T1, T2, T4, and T5

Aneek could have worked in T1 in 1st month (in challenging project), T2 in 2nd month (in challenging project), T4 in 3rd month (in standard project), T4 in 4th month (in challenging project) and T5 in 5th month (in challenging project). Hence, this is possible.

(C) Aneek worked only in teams T2, T3, T4, and T5

Aneek could have worked in T2 in 1st month (in standard project), T2 in 2nd month (in challenging project), T3 in 3rd month (in challenging project), T4 in 4th month (in challenging project) and T5 in 5th month (in challenging project). Hence, this is possible.

(d) Aneek worked only in teams T1, T3, T4, and T5

Aneek could have worked in T1 in first month (in challenging project). He can work in T1 or T5 in the second month. In either case, he cannot work in T3 without working in T2 first. If we assume, he worked in T3 in the first month, he could not have worked in four teams in the five months. Similarly, we can rule out the other possibilities for this option. Hence, this is not possible

Hence, option (d) is the answer.

General solution for 21 to 24

All the square layouts with the heights shown as numbers can be shown as a table-

6	1	2	4	3
9	5	3	2	8
7	8	4	6	5
3	9	5	1	2
1	7	6	3	9

21. Let the individuals seated in these positions are shown as a_{ij} where i & j shows the row and column respectively. As per the given conditions, the persons who can be reached by just 1 person are-

1. $a_{13} = 2$ as only 1 who is at exact left of it i.e. a_{12} can reach to him
2. $a_{31} = 7$ as only 3 who is at exact down of it i.e. a_{41} can reach to him
3. $a_{33} = 4$ as only 3 who is at exact above of it i.e. a_{23} can reach to him
4. $a_{35} = 5$ as only 2 who is at exact down of it i.e. a_{45} can reach to him
5. $a_{41} = 3$ as only 1 who is at exact down of it i.e. a_{51} can reach to him
6. $a_{45} = 2$ as only 1 who is at exact left of it i.e. a_{44} can reach to him
7. $a_{54} = 3$ as only 1 who is at exact above of it i.e. a_{44} can reach to him

So, there are total 7 individuals who can be reached by just 1 individual.

Hence, option (c) is the answer.

22. All of those individuals who are at the height of 1 cannot be reached by any person due to the condition (ii).

Hence, option (d) is the answer.

23. We have to check it by options

1. **Option A- last row** – there is just 1 individual at height 1 at position a_{51} who cannot be reached by anyone. So, this option is not correct.
2. **Option B- fourth row** – there is just 1 individual at height 1 at position a_{44} who cannot be reached by anyone. So, this option is not correct.
3. **Option C- fourth column** – there are 2 individuals at height 2 and 1 respectively who are at positions a_{24} and a_{44} who cannot be reached

by anyone. So, this option is correct. No need to check option D.

Hence, option (c) is the answer.

24. We have to check it by options

1. **Option A-** it is incorrect as there is no individual in row 1 who can be reached by 5 or more individuals.
2. **Option B-** it is incorrect as there is no individual in row 3 who cannot be reached by anyone.
3. **Option D-** it is incorrect as the individual in column 1 who is at height of 9 can be reached by 4 individuals.
4. The statement in option C is correct.
Hence, option (c) is the answer.

Solution for 25 to 28

25. The underlying principle is that any person staying in any of these 10 cities should be able to make a trip to any other city in the morning and should be able to return by the evening of the same day. To satisfy this principle there must be 4 flights for each pair of cities. For example, let any pair of cities having city A & city B. For, person going from A to B in morning & returning to A in evening we must have flight from A to B in morning and from B to A in the evening. Similarly, for person going from B to A in morning & returning to B in evening we must have flight from B to A in morning and from A to B in the evening. So, there must be 4 flights for each pair of cities. Now, total number of pairs of 2 from total 10 cities is ${}^{10}C_2$. So, the minimum number of flights that must be scheduled = ${}^{10}C_2 \times 4 = 180$.

Hence, option (c) is the answer.

26. There are total 10 cities & 3 among them are hubs. It is given that any direct flight should originate and/or terminate at a hub. Let the cities be named as A, B, C, ..., J. The 3 cities which are hub are A, B & C. Now, the flight operation is of 2 types.

A. Flight between hub & non hub

There are 7 cities which are non-hub & each of them must have direct flights with each of 3 hubs. There must be 4 flights between 2 cities (as we seen in solution 25). So, for any non-hub there will be 3×4 flights. There are 7 non-hubs. So, total number of flights between hub & non-hub will be $7 \times 3 \times 4 = 84$.

B. Flights between hubs

For each pair of hubs we need 4 flights (as explained in solution 25). So, total number of flights in-between hub cities is $3 \times 4 = 12$.

So, total number of flights will be $84 + 12 = 96$.

Hence, option (c) is the answer.

27. We know that G1 has the cities A, B and C. Also, G2, G3 and G4 have 3, 2 and 2 cities respectively. All the 3 cities of G2 cannot be connected to a city from G3 & G4. So, any person willing to go to G2 must go through G2. Hence, all the 3 cities in G2 must be connected to A. In a same manner any person who wishes to go to any city of G3 or G4 must pass through B & C respectively.

Now, number of flights between A & all 3 cities of G2 = $3 \times 4 = 12$

Further we know that there are 2 cities in G3. So, number of flights between B & both the cities of G3 = $2 \times 4 = 8$

Also, there are 2 cities in G4. So, number of flights between C & both the cities of G4 = $2 \times 4 = 8$

In G1 there are 3 cities A, B & C. These cities must be interconnected pairwise among themselves. So, the number of flights needed is $3 \times 4 = 12$

So, the total number of flights needed are = $12 + 8 + 8 + 12 = 40$.

So, the correct answer is 40 (*non-MCQ question*)

28. We know that the flights that would operate at A would be those to and from B. Cities in G2 would have to be assigned to G3 or to G4. But, it would not result in any reduction in the number of flights because the cities in G2 will still have to be connected to either B or C. We also know that now there are no flights between A and C. There were 4 flights scheduled between A & C (there are 4 flights between any 2 cities which must satisfy the given principle in 24). So, these 4 flights are not needed now. Hence, there is reduction in number of flights by 4.

So, the correct answer is 4 (*non-MCQ question*)

Solutions for 29 to 32

29. There are 4 cars & 2 possible routes A-M-B & A-N-B. The time needed for both the routes for just 1 car is 26 minutes ($6 + 20$).

For 2 cars, time needed in route A-N-B is $9 + 21 = 30$ minutes.

For 2 cars, time needed in route A-M-B is $9 + 20.9 = 29.9$ minutes.

In both routes nearly the time needed is nearly same (the difference is just 0.1 min) for 2 cars in each route. But, if one of these 2 routes will have 3 or 4 cars, there will be too much time for those 3 or 4 cars. So, for the overall minimization of time, there must be 2 cars on each of the routes.

So, the correct answer is 2 (*non-MCQ question*)

30. As given in solution for 29, the police order must be for 2 cars on each route.

For 2 cars, time needed in route A-N-B is $9 + 21 = 30$ minutes.

For 2 cars, time needed in route A-M-B is $9 + 20.9 = 29.9$ minutes.

So, the required difference is 0.1 min.

Hence, option (b) is the answer.

31. It is known that

1. All the cars cannot take the same route.
2. No car should be able to reduce its travel time by not following the order.

Using these 2 conditions we can deduce that either two or three cars should go through A-M.

Case 1- If 2 cars are directed to follow A-M route

- (a) If they are directed to follow A-M-B route, the time required will be 29.9 min.

But, if 1 of these 2 cars breaks the police order and go through M-N i.e. follow the route of A-M-N-B, it can reach B in $9 + 7 + 12 = 28$ minutes.

- (b) Also, if 1 of these 2 cars which were directed to go through A-M is directed to go through the route of A-M-N-B, then 1 of the cars which was directed to go through A-N-B can break the police order and go through A-M-B.

In this case, the original time (A-N-B) = $21 + 12 =$ (three cars) = 33 minutes.

New time = 12 (3 cars) + $20.9 = 32.9$ minutes.

Hence, there could be reduction in time by 0.1 minute.

- (c) Further both the cars which were directed to go through A-M, cannot be directed to go through M-N as in then all 4 cars would go through N-B.

Case 2- If 3 cars are directed to follow A-M route

In this case either 1 or 2 cars can be directed through M-N route

- (a) If one car is directed through M-N, one of the two cars directed through M-B, can break the police order and go through M-N.

Original time (A-M-B) = 12 (3 cars) + $20.9 = 32.9$ minutes.

New time (A-M-N-B) = $12 + 8 + 12 = 32$ minutes.

So, there will be time reduction by 0.9 minute.

So, the police order must direct 3 cars to follow A-M route & from these 3 cars, it must direct exactly 2 cars to follow the M-N route, so that no car can reduce the travelling time by breaking the police order. So, the correct answer is 2 (*non-MCQ question*).

32. As explained in solution 31, the police order must direct 3 cars to follow A-M route & from these 3 cars, it must direct exactly 2 cars to follow the M-N route

So, the police order is as-

- (a) 1 car will follow A-M-B route, the time needed is $12 + 20 = 32$ minute.
- (b) 2 cars will follow A-M-N-B route, the time needed is $12 + 8 + 12 = 32$ minute.
- (c) 1 car will follow A-N-B route, the time needed is $20 + 12 = 32$ minutes.

So, if all the cars follow the police order, the minimum travel time from A to B is 32 minutes.

Hence, option (b) is the answer.

CAT 2017—SLOT II

INSTRUCTIONS

- ☐ Directions for answering the questions are given before each group of questions. Read these directions carefully and answer the questions by darkening the appropriate circles Sheet. Each question has only one correct answer.
 - ☐ All questions carry three marks each. Each wrong answer will attract a penalty of one mark.
 - ☐ Do your rough work only on the Test Booklet and NOT on the Answer Sheet.
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Direction for the questions 1–4: Study the following information carefully and answer the given question.

Funky Pizzeria was required to supply pizzas to three different parties. The total number of pizzas it had to deliver was 800, 70% of which were to be delivered to Party 3 and the rest equally divided between Party 1 and Party 2.

Pizzas could be of Thin Crust (T) or Deep Dish (D) variety and come in either Normal Cheese (NC) or Extra Cheese (EC) versions. Hence, there are four types of pizzas: T-NC, T-EC, D-NC and D-EC. Partial information about proportions of T and NC pizzas ordered by the three parties is given below:

	Thin Crust (T)	Normal Cheese (NC)
Party 1	0.6	
Party 2	0.55	0.3
Party 3		0.65
Total	0.375	0.52

1. How many Thin Crust pizzas were to be delivered to Party 3?
(a) 398 (b) 162
(c) 196 (d) 364
2. How many Normal Cheese pizzas were required to be delivered to Party 1?
(a) 104 (b) 84
(c) 16 (d) 196
3. For Party 2, if 50% of the Normal Cheese pizzas were of Thin Crust variety, what was the difference between the numbers of T-EC and D-EC pizzas to be delivered to Party 2?
(a) 18 (b) 12
(c) 30 (d) 24
4. Suppose that a T-NC pizza cost as much as a D-NC pizza, but $\frac{3}{5}$ th of the price of a D-EC pizza. A D-EC pizza costs ₹ 50 more than a T-EC pizza, and the latter costs ₹ 500.
If 25% of the Normal Cheese pizzas delivered to Party 1 were of Deep Dish variety, what was the total bill for Party 1?

- (a) ₹ 59,480 (b) ₹ 59,840
(c) ₹ 42,520 (d) ₹ 45,240

Direction for the questions 5–8: Study the following information carefully and answer the given question.

There were seven elective courses - E1 to E7 - running in a specific term in a college. Each of the 300 students enrolled had chosen just one elective from among these seven. However, before the start of the term, E7 was withdrawn as the instructor concerned had left the college. The students who had opted for E7 were allowed to join any of the remaining electives. Also, the students who had chosen other electives were given one chance to change their choice. The table below captures the movement of the students from one elective to another during this process. Movement from one elective to the same elective simply means no movement. Some numbers in the table got accidentally erased; however, it is known that these were either 0 or 1.

		To Elective					
		E1	E2	E3	E4	E5	E6
From Elective	E1	9	5	10	1	4	2
	E2		34	8		2	2
	E3	2	6	25			2
	E4		3	2	14		4
	E5		5			30	
	E6		7	3		2	9
	E7	4	16	30	5	5	41

Further, the following are known:

- Before the change process there were 6 more students in E1 than in E4, but after the reshuffle, the number of students in E4 was 3 more than that in E1.
 - The number of students in E2 increased by 30 after the change process.
 - Before the change process, E4 had 2 more students than E6, while E2 had 10 more students than E3.
5. How many elective courses among E1 to E6 had a decrease in their enrollments after the change process?

- (a) 4 (b) 1
(c) 2 (d) 3

6. After the change process, which of the following is the correct sequence of number of students in the six electives E1 to E6?
- (a) 19, 76, 79, 21, 45, 60
(b) 19, 76, 78, 22, 45, 60
(c) 18, 76, 79, 23, 43, 61
(d) 18, 76, 79, 21, 45, 61
7. After the change process, which course among E1 to E6 had the largest change in its enrollment as a percentage of its original enrollment?
- (a) E1 (b) E2
(c) E3 (d) E6
8. Later, the college imposed a condition that if after the change of electives, the enrollment in any elective (other than E7) dropped to less than 20 students, all the students who had left that course will be required to re-enroll for that elective.

Which of the following is a correct sequence of electives in decreasing order of their final enrollments?

- (a) E2, E3, E6, E5, E1, E4
(b) E3, E2, E6, E5, E4, E1
(c) E2, E5, E3, E1, E4, E6
(d) E2, E3, E5, E6, E1, E3

Direction for the question 9: Study the following information carefully and answer the given question.

9. An old woman had the following assets:
- (a) ₹ 70 lakh in bank deposits
(b) 1 house worth ₹ 50 lakh
(c) 3 flats, each worth ₹ 30 lakh
(d) Certain number of gold coins, each worth ₹ 1 lakh

She wanted to distribute her assets among her three children; Neeta, Seeta and Geeta.

The house, any of the flats or any of the coins were not to be split. That is, the house went entirely to one child; a flat went to one child and similarly, a gold coin went to one child.

Among the three, Neeta received the least amount in bank deposits, while Geeta received the highest. The value of the assets was distributed equally among the children, as were the gold coins.

How much did Seeta receive in bank deposits (in lakhs of rupees)?

- (a) 30 (b) 40
(c) 20 (d) 10

Direction for the question 10: *Study the following information carefully and answer the given question.*

10. An old woman had the following assets:

- (a) ₹ 70 lakh in bank deposits
(b) 1 house worth ₹ 50 lakh
(c) 3 flats, each worth ₹ 30 lakh
(d) Certain number of gold coins, each worth ₹ 1 lakh

She wanted to distribute her assets among her three children; Neeta, Seeta and Geeta.

The house, any of the flats or any of the coins were not to be split. That is, the house went entirely to one child; a flat went to one child and similarly, a gold coin went to one child.

Among the three, Neeta received the least amount in bank deposits, while Geeta received the highest. The value of the assets was distributed equally among the children, as were the gold coins.

How many flats did Neeta receive?

(Non-MCQ question)

Direction for the question 11: *Study the following information carefully and answer the given question.*

11. An old woman had the following assets:

- (a) ₹ 70 lakh in bank deposits
(b) 1 house worth ₹ 50 lakh
(c) 3 flats, each worth ₹ 30 lakh
(d) Certain number of gold coins, each worth ₹ 1 lakh

She wanted to distribute her assets among her three children; Neeta, Seeta and Geeta.

The house, any of the flats or any of the coins were not to be split. That is, the house went entirely to one child; a flat went to one child and similarly, a gold coin went to one child.

The value of the assets distributed among Neeta, Seeta and Geeta was in the ratio of 1:2:3, while

the gold coins were distributed among them in the ratio of 2:3:4. One child got all three flats and she did not get the house. One child, other than Geeta, got ₹ 30 lakh in bank deposits.

How many gold coins did the old woman have?

- (a) 72 (b) 90
(c) 180 (d) 216

Direction for the question 12: *Study the following information carefully and answer the given question.*

12. An old woman had the following assets:

- (a) ₹ 70 lakh in bank deposits
(b) 1 house worth ₹ 50 lakh
(c) 3 flats, each worth ₹ 30 lakh
(d) Certain number of gold coins, each worth ₹ 1 lakh

She wanted to distribute her assets among her three children; Neeta, Seeta and Geeta.

The house, any of the flats or any of the coins were not to be split. That is, the house went entirely to one child; a flat went to one child and similarly, a gold coin went to one child.

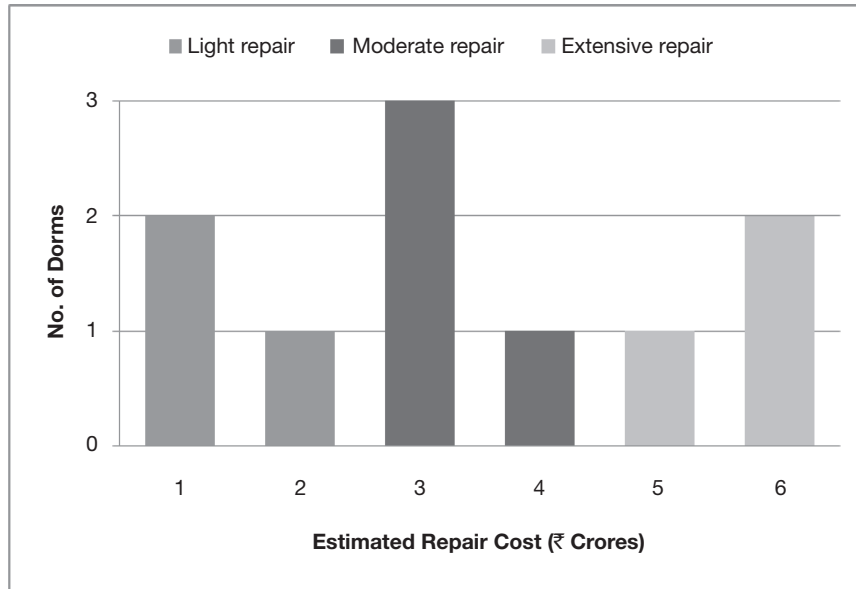
The value of the assets distributed among Neeta, Seeta and Geeta was in the ratio of 1:2:3, while the gold coins were distributed among them in the ratio of 2:3:4. One child got all three flats and she did not get the house. One child, other than Geeta, got ₹ 30 lakh in bank deposits.

How much did Geeta get in bank deposits (in lakhs of rupees)?

(Non-MCQ question)

Direction for the questions 13–16: *Analyse the graph/s given below and answer the question that follows.*

At a management school, the oldest 10 dorms, numbered 1 to 10, need to be repaired urgently. The following diagram represents the estimated repair costs (in ₹ crore) for the 10 dorms. For any dorm, the estimated repair cost (in ₹ crore) is an integer. Repairs with estimated cost ₹ 1 or 2 crore are considered light repairs, repairs with estimated cost ₹ 3 or 4 crores are considered moderate repairs and repairs with estimated cost ₹ 5 or 6 crore are considered extensive repairs.



Further, the following are known:

1. Odd-numbered dorms do not need light repair; even-numbered dorms do not need moderate repair and dorms, whose numbers are divisible by 3, do not need extensive repair.
2. Dorms 4 to 9 all need different repair costs, with Dorm 7 needing the maximum and Dorm 8 needing the minimum.

13. Which of the following is NOT necessarily true?
- (a) Dorm 1 needs a moderate repair
 - (b) Dorm 5 repair will cost no more than ₹ 4 crore
 - (c) Dorm 7 needs an extensive repair
 - (d) Dorm 10 repair will cost no more than ₹ 4 crore
14. What is the total cost of repairing the odd-numbered dorms (in ₹ crore)? *(Non-MCQ question)*
15. Suppose further that:
1. 4 of the 10 dorms needing repair are women's dorms and need a total of ₹ 20 crore for repair.
 2. Only one of Dorms 1 to 5 is a women's dorm.
- What is the cost for repairing Dorm 9 (in ₹ crore)? *(Non-MCQ question)*
16. Suppose further that:
1. 4 of the 10 dorms needing repair are women's dorms and need a total of ₹ 20 crore for repair.
 2. Only one of Dorms 1 to 5 is a women's dorm.

Which of the following is a women's dorm?

- (a) Dorm 2
- (b) Dorm 5
- (c) Dorm 8
- (d) Dorm 10

Direction for the question 17: Read the information given below and answer the question that follows.

A tea taster was assigned to rate teas from six different locations - Munnar, Wayanad, Ooty, Darjeeling, Assam and Himachal. These teas were placed in six cups, numbered 1 to 6, not necessarily in the same order. The tea taster was asked to rate these teas on the strength of their flavour on a scale of 1 to 10. He gave a unique integer rating to each tea. Some other information is given below:

1. Cup 6 contained tea from Himachal.
 2. Tea from Ooty got the highest rating, but it was not in Cup 3.
 3. The rating of tea in Cup 3 was double the rating of the tea in Cup 5.
 4. Only two cups got ratings in even numbers.
 5. Cup 2 got the minimum rating and this rating was an even number.
 6. Tea in Cup 3 got a higher rating than that in Cup 1.
 7. The rating of tea from Wayanad was more than the rating of tea from Munnar, but less than that from Assam.
17. What was the second highest rating given? *(Non-MCQ question)*

Direction for the question 18: *Read the information given below and answer the question that follows.*

A tea taster was assigned to rate teas from six different locations - Munnar, Wayanad, Ooty, Darjeeling, Assam and Himachal. These teas were placed in six cups, numbered 1 to 6, not necessarily in the same order. The tea taster was asked to rate these teas on the strength of their flavour on a scale of 1 to 10. He gave a unique integer rating to each tea. Some other information is given below:

1. Cup 6 contained tea from Himachal.
2. Tea from Ooty got the highest rating, but it was not in Cup 3.
3. The rating of tea in Cup 3 was double the rating of the tea in Cup 5.
4. Only two cups got ratings in even numbers.
5. Cup 2 got the minimum rating and this rating was an even number.
6. Tea in Cup 3 got a higher rating than that in Cup 1.
7. The rating of tea from Wayanad was more than the rating of tea from Munnar, but less than that from Assam.

18. What was the number of the cup that contained tea from Ooty? *(Non-MCQ question)*

Direction for the question 19: *Read the information given below and answer the question that follows.*

A tea taster was assigned to rate teas from six different locations - Munnar, Wayanad, Ooty, Darjeeling, Assam and Himachal. These teas were placed in six cups, numbered 1 to 6, not necessarily in the same order. The tea taster was asked to rate these teas on the strength of their flavour on a scale of 1 to 10. He gave a unique integer rating to each tea. Some other information is given below:

1. Cup 6 contained tea from Himachal.
2. Tea from Ooty got the highest rating, but it was not in Cup 3.
3. The rating of tea in Cup 3 was double the rating of the tea in Cup 5.
4. Only two cups got ratings in even numbers.
5. Cup 2 got the minimum rating and this rating was an even number.
6. Tea in Cup 3 got a higher rating than that in Cup 1.
7. The rating of tea from Wayanad was more than the rating of tea from Munnar, but less than that from Assam.

19. If the tea from Munnar did not get the minimum rating, what was the rating of the tea from Wayanad?

(a) 3	(b) 5
(c) 1	(d) 6

Direction for the question 20: *Read the information given below and answer the question that follows.*

A tea taster was assigned to rate teas from six different locations - Munnar, Wayanad, Ooty, Darjeeling, Assam and Himachal. These teas were placed in six cups, numbered 1 to 6, not necessarily in the same order. The tea taster was asked to rate these teas on the strength of their flavour on a scale of 1 to 10. He gave a unique integer rating to each tea. Some other information is given below:

1. Cup 6 contained tea from Himachal.
2. Tea from Ooty got the highest rating, but it was not in Cup 3.
3. The rating of tea in Cup 3 was double the rating of the tea in Cup 5.
4. Only two cups got ratings in even numbers.
5. Cup 2 got the minimum rating and this rating was an even number.
6. Tea in Cup 3 got a higher rating than that in Cup 1.
7. The rating of tea from Wayanad was more than the rating of tea from Munnar, but less than that from Assam.

20. If cups containing teas from Wayanad and Ooty had consecutive numbers, which of the following statements may be true?

- (a) Cup 5 contains tea from Assam
- (b) Cup 1 contains tea from Darjeeling
- (c) Tea from Wayanad has got a rating of 6
- (d) Tea from Darjeeling got the minimum rating

Direction for the question 21: *Read the information given below and answer the question that follows.*

21. In a 8×8 chessboard a queen placed anywhere can attack another piece if the piece is present in the same row, or in the same column or in any diagonal position in any possible 4 directions, provided there is no other piece in between in the path from the queen to that piece.

The columns are labelled a to h (left to right) and the rows are numbered 1 to 8 (bottom to top). The position of a piece is given by the combination of column and row labels. For example, posi-

tion c5 means that the piece is in cth column and 5th row.

If the queen is at c5, and the other pieces at positions c2, g1, g3, g5 and a3, how many are under attack by the queen? There are no other pieces on the board.

- (a) 2 (b) 3
(c) 4 (d) 5

Direction for the question 22: Read the information given below and answer the question that follows.

22. In a 8×8 chessboard a queen placed anywhere can attack another piece if the piece is present in the same row, or in the same column or in any diagonal position in any possible 4 directions, provided there is no other piece in between in the path from the queen to that piece.

The columns are labelled a to h (left to right) and the rows are numbered 1 to 8 (bottom to top). The position of a piece is given by the combination of column and row labels. For example, position c5 means that the piece is in cth column and 5th row.

If the other pieces are only at positions a1, a3, b4, d7, h7 and h8, then which of the following positions of the queen results in the maximum number of pieces being under attack?

- (a) f8 (b) a7
(c) c1 (d) d3

Direction for the question 23: Read the information given below and answer the question that follows.

23. In a 8×8 chessboard a queen placed anywhere can attack another piece if the piece is present in the same row, or in the same column or in any diagonal position in any possible 4 directions, provided there is no other piece in between in the path from the queen to that piece.

The columns are labelled a to h (left to right) and the rows are numbered 1 to 8 (bottom to top). The position of a piece is given by the combination of column and row labels. For example, position c5 means that the piece is in cth column and 5th row.

If the other pieces are only at positions a1, a3, b4, d7, h7 and h8, then from how many positions the queen cannot attack any of the pieces?

- (a) 0 (b) 3
(c) 4 (d) 6

Direction for the question 24: Read the information given below and answer the question that follows.

24. In a 8×8 chessboard a queen placed anywhere can attack another piece if the piece is present in the same row, or in the same column or in any diagonal position in any possible 4 directions, provided there is no other piece in between in the path from the queen to that piece.

The columns are labelled a to h (left to right) and the rows are numbered 1 to 8 (bottom to top). The position of a piece is given by the combination of column and row labels. For example, position c5 means that the piece is in cth column and 5th row.

Suppose the queen is the only piece on the board and it is at position d5. In how many positions can another piece be placed on the board such that it is safe from attack from the queen?

- (a) 32 (b) 35
(c) 36 (d) 37

Direction for the question 25: Read the information given below and answer the question that follows.

25. Eight friends: Ajit, Byomkesh, Gargi, Jayanta, Kikira, Manik, Prodosh and Tapeshe are going to Delhi from Kolkata by a flight operated by Cheap Air. In the flight, sitting is arranged in 30 rows, numbered 1 to 30, each consisting of 6 seats, marked by letters A to F from left to right, respectively. Seats A to C are to the left of the aisle (the passage running from the front of the aircraft to the back), and seats D to F are to the right of the aisle. Seats A and F are by the windows and referred to as Window seats, C and D are by the aisle and are referred to as Aisle seats while B and E are referred to as Middle seats. Seats marked by consecutive letters are called consecutive seats (or seats next to each other). A seat number is a combination of the row number, followed by the letter indicating the position in the row; e.g., 1A is the left window seat in the first row, while 12E is the right middle seat in the 12th row.

Cheap Air charges ₹ 1000 extra for any seats in Rows 1, 12 and 13 as those have extra legroom. For Rows 2-10, it charges ₹ 300 extra for Window seats and ₹ 500 extra for Aisle seats. For Rows 11 and 14 to 20, it charges ₹ 200 extra for Window seats and ₹ 400 extra for Aisle seats. All other seats are available at no extra charge.

The following are known:

1. The eight friends were seated in six different rows.
2. They occupied 3 Window seats, 4 Aisle seats and 1 Middle seat.
3. Seven of them had to pay extra amounts, totaling to ₹ 4600, for their choices of seat. One of them did not pay any additional amount for his/her choice of seat.
4. Jayanta, Ajit and Byomkesh were sitting in seats marked by the same letter, in consecutive rows in increasing order of row numbers; but all of them paid different amounts for their choices of seat. One of these amounts may be zero.
5. Gargi was sitting next to Kikira, and Manik was sitting next to Jayanta.
6. Prodosh and Tapesb were sitting in seats marked by the same letter, in consecutive rows in increasing order of row numbers; but they paid different amounts for their choices of seat. One of these amounts may be zero.

In which row was Manik sitting?

(a) 10	(b) 11
(c) 12	(d) 13

Direction for the question 26: *Read the information given below and answer the question that follows.*

26. Eight friends: Ajit, Byomkesh, Gargi, Jayanta, Kikira, Manik, Prodosh and Tapesb are going to Delhi from Kolkata by a flight operated by Cheap Air. In the flight, sitting is arranged in 30 rows, numbered 1 to 30, each consisting of 6 seats, marked by letters A to F from left to right, respectively. Seats A to C are to the left of the aisle (the passage running from the front of the aircraft to the back), and seats D to F are to the right of the aisle. Seats A and F are by the windows and referred to as Window seats, C and D are by the aisle and are referred to as Aisle seats while B and E are referred to as Middle seats. Seats marked by consecutive letters are called consecutive seats (or seats next to each other). A seat number is a combination of the row number, followed by the letter indicating the position in the row; e.g., 1A is the left window seat in the first row, while 12E is the right middle seat in the 12th row.

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14 to 20, it charges ₹ 200 extra for Window seats and ₹ 400 extra for Aisle seats. All other seats are available at no extra charge.

The following are known:

1. The eight friends were seated in six different rows.
2. They occupied 3 Window seats, 4 Aisle seats and 1 Middle seat.
3. Seven of them had to pay extra amounts, totaling to ₹ 4600, for their choices of seat. One of them did not pay any additional amount for his/her choice of seat.
4. Jayanta, Ajit and Byomkesh were sitting in seats marked by the same letter, in consecutive rows in increasing order of row numbers; but all of them paid different amounts for their choices of seat. One of these amounts may be zero.
5. Gargi was sitting next to Kikira, and Manik was sitting next to Jayanta.
6. Prodosh and Tapesb were sitting in seats marked by the same letter, in consecutive rows in increasing order of row numbers; but they paid different amounts for their choices of seat. One of these amounts may be zero.

How much extra did Jayanta pay for his choice of seat?

(a) ₹ 300	(b) ₹ 400
(c) ₹ 500	(d) ₹ 1000

Direction for the question 27: *Read the information given below and answer the question that follows.*

27. Eight friends: Ajit, Byomkesh, Gargi, Jayanta, Kikira, Manik, Prodosh and Tapesb are going to Delhi from Kolkata by a flight operated by Cheap Air. In the flight, sitting is arranged in 30 rows, numbered 1 to 30, each consisting of 6 seats, marked by letters A to F from left to right, respectively. Seats A to C are to the left of the aisle (the passage running from the front of the aircraft to the back), and seats D to F are to the right of the aisle. Seats A and F are by the windows and referred to as Window seats, C and D are by the aisle and are referred to as Aisle seats while B and E are referred to as Middle seats. Seats marked by consecutive letters are called consecutive seats (or seats next to each other). A seat number is a combination of the row number, followed by the letter indicating the position in the row; e.g., 1A is the left window seat in the first row, while 12E is the right middle seat in the 12th row.

Cheap Air charges ₹ 1000 extra for any seats in Rows 1, 12 and 13 as those have extra legroom. For Rows 2-10, it charges ₹ 300 extra for Window seats and ₹ 500 extra for Aisle seats. For Rows 11 and 14 to 20, it charges ₹ 200 extra for Window seats and ₹ 400 extra for Aisle seats. All other seats are available at no extra charge.

The following are known:

1. The eight friends were seated in six different rows.
2. They occupied 3 Window seats, 4 Aisle seats and 1 Middle seat.
3. Seven of them had to pay extra amounts, totaling to ₹ 4600, for their choices of seat. One of them did not pay any additional amount for his/her choice of seat.
4. Jayanta, Ajit and Byomkesh were sitting in seats marked by the same letter, in consecutive rows in increasing order of row numbers; but all of them paid different amounts for their choices of seat. One of these amounts may be zero.
5. Gargi was sitting next to Kikira, and Manik was sitting next to Jayanta.
6. Prodosh and Tapesesh were sitting in seats marked by the same letter, in consecutive rows in increasing order of row numbers; but they paid different amounts for their choices of seat. One of these amounts may be zero.

How much extra did Gargi pay for her choice of seat?

(a) 0	(b) ₹ 300
(c) ₹ 500	(d) ₹ 1000

Direction for the question 28: *Read the information given below and answer the question that follows.*

28. Eight friends: Ajit, Byomkesh, Gargi, Jayanta, Kikira, Manik, Prodosh and Tapesesh are going to Delhi from Kolkata by a flight operated by Cheap Air. In the flight, sitting is arranged in 30 rows, numbered 1 to 30, each consisting of 6 seats, marked by letters A to F from left to right, respectively. Seats A to C are to the left of the aisle (the passage running from the front of the aircraft to the back), and seats D to F are to the right of the aisle. Seats A and F are by the windows and referred to as Window seats, C and D are by the aisle and are referred to as Aisle seats while B and E are referred to as Middle seats. Seats marked by consecutive letters are called consecutive seats (or seats next to each other). A seat number is a combination of the row number, followed by the

letter indicating the position in the row; e.g., 1A is the left window seat in the first row, while 12E is the right middle seat in the 12th row.

Cheap Air charges ₹ 1000 extra for any seats in Rows 1, 12 and 13 as those have extra legroom. For Rows 2-10, it charges ₹ 300 extra for Window seats and ₹ 500 extra for Aisle seats. For Rows 11 and 14 to 20, it charges ₹ 200 extra for Window seats and ₹ 400 extra for Aisle seats. All other seats are available at no extra charge.

The following are known:

1. The eight friends were seated in six different rows.
2. They occupied 3 Window seats, 4 Aisle seats and 1 Middle seat.
3. Seven of them had to pay extra amounts, totaling to ₹ 4600, for their choices of seat. One of them did not pay any additional amount for his/her choice of seat.
4. Jayanta, Ajit and Byomkesh were sitting in seats marked by the same letter, in consecutive rows in increasing order of row numbers; but all of them paid different amounts for their choices of seat. One of these amounts may be zero.
5. Gargi was sitting next to Kikira, and Manik was sitting next to Jayanta.
6. Prodosh and Tapesesh were sitting in seats marked by the same letter, in consecutive rows in increasing order of row numbers; but they paid different amounts for their choices of seat. One of these amounts may be zero.

Who among the following did not pay any extra amount for his/her choice of seat?

(a) Kikira	(b) Manik
(c) Gargi	(d) Tapesesh

Direction for the question 29: *Read the information given below and answer the question that follows.*

29. A high security research lab requires the researchers to set a pass key sequence based on the scan of the five fingers of their left hands. When an employee first joins the lab, her fingers are scanned in an order of her choice, and then when she wants to re-enter the facility, she has to scan the five fingers in the same sequence.

The lab authorities are considering some relaxations of the scan order requirements, since it is observed that some employees often get locked-out because they forget the sequence.

The lab has decided to allow a variation in the sequence of scans of the five fingers so that at

most two scans (out of five) are out of place. For example, if the original sequence is Thumb (T), index finger (I), middle finger (M), ring finger (R) and little finger (L) then TLMRI is also allowed, but TMRLI is not.

How many different sequences of scans are allowed for any given person's original scan?

(Non-MCQ question)

Direction for the question 30: *Read the information given below and answer the question that follows.*

30. A high security research lab requires the researchers to set a pass key sequence based on the scan of the five fingers of their left hands. When an employee first joins the lab, her fingers are scanned in an order of her choice, and then when she wants to re-enter the facility, she has to scan the five fingers in the same sequence.

The lab authorities are considering some relaxations of the scan order requirements, since it is observed that some employees often get locked-out because they forget the sequence.

The lab has decided to allow variations of the original sequence so that input of the scanned sequence of five fingers is allowed to vary from the original sequence by one place for any of the fingers. Thus, for example, if TIMRL is the original sequence, then ITRML is also allowed, but LIMRT is not.

How many different sequences are allowed for any given person's original scan?

- (a) 7 (b) 5
(c) 8 (d) 13

Direction for the question 31: *Read the information given below and answer the question that follows.*

31. A high security research lab requires the researchers to set a pass key sequence based on the scan of the five fingers of their left hands. When an employee first joins the lab, her fingers are scanned in an order of her choice, and then when she wants to re-enter the facility, she has to scan the five fingers in the same sequence.

The lab authorities are considering some relaxations of the scan order requirements, since it is

observed that some employees often get locked-out because they forget the sequence.

The lab has now decided to require six scans in the pass key sequence, where exactly one finger is scanned twice, and the other fingers are scanned exactly once, which can be done in any order. For example, a possible sequence is TIMTRL. Suppose the lab allows a variation of the original sequence (of six inputs) where at most two scans (out of six) are out of place, as long as the finger originally scanned twice is scanned twice and other fingers are scanned once.

How many different sequences of scans are allowed for any given person's original scan?

(Non-MCQ question)

Direction for the question 32: *Read the information given below and answer the question that follows.*

32. A high security research lab requires the researchers to set a pass key sequence based on the scan of the five fingers of their left hands. When an employee first joins the lab, her fingers are scanned in an order of her choice, and then when she wants to re-enter the facility, she has to scan the five fingers in the same sequence.

The lab authorities are considering some relaxations of the scan order requirements, since it is observed that some employees often get locked-out because they forget the sequence.

The lab has now decided to require six scans in the pass key sequence, where exactly one finger is scanned twice, and the other fingers are scanned exactly once, which can be done in any order. For example, a possible sequence is TIMTRL. Suppose the lab allows a variation of the original sequence (of six inputs) so that input in the form of scanned sequence of six fingers is allowed to vary from the original sequence by one place for any of the fingers, as long as the finger originally scanned twice is scanned twice and other fingers are scanned once.

How many different sequences of scans are allowed if the original scan sequence is LRLTIM?

- (a) 8 (b) 11
(c) 13 (d) 14

ANSWER KEYS

1. (b) 2. (c) 3. (b) 4. (a) 5. (c) 6. (d) 7. (d) 8. (b) 9. (c) 10. (2)
 11. (b) 12. (20) 13. (d) 14. (19) 15. (3) 16. (d) 17. (7) 18. (4) 19. (b) 20. (b)
 21. (b) 22. (d) 23. (c) 24. (c) 25. (a) 26. (c) 27. (d) 28. (d) 29. (11) 30. (c)
 31. (15) 32. (c)

HINTS AND EXPLANATIONS

General Solution for 1 to 4

Total number of pizzas to be delivered was 800.

Number of Pizzas to be delivered to Party 3 is 70% and the rest equally divided between Party 1 and Party 2.

So, number of Pizzas delivered to Party 3 = 70% of 800 = 560

Number of Pizzas delivered to Party 1 = Number of Pizzas delivered to Party 2 = 120

Pizzas could be of Thin Crust (T) or Deep Dish (D) variety and come in either Normal Cheese (NC) or Extra Cheese (EC) versions. Hence, there are four types of pizzas: T-NC, T-EC, D-NC and D-EC.

We have an incomplete table on basis of partial information about the proportion of Pizzas-

	T (Thin Crust)	NC (Normal Cheese)
Party 1	0.6	
Party 2	0.55	0.3

Party 3	0.65

Total	0.375	0.52

As, Pizzas could be of Thin Crust (T) or Deep Dish (D) variety,

Proportion of Deep dish (D) for party 1 = $1 - 0.6 = 0.4$

Proportion of Deep dish (D) for party 2 = $1 - 0.55 = 0.45$

Proportion of Deep dish (D) for total = $1 - 0.375 = 0.625$

As, Pizzas come in either Normal Cheese (NC) or Extra Cheese (EC) versions

Proportion of Extra Cheese (EC) for party 2 = $1 - 0.3 = 0.7$

Proportion of Extra Cheese (EC) for party 3 = $1 - 0.65 = 0.35$

Proportion of Extra Cheese (EC) for total = $1 - 0.52 = 0.48$

Using these values number of Pizzas of each party, the table can be modified as-

	T (Thin Crust)	D (Deep Dish)	NC (Normal Cheese)	EC (Extra Cheese)	Total
Party 1	0.6	0.4			120
Party 2	0.55	0.45	0.3	0.7	120
Party 3			0.65	0.35	560
Total	0.375	0.625	0.52	0.48	800

We can find the number of Pizzas of each type using the proportion as,

Total pizzas of T variety = $0.375 \times 800 = 300$

Total pizzas of D variety = $0.625 \times 800 = 500$

Total pizzas of NC version = $0.52 \times 800 = 416$

Total pizzas of EC version = $0.48 \times 800 = 384$

No. of T variety for party 1 = $0.6 \times 120 = 72$

No. of D variety for party 1 = $0.4 \times 120 = 48$

Similarly, other values can be obtained

	T (Thin Crust)	D (Deep Dish)	NC (Normal Cheese)	EC (Extra Cheese)	Total
Party 1	72	48			120
Party 2	66	54	36	84	120
Party 3			364	196	560
Total	300	500	416	384	800

The unknown values can be easily obtained by simple arithmetic calculations as-

	T (Thin Crust)	D (Deep Dish)	NC (Normal Cheese)	EC (Extra Cheese)	Total
Party 1	72	48	16	104	120
Party 2	66	54	36	84	120
Party 3	162	398	364	196	560
Total	300	500	416	384	800

1. The number of T (Thin Crust) pizzas delivered to Party 3 is 162.

Hence, option (b) is the answer.

2. Party 1 ordered 16 NC (Normal Cheese) pizzas.

Hence, option (c) is the answer.

3. Party 2 ordered 36 NC (Normal Cheese) pizzas & 50% of them were of variety T (Thin Crust).

So, 18 pizzas are T-NC type.

No. of T-EC type pizzas for party 2 = no. of T type pizzas – no. of T-NC type pizzas = $66 - 18 = 48$.

No. of D-NC type pizzas for party 2 = no. of NC variety pizza – no. of T-NC type pizzas = $36 - 18 = 18$.

Total no. of D (Deep Dish) variety pizzas for Party 2 = 54.

So, no. of D-EC type pizzas for party 2 = no. of D variety pizza – no. of D-NC type pizzas = $54 - 18 = 36$.

The difference between the numbers of T-EC and D-EC pizzas to be delivered to Party 2 = $48 - 36 = 12$.

Hence, option (b) is the answer.

4. 25% of the NC (Normal Cheese) pizzas delivered to Party 1 were of D (Deep Dish) variety.

So, no. of D-NC pizzas delivered to Party 1 = 25% of 16 = 4.

No. of T-NC pizza delivered to Party 1 = no. of NC pizza delivered – no. of D-NC pizza delivered = $16 - 4 = 12$.

No. of T-EC pizza delivered to Party 1 = no. of T pizza delivered – no. of T-NC pizza delivered = $72 - 12 = 60$.

No. of D-EC pizza delivered to Party 1 = no. of EC pizza delivered – no. of T-EC pizza delivered = $104 - 60 = 44$.

Cost of T-EC pizza = ₹ 500

Cost of D-EC pizza = ₹ $(500 + 50) = ₹ 550$

Cost of T-NC pizza = ₹ $[(3/5) \times 550] = ₹ 330$

Cost of D-NC pizza = ₹ 330

So, the total bill for Party 1 = $4(330) + 12(330) + 60(500) + 44(550) = ₹ 59480$

Hence, option (a) is the answer.

General solution 5 to 8

We know that there are total 300 students who originally chosen any of the 7 electives E1 to E7. At end there were changes in the choice made by students due to 2 reasons-

- E7 is removed & students who opted for E7 joined any of the remaining 6 i.e. E1 to E6.
- Students were given chance to change their choice of elective.

The table given shows the movement of student from their initial choice to final choice. E1 to E1, E2 to E2,...E6 to E6 shows no change in initial choice. All other case show change in initial choice. This table has some missing values. The missing values are either 0 or 1.

The table given is as-

Table A

To Elective							
		E1	E2	E3	E4	E5	E6
From Elective	E1	9	5	10	1	4	2
	E2		34	8		2	2
	E3	2	6	25			2
	E4		3	2	14		4
	E5		5			30	
	E6		7	3		2	9
	E7	4	16	30	5	5	41

Further, the following are known:

- Before the change process there were 6 more students in E1 than in E4, but after the reshuffle, the number of students in E4 was 3 more than that in E1.
- The number of students in E2 increased by 30 after the change process.
- Before the change process, E4 had 2 more students than E6, while E2 had 10 more students than E3.

We can also make a new table showing the number of students in electives initially & finally. Using the given table, we can find these values for initial no. of students for E1 & E7 to be 31 & 101. (By adding all the values in row for E1 & E7) The final number of students can be obtained for E2 to be 76 (by adding all the values in column for E2).

The table which we can make for given information is-

Table B

	Number of Students	
	Initial	Final
E1	31	
E2		76
E3		
E4		

E5

E6

E7	101	0
Total	300	300

Now, the missing values in table B can be changed as-

- Using statement 2, number of students in E2 initially is $76 - 30 = 46$. It can be filled in table B.
- Using statement 3, initial no. of students in E3 = $46 - 10 = 36$
- Using statement 1, initially no. of students in E4 = $31 - 6 = 25$
- Now, we can use statement 3, initial no. of students in E6 = $25 - 2 = 23$
- Using all the values deduced above for initial no. of students in electives E1, E7, E2, E3, E4 & E6. We also know that total no. of students is 300

So, initial no. of students in E5 = $300 - (31 + 101 + 46 + 36 + 25 + 23) = 38$

The table B can be modified as

Table B (Modified-1)

	Number of Students	
	Initial	Final
E1	31	
E2	46	76
E3	36	
E4	25	
E5	38	
E6	23	
E7	101	0
Total	300	300

Now, values in table A can be changed as-

- As total no. of students in E2 initially were 46. The addition of 4 given values in row for E2 is 46. So, the missing values must be both 0 for row for E2 in table A.
- The initial no. of students in E4 is 25. So, both the missing values in row for E4 must be 1.

3. The initial no. of students in E6 is 23. So, both the missing values in row for E6 must be 1.
4. We cannot find the missing values for rows for E3 & E5.

The given table can be modified as-

Table A (modified 1)

		To Elective					
		E1	E2	E3	E4	E5	E6
From Elective	E1	9	5	10	1	4	2
	E2	0	34	8	0	2	2
	E3	2	6	25			2
	E4	1	3	2	14	1	4
	E5		5			30	
	E6	1	7	3	1	2	9
	E7	4	16	30	5	5	41

Now, form table A (modified 1), we can find the possible values for final no. of students for Electives E1 to E6 by adding the values for column for each elective

1. The possible no. of final no. of students in E1 can be 17 or 18 (the missing value is 0 or 1).
2. The possible no. of final no. of students in E3 can be 78 or 79 (the missing value is 0 or 1).
3. The possible no. of final no. of students in E4 can be 21 or 22 or 23 (the missing values are 0 or 1).
4. The possible no. of final no. of students in E5 can be 44 or 18 (the missing value is 0 or 1).
5. The possible no. of final no. of students in E6 can be 60 or 61 (the missing value is 0 or 1).

So, table B is further modified as-

Table B (Modified-2)

Number of Students		
	Initial	Final
E1	31	17/18
E2	46	76
E3	36	78/79
E4	25	21/22/23

E5	38	44/45
E6	23	60/61
E7	101	0
Total	300	300

From statement 1 we know that after the reshuffle, the number of students in E4 was 3 more than that in E1.

So, final no. of students in E1 & E4 must be 18 & 21 respectively. With the help of these values the missing values in Table A (modified 1) can be obtained. The missing value in column for E1 must be 1. Both the missing value in column for E4 must be 0.

Further the missing value for row for E3 must be 1
So, total no. of students in E5 is obtained as 45 (using the missing value in row for E3).

Now, the 2 missing values for row for E5 must be 1.

Using these values above the final no. of students in E3 & E6 is obtained as 79 & 61 respectively.

Now, finally we can modified both the tables for 1 last time to give all the values as

Table A (Modified-2).

		To Elective					
		E1	E2	E3	E4	E5	E6
From Elective	E1	9	5	10	1	4	2
	E2	0	34	8	0	2	2
	E3	2	6	25	0	1	2
	E4	1	3	2	14	1	4
	E5	1	5	1	0	30	1
	E6	1	7	3	1	2	9
	E7	4	16	30	5	5	41

Table B (Modified-3)

Number of Students		
	Initial	Final
E1	31	18
E2	46	76
E3	36	79

E4	25	21
E5	38	45
E6	23	61
E7	101	0
Total	300	300

We have the complete information in form of Table A (modified 2) & table B (modified 3).

5. From Table B (modified 3), we can observe that the elective courses E1 & E4 had a decrease in their enrollments after the change process.

So, the required no. is 2.

Hence, option (c) is the answer.

6. From Table B (modified 3), we can observe that after the change process, the number of students in the six electives E1 to E6 is 18, 76, 79, 21, 45 & 61.

Hence, option (d) is the answer.

7. We have to check it by options using the Table B (modified 3)

1. **Option A- E1-** the no. of students changed from 31 to 18. The percentage decrease is $(18-31)/31 \times 100\% = -41.2\%$.
2. **Option B- E2-** the no. of students changed from 46 to 76. The percentage decrease is $(76-46)/46 \times 100\% = 65.2\%$.
3. **Option C- E3-** the no. of students changed from 36 to 79. The percentage decrease is $(79-36)/36 \times 100\% = 119.4\%$.
4. **Option D- E6-** the no. of students changed from 23 to 61. The percentage decrease is $(61-23)/23 \times 100\% = 165.2\%$.

Hence, option (D) is the answer.

8. Using table B (modified 3), the correct sequence of electives in decreasing order of their final enrollments is E3, E2, E6, E5, E4, E1.

Hence, option (b) is the answer.

General solution for 9 to 12

The assets of the old woman are-

- (a) ₹ 70 lakh in bank deposits
- (b) 1 house worth ₹ 50 lakh
- (c) 3 flats, each worth ₹ 30 lakh
- (d) Certain number of gold coins, each worth ₹ 1 lakh, let there are total n coins.

Monetary value of all the assets combined together = $70 + 50 + 3(30) + \text{coins} = ₹ (210 + n)$ lakh.

So, the exact value of all the assets is not known, as no. of coins is not known.

The house, any of the flats or any of the coins was not to be split. That is, the house went entirely to one child; a flat went to one child and similarly, a gold coin went to one child.

The value of the assets was distributed equally among the children, as were the gold coins. So, each of the children will get $n/3$ coins. So, each of the children will get assets of worth ₹ 70 lakh (excluding coins).

9. We are given that among the three, Neeta received the least amount in bank deposits, while Geeta received the highest. It is possible if:

1. Neeta gets 2 flats of ₹ 60 lakh & so she will get ₹ 10 lakh from bank deposit.
2. Seeta must have received the house of worth ₹ 50 lakh & she will get ₹ 20 lakh from bank deposit.
3. Geeta must have received 1 flat of worth ₹ 30 lakh & she will get ₹ 40 lakh from bank deposit.

So, Seeta receive ₹ 20 lakh in bank deposits.

Hence, option (c) is the answer.

10. The given condition is same as for 9. So, solution of 9 can be used.

Neeta received 2 flats.

So, the correct answer is 2 (**non-MCQ question**).

Solution for 11 and 12

It given that

1. The value of the assets distributed among Neeta, Seeta and Geeta was in the ratio of 1:2:3, while the gold coins were distributed among them in the ratio of 2:3:4.
2. One child got all three flats and she did not get the house.
3. One child, other than Geeta, got ₹ 30 lakh in bank deposits.

We can start from Seeta only, as from 1, using both ratios we can see that Seeta received $1/3$ of the total property and $1/3$ of the gold coins. This means her share (excluding $1/3$ of total coins) is $1/3$ (Bank deposits + house + flats) = ₹ 70 lakhs. Clearly, Seeta cannot get all 3 flats (as their value is ₹ 90 lakh). She cannot get entire ₹ 70 lakh from bank deposits only as one of child got

₹ 30 lakh in bank deposit. So, maximum amount one can get in bank deposit can be ₹ 40 lakh only. So, Seeta received the house of worth ₹ 50 lakh & ₹ 20 lakh from bank deposit. She also $\frac{n}{3}$ (i.e. one-third of total) gold coins.

Using 3, Neeta must receive ₹ 30 lakh from bank deposit. So, Geeta got ₹ 20 lakh from bank deposit. Let the coins received by Neeta, Seeta & Geeta be $2x$, $3x$ & $4x$ respectively.

Total asset of Geeta/ total asset of Neeta = $\frac{3}{1}$.

But the ratio of coins for them is $2:1$. So, we can conclude that Geeta must also get more non-coin assets than Neeta. Geeta got ₹ 20 lakh in bank deposit & Neeta got ₹ 30 lakh in bank deposit. So, the all 3 flats of worth ₹ 90 lakh must be received by the Geeta. Else, the non-coin assets of Neeta will be more than Geeta.

11. Total asset of Geeta/ total asset of Neeta = $\frac{3}{1} = \frac{(90 + 20 + 4x)}{(30 + 2x)}$.

So, $90 + 6x = 110 + 4x$.

Solving it, $x = 10$.

So, total no. of gold coins = $2x + 3x + 4x = 9x = 90$.

Hence, option (b) is the answer.

12. Geeta received ₹ 20 lakh in bank deposits

So, the correct answer is 20 (**non-MCQ question**).

General solution for 13 to 16

Repairs with estimated cost of ₹ 1 crore or 2 crore are considered light repairs, repairs with estimated cost of ₹ 3 crores or ₹ 4 crores are considered moderate repairs and repairs with estimated cost of ₹ 5 or ₹ 6 crore are considered extensive repairs.

It is also given that-

1. Odd-numbered dorms do not need light repair; even-numbered dorms do not need moderate repair and dorms, whose numbers are divisible by 3, do not need extensive repair.
2. Dorms 4 to 9 all need different repair costs, with dorm 7 needing the maximum and dorm 8 needing the minimum.

From the given bar graph, there are 2 dorms which require ₹ 1 crore, 1 dorm which requires ₹ 2 crore, 3 dorms which require ₹ 3 crore, 1 dorm which requires ₹ 4 crore, 1 dorm which requires ₹ 5 crore and two dorms which require ₹ 6 crore.

We can also observe that 3 Dorms need light repairing, 4 need moderate & 3 need extensive repairing.

From 2, dorms 4 to 9 all different repair costs. Dorm 7 needs maximum, so it needs ₹ 6 crore. Similarly Dorm 8 needs the minimum & so it needs ₹ 1 crore.

Odd-numbered dorms do not need light repair & dorms whose numbers are divisible by 3, do not need extensive repair. So, we can conclude that Dorms 3 & 9 must need moderate repair & so they need ₹ 3-4 crore for repair.

Even-numbered dorms do not need Moderate repair & dorms whose numbers are divisible by 3, do not need extensive repair. So, we can conclude that Dorm 6 must need light repair & so it needs ₹ 1-2 crore for repair. But Dorm 8 needs ₹ 1 crore & dorms from 4 to 9 need different repair costs. So, Dorm 6 needs ₹ 2 crore.

So, from the information so far we can make the following table-

Dorm Number	Repair Type	Repair Amount (in ₹ crore)
1	Moderate/Extensive	3/4/5/6
2	Light/Extensive	1/2/5/6
3	Moderate	3-4
4	Light/Extensive	1/2/5/6
5	Moderate/Extensive	3/4/5/6
6	Light	2
7	Extensive	6
8	Light	1
9	Moderate	3-4
10	Light/Extensive	1/2/5/6

Further as we know that Dorms from 4 to 9 need different repair costs. So, Dorm 4 must need repair cost of ₹ 5 crore. Dorm 5 must need ₹ 3 or 4 crore & so it need moderate repair. We also know only 1 team needs ₹ 2 crore for repair & only 1 team needs ₹ 5 crore for repair.

Now, we also know that there must be 4 dorms which need moderate repairing. So, Dorm 1 must need moderate repairing.

So, the table is modified as-

Dorm Number	Repair Type	Repair Amount (in ₹ crore)
1	Moderate	3/4
2	Light/Extensive	1/6
3	Moderate	3/4
4	Extensive	5
5	Moderate	3/4
6	Light	2
7	Extensive	6
8	Light	1
9	Moderate	3/4
10	Light/Extensive	1/6

13. We have to check it by options

- Option A-** It is incorrect option as Dorm 1 needs a moderate repair must be true.
- Option B-** It is incorrect option as Dorm 5 needs ₹ 3 or 4 crore for repair & so it is not more than ₹ 4 crore.
- Option C-** It is incorrect option as Dorm 7 needs an extensive repair must be true.
- Option D-** It is correct option as Dorm 10 needs either ₹ 1 crore or ₹ 6 crore. So, given statement may or may not be true. Hence, the statement is not necessarily true.

Hence, option (D) is the answer.

14. There are 5 odd-numbered dorms we know the exact repair cost for only Dorm 7 which is ₹ 6 crore. For all other 5 odd-numbered dorms we only know that they need either ₹ 3 or 4 crore.

But, further we know no other dorm then these 4 need either 3 or 4 crore. From given bar graph we also know that 3 dorms needs ₹ 3 crore & 1 dorm needs ₹ 4 crore for repair. So, we can conclude 3 from these 4 dorms would need ₹ 3 crore & 1 will need ₹ 4 crore.

So, total cost of repairing the odd-numbered dorms = $3(3) + 4 + 6 = 19 = ₹ 19$ crores

So, the correct answer is 19 (**non-MCQ question**).

Solution for 15 and 16

Additional data for 15 & 16

- 4 of the 10 dorms needing repair are women's dorms and need a total of ₹ 20 crore for repair.
- Only one of Dorms 1 to 5 is a women's dorm.

There are 4 dorms, which are women's dorms, needs total ₹ 20 crore for repair. This is possible only if these 4 dorms need ₹ 6, ₹ 6, ₹ 5 and ₹ 3 crore. As, dorm 4 is the only dorm which needs ₹ 5 crore, so among the first 5, dorm 4 should be women's dorm. ₹ 6 cr dorms can only be dorm 7 and dorm 10. ₹ 3 crore can be from dorm 1, 3, 5 or 9. But 1, 3 or 5 are not women's dorm. So it has to be dorm 9. (Also, dorm 10 will need ₹ 6 crore). The women's dorms will be dorm 4, 7, 9 & 10. The table would be modified for these conditions as-

Dorm Number	Repair Type	Repair Amount (in ₹ crore)
1	Moderate	3/4
2	Light/Extensive	1
3	Moderate	3/4
4	Extensive	5
5	Moderate	3/4
6	Light	2
7	Extensive	6
8	Light	1
9	Moderate	3
10	Light/Extensive	6

15. From the above, the repair cost for dorm 9 is ₹ 3 crore.

So, the correct answer is 3 (**non-MCQ question**).

16. From the above, women's dorms will be dorm 4, 7, 9 & 10. So, from given options Dorm 10 is women's dorm.

Hence, option (d) is the answer.

General solution for 17 to 20

We are given the following statements-

1. Cup 6 contained tea from Himachal.
2. Tea from Ooty got the highest rating, but it was not in Cup 3.
3. The rating of tea in Cup 3 was double the rating of the tea in Cup 5.
4. Only two cups got ratings in even numbers.
5. Cup 2 got the minimum rating and this rating was an even number.
6. Tea in Cup 3 got a higher rating than that in Cup 1.
7. The rating of tea from Wayanad was more than the rating of tea from Munnar, but less than that from Assam.

In this case we have to arrange 6 teas on the basis of their locations, Cup number (in which these are placed) & the rating they obtained by tea taster (from 10, for the strength of their flavour). So, it is the problem of tabular arrangement with 3 columns for location, cup number & rating.

We can fill the cup number in the 1st column. The location & rating will be filled in 2nd & 3rd columns respectively. They all got unique scores.

Now, using statement 1 & 2 in the table we get location of Cup 6 & we know Cup 3 is not from Ooty. Using statement 5, the rating of Cup 2 is even & so it can be 2/4/6/8/10. Also, it is lowest rating, so it cannot be 10 or 8 or 6 (5 teas got better rating than tea in Cup 3, so if we give them maximum possible ratings i.e. 10, 9, 8, 7 & 6). So, Nitin got rating of either 2 or 4. Now, using statement 3 we can assume rating of Cup 5 to be x , then rating of Cup 3 will be $2x$. The table will be obtained as-

Cup number	Location	Rating
1		
2		2/4
3	x Ooty	$2x$
4		
5		x
6	Himachal	

Now, Cup 5 must be having rating from 1 to 5 (as rating of tea in Cup 3 is double then it) Also, it cannot get rating lower than Cup 2 which has minimum possible rating of 2. So, rating of Cup 5 cannot be 1 or 2. Using statement 4, only two cups got rating in even numbers.

Now, Cup 2 already got ratings in even number. So, only 1 more Cup can get a rating which is an even number. The rating obtained by Cup 3 must be an even number as this is twice of rating of Cup 5. Therefore, rating of Cup 5 must not be an even number. So, possible rating of Cup 5 is 3/5 & possible rating of Cup 3 is 6/10. But, as the highest rating is obtained by tea from Ooty & Cup 3 is not from Ooty, so rating of Cup 3 must be 6 & 3 must be the rating of Cup 5. Now the rating of Cup 2 is least & so it must be 2. The table is now as-

Cup number	Location	Rating
1		
2		2
3	x Ooty	6
4		
5		3
6	Himachal	

Now using statement 6, the rating of Cup 1 must be odd & less than 6. So, it could be 1 or 3 or 5. But it cannot be 1 as lowest rating is 2 & 3 is already rating of Cup 5 & all got unique ratings. So, the rating of Cup 1 must be 5.

There are only 2 possible even ratings, which are 2 & 6, so no tea can get rating of 4, 8 or 10. Now, the odd ratings must be 3, 5, 7 & 9 (as minimum rating is 2, so 1 cannot be rating for any tea). So, the possible ratings for Cup 4 & Cup 6 must be 7/9 & 9/7. Using statement 2, we can conclude that the highest rating must be obtained by Cup 4 & its location is Ooty (as tea in Cup 6 is not from Ooty). So, rating of cup 4 is 9 & rating of Cup 6 must be 7.

So, the table can be modified as-

Cup number	Location	Rating
1		5
2		2
3		6
4	Ooty	9
5		3
6	Himachal	7

17. The second highest rating given is 7.
So, the correct answer is 7 (**non-MCQ question**).
18. The number of the cup that contained tea from Ooty is 4.
So, the correct answer is 4 (**non-MCQ question**).
19. Additional information given is-

1. The tea from Munnar did not get the minimum rating.

Using statement 7, tea in Cup 5 must be from Munnar, tea in Cup 5 is from Wayanad & tea in Cup 3 is from Assam. The only possible location for tea in Cup 2 is Darjeeling.

Cup number	Location	Rating
1	Wayanad	5
2	Darjeeling	2
3	Assam	6
4	Ooty	9
5	Munnar	3
6	Himachal	7

The rating of the tea from Wayanad is 5.
Hence, option (b) is the answer.

20. Additional information given is-
1. The cups containing teas from Wayanad and Ooty had consecutive numbers.
So, the tea from Wayanad must be in Cup 3 or Cup 5. We have to check the feasibility of both the cases.

Case 1- If tea from Wayanad is in Cup 3

The rating of tea from wayanad is 6. Using statement 7, the rating of tea from Assam must be more than rating of tea from Wayanad. There are 2 possible ratings which are more than 6 i.e., 7 & 9. But, both are already obtained by tea from Himachal & Ooty respectively. So, this case is not feasible as there is no possible rating for tea from Assam.

Case 2- If tea from Wayanad is in Cup 5

The rating of tea from Wayanad is 3. Using statement 7, the rating of tea from Assam must be more than rating of tea from Wayanad. There are 2 possible ratings which are more than 3 which are available for Assam & these are 5 & 6. So, tea from Assam can be in Cup 1 or Cup 3. Using statement 7, the rating of tea from Munnar must be less than rating of tea from Wayanad. So, tea from Mannar got rating of 2 & is in Cup 2. This gives feasible arrangement. The location of tea in Cup 1 is either Darjeeling or Munnar.

The location of tea in Cup 3 is either Darjeeling or Munnar. So, it gives the following arrangement-

Cup number	Location	Rating
1	Darjeeling/Munnar	5
2	Munnar	2
3	Darjeeling/Munnar	6
4	Ooty	9
5	Wayanad	3
6	Himachal	7

We have to check it by options

- Option A-** It is not true as Cup 5 contains tea from Wayanad.
- Option B-** It may be true as Cup 1 contains tea from Darjeeling or Munnar.
- Option C-** It is not true as Tea from Wayanad has got a rating of 3.
- Option D-** It is not true as Tea from Darjeeling got the rating of 5 or 6 which cannot be the minimum.

Hence, option (b) is the answer.

21. Let the chess board be shown by the following table where rows of chess are shown from 1 to 8. The columns of chess board are shown from a to h. The positions of queen & 5 pieces is shown in the following table:

Row/Column	a	b	C	d	e	f	g	h
1							Piece 2	
2			Piece 1					
3	Piece 5						Piece 3	
4								
5			Queen				Piece 4	
6								
7								
8								

It is given that the queen placed anywhere can attack another piece if-

1. The piece is present in the same row.
2. The piece is present in the same column.
3. The piece is present in any diagonal position in any possible 4 directions.

Provided there is no other piece in between in the path from the queen to that piece.

So, the queen can attack-

1. Piece 1 as both are in same column.
2. Piece 4 as both are in same row.
3. Piece 2 as it is placed in diagonal position (north-east).

So, 3 pieces are under attack by the queen.

Hence, option (b) is the answer.

22. Let the chess board be shown by the following table where rows of chess are shown from 1 to 8. The columns of chess board are shown from a to h. The positions of 6 pieces is shown in the following table:

Row/Column	a	b	c	d	e	f	g	h
1	Piece 1		QC					
2								
3	Piece 2			QD				
4		Piece 3						
5								
6								
7	QB			Piece 4				Piece 5
8						QA		Piece 6

The 4 possible positions of Queen is shown by **QA, QB, QC & QD** respectively. We have to find the number of pieces being under attack for each of the possible position of Queen.

We have to check it by options.

A. **Option A-** If position of queen is f8 (shown by QA)- The pieces under attack by queen are-

1. Piece 3 as it is placed in diagonal position (north-west) & there is no other piece between it & queen.

2. Piece 6 as both are in same row.

So, 2 pieces are under attack by the queen.

B. **Option B-** If position of queen is a7 (shown by QB)- The pieces under attack by queen are-

1. Piece 2 as both are in same column.

2. Piece 4 as both are in same row.

So, 2 pieces are under attack by the queen.

C. **Option C-** If position of queen is c1 (shown by QC)- The pieces under attack by queen are-

1. Piece 1 as both are in same row.

2. Piece 2 as it is placed in diagonal position (south-west).

So, 2 pieces are under attack by the queen.

D. **Option D-** If position of queen is d3 (shown by QD)- The pieces under attack by queen are-

1. Piece 2 as both are in same row.

2. Piece 4 as both are in same column.

3. Piece 5 as it is placed in diagonal position (south-east).

So, 3 pieces are under attack by the queen.

So, d3 position of the queen results in the maximum number of pieces being under attack.

Hence, option (d) is the answer.

23. Let the chess board be shown by the following table where rows of chess are shown from 1 to 8. The columns of chess board are shown from a to h. The positions of 6 pieces is shown in the following table:

Row/Column	a	b	c	D	e	f	g	h
1	Piece 1							
2								
3	Piece 2							
4		Piece 3						
5								
6								
7				Piece 4				Piece 5
8								Piece 6

We have to find the possible positions of queen in which no piece will be under attack. Queen can attack any piece in its row & column. So, queen cannot be placed in the columns a, b, d & h. Similarly it cannot be placed in rows 1, 3, 4, 7 & 8.

So, queen can be placed in rows, 2, 5 or 6 and column c, e, f or g. So, there are 12 positions we have to check for the possible attack of queen in diagonal positions

1. Position c2- It can attack piece 5
2. Position c5- It can attack piece 3
3. Position c6- It can attack piece 4
4. Position e2- It cannot attack any piece
5. Position e5- It can attack piece 1 & piece 6
6. Position e6- It can attack piece 4

7. Position f2- It cannot attack any piece

8. Position f5- It can attack piece 5

9. Position f6- It can attack piece 6

10. Position g2- It cannot attack any piece

11. Position g5- It cannot attack any piece

12. Position g6- It can attack piece 5

So, there are total 4 such positions- e2, f2, g2 & g5.

So, there are 4 positions from which the queen cannot attack any of the pieces.

Hence, option (c) is the answer.

24. Let the chess board be shown by the following table where rows of chess are shown from 1 to 8. The columns of chess board are shown from a to h. The position of queen is shown in the table:

Row/Column	a	B	c	D	e	f	g	h
1								
2								
3								
4								
5				Queen				
6								
7								
8								

We have to find the number of possible positions in which we can place another piece on the board such that it is safe from attack from the queen possible attack of queen. We can easily find the number of positions in which a piece can be attacked by queen. Total positions are 64 in which 1 (d5) is held by queen. So, from remaining 63 we can subtract the number of positions which can be attacked by queen to find the required number.

The queen can attack

1. The 7 positions of same row i.e. row 5
2. The 7 positions of same column i.e. column d
3. The 13 positions in the diagonal positions (i.e. all possible diagonal directions)

So, there are total = $7 + 7 + 13 = 27$ positions which can be attacked by queen.

So, the no. of positions in which a piece cannot be attacked by queen = $63 - 27 = 36$

Hence, option (c) is the answer.

Solution for 25 to 28

We know 7 of the 8 friends paid total of ₹ 4600 as extra amount for choice of seat. They occupied 3 Window

seats, 4 Aisle seats and 1 Middle seat. The maximum amount to be paid for Aisle seat 500 & for window seat it is ₹ 400. So, maximum amount that can be paid on choice for type of seat is = $4(500) + 3(400) = ₹ 3200$. So, at least 2 of them must have made choice for row which needs additional cost of ₹ 1000 (& so ₹ 2000 for 2 choices). It can also be concluded that maximum no. of choice for row can be 3.

Jayanta, Ajit and Byomkesh were sitting in consecutive rows. Prodosh and Tapesesh were sitting in consecutive rows. Jayant & manik are in same row. Gargi & Kikira are in same row. Jayanta, Ajit and Byomkesh were sitting in same type of seats. Prodosh and Tapesesh were sitting in same type of seats. These can be 2 possibilities-

1. Jayanta, Ajit and Byomkesh were sitting in Aisle seats & Prodosh and Tapesesh were sitting in Window seats
2. Jayanta, Ajit and Byomkesh were sitting in Window seats & Prodosh and Tapesesh were sitting in Aisle seats

By going through all the given conditions, their position can be shown by following table-

Row Number/Seat	A (Window)	B (Middle)	C (Aisle)	D (Aisle)	E (Middle)	F (Window)
10			Jayant	Manik		
11			Ajit			
12			Byomkesh			
13					Gargi	Kikira
20						Prodosh
21						Tapesesh

1. The extra amount paid by Jayanta (C-10) = ₹ 500
2. The extra amount paid by Manik (D-10) = ₹ 500
3. The extra amount paid by Ajit (C-11) = ₹ 400
4. The extra amount paid by Byomkesh (C-12) = ₹ 1000
5. The extra amount paid by Gargi (E-13) = ₹ 1000
6. The extra amount paid by Kikira (F-13) = ₹ 1000
7. The extra amount paid by Prodosh (F-20) = ₹ 200
8. The extra amount paid by Topesh (F-21) = No extra charge

So, total amount paid will be = $500 + 500 + 400 + 1000 + 1000 + 1000 + 200 + 0 = ₹ 4600$

25. The position of Manik is D-10. So, he is sitting in 10th row.
Hence, option (a) is the answer.
26. Jayanta paid ₹ 500 as extra amount for his choice of seat.
Hence, option (c) is the answer.
27. Gargi paid ₹ 1000 as extra for her choice of seat.
Hence, option (d) is the answer.
28. Tapesh did not paid any extra amount for his choice of seat.
Hence, option (d) is the answer.

Solutions for 29 to 32

29. Every employee has to scan 5 fingers of left hand in same sequence for e.g. TIMRL- i.e. Thumb (T), index finger (I), middle finger (M), ring finger (R) and little finger (L).

If at most 2 scans may be out of place. Then, the different sequences of scans that are allowed for any given person's original scan can be of 3 types-

1. **Original sequence (i.e. no scan is out of place)** – it has only 1 possible case (which is the original sequence itself)
2. **If 1 exactly 1 scan is out of place-** There is no such case, as we can have either 2 or 4 scans which could be out of place. The number of 2 or 4 scans may be interchanged to give 2 or 4 scans out of place. But, there cannot be any possible sequence with odd number of scans out of place
3. **If exactly 2 scans are out of place-** The 2 scans which are out of place can be chosen randomly from total 5. So, possible number of cases is ${}^5C_2 = 10$

So, total no. of different sequences of scans that are allowed for any given person's original scan are = $1 + 10 = 11$

So, the correct answer is 11 (**non-MCQ question**).

30. Input of the scanned sequence of five fingers is allowed to vary from the original sequence by one place for any of the fingers. Thus, for example, if TIMRL is the original sequence, then ITRML is also allowed, but LIMRT is not.

Then, the different sequences are allowed for any given person's original scan can be obtained as follows. We can assume the original scan is TIMRL. There are following cases in which the scan will be acceptable-

1. Original sequence- TIMRL
2. If variation is shown by TI – ITMRL
3. If variation is shown by IM – TMIRL
4. If variation is shown by MR – TIRML
5. If variation is shown by RL – TIMLR
5. If variation is shown by TI and MR – ITRML
7. If variation is shown by TI and RL – ITMLR
8. If variation is shown by IM and RL – TMILR

So, there are total 8 different sequences that are allowed for any given person's original scan

Hence, option (c) is the answer.

31. Now, we have 6 scans with 1 finger being repeated. For example, a possible sequence is TIMTRL where T (thumb) is repeated. There could be at most two scans (out of six) are out of place, as long as the finger originally scanned twice is scanned twice and other fingers are scanned once.

So, the acceptable sequences have following cases-

1. **Original sequence (i.e. no scan is out of place)** – it has only 1 possible case (which is the original sequence itself)
2. **If 1 exactly 1 scan is out of place-** There is no such case, as we can have either 2 or 4 scans which could be out of place. The number of 2 or 4 scans may be interchanged to give 2 or 4 scans out of place. But, there cannot be any possible sequence with odd number of scans out of place
3. **If exactly 2 scans are out of place-** The 2 scans which are out of place can be chosen randomly from total 6 scans. So, possible number of cases is ${}^6C_2 = 15$. But, one of case is when both are T, this case will be cancelled as it will remain same. So, the total such cases is $15 - 1 = 14$

So, total no. of different sequences of scans that are allowed for any given person's original scan are = $1 + 14 = 15$

So, the correct answer is 15 (**non-MCQ question**).

32. Now, we have 6 scans with 1 finger being repeated. For example, a possible sequence is TIMTRL where T(thumb) is repeated. There can be variation from original sequence by one place for any of the fingers, as long as the finger originally scanned twice is scanned twice and other fingers are scanned once. So, the variation must be shown by the consecutive pairs of scans

So, the acceptable sequences have following cases-

A. Original sequence— it has only 1 possible case (which is the original sequence itself)

B. If variation is shown by only 1 pair of consecutive scans- The possible cases are-

1. If variation is shown by TI – ITMTRL
2. If variation is shown by IM – TMITRL
3. If variation is shown by MT – TITMRL
4. If variation is shown by TR – TIMRTL
5. If variation is shown by RL – TIMTLR

C. If variation is shown by 2 pairs of consecutive scans- The possible cases are-

1. If variation is shown by TI and MT – ITTMRL
2. If variation is shown by TI and TR – ITMRTL
3. If variation is shown by TI and RL – ITMTLR
4. If variation is shown by IM and TR – TMIRTL
5. If variation is shown by IM and RL – TMITLR
6. If variation is shown by MT and RL – TITMLR

D. If variation is shown by 3 pairs of consecutive scans

1. If variation is shown by TI, MT & RL - IT-TMLR

So, total no. of different sequences of scans that are allowed for any given person's original scan are = $1 + 5 + 6 + 1 = 13$

Hence, option (c) is the answer.

XAT 2017

INSTRUCTIONS

- ☐ Directions for answering the questions are given before each group of questions. Read these directions carefully and answer the questions by darkening the appropriate circles in Answer Sheet. Each question has only one correct answer.
 - ☐ Do your rough work only on the Test Booklet and NOT on the Answer Sheet.
-

Analyse the following caselet and answer the questions 1–3 that follow:

A University coach was asked to select teams in three sports: Shooting, Cricket (batsmen only) and “Snakes & Ladder”. The honest and keen observer head boy of the school informed the coach that he had observed 100 students playing the three games - shooting, cricket and “Snakes & Ladder”. In shooting, all students were given 100 chances to hit a target. In cricket, a batsman faced a maximum of 100 balls, provided he DID NOT GET OUT. In “Snakes & Ladder”, every student could play 100 matches, one each with the other students and one against a computer. In shooting, a player got one point for hitting the target and zero point for missing the target. In cricket, a batsman got one point for hitting the ball and zero point for missing it. In “Snakes & Ladder”, a person got one point for winning the game and zero for losing. To the coach’s utter surprise, the distribution of points across all three games was the same. It was as follows:

Points scored	Number of students
0–9	1
10–19	8

20–29	5
30–39	15
40–49	20
50–59	20
60–69	13
70–79	7
80–89	9
90–99	2

The coach has to select a team of eleven in each sport.

1. Which of the following options is the best way to select the “Snakes & Ladder” team?
 - (a) The coach must select all students between 80 and 99.
 - (b) The coach must select both the students between 90 and 99.
 - (c) The coach must select at least 6 students between 40 and 59.
 - (d) The coach must not select students between 0 and 9.

- (e) The coach can ignore the data in the table and randomly pick any 11 prayers.
2. Which of the following options is the best way of selecting the Shooting team?
- (a) The coach should select all students in 80-99 ranges.
- (b) The coach should select both the students in 90-99 range; others can be from any of the other ranges.
- (c) The coach should select at least 6 students between 40 and 49.
- (d) The coach should not select students between 40 and 89.
- (e) The coach can pick randomly any 11 players from any of the ranges.
3. Which of the following options is the correct statement for picking up the cricket team?
- (a) The coach should never select the player in the range of 0-9 points.
- (b) The coach should never select players from the range of 50-59.
- (c) The coach should never select players from the range of 70-79.
- (d) The coach should definitely select players only from the range of 80-99.
- (e) None of the above.

Analyse the following caselet and answer the questions 4-6 that follow:

Shyam prepares and sells piping hot puri and sabji (gravy) from 7:00 am to 9:00 am (both inclusive) through a stall at XLRI campus. Presently, he has just a single oven, which can do only one job at a time. It takes 30 minutes to cook one handi (a large bowl) of sabji, sufficient for 12 customers. It takes him 10 minutes to prepare 2 plates of puri at a time. While the cost of a plate of puri-sabji is ₹ 10, the price is ₹ 25. Puri stays hot for only 5 minutes after preparation, while sabji stays hot for 30 minutes only. It takes 10 minutes to reheat the sabji which stays hot for another 30 minutes. If he brings a handi of hot sabji from home, the transport would cost him ₹ 50. It can also stay hot for 30 minutes excluding the transportation time. Currently, every 20 minutes five plates are ordered. All unsold quantities are distributed at cost after 9:30 am.

4. Find the maximum number of plates of puri-sabji Shyam can sell in the first hour of business?
- (a) 6 (b) 8
- (c) 10 (d) 12
- (e) 15

5. Shyam's puri-sabji became famous. Now he gets 5 orders per 10 minutes and has invested in an additional oven. As he is working alone on both the ovens simultaneously, now in any one oven it takes him 45 minutes to cook one handi of sabji, 15 minutes for 2 plates of puri and 15 minutes to reheat the sabji. He can bring only one handi from home. What will be his maximum daily profit?
- (a) ₹ 250 (b) ₹ 280
- (c) ₹ 300 (d) ₹ 330
- (e) ₹ 360
6. Shyam's stall was becoming popular by the day. Now he gets 5 customers every 10 minutes. After buying a second oven, he employed a helping hand, Aman at ₹ 100 for two hours. Aman can cook one handi of sabji in 20 minutes or can prepare 3 plates of puri in 10 minutes. Reheat time for sabji is 10 minutes. None of them can work on both the ovens simultaneously.
- Which of the following options will help Shyam maximize his daily profit, if he does NOT bring sabji from home?
- (a) Shyam should dismiss Aman because his wage are more than the benefits he brings.
- (b) Shyam will prepare only puri and Aman will prepare only sabji.
- (c) Shyam will prepare only sabji and Aman will prepare only puri.
- (d) Shyam and Aman will prepare both puri and sabji.
- (e) Options B, C and D will yield the same profit.

Study the data given in the caselet below and answer the questions 7-8 that follow:

In an innings of a T20 cricket match (a team can bowl for 20 overs) 6 bowlers bowled from the fielding side, with a bowler allowed maximum of 4 overs. Only the three specialist bowlers bowled their full quota of 4 overs each, and the remaining 8 overs were shared among three non-specialist bowlers. The economy rates of four bowlers were 6, 6, 7 and 9 respectively. (*Economy rate is the total number of runs conceded by a bowler divided by the number of overs bowled by that bowler*). This however, does not include the data of the best bowler (*lowest economy rate*) and the worst bowler (*highest economy rate*). The number of overs bowled and the economy rate of any bowler are in integers.

7. Read the two statements below:

S1: The worst bowler did not bowl the minimum number of overs. S2: The best bowler is a specialist bowler.

Which of the above statements or their combinations can help arrive at the minimum number of overs bowled by a non-specialist bowler?

- (a) S1 only.
- (b) S2 only.
- (c) Either S1 or S2.
- (d) S1 and S2 in combination.
- (e) The minimum number of overs can be determined without using S1 or S2.

8. Read the two statements below:

- S1. The economy rates of the specialist bowlers are lower than that of the non-specialist bowlers.
- S2. The cumulative runs conceded by the three non-specialist bowlers were 1 more than those conceded by the three specialist bowlers.

Which of the above statements or their combinations can help arrive at the economy rate of the worst bowler?

- (a) S1 only.
- (b) S2 only.

- (c) Either S1 or S2.
- (d) S1 and S2 in combination.
- (e) The economy rate can be calculated without using S1 or S2.

Study the paragraph below and answer the questions 9–12 that follow:

Abdul has 8 factories, with different capacities, producing boutique kurtas. In the production process, he incurs raw material cost, selling cost (for packaging and transportation) and labour cost. These costs per kurta vary across factories. In all these factories, a worker takes 2 hours to produce a kurta. Profit per kurta is calculated by deducting raw material cost, selling cost and labour cost from the selling price (Profit = selling price - raw materials cost - selling cost - labour cost). Any other cost can be ignored.

Exhibit: Business Details of Abdul's 8 Factories

	Production Capacity	Selling Price/Kurta	Profit/Kurta	Selling Cost/Kurta	Labour Cost/Hour
#	(No. of Kurtas)	₹	₹	₹	₹
Factory 1	2500	4800	775	60	450
Factory 2	1500	5300	800	45	400
Factory 3	800	5800	900	60	550
Factory 4	1000	5500	800	68	450
Factory 5	1500	5400	600	75	600
Factory 6	1100	6000	875	65	400
Factory 7	2500	4900	500	85	350
Factory 8	2000	5300	600	70	420

9. Which of the following options is in decreasing order of raw materials cost?
- (a) Factory 3, Factory 4, Factory 7, Factory 5
 - (b) Factory 4, Factory 3, Factory 2, Factory 5
 - (c) Factory 6, Factory 3, Factory 5, Factory 7
 - (d) Factory 6, Factory 8, Factory 7, Factory 2
 - (e) Factory 8, Factory 3, Factory 2, Factory 4
10. Which of the factories listed in the options below has the lowest sales margin (sales margin = profit per kurta divided by selling price per kurta)?

- (a) Factory 2
- (b) Factory 4
- (c) Factory 5
- (d) Factory 6
- (e) Factory 7

11. Abdul has received an order for 2,000 kurtas from a big retail chain. They will collect the finished pre-packaged kurtas directly from the factories, saving him the selling cost. To deliver this order, he can use multiple factories for production. Which of the following options will ensure maximum profit from this order?

- (a) Factory 1
 (b) Factories 2 and 3
 (c) Factories 4 and 6
 (d) Factories 3, 6 and 4
 (e) Factory 1 or Factory 7 or Factory 8
12. Abdul has introduced a new technology in all his factories. As a result, a worker needs just 1.5 hours to

produce a kurta. If raw materials cost and selling cost remain the same, which of the factories listed in the options below will yield the highest profit per kurta?

- (a) Factory 2 (b) Factory 3
 (c) Factory 4 (d) Factory 5
 (e) Factory 6

ANSWER KEYS

1. (e) 2. (a) 3. (e) 4. (a) 5. (b) 6. (d) 7. (e) 8. (d) 9. (a) 10. (e)
 11. (d) 12. (b)

HINTS AND EXPLANATIONS

1. In snakes and ladder, the player doesn't exhibit any skill and it is of pure luck. So, the past data in the table has no relevance for selection. Hence, the best selection process should give equal opportunity to everyone.
 Hence, option (e).

2. In hundred shooting trials, it is highly unlikely that any student would get a high score unless he/she is really good at shooting. The trials give us enough information to choose those who have scored the highest. Therefore, option A is correct.

It is likely that any student who would get a high score when he/she is good at shooting. Thus, the trial give us the information to choose those who have scored the highest. Hence, option (a).

3. The coach can never be sure of rejecting a person with low score or select a batsman, based on the above data. The weak may have played hundred while the good player have ended up with few runs. Hence, options (a), (b), (c), and (d), all are wrong. Hence, option (e).

4. To sell maximum number of plates of puri-sabji, Shyam needs to bring sabji from home. He can serve 2 plates at the end of every 10 minutes till 7:30 am. After that, he needs to reheat the sabji for 10 minutes. After that he prepares 2 plates of puri and serve them at the end of every ten minutes till 8 o'clock.

Thus, he will be able to serve $3 \times 2 + 2 \times 2 = 10$ plates of puri-sabji. Hence, option (a).

5. Shyam brings a handi from home. It is sufficient for 12 customers. Shyam will use both the ovens till 7:30 for plates for puri. So he can serve 8 customers.

He will now reheat sabji on using one oven and prepare another handi of sabji on the other oven.

After reheating sabji, he will use that oven for preparing puris. So, at the end of 8:15, he will serve to 4 more customers.

From 8:15 to 8:45, he will use both the ovens for preparing puris and thereby he will serve 8 customers.

From 8:45 to 9, he will use one oven to prepare a plate of puri and other for reheating sabji. This will be sufficient to two customers.

Thus, in all he can sale $8 + 4 + 8 + 2 = 22$

Cost of 22 plates = $22 \times 10 + 50 = 270$

He will make 25×22

= 550 by selling 22 plates.

Profit = $550 - 270 = 280$

Hence, option (b).

6. Option (b):

If Shyam prepares only puris, then at the end of every 10 minutes from 7:20, he will be able to serve 2 customers. So, he can start making puris from 7:05 and serve 22 customers.

So, profit by selling puri-sabji

= $22 \times 15 - 100$ (Aman's charges)

= $330 - 100 = 230$

Option (c):

If Aman prepares only puris, he will be able to prepare 3 plates in 10 minutes as Shyam's sabji will be ready only at 7:30. So, Aman can start making puris from 7:15. Till 8:55, Aman makes 10 plates of puris. So, Shyam can serve 30 customers.

So, profit by selling puri-sabji

= $30 \times 15 - 100$ (Aman's charges)

= $450 - 100 = 350$

Option (d):

Aman prepares first Handi on one oven in first 20 minutes and in first 25 minutes, Shyam will prepare 4 puri plates starting from 7:05.

So at the end of 7:25, 4 puri-sabji plates can be served

After that Shyam prepares another Handi till 7:55 and Aman prepares 9 plates of puri till 7:50

So, at the end of 7:55, 9 more puri plates can be served.

Note that 11 plates of sabji from Handi 2 is remaining.

Shyam will prepare 2 puri plates from 7:55 to 8:05 and then start with Handi 3 till 8:35 Aman will continue with preparing puri plates from 7:50. Till 8:30, he makes 12 more puri plates. So at the end of 8:35, $2 + 12 = 14$ puri plates can be served. Note that 9 plates of sabji from Handi 3 is still remaining. This sabji will be hot till 9:00 (in fact 9:05).

After 8:30, Aman will continue with Puris and Shyam also will start with puris. But only 9 more plates can be served.

Thus, Shyam can serve $4 + 9 + 14 + 9$

$= 36$ plates of puri-sabji.

So, profit by selling puri-sabji

$= 36 \times 15 - 100$ (Aman's charges)

$= 540 - 100 = 440$

In previous solution, we have seen that

Shyam can make a profit of ₹280.

So, his profit will increase after appointing Aman.

Hence, option (d).

7. The economy rates of 4 bowlers are 6, 6, 7 and 9.

The three specialist bowlers bowled 4 overs each and non-specialists would only have one combination of 3, 3 and 2 overs to complete 20 overs.

So, the least number of overs bowled by a non-specialist bowler would be 2 only.

So, none of the S1 and S2 required to answer the question. Hence, option (e).

8. Statement 1: The given economy rates of 4 bowlers are 6, 6, 7 and 9. So, the non-specialist bowlers would have 7, 9, x as their economy rates and specialist bowlers would have y , 6, 6 as their economy rates.

Statement 2: The overs bowled by specialist bowlers would be 4, 4 and 4 each. The number of overs bowled by non-specialist bowlers would in any combination of 3, 3 and 2 each.

The runs given by specialist bowlers would be $6 \times 4 + 6 \times 4 + 4x = 48 + 4y$

1. The runs given by non-specialist bowlers =

$$(7 \times 3 + 9 \times 3 + x \times 2) = 48 + 2x$$

For 1, the difference could not be 1, as $2x - 4y$ cannot give an odd value.

2. The runs given by non-specialist bowlers = $(9 \times 2 + 7 \times 3 + 3x) = 39 + 3x$

$$\text{So, } 39 + 3x = 48 + 4y + 1$$

This is satisfied for $x = 10$ and $y = 5$.

Thus, we need both the statements to get to worst economy rate of the bowler.

Hence, option (d).

9. Profit = Selling price – raw material cost – selling cost – labour cost

A worker takes 2 hours to produce a kurta.

Raw material cost	Factories
3065	1
3655	2
3740	3
3732	4
3525	5
4260	6
3615	7
3790	8

Now, check the option for the decreasing order. Hence, option (a).

10. Sales margin = profit per kurta/Selling price per kurta

$$\text{Factory 2} = 800/5300 = 0.15$$

$$\text{Factory 4} = 800/5500 = 0.145$$

$$\text{Factory 5} = 600/5400 = 0.111$$

$$\text{Factory 6} = 875/6000 = 0.145$$

$$\text{Factory 7} = 500/4900 = 0.10$$

Thus, Factory 7 has the lowest sales margin.

Hence, option (e).

11. Selling cost would be added to the profit.

Using options.

$$\text{F1} \rightarrow \text{Profit} = 775 + 60 = 835$$

$$\text{F2 \& F3} \rightarrow \text{Profit} = 800 + 45 = 845$$

$$\text{(F2) Profit} = 900 + 60 = 960$$

$$\text{(F3) F4 \& F6} \rightarrow \text{Profit} = 800 + 68 = 868$$

$$\text{(F4) Profit} = 875 + 65 = 940$$

(F6) F3, F6, F4 $\rightarrow$ F3 (profit) = 960, F6 (profit) = 940, F4 (profit) = 868

It can't be F1 or F7 or F8 as profit for F7 = $500 + 85 = 585$, Profit for F8 = $600 + 70 = 670$.

Since the profit margins are highest in F3 & F6 and together they can produce 1900 kurtas, thus the maximum profit will be from factories F3, F4 & F6.

Hence, option (d).

12. A worker takes 1.5 hours to produce a kurta.

Profit	Factory
700	2
1175	3
1025	4
900	5
1075	6

Thus, the maximum profit is obtained from Factory 3.

Hence, option (b).

XAT 2016

INSTRUCTIONS

- ☐ Directions for answering the questions are given before each group of questions. Read these directions carefully and answer the questions by darkening the appropriate circles in Answer Sheet. Each question has only one correct answer.
 - ☐ Do your rough work only on the Test Booklet and NOT on the Answer Sheet.
-

Directions for questions 1–3: Analyse the following caselet and answer the questions that follow:

Six people working at the Bengaluru office of Simsys are planning to buy flats at a real estate project at Whitefield. Their preferences are listed below:

Person	Designation	First Preference	Second Preference	Third Preference
Bhatia	Vice President	Ground floor flat	Price < ₹50 lacs.	Shopping mall within 5 km.
Patel	Client Relationship Manager	Distance to office < 10 km.	Recreation Club	
Khan	Project Manager	Recreation Club	Place for morning walk	Car parking
Singh	Senior Software Engineer	Shopping mall within 15 km.	Price < ₹30 lacs.	Place for morning walk
Yadav	Assistant Software Engineer	Price < ₹50 lacs.	Distance to office < 10 km.	
Lingdo	Assistant Software Engineer	Recreation club		

They have identified 7 real estate projects with following facilities available (marked with V):

Real Estate Project	M	N	O	P	Q	R	S
Price	₹60-80 lacs	₹45-50 lacs	₹20-25 lacs	₹65-80 lacs	₹35-45 lacs	₹25-40 lacs	₹20-30 lacs
Distance to office	< 5 km	< 10 km	> 20 km	> 15 km	< 2 km	< 10 km	< 5 km
Place for morning walk	V	V	V	V	V	V	
Recreation Club	V				V		V
Distance to shopping mall	Inside	> 25 km	< 2 km	Inside	< 5 km	> 10 km	> 20 km
Car parking facility	V		V			V	V
Availability of ground floor flat		V				V	

A person is 'satisfied' if a project meets all three preferences.

- Identify the project(s) where NONE of the 6 persons will be 'satisfied'.
 - M only
 - N only
 - P only
 - N and P only
 - In all projects at least one person will be 'satisfied'.
- Identify the project(s), where AT LEAST 3 of the persons will be 'satisfied'.
 - M only
 - S only
 - Q and R only
 - M, Q and S only
 - M, Q and R only
- The marketing managers of all the six projects have agreed to add a recreation club and a car parking facility to the projects. In this changed scenario identify projects where AT MOST 2 of the 6 persons will NOT be 'satisfied'.
 - N, Q and R only
 - P only
 - M and P only
 - N and P only
 - M, N and P only

Directions for questions 4–5: Analyse the following caselet and answer the questions that follow:

Geetha Gawde can cultivate up to 6 crops a year. Crop A and B are ready for harvest in 2 months; crop C and D in 3 months, and crop E and F in 4 months. Crop A can be cultivated from January to June; crop B can be cultivated

from April to September; crop C can be cultivated from May to December; crops D as well as E can be cultivated from August to December, and crop F from November to May. If Geetha plans a change of crop the soil should be left fallow for one month; however, if the same crop is sown no fallow time is needed. Sowing takes place only at the beginning of a month. Geetha can only harvest a maximum of 1000 units of any crop at any point in time. The *production cost per unit* (incurred at the time of sowing) and *price per unit* of crop are as follows:

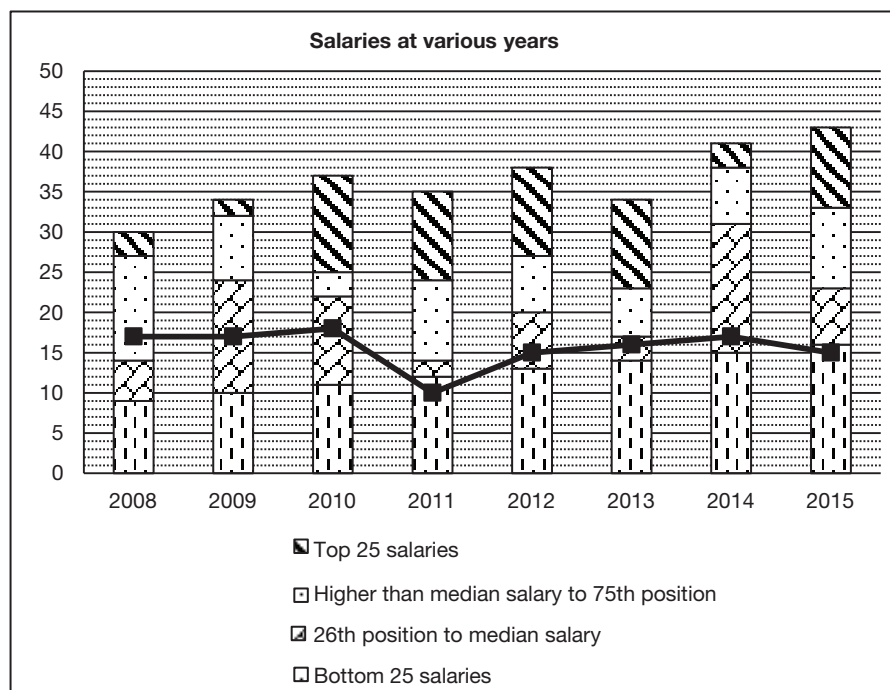
Crop	Production cost per unit crop (in USD)	Price per unit crop (in USD)
A	20	60
B	5	55
C	25	70
D	15	75
E	5	65
F	35	75

For Geetha soil preparation does not incur any cost. If a crop is abandoned before the scheduled harvesting, she gets no money. Geetha is preparing a cropping schedule to maximize her annual profits (i.e., price – cost). She plans to replicate the schedule in the coming years.

4. Which of the following would DEFINITELY be a part of the ideal schedule?
- Cultivate crop B in August or September.
 - Cultivate crop B from April to September.
 - Do not cultivate any crop in August but cultivate crop D in September.
 - Cultivate crop D or crop E in August or September.
 - Do not cultivate any crop in August; but cultivate crop D or crop E in September.
5. Which of the following schedules would maximize her annual profit while minimizing the costs, if Geetha decides NOT to repeat a crop in a calendar year?
- Crops A, B and E
 - Crops B, D and F
 - Crops B, D, E and F
 - Crops C, D and F
 - Crops A, B, D or E
6. Anita, Biplove, Cheryl, Danish, Emily and Feroze compared their marks among themselves. Anita scored the highest marks, Biplove scored more than Danish. Cheryl scored more than at least two others and Emily had not scored the lowest.
- Statement I:** Exactly two members scored less than Cheryl.
- Statement II:** Emily and Feroze scored the same marks.
- Which of the following statements would be sufficient to identify the one with the lowest marks?
- Statement I only.
 - Statement II only.
 - Both Statement I and Statement II are required together.
 - Neither Statement I nor Statement II is sufficient.
 - Either Statement I or Statement II is sufficient.

Directions for questions 7–10: Study the graph below and answer the questions that follow:

This graph depicts the last eight years' annual salaries (in ₹ lacs.) offered to student during campus placement. Every year 100 students go through placement process. However, at least one of them fails to get placed. The salaries of all unplaced students are marked zero and represented in the graph.



The bold line in the graph presents Mean salaries at various years.

7. In which year were a maximum number of students offered salaries between ₹ 20 to ₹ 30 lacs (both inclusive)?
- 2008
 - 2009
 - 2010
 - 2012
 - Cannot be determined

8. Identify the years in which the annual median salary is higher by at least 60% than the average salary of the preceding year?
- (a) 2009, 2010
(b) 2012, 2014
(c) 2009, 2010, 2012
(d) 2009, 2012, 2014
(e) 2009, 2010, 2012, 2014
9. Identify the number of years in which the difference between the average salaries of the top 25% and the bottom 25% is more than ₹ 20 lacs:
- (a) 0 (b) 1
(c) 2 (d) 3
(e) 4
10. If the average salary is computed excluding students with no offers, in how many years will the new average salary be greater than the existing median salary? Refer the table below for number of students without offers.

Years	2008	2009	2010	2011	2012	2013	2014	2015
Number without job offers	9	5	20	2	2	4	15	2

- (a) 3
(b) 4
(c) 5
(d) 6
(e) Cannot be solved without additional information.

Directions for questions 11–13: Study the data given in the table below and answer the questions that follow:

Shop Type \ Region	North	East	West	South	All India
Grocers	34.7	32	32.2	30.2	32.4
Pan Bidi	7.1	21.2	13.1	19.1	14.6
Food Shops	11.8	7.9	14.8	12	11.6
General stores	12.4	9.1	12	6.6	10.1
Electrical Hardware	8.3	5.6	7.7	5.7	6.7
Chemists	6	5.8	5	5.7	5.7
Cosmetic Stores	3.8	3.6	3.3	3.9	3.7
Others	15.8	14.8	12	16.8	15.2
Total	100	100	100	100	100

All figures are in percentage

Based on survey of 'shop types' Kamath categorized Indian states into four geographical regions as shown in the table above. His boss felt that the categorization was inadequate since important labels were missing. Kamath argued that no further labels are required to interpret the data.

11. A consultant observing the data made the following two inferences:

Inference I: The number of Grocers per-thousand-population is the highest in North India.

Inference II: The number of Cosmetic per-thousand-population is the highest in South India. Which of following options is DEFINITELY correct?

- (a) Inference I alone is correct.
(b) Inference II alone is correct.
(c) Either of the inferences is correct.

- (d) Neither of the inference is correct.
 (e) Inference I will be correct only if inference II is correct.

12. The average size of Food Shops in East India was twice that of Food Shops in West India. Which of the following cannot be inferred from the above data?
 (a) As far as 'Food Shops' are concerned, customers in East India prefer spatial surroundings compared to customers in the West India.
 (b) As far as 'Food Shops' are concerned, Rentals are very high in West India compared to East India.
 (c) The ratio of customers buying from 'Food Shops' in East India to customers buying from 'Food Shops' in West India is 15.8 : 11.8.
 (d) There are 740 'Food Shops' in West India.
 (e) There are 240 'Food Shops' in South India.
13. Bala collected the same data five years after Kamath, using the same categorization. His data is presented below:

	North	East	West	South	All India
Grocers	30	32	32.2	40	32.4
Pan Bidi	7.1	25	13.1	19.1	14.6
Food Shops	4	7.9	14.9	12	11.6

General stores	12.4	9.1	12	7	10.1
Electrical Hardware	15	5.8	7.6	5.7	6.7
Chemists	7	5.8	5	5.7	5.7
Cosmetic Stores	3.9	3.6	3.2	3.9	3.7
Others	20.6	10.8	12	6.6	15.2
Total	100	100	100	100	100

Which of the following statements can DEFINITELY be concluded?

- (a) In the last four years the number of Electrical hardware shop types has increased in North India.
 (b) In the last four years the number of Grocers shop types has increased in South India.
 (c) For the last four years in All India the number of Chemists shop types has remained constant.
 (d) In the four years in East India the number of 'other' shop type has decreased.
 (e) As per the new survey conducted *Pan Bidi* shops in East India are next only to Grocers.

ANSWER KEYS

1. (c) 2. (d) 3. (a) 4. (c) 5. (a) 6. (b) 7. (c) 8. (b) 9.* 10. (a)
 11. (d) 12. (c) 13. (e)

*Please see hints and explanations

HINTS AND EXPLANATIONS

1. In this question, if even one person is satisfied then the project will be disregarded.
 For project N, we can see that Yadav will be satisfied. Hence, options (b), (d), (e) are eliminated.
 For project P, we can see that there is no recreation club, no ground floor flat, distance to office is greater than 15 km and the price is 65-80 Lacs. Therefore, all 6 people will be unsatisfied. Hence, **option (c)**.
2. In this question, if a project has more than 3 unsatisfied people then that project is disregarded.

In project R, we can see that Patel, Khan and Lingdo will be unsatisfied since there is no recreation club. This eliminates option (c) and (e).

In project M, Bhatia, Yadav and Singh will be the only people unsatisfied on the criteria of Price. Therefore, this project is considered.

In project S, Bhatia will be the only person unsatisfied on the criteria of distance to mall. Therefore, this project is considered. The only option with M and S both present is option (d). Hence, **option (d)**.

3. In this question, if more than 2 persons are not satisfied then the project is disregarded else it is considered.

In project P, Bhatia, Yadav and Singh will be unsatisfied on the criteria of price. Therefore, this project is disregarded.

This eliminates all the options except (a). Hence, **option (a)**.

4.

Option	Possible Schedules by Months for Max. Profit												Profit
	J	F	M	A	M	J	J	A	S	O	N	D	
(a)	A	A	A	A	-	-	B	B	B	B	-	-	$80 + 100 = 180$
(b)	A	A	-	B	B	B	B	B	B	-	-	-	$40 + 150 = 190$
(c)	A	A	-	B	B	B	B	-	D	D	D	-	$40 + 100 + 60 = 200$
	A	A	-	B	B	-	-	D	D	D	-	-	$40 + 50 + 60 = 150$
(d)	A	A	-	B	B	-	-	E	E	E	E	-	$40 + 50 + 60 = 150$
	A	A	-	B	B	B	B	-	D	D	D	-	$40 + 100 + 60 = 200$
	A	A	-	B	B	B	B	-	E	E	E	E	$40 + 100 + 60 = 200$
(e)	A	A	-	B	B	B	B	-	D	D	D	-	$40 + 100 + 60 = 200$
	A	A	-	B	B	B	B	-	E	E	E	E	$40 + 100 + 60 = 200$

E cannot be cultivated from September to December as A cannot be cultivated in January then. Also from the above table we can see that Geetha gets highest profit if she follows the condition given in option (c). Hence, **option (c)**.

5. Note: All calculated prices are per unit and in \$
Option (c) can be straightaway eliminated as total months required would be $2 + 3 + 4 + 4 = 13$ which will not be possible in a single year

Option	Profit (\$/unit)	Cost (\$/unit)
1	$40 + 50 + 60 = 150$	$20 + 5 + 5 = 30$
2	$50 + 60 + 40 = 150$	$5 + 15 + 35 = 55$
4	$45 + 60 + 40 = 145$	$25 + 15 + 35 = 75$
5	$40 + 50 + 60 = 150$	$20 + 5 + 15/5 = 40/30$

We can clearly see that option (a) satisfies the criteria of both maximum profit at minimum cost. Hence, **option (a)**.

6. Let the six persons be ranked from 1 to 6 with rank 1 having obtained the highest marks
From the data,

Anita = 1; Biplove > Danish; Emily $\neq$ 6 and Cheryl $\leq$ 4

From Statement I: Cheryl = 4

Here, we cannot uniquely identify the person with least marks with only this information.

From Statement II: Emily = Feroz We know that, Emily $\neq$ 6 which means Feroz $\neq$ 6

$\therefore$ Biplove > Danish, Biplove $\neq$ 6

Cheryl $\leq$ 4 i.e., Cheryl $\neq$ 6 and Anita = 1

$\therefore$ The only person who can be last is

Danish.

Hence, Statement II is sufficient to identify the person with the lowest marks. Hence, **option (b)**.

7. From the given chart by observation 2008, 2009 and 2012 have a maximum of two categories of students in the range of 20–30 lakhs.

2010 is the only year in which three categories of students (top 25, higher than median to 75th and 26th position to median salary are included). Hence, **option (c)**.

8. In the given chart the median salary is the junction of the second and third category from the bottom.

For 2009 the median salary is approximately 24 lakhs.

For 2008 the average salary is approximately 16 lakhs.

The median of 2009 is 50% more than the average of 2008.

Hence, 2009 does not satisfy the given criterion.

Therefore, all four options (a), (c), (d) and (e) are eliminated.

Hence **option (b)**.

9. **None of the options is the correct answer. This question was withdrawn after exam.**

10.

Year	Number of students without job offers	Median salary	Mean salary	Mean salary of job offered students
2008	9	14	16	18
2009	5	24	16	17
2010	20	22	19	23.75
2011	2	14	10	10.2
2012	2	20	15	15.3
2013	4	16	16	16.66
2014	15	31	17	20
2015	2	22	15	15.3

From the table it can be easily seen that the Mean salary after discarding the unemployed students is greater than the mean for years 2008, 2010 and 2013. Hence, **option (a)**.

11. Since, there is no information available on the population of the different areas neither of the statements can be concluded from the given data. Therefore, neither of the statements is correct. Hence, **option (d)**.
12. There is no data available on the number or distribution of customers buying from "Food Shops" in East India or West India, while the statement C talks about the ratio of customers which cannot be inferred. Hence, **option (c)**.

13. The two given tables provide information on the distribution percentage of the different types of shops in two different years. However there is no information is available on the total number of shops in the two different years. Hence, no comparison is not possible between the two years.

Options (a), (b), (c) and (d) talk about the increase or decrease in the number of shops with respect to each other. Hence, they cannot be definitely concluded. Statement (e) talks about the distribution in the same year as well as the same region. Therefore, it can be concluded by comparing the percentage distribution. Hence, **option (e)**.

IIFT 2016

INSTRUCTIONS

- ☐ Directions for answering the questions are given before each group of questions. Read these directions carefully and answer the questions by darkening the appropriate circles in Answer Sheet. Each question has only one correct answer.
 - ☐ Do your rough work only on the Test Booklet and NOT on the Answer Sheet.
-

Directions for questions 1 to 3: Read the information provided and answer the questions which follow.

In one of the islands of Neverland, people from two tribes exist namely A and B. On the island there is no other tribe except these two. The activities of these tribes are governed by rigid norms and are strictly obeyed for marriages. The norms are:

- The people of one tribe cannot marry any other member of their own tribe though they can marry people from other tribe.
- After being married, each male member ceases to be a member of that tribe in which he was born and becomes the member of the tribe to which his wife belongs.
- The females continue to remain members of the tribe in which they were born even after marriage.
- On birth, the child becomes the member of the mother's tribe.
- The males become members of the tribe in which they were born when they become divorcee or widower.
- As per norms, nobody can have more than one spouse at a given point of time.

1. A female in tribe B can have
 - a. Maternal Grandmother born in tribe A
 - b. Paternal Grandmother born in tribe A
 - (a) Only a can be true
 - (b) Only b can be true
 - (c) Both a and b are true
 - (d) Neither a nor b can be true
2. A boy born in tribe B
 - (a) Can have his daughter in tribe B
 - (b) Can have his daughter-in-law in tribe A
 - (c) Can have uncle from any tribe
 - (d) Can have a divorced son in tribe B
3. Which of the following marriages are not permissible as per norms?
 - (a) Any widower marries his wife's sister
 - (b) Any widow marries the former divorced husband of her daughter
 - (c) Any girl of the tribe B marries her mother's brother
 - (d) Any widower born in tribe A marries his brother's widow

Directions for questions 4 to 7: On the basis of the information provided, answer the questions below.

Six friends Ana, Belle, Cinderella, Diana, Elsa and Ferida are sitting on the ground in a hexagonal shape discussing their trades, i.e., cook, hairdresser, washerwoman, tailor, carpenter and plumber. All the sides of the hexagon are of the same length. The seating arrangement is subject to following conditions:

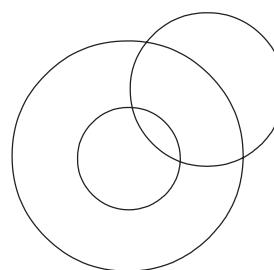
- Ana is not adjacent to the hairdresser or Cinderella
- The tailor is not adjacent to Cinderella or Elsa but adjacent to Ana.
- Hairdresser and Cinderella are adjacent to each other.
- Plumber is in the middle of tailor and Cinderella in a clockwise direction.
- Cook is adjacent to the Carpenter who is adjacent to Belle in an anti-clockwise direction.
- Ferida is a plumber and Elsa is adjacent the cook.
- In a clockwise direction, the washerwoman is followed by the hairdresser

4. Who is at the same distance from Diana as carpenter is from Diana?
(a) Belle (b) Cinderella
(c) Tailor (d) Plumber
5. If one neighbour of cook is Elsa, who is the other?
(a) Cinderella (b) Diana
(c) Belle (d) Ferida
6. What are the trades of Diana and Elsa?
(a) Tailor and Carpenter
(b) Cook and Carpenter
(c) Tailor and Washerwoman
(d) Tailor and Plumber
7. Who is sitting opposite to the plumber?
(a) Ana (b) Elsa
(c) Diana (d) Cinderella

Directions for questions 8 to 10: On the basis of the information provided, answer the questions below.

A, B, C, E, F, G and H are 7 employees in an organisation working in different departments of Administration, Finance and Logistics. There are at least two employees in each department. Out of these 7, 3 are females and one is in each department. Each employee gets a different salary. F works in Administration and his only other colleague G earns the maximum. C, the least earner works in Finance. B and E are brothers and are not in the same department. A, husband of H, works in Finance and earns more than F, B and E. The wife in the couple earns more than the husband.

8. In which of the department, does a group of 3 work?
(a) Logistics
(b) Logistics or Administration
(c) Administration or Finance
(d) Finance or Logistics
9. Which of the following statement is true?
(a) B earns less than A and H
(b) B earns less than F and H
(c) F earns more than B and E
(d) B earns more than E and C
10. In descending order of income, H is at which position?
(a) 2 (b) 3
(c) 5 (d) 1
11. The diagram below, explains which of the given relationship



- (a) Judge, Thief, Criminal
(b) Tea, Coffee, Beverages
(c) Males, Fathers, Doctors
(d) Cabinet, Minister, Home Minister
12. Insert the missing number

15		2	9		7	13		16
	80			65			?	
5		6	4		6	11		8

(a) 35 (b) 48
(c) 72 (d) 120
13. In the following question, one term in the number series is wrong. Find out the wrong term. 10, 26, 74, 218, 654, 1946, 5834
(a) 654 (b) 26
(c) 1946 (d) 218
14. In the question below, three incomplete rows of letters/numerals are given which correspond to each other in some way. Find the letters/numerals which come in the vacant places marked by “?”

–	A	D	A	C	B	–	–	B	D	C	C
1	3	–	–	1	2	4	2	–	–	–	–
a	–	–	b	–	–	c	d	?	?	?	?

- (a) a, c, d, d (b) d, a, c, c
(c) c, a, d, d (d) d, c, a, a

15. Choose the conclusion which logically follow from the given statement irrespective of commonly known facts.

Statement: All branches are flowers. All flowers are leaves

Conclusion:

- I. All branches are leaves
II. All leaves are branches
III. All flowers are branches
IV. Some leaves are branches
(a) None follows
(b) Only I and IV follow
(c) Only II and III follow
(d) All follow

Directions for questions 16 to 18: On the basis of the information provided, answer the questions below.

Eight doctors P, Q, R, S, T, U, V and W of the same family, i.e., father, mother, father's sister, mother's brother, 2 daughters and 2 sons visit a clinic every day for one hour each except on Monday which is a holiday. The timings are 9 am to 1 pm and 2 pm to 6 pm, with lunch time from 1 pm to 2 pm. Each has a different specialisation namely Cardiologist, Orthodontist, Neurologist, Paediatrician, Gynaecologist, Urologist, Radiologist and General Physician.

- No doctor visits the clinic before doctor Q and after doctor U.
- The Orthodontist visits right after lunch and is followed by R who is a female.
- The mother comes in at the same place before lunch as the younger son P after lunch.
- The General Physician is the sister of Urologist's father and is last to visit before lunch.
- The Cardiologist is the first while the elder daughter is the last to visit.

- T is the mother's brother of U and visits between the father and mother.
- Before 1 pm, V comes after the Radiologist, who is second to visit during the day
- S, the mother comes at 11 am after the father.
- The Neurologist is at the same place after lunch as the Gynaecologist before lunch and comes right after Urologist.

16. The General Physician is a _____ and comes at _____.
(a) Female, 11am (b) Female, 12 noon
(c) Male, 11am (d) Male, 12 noon
17. R is a _____ by specialization and is Cardiologist's _____.
(a) Orthodontist, Sister
(b) Paediatrician, Daughter
(c) Urologist, Mother
(d) Urologist, Daughter
18. If lunch break and subsequent working hours are reduced by 15 minutes on Wednesday, then Doctor U who is _____ and Cardiologist's _____ will reach the clinic at _____.
(a) Radiologist, Sister, 3:15 pm
(b) Urologist, Daughter, 4:15 pm
(c) Paediatrician, Daughter, 5:45 pm
(d) Paediatrician, Daughter, 4:15 pm

Directions for questions 19 to 23: On the basis of information provided, answer the questions below.

After receiving the disturbing news of falling standards the Supreme Council of Confederation of five Kingdoms is considering to conduct joint entrance examination for all student in these kingdoms for Vaidya Ratna course. As a first step, it has been decided to review the past five years data about the individual entrance examination of the kingdoms so that an appropriate action can be taken.

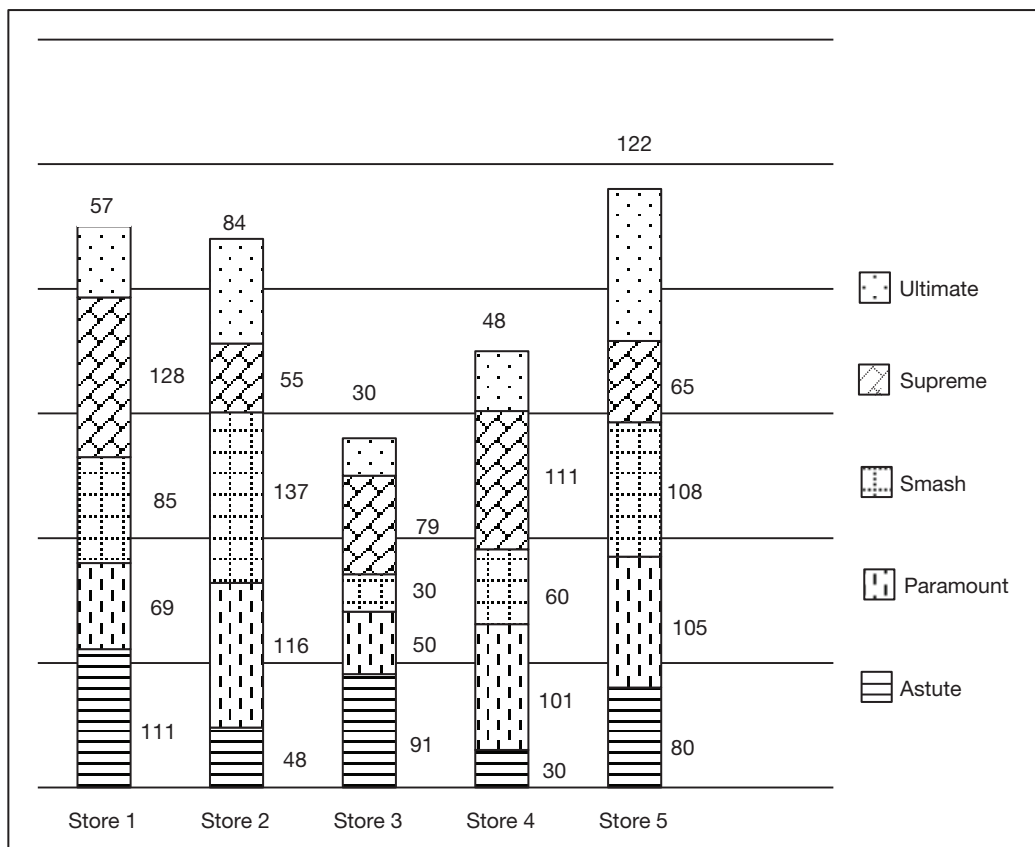
		Anga	Banga	Chedi	Dwarka	Gandhar
2012	Appeared	5000	4000	2600	6000	4500
	Passed	850	640	468	780	765
2013	Appeared	5500	4500	2500	8000	3500
	Passed	770	810	275	1120	595
2014	Appeared	6000	6500	1900	6500	4500
	Passed	1200	1235	266	715	810
2015	Appeared	5000	5500	2500	5500	4000
	Passed	750	880	275	935	520
2016	Appeared	7000	6000	2000	7000	6000
	Passed	1190	660	400	1330	1200

19. What is the overall pass percentage from Anga Kingdom for all the years together?
 (a) 16.7 (b) 17.5
 (c) 18.7 (d) 15.5
20. In which of the following years, total number of candidates passed from all the kingdoms is lowest?
 (a) 2012 (b) 2013
 (c) 2014 (d) 2015
21. In which of the following years, Banga Kingdom recorded highest pass percentage?
 (a) 2012 (b) 2013
 (c) 2014 (d) 2016
22. What is the overall pass percentage of all the kingdoms in the year 2013?

- (a) 13.88 (b) 14.88
 (c) 15.88 (d) 16.88

23. Highest number of candidates passed are from which of the following kingdoms for all the years together?
 (a) Anga (b) Banga
 (c) Gandhar (d) Dwarka

Directions for questions 24 to 28: *T-Nation, a T-shirt manufacturing company has unleashed 5-5-5 strategy, five brands (Ultimate Supreme, Smash, Paramount, Astute), five sizes, (S, M, L, XL, XXL), and five Stores (S1, S2, S3, S4, S5) to capture New Delhi market. Number of T-Shirts in each of the store is given in the stacked bar chart below.*



Note: Visibility of a brand in a store is given by number of T-Shirts of the brand in the store by total number of T-Shirts in the store. Visibility across the stores is measured by sum of the scores of visibility of a brand in a store.

24. Which brand of T-Shirt has more visibility across the stores?

- (a) Astute (b) Supreme
 (c) Paramount (d) Smash

25. Which brand has lowest visibility score in any of the stores?

- (a) Astute (b) Smash
 (c) Paramount (d) Ultimate

26. Suppose, size M constitutes 22% of all the T-Shirts owned by T-nation. It is also given that 'size M T-shirt in stores 1, 2 and 5 are 10% of the total T-shirts in these stores. Then, the total number of T-Shirts of size M in store 4 cannot be less than
 (a) 23 (b) 28
 (c) 32 (d) 44
27. What is the approximate share of Supreme brand in all stores together?
 (a) 19 (b) 22
 (c) 18 (d) 20

28. Approximately, by what percentage are Smash T-shirts greater than Ultimate T-shirts in all the stores together?
 (a) 79 (b) 50
 (c) 35 (d) 23

Directions for questions 29 to 33: Given below is the data about Domestic Investment (DI) and Foreign Investment (FI) in 9 different sectors over 5 year period. (In ₹ Crores)

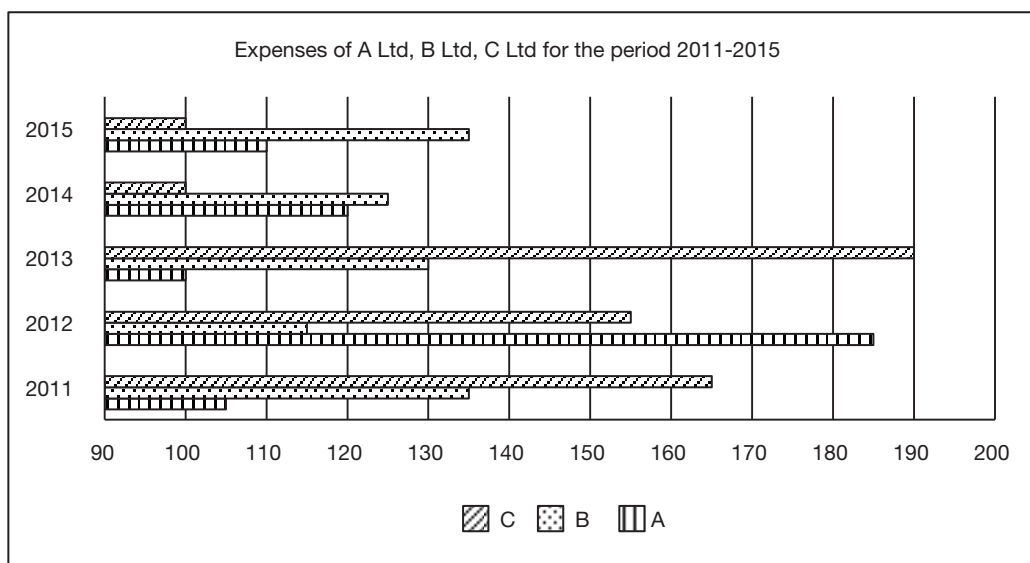
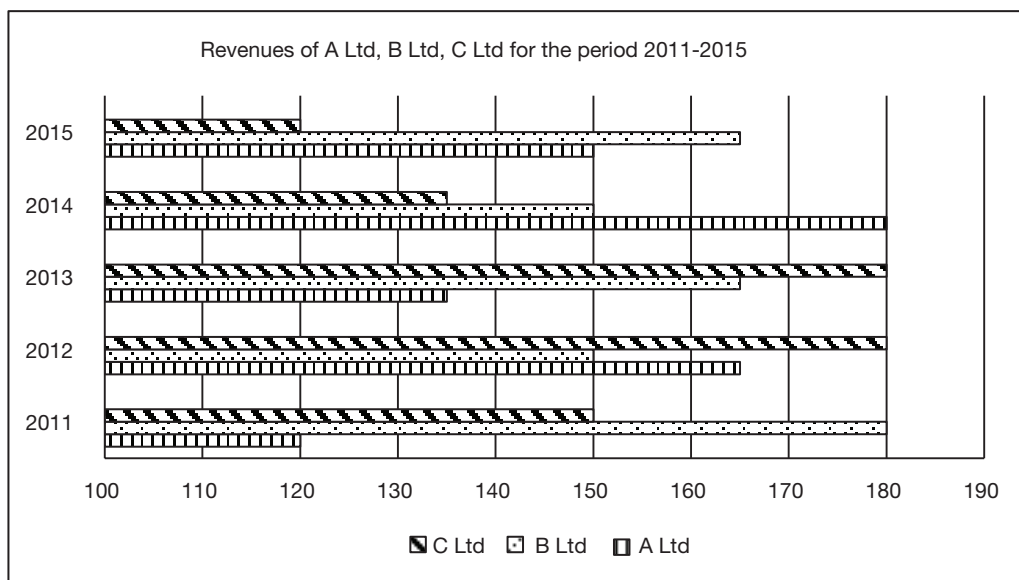
Sectors	2009		2010		2011		2012		2013	
	DI	FI	DI	FI	DI	FI	DI	FI	DI	FI
Basic Materials	1500	800	1500	1300	2500	1400	2000	900	2500	800
Communication Services	2000	1400	1200	1000	1600	1100	1000	300	500	1200
Consumer Cyclical	1000	1500	1200	1500	1100	3000	500	700	900	1900
Consumer Defensive	1300	1000	700	1600	1500	800	2000	500	1800	1600
Energy	800	1200	500	1400	700	2500	600	1000	1100	500
Financial Services	1800	500	400	2000	1200	1600	1000	1500	700	1400
Healthcare	2000	3000	600	3000	400	6000	1000	1500	3500	600
Real Estate	500	2000	1000	1500	4000	3000	6000	1500	2000	2100
Technology	1500	2500	1000	2800	1500	5000	1200	2000	3000	4000

Note: DI = Domestic Investment; FI = Foreign Investment

29. What is the approximate ratio of the total investment in Energy sector to that of Financial services sector?
 (a) 1 : 1.2 (b) 3 : 4.5
 (c) 1 : 0.5 (d) 2 : 3.8
30. Absolute different between the Total DI and Total FI is highest for which sector?
 (a) Technology (b) Healthcare
 (c) Basic Material (d) None of the above
31. In which year the average DI is the highest?
 (a) 2013 (b) 2011
 (c) 2010 (d) 2009

32. Which sector has received the 2nd lowest investment from DI for the total period?
 (a) Consumer cyclical
 (b) Consumer durable
 (c) Energy
 (d) None of the above
33. What is the approximate ratio of total DI to total FI?
 (a) 1 : 1.10 (b) 2 : 2.36
 (c) 0.75 : 1 (d) 0.75 : 1.5

Directions for questions 34 to 38: The following 2 bar charts represent revenues and expenses (in thousands) of A Ltd, B Ltd, and C Ltd over a period of five years.



Profit = Revenues - Expenses

34. For which company, the average annual expenses were maximum in the given period?
- (a) A Ltd (b) B Ltd
(c) C Ltd (d) Both A Ltd and B Ltd
35. For which year, the average annual revenue (considering all three companies) was the maximum?
- (a) 2011 (b) 2012
(c) 2013 (d) 2014
36. What was the approximate percentage decline in the revenue of C Ltd in 2015 as compared to the revenue in 2012?
- (a) 16 (b) 25
(c) 33 (d) 40
37. What was the approximate absolute difference between the average revenue of A Ltd in 2011, 2012 and 2013 and the average revenue of B Ltd in 2013, 2014 and 2015?
- (a) 20 (b) 160
(c) 20000 (d) 26000
38. For which of the following years the percentage of rise/fall in profit from the previous year was the maximum for A Ltd?
- (a) 2012 (b) 2013
(c) 2014 (d) 2015

ANSWER KEYS

1. (b)	2. (c)	3. (c)	4. (b)	5. (b)	6. (a)	7. (b)	8. (d)	9. (a)	10. (a)
11. (c)	12. (b)	13. (a)	14. (d)	15. (b)	16. (b)	17. (d)	18. (d)	19. (a)	20. (d)
21. (c)	22. (b)	23. (d)	24. (b)	25. (a)	26. (a)	27. (b)	28. (d)	29. (a)	30. (a)
31. (a)	32. (a)	33. (b)	34. (c)	35. (b)	36. (c)	37. (c)	38. (b)		

HINTS AND EXPLANATIONS

1. A female always remains in the same tribe, irrespective of whether she is married, unmarried, divorced or widowed.

Maternal grandmother is the mother's mother. If the female is in tribe B, her mother as well as maternal grandmother will always be in tribe B.

Hence, a female in tribe B cannot have her maternal grandmother in tribe A.

Hence, statement (a) cannot be true.

Now, consider a lady (X) born in tribe A. When she marries, she remains in tribe A, and her husband enters tribe A from tribe B. Assume that she has a son (Y). Y will also be in tribe A.

When Y marries, Y will move to tribe B. Assume that Y has a daughter (Z). Z will be in tribe B, as it is her mother's tribe.

Thus, a female in tribe B (i.e., Z) can have her paternal grandmother (i.e., X) born in tribe A.

Hence, statement (b) is true.

Hence, option (b).

2. A boy born in tribe B (say X), can have a son, daughter, son-in-law or daughter-in-law only if he is married. When he marries, he moves to tribe A. Also, his daughter always remains in tribe A (as it is her mother's tribe). Hence, a boy born in tribe B cannot have his daughter in tribe B.

Hence, option (a) is eliminated.

The son of X will be in tribe A (till marriage). When he marries, this son and daughter-in-law will be in tribe B. Hence, X cannot have his daughter-in-law in tribe A.

Hence, option (b) is eliminated.

If this married son gets divorced, he moves back to his mother's tribe, i.e., tribe A. Hence, X cannot have a divorced son in tribe B.

Hence, option (d) is eliminated.

Hence, option (c).

Note: You need not check option (c). However, it can be verified as under:

If the boy is born in tribe B, his mother and her brother will also be in tribe B. This uncle will remain in tribe B before marriage and move to tribe A after marriage.

Hence, a boy born in tribe B can have an uncle in any tribe.

3. Since an invalid marriage is to be found, marriages will be possible in three out of four options.

Considering each option.

Option (a):

Let X be born in tribe A. When he marries, he moves to tribe B. He moves back to tribe A, on being widowed. Meanwhile, his wife's sister is still in tribe B. Since he is currently unmarried, it is possible for him to marry his wife's sister.

Option (b):

A lady and her daughter will be always remain in the same tribe (say A). Her daughter's husband would originally have been from tribe B, and would have entered tribe A after marriage. He would have gone back to tribe B after divorce. Since the female (widowed) and male (divorced) are currently unmarried and in different tribes, they can get married.

Option (c):

If the girl is in tribe B, her mother as well as mother's brother are also in tribe B.

Since two people of the same tribe cannot marry, this marriage is not permissible.

Also, this uncle will be in tribe A only if he is married. The marriage is still not permissible as a person can only have one spouse at a time.

Hence, option (c).

Note: You need not check option (d), but it can be verified that this marriage is possible.

4. You can consider the six hexagonal places as 1-6 in clockwise order as shown below.

4
3 5
2 6
1

The washerwoman is followed by the hairdresser in clockwise direction. Hence, let the washerwoman and hairdresser be at places 1 and 2 respectively.

4
3 5
HD 6
WW

The hairdresser and Cinderella are adjacent to each other. Hence, Cinderella is either the washerwoman or on place 3, as shown below:

4 4
3 5 (C) 5
HD 6 **HD** 6
WW WW
(C)

The plumber is between the tailor and Cinderella in clockwise direction. Hence, their clockwise order is: tailor-plumber-Cinderella.

Observe that this is not possible in the second figure, as the sequence there is: washerwoman-hairdresser-Cinderella. Hence, the second case is eliminated and **Cinderella = washerwoman**.

Hence, to satisfy the tailor-plumber-Cinderella sequence, the tailor and plumber have to be at places 5 and 6 respectively.

Also, **Ferida = plumber**. Thus, the arrangement becomes:

4
3 Tlr
HD Plbr (F)
WW
(C)

Ana is not adjacent to the hairdresser or Cinderella. Hence, Ana cannot be on seats 3 and 6. Hence, Ana is at 4 or 5. Since the tailor is adjacent to Ana, Ana cannot be the tailor. Hence, Ana is on seat 4.

(A)
3 Tlr
HD Plbr (F)
WW
(C)

From the above figure, seat 3 and Ana should be cook and carpenter (in no specific order).

However, it is known that in anticlockwise order, the sequence is cook-carpenter-Belle.

This is only possible if **Ana = cook** and **Belle = hairdresser**.

Now, Elsa can be the tailor or carpenter, as Elsa is adjacent the cook. Since the tailor is not adjacent to Elsa, Elsa is not the tailor. Hence, **Elsa = carpenter** and **Diana = tailor**.

Thus, the final arrangement is:

(A)
Cook
Crpt (E) Tlr (D)
HD (B) Plbr (F)
WW
(C)

From the above figure, the carpenter is two places away from Diana. The other person who is two places away from Diana is Cinderella (the washerwoman).

Hence, option (b).

5. Consider the solution to the first question.

Ana is the cook, and her neighbours are Elsa and Diana.

Hence, option (b).

6. Consider the solution to the first question.

Diana and Elsa are the tailor and carpenter respectively.

Hence, option (a).

7. Consider the solution to the first question.

Ferida is the plumber and Elsa is opposite Ferida.

Hence, option (b).

8. There are seven people in three different departments, such that there are atleast two people per department.

Hence, the department-level breakup of people is (3, 2, 2) in any order.

There are three females such that there is one female in each department. Hence, the male-female breakup per department is: $(f + m)$, $(f + m)$, $(f + 2m)$. F is in Administration and his only colleague is G.

Hence, **F = Administration = Male** Also, there are only two people in Administration, i.e., F and G, one of whom has to be female.

Hence, **G = Administration = Female** **C = Finance**

A is the husband of H and works in Finance.

Hence, **A = Finance = Male**

Since B and E are brothers, both are male and both work in different departments.

Hence, **B/E = Finance = Male** Hence, the third person in Finance, i.e., C, has to be female.

Hence, **C = Finance = Female.**

Since there have to be atleast two people in each department, the two remaining people have to be in Logistics i.e., **E/B = Logistics = Male** and **H = Logistics = Female**

Thus, a group of 3 works in Finance.

Hence, option (d).

Note: The correct answer is not given in any of the options. Hence, you can mark the closest possible answer, i.e., option (d).

9. Rank the people as 1–7 in descending order of salary, i.e., 1 = highest and 7 = lowest

$G = 1$; $C = 7$; $A > F, B, E$

A–H is the couple where H is the wife. Since the wife earns more than the husband, $H > A$.

Hence, the overall descending order is:

$G > H > A > (F, B, E) > C$.

Hence, B definitely earns less than A and H.

Hence, option (a).

Note: The statements in the remaining options may or may not be true.

10. Consider the solution to the previous question.

H is ranked second in descending order of income.

Hence, option (a).

11. Every father is a male, but every male need not be a father. Hence, the set of fathers is the subset of the set of males. Some males are doctors and some fathers are doctors, and vice versa. Hence, the set of doctors partially intersects the set of males as well as fathers.

Hence, the given diagram corresponds to Males, Fathers, Doctors.

Hence, option (c).

12. Middle number = (difference between numbers of left column) $\times$ (sum of numbers of right column)

i.e., $80 = (15 - 5) \times (2 + 6) = (10) \times (8)$ and $65 = (9 - 4) \times (7 + 6) = (5) \times (13)$

$\therefore ? = (13 - 11) \times (16 + 8) = 2 \times 24 = 48$

Hence, option (b).

13. The logic is: given term = (previous term) $\times 3 - 4$.

This pattern is broken for 654, i.e., $(218 \times 3) - 4 = 650$, Hence, the wrong term is 654.

Hence, option (a).

14. The first row has uppercase letters, the second has digits and the third has lowercase letters.

Use terms common to rows to identify the relation between these three groups.

From first two rows: $C = 1$; and from last two rows: $1 = a$, i.e., **$C = 1 = a$** Hence, the required term, i.e., BDCC corresponds to _ _ aa.

Hence, option (d).

Note: It can be verified that $B = 2 = d$ and $D = 4 = c$ (as $A = 3$)

15. Since all branches are flowers, and all flowers are leaves, it implies that all branches are leaves and some leaves are branches.

Hence, conclusions I and IV follow.

Hence, option (b).

16. There are four males: father, mother's brother and two sons. Similarly, there are four females: mother, father's sister and two daughters. Some of the data is directly given and can be tabulated as under:

Time Slot	Doctor	Specialisation	Gender	Relation
9–10	Q	Cardiologist	Male	
10–11		Radiologist		
11–12	S		Female	Mother
12–1		General Physician	Female	Father's Sister
1–2			Lunch	
2–3		Orthodontist		
3–4	R		Female	
4–5				
5–6	U		Female	Elder Daughter

The following points can be concluded from the table:

- V is the General Physician (as V comes before 1 p.m., but after the radiologist).

- The mother is the Gynaecologist (as the gynaecologist comes before lunch).
- R is the younger daughter.

Time Slot	Doctor	Specialisation	Gender	Relation
9–10	Q	Cardiologist	Male	
10–11		Radiologist	Male	
11–12	S	Gynaecologist	Female	Mother
12–1	V	General Physician	Female	Father's Sister
1–2	Lunch			
2–3		Orthodontist	Male	
3–4	R		Female	Younger Daughter
4–5			Male	
5–6	U		Female	Elder Daughter

The following points can now be added:

- Neurologist comes third after lunch (as Gynaecologist comes third before lunch) and Urologist comes second after lunch (as Neurologist is immediately after Urologist). Hence, R is the Urologist.
- Younger son, P, comes third after lunch (as mother comes third before lunch). Hence, P is the Neurologist.

- T (mother's brother) comes between father and mother, while the father comes before the mother. Hence, Q is the father and T is the Radiologist.

Hence, the only person left, i.e., W is the elder son and is the Orthodontist. U is the Paediatrician. The final combinations are as shown below:

Time Slot	Doctor	Specialisation	Gender	Relation
9–10	Q	Cardiologist	Male	Father
10–11	T	Radiologist	Male	Mother's Brother
11–12	S	Gynaecologist	Female	Mother
12–1	V	General Physician	Female	Father's Sister
1–2	Lunch			
2–3	W	Orthodontist	Male	Elder Son
3–4	R	Urologist	Female	Younger Daughter
4–5	P	Neurologist	Male	Younger Son
5–6	U	Paediatrician	Female	Elder Daughter

Thus, the General Physician is a female and comes at 12 noon.

Hence, option (b).

17. Consider the solution to the first question.

R is a Urologist and is the daughter of Q (the Cardiologist).

Hence, option (d).

18. Consider the solution to the first question.

U is a Paediatrician and is the daughter of the Cardiologist.

Hence, options (a) and (b) can be eliminated.

Originally, she used to reach at 5 p.m. Now she will reach before 5 p.m.

Hence, option (d).

Note: U will actually reach at 4 p.m. and not 4:15 p.m. Hence, none of the answers is actually correct.

19. Total appeared for Anga

$$= 5000 + 5500 + 6000 + 5000 + 7000 \\ = 28500$$

Total passed from Anga

$$= 850 + 770 + 1200 + 750 + 1190 = 4760$$

$$\therefore \text{Required \%} = (4760/28500) \times 100 = 16.7\%$$

Hence, option (a).

20. Consider the total number of candidates passed from all kingdoms in each year in the options.

$$2012: 850 + 640 + 468 + 780 + 765 = 3503$$

$$2013: 770 + 810 + 275 + 1120 + 595 = 3570$$

$$2014: 1200 + 1235 + 266 + 715 + 810 = 4226$$

$$2015: 750 + 880 + 275 + 935 + 520 = 3360$$

Hence, among the given years, the total number of passed candidates is the least in 2015.

Hence, option (d).

21. Here, the calculation is required only for Banga kingdom.

$$2012: (640/4000) \times 100 = 16\%$$

$$2013: (810/4500) \times 100 = 18\%$$

$$2014: (1235/6500) \times 100 = 19\%$$

$$2016: (660/6000) \times 100 = 11\%$$

Hence, the highest passing percentage is in 2014.

Hence, option (c).

22. Consider the solution to the earlier questions.

Total passed students = 3570

Total appeared students

$$= 5500 + 4500 + 2500 + 8000 + 3500$$

$$= 24000$$

$$\therefore \text{Total passing \% of all kingdoms in 2013} = (3570/24000) \times 100 = 14.88\%$$

Hence, option (b).

23. Consider the solution to the earlier questions.

Total passed candidates from Anga = 4760

Now calculate this for the other three kingdoms in the options.

$$\text{Banga: } 640 + 810 + 1235 + 880 + 660 = 4225$$

$$\text{Gandhar: } 765 + 595 + 810 + 520 + 1200 = 3890$$

$$\text{Dwarka: } 780 + 1120 + 715 + 935 + 1330 = 4880$$

Hence, the maximum candidates passed from Dwarka.

Hence, option (d).

24. Since the first two questions of the set require you to find visibility of each brand in each store, you can make a table as under:

	S1	S2	S3	S4	S5	Total
Ultimate	12.67	19.09	10.71	13.71	25.42	81.60
Supreme	28.44	12.50	28.21	31.71	13.54	114.41
Smash	18.89	31.14	10.71	17.14	22.50	100.38
Paramount	15.33	26.36	17.86	28.86	21.88	110.29
Astute	24.67	10.91	32.50	8.57	16.67	93.31

Hence, Supreme has the highest total visibility.

Hence, option (b).

25. Consider the solution to the first question.

Astute has the lowest visibility score in store 3, i.e., 8.57.

Hence, option (a).

Note: This specific question can also be solved without the table, but we have made the table as it helps solve two questions directly.

To solve this, find the lowest stocked shirt per store.

E.g., 30 units of Ultimate and Smash is the lowest in Store 3 while 30 of Astute is the lowest in Store 4. Hence, for stores 3 and 4, these brands can have lowest visibility score. Total t-shirts in stores 3 and 4 is 280 and 350 respectively.

$$(30/280) > (30/350)$$

Hence, visibility of Astute in store 4 is lower than any brand in store 3.

Similarly, lowest visibility in other three stores is:

Store 1: (57/450); store 2: (48/440), store 5: (65/480)

By comparing these fractions with (30/350), you can conclude that Astute in store 3 still have lowest visibility score.

26. Total t-shirts owned by T-Nation = sum of total t-shirts across all stores.

$$\text{Store 1} = 57 + 128 + 85 + 69 + 111 = 450$$

$$\text{Store 2} = 84 + 55 + 137 + 116 + 48 = 440$$

$$\text{Store 3} = 30 + 79 + 30 + 50 + 91 = 280$$

$$\text{Store 4} = 48 + 111 + 60 + 101 + 30 = 350$$

$$\text{Store 5} = 122 + 65 + 108 + 105 + 80 = 480$$

$$\therefore \text{Total t-shirts owned by T-Nation}$$

$$= 450 + 440 + 280 + 350 + 480 = 2000$$

$$\therefore \text{Total t-shirts of size M} = 22\% \text{ of } 2000 = 440$$

$$\text{Total size M t-shirts in stores 1, 2 and 5} = 10\% \text{ of } (450 + 440 + 480) = 10\% \text{ of } 1370 = 137$$

$$\therefore \text{Total size M t-shirts in stores 3 and 4} = 440 - 137 = 303$$

Now, the minimum number of size M t-shirts in store 4 has to be found. For this, as many t-shirts as possible should be in store 3.

Since total t-shirts in store 3 are 280, assume that all of them are size M.

$$\therefore \text{Minimum number of size M t-shirts in store 4} = 303 - 280 = 23$$

Hence, option (a).

27. Consider the solution to the previous question.
Total t-shirts across all stores = 2000
Total t-shirts of Supreme brand = $128 + 55 + 79 + 111 + 65 = 438$
 $\therefore$ Share of Supreme brand
 $= (438/2000) \times 100 = 21.9\% = 22\%$

Hence, option (b).

28. Total Smash t-shirts
 $= 85 + 137 + 30 + 60 + 108 = 420$
Total Ultimate t-shirts
 $= 57 + 84 + 30 + 48 + 122 = 341$
 $\therefore$ Required percentage
 $= \frac{(420 - 341)}{341} \times 100 = 23.17\%$

$$\approx 23\%$$

Hence, option (d).

29. Total investment = total DI + total FI
For Energy: total

$$= (800 + 500 + 700 + 600 + 1100) + (1200 + 1400 + 2500 + 1000 + 500)$$

$$= 3700 + 6600 = 10300$$

For Financial Services: total

$$= (1800 + 400 + 1200 + 1000 + 700) + (500 + 2000 + 1600 + 1500 + 1400) = 5100 + 7000 = 12100$$

$$\therefore \text{Required ratio} = 10300 : 12100 = 103 : 121 = 100 : 120 = 1 : 1.2$$

Hence, option (a).

30. Here, because one of the options is "None of the above", you will need to calculate total DI and total FI for each sector.

Some data can already be found from the previous question.

$$\text{Energy: DI} - \text{FI} = 6600 - 3700 = 2900$$

$$\text{Financial Services: } 7000 - 5100 = 1900$$

Now consider each option.

$$\text{Technology: } (2500 + 2800 + 5000 + 2000 + 4000) - (1500 + 1000 + 1500 + 1200 + 3000) = 16300 - 8200 = 8100$$

$$\text{Healthcare: } (3000 + 3000 + 6000 + 1500 + 600) - (2000 + 600 + 400 + 1000 + 3500) = 14100 - 7500 = 6600$$

$$\text{Basic Material: } (1500 + 1500 + 2500 + 2000 + 2500) - (800 + 1300 + 1400 + 900 + 800) = 10000 - 5200 = 4800$$

Hence, option (b) can be eliminated.
Among "None of the Above", Energy and Financial Services can be ignored. Only Communication Services, Consumer Cyclical, Consumer Defensive and Real Estate need to be compared with Technology (8100).

$$\text{Communication Services: } (2000 + 1200 + 1600 + 1000 + 500) - (1400 + 1000 + 1100 + 300 + 1200) = 6300 - 5000 = 1300$$

Hence, this can be ignored.

$$\text{Consumer Cyclical: } (1500 + 1500 + 3000 + 700 + 1900) - (1000 + 1200 + 1100 + 500 + 900) = 8600 - 4700 = 3900$$

Hence, this can also be ignored.

$$\text{Consumer Defensive: } (1300 + 700 + 1500 + 2000 + 1800) - (1000 + 1600 + 800 + 500 + 1600) = 7300 - 5500 = 1800$$

Hence, this can also be ignored.

$$\text{Real Estate: } (500 + 1000 + 4000 + 6000 + 2000) - (2000 + 1500 + 3000 + 1500 + 2100) = 13500 - 10100 = 2400$$

Hence, this can also be ignored.

Hence, all the sectors under "None of the above" have a lower value compared to Technology.

Hence, option (a).

31. The average DI will be the highest for the year when the total DI is highest. Consider the four years given in the options.

2009: $1500 + 2000 + 1000 + 1300 + 800 + 1800 + 2000 + 500 + 1500 = 12400$

2010: $1500 + 1200 + 1200 + 700 + 500 + 400 + 600 + 1000 + 1000 = 8100$

2011: $2500 + 1600 + 1100 + 1500 + 700 + 1200 + 400 + 4000 + 1500 = 14500$

2013: $2500 + 500 + 900 + 1800 + 1100 + 700 + 3500 + 2000 + 3000 = 16000$

Hence, option (a).

32. Consider the solution to the earlier questions. The DI for each sector has been found.

The second lowest investment from DI is for Consumer Cyclical.

Hence, option (a).

33. Consider the solution to the earlier questions. Since the sector-wise DI and FI is known, total DI and FI can be found.

Total DI = $12400 + 8100 + 14500 + 15300 + 16000 = 66300$

Total FI = $13900 + 16100 + 24400 + 9900 + 14100 = 78400$

$\therefore$ Required ratio = $66300 : 78400 = 0.84$

This is closest to 2 : 2.36.

Hence, option (b).

34. The average annual expenses will be maximum for the company that has the maximum total expenses over the given period.

A: $105 + 185 + 100 + 120 + 110 = 620$

B: $135 + 115 + 130 + 125 + 135 = 640$

C: $165 + 155 + 190 + 100 + 100 = 710$

Hence, option (c).

35. The average revenue will be highest for the year where total revenue is highest. By observation, the maximum total revenue in 2012.

Hence, option (b).

36. $C(2015) = 120$ and $C(2012) = 180$

$\therefore$ Required percentage

$$= \frac{180 - 120}{180} \times 100 = 33.33\%$$

Hence, option (c).

37. Average revenue of A

$$= (120 + 165 + 135)/3 = 140$$

Average revenue of B

$$= (165 + 150 + 165)/3 = 160$$

$\therefore$ Difference = $140 - 120$

= 20 (in thousands), i.e., 20000

Hence, option (c).

38. Profit/Loss for A in each year is:

2011 – 15 (profit)

2012 – 20 (loss)

2013 – 35 (profit)

2014 – 60 (profit)

2015 – 40 (profit)

Since the profit is increasing from (–20) to (35), the maximum percentage rise will be in this period, i.e., in 2013.

Hence, option (b).

CAT 2008

INSTRUCTIONS

- ☐ Directions for answering the questions are given before each group of questions. Read these directions carefully and answer the questions by darkening the appropriate circles Sheet. Each question has only one correct answer.
 - ☐ All questions carry four marks each. Each wrong answer will attract a penalty of one mark.
 - ☐ Do your rough work only on the Test Booklet and NOT on the Answer Sheet.
-

SECTION II: THIS SECTION CONTAINS 25 QUESTIONS

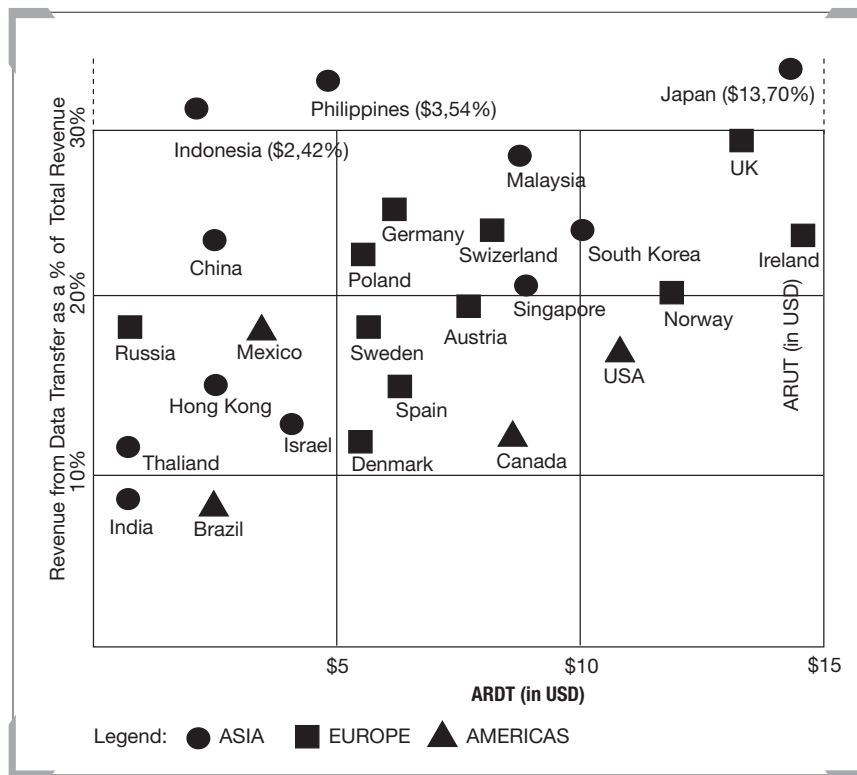
Directions for questions 26 to 28: *Answer the following questions based on the statements given below:*

- (i) There are three houses on each side of the road.
- (ii) These six houses are labeled as P, Q, R, S, T and U.
- (iii) The houses are of different colours, namely, Red, Blue, Green, Orange, Yellow and White.
- (iv) The houses are of different heights.
- (v) T, the tallest house, is exactly opposite to the Red coloured house.
- (vi) The shortest house is exactly opposite to the Green coloured house.
- (vii) U, the Orange coloured house, is located between P and S.
- (viii) R, the Yellow coloured house, is exactly opposite to P.
- (ix) Q, the Green coloured house, is exactly opposite to U.
- (x) P, the White coloured house, is taller than R, but shorter than S and Q.

- 26. What is the colour of the house diagonally opposite to the Yellow coloured house?
 - (a) White
 - (b) Blue
 - (c) Green
 - (d) Red
 - (e) none of these
- 27. Which is the second tallest house?
 - (a) P
 - (b) S
 - (c) Q
 - (d) R
 - (e) cannot be determined
- 28. What is the colour of the tallest house?
 - (a) Red
 - (b) Blue
 - (c) Green
 - (d) Yellow
 - (e) none of these

Directions for questions 29 to 31: *Answer the following questions based on the information given below:*

Telecom operators get revenue from transfer of data and voice. Average revenue received from transfer of each unit of data is known as ARDT. In the diagram below, the revenue received from data transfer as percentage of total revenue received and the ARDT in US Dollars (USD) are given for various countries.



29. It was found that the volume of data transfer in India is the same as that of Singapore. Then which of the following statements is true?
- Total revenue is the same in both countries
 - Total revenue in India is about 2 times that of Singapore
 - Total revenue in India is about 4 times that of Singapore
 - Total revenue in Singapore is about 2 times that of India
 - Total revenue in Singapore is about 4 times that of India
30. It is expected that by 2010, revenue from data transfer as a percentage of total revenue will triple for India and double for Sweden. Assume that in 2010, the total revenue in India is twice that of Sweden and that the volume of data transfer is the same in both the countries. What is the percentage increase of ARDT in India if there is no change in ARDT in Sweden?
- 400%
 - 550%
 - 800%
 - 950%
 - Cannot be determined

31. If the total revenue received is the same for the pairs of countries listed in the choices below, choose the pair that has approximately the same volume of data transfer.
- Philippines and Austria
 - Canada and Poland
 - Germany and USA
 - UK and Spain
 - Denmark and Mexico

Directions for questions 32 to 34: Answer the following questions based on the information given below:

For admission to various affiliated colleges, a university conducts a written test with four different sections, each with a maximum of 50 marks. The following table gives the aggregate as well as the sectional cut-off marks fixed by six different colleges affiliated to the university. A student will get admission only if he/she gets marks greater than or equal to the cut-off marks' in each of the sections and his/her aggregate marks are at least equal to the aggregate cut-off marks as specified by the college.

	Sectional Cut-off Marks				Aggregate Cut-off Marks
	Section A	Section B	Section C	Section D	
College 1	42	42	42		176
College 2		45	45		175
College 3			46		171
College 4	43			45	178
College 5	45		43		180
College 6		41		44	176

32. Bhama got calls from all colleges. What could be the minimum aggregate marks obtained by her?

(a) 180 (b) 181
(c) 196 (d) 176
(e) 184

33. Charlie got calls from two colleges. What could be the minimum marks obtained by him in a section?

(a) 0 (b) 21
(c) 25 (d) 35
(e) 41

34. Aditya did not get a call from even a single college. What could be the maximum aggregate marks obtained by him?

(a) 181 (b) 176
(c) 184 (d) 196
(e) 190

Directions for questions 35 to 38: Answer the following questions based on the information given below:

In a sports event, six teams (A, B, C, D, E and F) are competing against each other. Matches are scheduled in two stages. Each team plays three matches in Stage-I and two matches in Stage-II. No team plays against the same team more than once in the event. No ties are permitted in any of the matches. The observations after the completion of Stage-I and Stage-II are as given below.

Stage-I:

- One team won all the three matches
- Two teams lost all the matches
- D lost to A but won against C and F.
- E lost to B but won against C and F.
- B lost at least one match.
- F did not play against the top team of stage-I.

Stage-II:

- The leader of Stage-I lost the next two matches.
- Of the two teams at the bottom after Stage-I, one team won both matches, while the other lost both matches.
- One more team lost both matches in Stage-II.

35. The two teams that defeated the leader of Stage-I are:

(a) F and D (b) E and F
(c) B and D (d) E and D
(e) F and D

36. The only team(s) that won matches in Stage-II is (are):

(a) B (b) E and F
(c) A, E and F (d) B, E and F
(e) B and F

37. The teams that won exactly two matches in the event are:

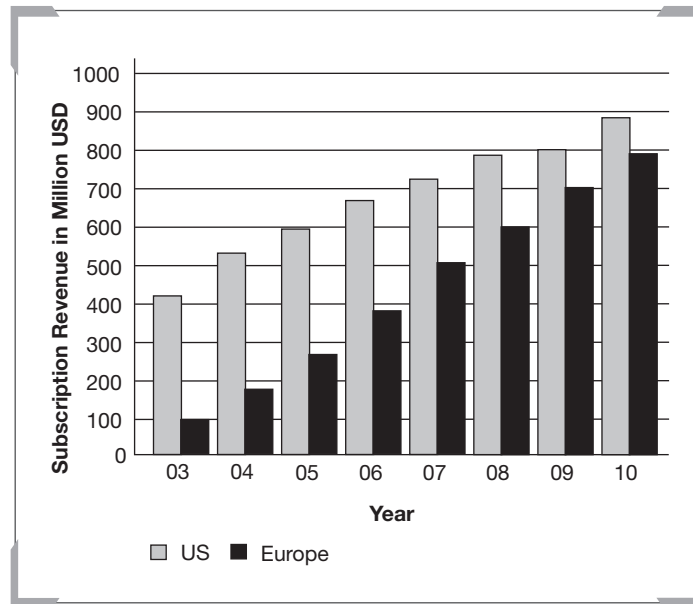
(a) A, D and F (b) D and E
(c) E and F (d) D, E and F
(e) D and F

38. The team(s) with the most wins in the event is (are):

(a) A (b) A and C
(c) F (d) F and E
(e) B and E

Directions for questions 39 to 42: Answer the following questions based on the information given below:

The bar chart shows the revenue received, in million US dollars (USD), from subscribers to a particular Internet service. The data covers the period 2003 to 2007 for the United States (US) and Europe. The bar chart also shows the estimated revenues from subscription to this service for the period 2008 to 2010.



39. The difference between the estimated subscription in Europe in 2008 and what it would have been if it were computed using the percentage growth rate of 2007 (over 2006), is closest to:

(a) 50 (b) 80
(c) 20 (d) 10
(e) 0

40. In 2003, 60% of subscribers in Europe were men. Given that women subscribers increase at the rate of 10 per cent per annum and men at the rate of 5 per cent per annum, what is the approximate percentage growth of subscribers between 2003 and 2010 in Europe? The subscription prices are volatile and may change each year.

(a) 62 (b) 15
(c) 78 (d) 84
(e) 50

41. Consider the annual percentage change in the gap between subscription revenues in the US and Europe. What is the year in which the absolute value of this change is the highest?

(a) 03–04 (b) 05–06
(c) 06–07 (d) 08–09
(e) 09–10

42. While the subscription in Europe has been growing steadily towards that of the US, the growth rate in Europe seems to be declining. Which of the following is closest to the percentage change in growth rate of 2007 (over 2006) relative to the growth rate of 2005 (over 2004)?

(a) 17 (b) 20
(c) 35 (d) 60
(e) 100

Directions for questions 43 to 47: Answer the following questions based on the information given below:

Abdul, Bikram and Chetan are three professional traders who trade in shares of a company XYZ Ltd. Abdul follows the strategy of buying at the opening of the day at 10 am and selling the whole lot at the close of the day at 3 pm. Bikram follows the strategy of buying at hourly intervals: 10 am, 11 am, 12 noon, 1 pm and 2 pm, and selling the whole lot at the close of the day. Further, he buys an equal number of shares in each purchase. Chetan follows a similar pattern as Bikram but his strategy is somewhat different. Chetan's total investment amount is divided equally among his purchases. The profit or loss made by each investor is the difference between the sales values at the close of the day less the investment in purchase. The "return" for each investor is defined as the ratio of the profit or loss to the investment amount expressed as a percentage.

43. On a day of fluctuating market prices, the share price of XYZ Ltd ends with a gain, i.e., it is higher at the close of the day compared to the opening value. Which trader got the maximum return on that day?

(a) Bikram (b) Chetan
(c) Abdul (d) Bikram or Chetan
(e) Cannot be determined

44. Which one of the following statements is always true?
- Abdul will not be the one with the minimum return
 - Return for Chetan will be higher than that of Bikram
 - Return for Bikram will be higher than that of Chetan
 - Return for Chetan cannot be higher than that of Abdul
 - None of the above
45. On a “boom” day the share price of XYZ Ltd keeps rising throughout the day and peaks at the close of the day. Which trader got the minimum return on that day?
- Bikram
 - Chetan
 - Abdul
 - Abdul or Chetan
 - cannot be determined

One day, two other traders, Dane and Emily joined Abdul, Bikram and Chetan for trading in the shares of XYZ Ltd. Dane followed a strategy of buying equal numbers of shares at 10 am, 11 am and 12 noon, and selling the same numbers at 1 pm, 2 pm and 3 pm. Emily, on the other hand, followed the

strategy of buying shares using all her money at 10 am and selling all of them at 12 noon and again buying the shares for all the money at 1 pm and again selling all of them at the close of the day at 3 pm. At the close of the day the following was observed:

- Abdul lost money in the transactions.
 - Both Dane and Emily made profits.
 - There was an increase in share price during the closing hour compared to the price at 2 pm.
 - Share price at 12 noon was lower than the opening price.
46. Share price was at its highest at
- 10 am
 - 11 am
 - 12 noon
 - 1 pm
 - Cannot be determined
47. Which of the following is necessarily false?
- Share price was at its lowest at 2 pm
 - Share price was at its lowest at 11 am
 - Share price at 1 pm was higher than the share price at 2 pm
 - Share price at 1 pm was higher than the share price at 12 noon
 - None of the above

Directions for questions 48 to 50: Answer the following questions based on the information given below:

There are 100 employees in an organization across five departments. The following table gives the department-wise distribution of average age, average basic pay and allowances. The gross pay of an employee is the sum of his/her basic pay and allowance.

Department	Number of Employees	Average Age (Years)	Average Basic Pay (₹)	Allowances (% of Basic Pay)
HR	5	45	5000	70
Marketing	30	35	6000	80
Finance	20	30	6500	60
Business Development	35	42	7500	75
Maintenance	10	35	5500	50

There are limited numbers of employees considered for transfer/promotion across departments. Whenever a person is transferred/promoted from a department of lower average age to a department to higher average age, he/she will get an additional allowance of 10% of basic pay over the above his/her current allowance. There will not be an change in pay structure if a person is transferred/promoted from a

department with higher average age to a department with lower average age.

Questions below are independent of each other.

48. What is the approximate percentage change in the average gross pay of the HR department due to transfer of a 40-year old person with basic pay of a ₹8000 from the Marketing department?
- 9%
 - 11%
 - 13%
 - 15%
 - 17%

49. There was a mutual transfer of an employee between Marketing and Finance departments and transfer of one employee from Marketing to HR. As a result, the average age of Finance department increased by one year and that of marketing department remained the same. What is the new average age of HR department?
- (a) 30 (b) 35
(c) 40 (d) 45
(e) Cannot be determined
50. If two employees (each with a basic pay of ₹6000) are transferred from maintenance department and one person (with a basic pay of ₹8000) was transferred from marketing department to HR dept., what will be the percentage change in average basic pay of HR department?
- (a) 10.5% (b) 12.5%
(c) 15% (d) 30%
(e) 40%

ANSWER KEYS

26. (d) 27. (e) 28. (b) 29. (e) 30. (c) 31. (d) 32. (b) 33. (c) 34. (e) 35. (b)
36. (d) 37. (e) 38. (e) 39. (a) 40. (a) 41. (e) 42. (c) 43. (e) 44. (e) 45. (a)
46. (a) 47. (a), (d) 48. (c) 49. (a) 50. (b)

HINTS AND EXPLANATIONS

26 to 31

From statements (vii), (viii) and (ix), we get,

P	U	S
	Orange	
R	Q	
Yellow	Green	

Further, T is opposite to S and the colour of S is red. From (x), the colour of house P is white, hence the colour of house T is blue.

P	U	S
White	Orange	Red
R	Q	T
Yellow	Green	Blue

Now, from (v) and (x), we get

$$T > S, Q > P > R$$

From (vi), U is the shortest.

i.e., the order of houses in the descending order of their heights is T, S/Q, Q/S, P, R, U.

26. R is yellow coloured house and the house diagonally opposite R is S. And the colour of house S is Red. Hence (d).
27. The second tallest house is either S or Q. Hence (e).
28. The tallest house is T and its colour is blue. Hence (b).
29. Let the volume of data transfer in India and Singapore be x each, then

$$\text{For India: } \frac{x}{\text{Total revenue}} \times 100 = 9 \Rightarrow \text{Total revenue} = \frac{100x}{9} \approx 11.11x$$

$$\text{For Singapore: } \frac{9x}{\text{Total revenue}} \times 100 = 21 \Rightarrow \text{Total revenue} = \frac{900x}{21} \approx 42.85x$$

Hence (e).

30. Revenue from data transfer as a percentage of total revenue in 2010:

$$\text{For India} = 3 \times 9\% = 27\%$$

$$\text{For Sweden} = 2 \times 18\% = 36\%$$

Total revenue in 2010 (India) = 2 × Total revenue in 2010 (Sweden) (Assume a)

In 2010, the volume of the data transfer in each country be b.

$$\text{ARDT in Sweden in 2010} = \$6, \text{ So, } \frac{6b}{a} \times 100 = 36232 \Rightarrow b = \frac{6a}{100}$$

Let ARDT in India in 2010 be c, then

$$\frac{17}{11} \times 100 = 27 \Rightarrow \frac{c \times \frac{6a}{100}}{2a} \times 100 = 27$$

$$\Rightarrow c = \$9$$

$$\text{So, percentage increase} = \frac{9-1}{1} \times 100 = 800\%$$

Hence, (c).

31. $\frac{\text{ARDT} \times \text{volume}}{\text{Total revenue}} = \% \text{ of total revenue}$

Hence we want a pair for whom the ratio $\frac{\% \text{ of total revenue}}{\text{ARDT}}$ is same.

Option (a): Philippines = $\frac{12}{6}$; Austria = $\frac{17}{3}$, not same

Option (b): Canada = $\frac{12}{6}$; Austria = $\frac{29}{13}$, not same

Option (c): Germany = $\frac{12}{6}$; USA = $\frac{17}{11}$, not same

Option (d): UK = $\frac{29}{13}$; Spain = $\frac{17}{13}$, approximately same

Option (e): Denmark = $\frac{12}{6}$; Mexico = $\frac{17}{3}$, not same

Hence (d).

32 to 34

32. To get calls from all colleges, Bhama should score marks equal to maximum cut-off marks required for each section of all the colleges the Bhama should score,

Section A	Section B	Section C	Section D
45	45	46	45

Aggregate marks obtained = $45 + 45 + 45 + 46 = 181$. Hence, (b).

33. If aggregate marks of Charlie are 175, Charlie stands a chance to clear cut-off of college 2 and 3. So, Charlie should score,

Section A	Section B	Section C	Section D
50	50	50	25

His aggregate marks = $50 + 50 + 50 + 25 = 175$. Hence (c).

34. Aditya did not get a call from even a single college and if he has score maximum aggregate marks, he must have cleared cut-off of two sections with highest score and not cleared the remaining two. So, Score of Aditya =

Section A	Section B	Section C	Section D
50	50	41	43

Aggregate marks = $50 + 50 + 41 + 43 = 184$. Hence (e).

35 to 38

There are total 15 matches in the sports event. There are 9 matches in Stage-1 & 6 matches in Stage 2. It is given that there cannot be any draw & each team played with other 5 teams exactly once during entire event.

Stage 1

Each team played exactly 3 matches in Stage-1. We can make a table to show the matches with teams which won & lost that match. Direct information in this regard is:

1. D lost to A, but won against C & F.
2. E lost to B but won against C & F

So, the information of these 2 points can be tabulated as:

Match no.	Winner	Loser
1	A	D
2	D	C
3	D	F
4	B	E
5	E	C
6	E	F

It is given that D lost to A, E lost to B, C lost to D & E, F lost to D & E, B lost at least 1 match. So the team which won all 3 matches in Stage-1 must be A. Further it is clear that teams A, B, D & E have won at least 1 match in Stage-1, so the 2 teams which have lost all 3 matches in Stage-1 are C and F.

It is given that F did not played with top team of Stage-1 which must be A. F must not has played with C in stage-1 as both C and F lost all 3 matches & if they played with each other, there must be a winner who would have 1 win. F lost 2 matches to D & E. So, the 3rd match lost by F in Stage-1 must be with B. So, we can add 7th match in table between B and F (won by B). The 8th & 9th matches must been won by A.

We know B lost at least 1 match, so there must have been a match between A & B which was won by A (Match 8th). Now the only possibility for 9th match is that it was played between A & C which was won by A. So, table for Stage 1 can be modified as

Match no.	Winner	Loser
1	A	D
2	D	C
3	D	F
4	B	E
5	E	C
6	E	F
7	B	F
8	A	B
9	A	C

Stage 2

The leader of Stage-1 lost both matches. So, A lost both matches in stage 2. These must be played against F & E (As already played with other 3 teams in stage-1). We can show this information in table as:

Match no.	Winner	Loser
10	F	A
11	E	A

It is clear that the 2 teams which lost all 3 matches in stage -1 were C and F. One of these won both matches in Stage-2 & other lost both matches in Stage-2. The team which won both matches in Stage-2 must be F(as it is clear it won from A in stage-2). The team which lost both matches in Stage-2 is C.

So, F won against C in Stage -2 (match 12). C lost to B in Stage-2 as it is only team left for 5th match of C in the event(match 13). So, the table can be modified as

Match no.	Winner	Loser
10	F	A
11	E	A

12	F	C
13	B	C

It is given that 1 more team lost both matches in Stage-2. This must be about a team other than A & C. But, we know F won both matches in Stage-2. B and E have won 1 match in Stage-2. So, the 3rd team to lose both matches in Stage-2 must be D. It must have lost to B and E (as it has played matches with other 3 teams in Stage-1). So, the table for Stage-2 is modified as:

Match no.	Winner	Loser
10	F	A
11	E	A
12	F	C
13	B	C
14	B	D
15	E	D

So, total no. of matches won by teams A, B, C, D, E and F in the event are 3, 4, 0, 2, 4 and 2 respectively.

35. The teams which defeated the leader of Stage-1 are E and F
Hence, option (b) is the answer
36. The teams which have won matches in Stage-2 are B, E and F.
Hence, option (d) is the answer
37. The teams which won exactly 2 matches in the event are D and F
Hence, option (e) is the answer
38. The teams with the most no. of wins in the event are B and E
Hence, option (e) is the answer

39 to 42

39. Percentage growth rate of 2007(over 2006)= 31.6%
The subscription in Europe in 2008 = $1.3 \times 500 = 650$
The difference = $650 - 610 = 40$
The closest option is (a).
Hence (a).

40. Assume that there are 100 subscribers in Europe in 2003.
Following table indicates the number of subscribers in Europe:

	2003	2004	2005	2006	2007	2008	2009	2010
Men	60	63	66.15	69.5	73	76.6	80.4	$84.4 \approx 85$
Women	40	44	48.4	32.24	58.56	64.4	70.86	$77.9 \approx 78$
Total = 163								

Hence, option (a) is the answer.

41. Let us find out the annual percentage change in the gap between the subscription revenues in the US and Europe for the given period:

$$2003 - 04: \frac{340-300}{300} \equiv \frac{40}{300}$$

$$2005 - 06: \frac{270-320}{320} \equiv \frac{50}{320}$$

$$2006 - 07: \frac{210-270}{270} \equiv \frac{60}{270}$$

$$2008 - 09: \frac{110-180}{180} \equiv \frac{70}{180}, \text{ the highest}$$

$$2009 - 10: \frac{100-110}{190} \equiv \frac{10}{110}$$

Hence, option (d) is the answer.

42. Change is growth rate of European Subscribers in 2007 over 2006 = $(500 - 380)/380 = 6/19$

Change is growth rate of European Subscribers in 2005 over 2004 = $(270 - 180)/180 = \frac{1}{2}$

Hence percentage change in growth rate in

$$2007 \text{ over the growth rate in } 2005 = \frac{\frac{1}{2} - \frac{6}{19}}{\frac{1}{2}} \times 100 = 36.84\%$$

Hence, option (c) is the answer.

43 to 47

43. Chetan's return is always more than or equal to that of Bikram. So, the trader with the maximum return would be either Abdul or Chetan.

If it is a continuously rising market, then Abdul would end up having the highest gain as seen in the example above.

At the same time, there might be a scenario when the share price of XYZ would go down after 10 am and rise in the end at 3 pm to a higher value.

In such a case, if Chetan gets the shares at lower prices than what the price was at 10 am, he

would end up making more profit and hence higher return.

Following in an indicative table:

Time of the Day	Share Price (in ₹)
10 am (open)	100
11 am	110
12 noon	140
1 pm	150
2 pm	180
3 pm (close)	200

44. From the explanation seen till now, we can rule out options (a), (c) and (d).

Now, option (b) is only partially correct. We have seen that Chetan's return would be higher than or equal to that of Bikram. It would be equal to Bikram's return in the scenario when the share price remains at a constant value throughout the day. Option (b) is not always true.

Hence, option (e) is the answer.

45. Let us try to understand the way the investments of the three traders behave.

Abdul buys shares at 10 am daily and sells them at a particular price at 3 pm. So his return is determined by the difference in the share price at these two times.

Bikram and Chetan buy shares at equal intervals. But since Chetan buys them in equal amount he would end up buying more when the price is less and less when the price is more.

Whether the prices are continuously rising or continuously falling down or in a fluctuating market, Chetan always has a higher proportion of lower priced shares as compared to Bikram. This

increases his profit in a rising market and reduces his loss in a falling market. Hence, Chetan never has lower return than that of Bikram.

Hence, option (a) is the answer.

46. Using the solutions from the previous questions, we can see that price at 10 am is the highest. Hence, option (a) is the answer.
47. Owing to the ambiguity, IIM has dropped this question from consideration as options (a) and (d) both are correct.

48 to 50

48. Gross pay of HR department = $5000 \times 1.7 \times 5 = 42500$

Average gross pay = 8500

Gross pay of a new person in HR department = $8000 \times 1.9 = 15200$

Total new gross pay of HR = 57700

New average ≈ 9617

Percentage change = $\frac{9617 - 8500}{8500} \times 100 \approx 13\%$

Hence, option (c) is the answer.

49. Let the age of the employee being transferred from the
- Marketing department to the Finance department be x .
 - Finance department to the Marketing department be y .
 - Marketing department to the HR department be z .

Now, the sum of the ages of all employees in Finance originally was $30 \times 20 = 600$. Later, an employee of x years of age joined the department and one of y years of age left it.

So, the new average age of the finance dept. = $(600 + x - y)/20 = 31$ (Given in question)

Solving it, we get

$$x - y = 20 \quad (i)$$

Sum of ages of all employees in Marketing originally was $35 \times 30 = 1050$. Later on, two employees of age x years and z years left the department and one of y years of age joined it.

Total number of employees now = $30 - 2 + 1 = 29$

And new average age of marketing = $(1050 - x + y - z)/29 = 35$ (Given in question)

Solving it, we get,

$$x - y + z = 35 \quad (ii)$$

Using (i) and (ii), we get

$$z = 15$$

Sum of ages of all the HR employees initially = $45 \times 5 = 225$

New average age of HR dept. = $(225 + z)/6 = (225 + 15)/6 = 40$ years

Hence, option (c) is the answer.

50. Current average basic pay of HR department = 5000
New average basic of HR department

$$= \frac{5000 \times 5 + 2 \times 6000 + 8000}{8} = \frac{45000}{8} = 5625$$

So, Percentage change = $\frac{625}{5000} \times 100 = 12.5\%$

Hence, option (b) is the answer.

CAT 2007

INSTRUCTIONS

- ☐ All questions carry four marks each.
 - ☐ Each wrong answer will attract a penalty of one marks.
 - ☐ Do your rough work on Test Booklet and not on the Answer Sheet.
-

SECTION II: THIS SECTION CONTAINS 25 QUESTIONS

Directions for questions 26 to 29: *Answer the following questions based on the information given below:*

The table below shows the comparative cost, in US dollars, of major surgeries in USA and a select few Asian countries.

Comparative Costs in USA and Some Asian Countries (in US Dollars)

Procedure	USA	India	Thailand	Singapore	Malaysia
Heart Bypass	130000	10000	11000	18500	9000
Heart Valve Replacement	160000	9000	10000	12500	9000
Angioplasty	57000	11000	13000	13000	11000
Hip Replacement	43000	9000	12000	12000	10000
Hysterectomy	20000	3000	4500	6000	3000
Knee Replacement	40000	8500	1000	13000	8000
Spinal Fusion	62000	5500	7000	9000	6000

The equivalent of one US Dollar in the local currencies is given below:

1 US Dollar Equivalent

India	40.928	Rupees
Malaysia	3.51	Ringits
Thailand	32.89	Bahts
Singapore	1.53	S Dollars

A consulting firm found that the quality of the health services were not the same in all the countries above. A poor quality a surgery may have significant repercussions in future, resulting in more cost in correcting mistakes. The cost of poor quality of surgery is given in the table below:

Comparative Cost of Poor Quality in USA and Some Asian Countries (in US Dollars '000)

Procedure	USA	India	Thailand	Singapore	Malaysia
Heart Bypass	0	3	3	2	4
Heart Valve Replacement	0	5	4	5	5
Angioplasty	0	5	5	4	6
Hip Replacement	0	7	5	5	8
Hysterectomy	0	5	6	5	4
Knee Replacement	0	9	6	4	4
Spinal Fusion	0	5	6	5	6

26. Approximately, what difference in amount in Bahts will it make to a Thai citizen if she were to get a hysterectomy done in India instead of in her native country, taking into account the cost of poor quality? It costs 7500 Bahts for one-way travel between Thailand and India.
 (a) 23500 (b) 40500
 (c) 57500 (d) 67500
 (e) 75000
27. Taking the cost of poor quality into account, which country/countries will be the most expensive for knee replacement?
 (a) India (b) Thailand
 (c) Malaysia (d) Singapore
 (e) India and Singapore
28. A US citizen is hurt in an accident and requires an angioplasty, hip replacement and a knee replacement.

Cost of foreign travel and stay is not a consideration since the government will take care of it. Which country will result in the cheapest package, taking cost of poor quality into account?

- (a) India (b) Thailand
 (c) Malaysia (d) Singapore
 (e) USA
29. The rupee value increases to ₹35 for a US Dollar, and all other things including quality, remain the same. What is the approximate difference in cost, in US Dollars, between Singapore and India for a Spinal Fusion, taking this change into account?
 (a) 700 (b) 2500
 (c) 4500 (d) 8000
 (e) No difference

Directions for questions 30 to 34: *Answer the following questions based on the information given below:*

A low-cost airline company connects ten India cities, A to J. The table below gives the distance between a pair of airports and the corresponding price charged by the company. Travel is permitted only from a departure airport to an arrival airport. The customers do not travel by a route where they have to stop at more than two intermediate airports.

Sector No.	Airport of Departure	Airport of Arrival	Distance Between the	Price (₹)
1	A	B	556	670
2	A	C	790	1350
3	A	D	850	1250
4	A	E	1245	1600
5	A	F	1345	1700
6	A	G	1350	2450
7	A	H	1950	1850
8	B	C	1650	2000
9	B	H	1750	1900
10	B	I	2100	2450
11	B	J	2300	2275
12	C	D	460	2275
13	C	F	410	430
14	C	G	910	1100
15	D	E	540	590
16	D	F	625	700
17	D	G	640	750
18	D	H	950	1250
19	D	J	1650	2450
20	E	F	1250	1700
21	E	G	970	1150
22	E	H	850	875
23	F	G	900	1050
24	F	I	875	950
25	F	J	970	1150
26	G	I	510	550

(Continued)

Sector No.	Airport of Departure	Airport of Arrival Airports (km)	Distance Between the	Price (₹)
27	G	J	830	890
28	H	I	790	970
29	H	J	400	425
30	I	J	460	540

30. What is the lowest price, in rupees, a passenger has to pay for travelling by the shortest route from A to J?
 (a) 2275 (b) 2850
 (c) 2890 (d) 2930
 (e) 3840
31. The company plans to introduce a direct flight between A and J. The market research results indicate that all its existing passengers travelling between A and J will use this direct flight if it is priced 5% below the minimum price that they pay at present. What should the company charge approximately in rupees, for this direct flight?
 (a) 1991 (b) 2161
 (c) 2707 (d) 2745
 (e) 2783
32. If the airports C, D and H are closed down owing to security reasons, what would be minimum price, in rupees, to be paid by a passenger travelling from A to J?
- (a) 2275 (b) 2615
 (c) 2850 (d) 2945
 (e) 3190
33. If the prices include a margin of 10% over the total cost that the company incurs, what is the minimum cost per kilometer that the company incurs in flying from A to J?
 (a) 0.77 (b) 0.88
 (c) 0.99 (d) 1.06
 (e) 1.08
34. If the prices include a margin of 15% over the total cost that the company incurs, which among the following is the distance to be covered in flying from A to J that minimizes the total cost per kilometer for the company?
 (a) 2170 (b) 2180
 (c) 2315 (d) 2350
 (e) 2390

Directions for questions 35 to 38: Answer the following questions based on the information given below:

A health-drink company's R&D department is trying to make various diet formulation, which can be used for certain specific purposes. It is considering choice of 5 alternative ingredients (O, P, Q, R and S), which can be used in different proportion in the formulation. The table below gives the composition of these ingredients. The cost per unit of each of these ingredients is O: 150, P: 50, Q: 200, R: 500, S: 100.

Ingredient	Carbohydrate %	Composition Protein %	Fat %	Minerals %
O	50	30	10	10
P	80	20	0	0
Q	10	30	50	10
R	5	50	40	5
S	45	50	0	5

35. In what proportion P, Q and S should be mixed to make a diet having at least 60% carbohydrate at the lowest per unit cost?
 (a) 2 : 1 : 3 (b) 4 : 1 : 2
 (c) 2 : 1 : 4 (d) 3 : 1 : 2
 (e) 4 : 1 : 1
36. The company is planning to launch a balanced diet required for growth needs of adolescent children. This diet must contain at least 30% each of carbohydrate and proteins, no more than 25% fat and at least 5% minerals. Which one of the following combinations of equally mixed ingredients is feasible?
 (a) O and P (b) R and S
 (c) P and S (d) Q and R
 (e) O and S
37. For a recuperating patient, the doctor recommended a diet containing 10% minerals and at least 30% proteins. In how many different way can we prepare this diet by mixing at least two ingredients?
 (a) One (b) Two
 (c) Three (d) Four
 (e) None of these
38. Which among the following is the formulation having the lowest cost per unit for a diet having 10% fat and at least 30% proteins? The diet has to be formed by mixing two ingredients.
 (a) P and Q (b) P and S
 (c) P and R (d) Q and S
 (e) R and S

Directions for questions 39 to 42: Each question is followed by two statements, A and B. Answer each question using the following instruction;

Mark (a): if the question can be answered by using the statement A alone but not by using the statement B alone.

Mark (b): if the question can be answered by using the statement B alone but not by using the statement A alone

Mark (c): if the question can be answered by using either of the statement alone.

Mark (d): if the question can be answered by using both the statements together but not by either of the statement alone.

Mark (e): if the question cannot be answered on the basis of the two statement.

39. Thirty per cent of the employees of a call centre are males. Ten per cent of the female employees have an engineering background. What is the percentage of male employees with engineering background?
 A: Twenty five per cent of the employees have engineering background.
 B: Number of male employees having an engineering background is 20% more than the number of female employees having an engineering background.
40. In a football match, at the half-time, Mahindra and Mahindra Club was trailing by three goals. Did it win the match?
 A: In the second-half Mahindra and Mahindra Club scored four goals.
 B: The opponent scored four goal in the match.
41. In a particular school, sixty students were athletes. Ten among them were also among the top academic performers. How many top academic performers were in the school?
 A: Sixty per cent of the top academic performers were not athletes.
 B: All the top academic performers were not necessarily athletes.
42. Five student Atul, Bal, Chetan, Dev and Ernesto were the only ones who participated in a quiz contest. They were ranked based on their scored in the contest. Dev got a higher rank as compared to Ernesto, while Bala got a higher rank as compared to Chetan. Chetan's rank was lower than the median. Who among the five got the highest rank?
 A: Atul was the last rank holder.
 B: Bala was not among the top two rank holders.

Directions for questions 43 to 46: Answer the following question based on the information given below:

The following table shows the break-up of actual costs incurred by a company in last five years (year 2002 to year 2006) to produce a particular product.

	Year 2002	Year 2003	Year 2004	Year 2005	Year 2006
Volume of production and sale (units)	1000	900	1100	1200	1200
Cost (₹)					
Material	50,000	45,100	55,200	59,900	60,000

(Continued)

Labour	20,000	18,000	22,100	24,150	24,000
Consumables	2,000	2,200	1,800	1,600	1,400
Rent of building	1,000	1,000	1,100	1,100	1,200
Rates and taxes	400	400	400	400	400
Repair and maintenance expenses	800	820	780	790	800
Operating cost of machines	30,000	27,000	33,500	36,020	36,000
Selling and marketing expenses	5,750	5,800	5,800	5,750	5,800

The production capacity of the company is 2000 units. The selling price for the year 2006 was ₹125 per unit. Some costs change almost indirect proportion to the change in volume of production, while others do not follow any obvious pattern of change with respects to the volume of production and hence are considered fixed. Using the information provided for the year 2006 as the basis for projecting the figures for the year 2007, answer the following questions:

43. What is the approximate cost per unit in rupees, if the company produces and sells 1400 units in the year 2007?
 (a) 104 (b) 107
 (c) 110 (d) 115
 (e) 116
44. What is the minimum number of units that the company needs to produce and sell to avoid any loss?
 (a) 313 (b) 350
 (c) 384 (d) 747
 (e) 928
45. If the company reduce the price by 5%, it can produce and sell as many units as it desires. How many units the company should produce to maximize its profit?
 (a) 1400 (b) 1600
 (c) 1800 (d) 1900
 (e) 2000
46. Given that the company cannot sell more than 1700 units, and it will have to reduce the price by ₹5 for all units, if it wants to sell more than 1400 units, what is the maximum profit, in rupees, that the company can earn?
 (a) 25,400 (b) 24,400
 (c) 31,400 (d) 32,900
 (e) 32,000

Directions for questions 47 to 50: Answer the following questions based on the information given below:

The proportion of male students and the proportion of vegetarian student in a school are given below. The

school has a total of 800 students, 80% of whom are in the Secondary Section and rest equally divided between Class 11 and 12.

	Male (M)	Vegetarian (V)
Class 12	0.60	
Class 11	0.55	0.50
Secondary Section		0.55
Total	0.475	0.53

47. What is the percentage of male students in the secondary section?
 (a) 40 (b) 45
 (c) 50 (d) 55
 (e) 60
48. In the Secondary Section, 50% of the students are vegetarian males. Which of the following statement is correct?
 (a) Except vegetarian males, all other groups have same numbers of students
 (b) Except non-vegetarian males, all other groups have same number of students
 (c) Except vegetarian females, all other groups have same number of students
 (d) Except non-vegetarian females, all other group have same number of students
 (e) All of the above groups have the same number of students
49. What is the percentage of vegetarian students in Class 12?
 (a) 40 (b) 45
 (c) 50 (d) 55
 (e) 60
50. In Class 12, twenty five per cent of the vegetarians are male. What is the difference between the number of female vegetarians and male non-vegetarian?
 (a) less than 8 (b) 10
 (c) 12 (d) 14
 (e) 16

ANSWER KEYS

26. (d)	27. (a)	28. (c)	29. (b)	30. (d)	31. (b)	32. (c)	33. (b)	34. (d)	35. (e)
36. (e)	37. (a)	38. (d)	39. (c)	40. (e)	41. (a)	42. (d)	43. (b)	44. (c)	45. (e)
46. (a)	47. (b)	48. (c)	49. (a)	50. (e)					

HINTS AND EXPLANATIONS

26. Cost of treatment in Thailand = \$ 4500 + \$ 6000
= \$ 10500
= 10500 × 32.89 = 34534.5 Bahts.
Cost of treatment in India = \$ 3000 + \$ 5000
= \$ 8000
= 8000 × 32.89 = 263120 Bahts
Cost including travel expenses = 263120 + (2 × 7500) = 278120 Bahts.
Difference = 345345 – 278120 = 67225
Hence, option (d) is the answer.
27. Cost calculation for different countries:
India 8500 + 9000 = 17500
Thailand 10000 + 6000 = 16000
Malaysia 8000 + 4000 = 12000
Singapore 13000 + 4000 = 17000
So, most expensive is India.
Hence, option (a) is the answer.
28. For India, the cost is 49500
For Thailand, the cost is 51000
For Malaysia, the cost is 47000
For Singapore, the cost is 51000
Hence, least expensive is Malaysia. Hence, option (c) is the answer.
29. New cost for spinal fusion in India = 5500 × 40.928/35 = \$6431.54
Cost for spinal fusion in Singapore = 9000 (dollars)
The required difference = 2568.45 which is nearly equal to 2500.
Hence, option (b) is the answer.
30. Possible routes from A to J to get shortest distance:

	Distance (kms)	Cost (₹)
ABJ	2860	2945
ADJ	2500	3700

AFJ	2300	2850
AGJ	2180	3340
AHJ	2350	2275
ACFJ	2170	2930

There may be other possible routes like ABIJ, AFIJ, AGIJ and AHIJ, but these are costlier options.

Hence shortest route is ACFJ, and its cost = ₹2930.
Hence, option (d) is the answer.

31. Using previous question, lowest cost = ₹2275 for AHJ.

Price of flight = 95% of 2275 = approx ₹2161.
Hence, option (b) is the answer.

32. Simple observation:

If ADJ and AHJ are closed, then lowest cost will be ₹2850 for AFJ.

Hence, option (c) is the answer.

33. Number of routes from A to J are ABJ, AOJ, AFJ, AGJ and AHJ and minimum price per km is for route AHJ.

Distance = 1950 + 400 = 2350 km.

Price = ₹2275

Margin = 10% over the total cost

Hence, cost/km = 2275/(1.1 × 2350) = 0.88

Hence, option (b) is the answer.

34. Using the options, following table can be prepared:

Routes	Distance (Km)	Price (₹)	Cost	Cost per Km
AFJ	2315	2850	2478.2	1.07
AGJ	2180	3340	2904.3	1.33
AHJ	2350	2275	1978.2	0.84
ACFJ	2170	2390	2078	0.95

Fifth option can be eliminated. Since the distance is not possible for any route.

From the above table answer is 2350 km.

Hence, option (d) is the answer.

35. P, Q and S contain 80%, 10% and 45% carbohydrates respectively.

To achieve 60% carbohydrates, proportion of P should be maximum. Hence, options (a) and (c) are eliminated.

Option (b):

Carbohydrates content

$$= (320 + 10 + 90)/700 = 420/700$$

$$= 60\%$$

Cost per unit

$$= (200 + 200 + 200)/700 = 6/7 = 0.857$$

Option (d):

Carbohydrate content

$$= (240 + 10 + 90)/600 < 60\%$$

Option (e):

Carbohydrate content

$$= (320 + 10 + 45)/600$$

$$= 62.5\%$$

Cost per unit

$$= (200 + 200 + 100)/600 = 5/6 = 0.833$$

P, Q and S in the proportion 4 : 1 : 1 has the lowest cost per unit.

Hence, the correct option is (e).

36. A mixture of O and S in equal proportion satisfies the given constraints as can be seen from the table.

Hence, the correct option is (e).

	Carbohydrate	Protein	Fat	Minerals
O and P	65	25	5	5
R and S	25	50	20	5
P and S	62.5	35	0	2.5
Q and R	7.5	40	45	7.5
O and S	47.5	40	5	7.5

37. The diet should contain 10% minerals. P contains no minerals.

$\therefore$ P cannot be a part of any mixture.

R and S both contain 5% minerals.

$\therefore$ Mix of R and S in any proportion cannot give 10% minerals.

Consider O and R in the proportion $x : y$

$$\therefore 10x + 5y = 10(x + y)$$

$$\therefore 5y = 10y, \text{ which is not possible.}$$

Similarly, Q and S, O and S, and Q and R are not possible.

Similarly, a mix of three ingredients is not possible.

$\therefore$ The only possible mix is that of O and Q in equal proportion.

Hence, the correct option is (a).

38. Consider the options.

Option (a):

P and Q have to be mixed in the proportion 4:1 to achieve 10% fat content. But this does not give 30% protein.

Option (b):

P and S do not contain fat.

Option (c):

P and R should be mixed in the proportion 3:1 to achieve 10% fat content. But 30% protein content is not achieved.

Option (d):

Q and S should be mixed in the proportion 1:4 to achieve 10% fat content and 46% protein content. The cost of this mix per unit would be 6/5.

Option (e):

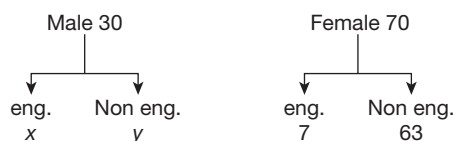
R and S should be mixed in the proportion 1:3 to achieve 10% fat content and 50% protein content. The cost per unit of this mix would be 2.

Therefore, lowest cost is for Q and S.

Hence, the correct option is (d).

39. Assume total number of employees = 100

So, males = 30 and females = 70



Using statement (A) alone:

Total engineering background = 25

$$x + 7 = 25$$

$$x = 18. \text{ Hence, A alone is sufficient.}$$

Using statement (B) alone:

$$x = (6/5) \times 7 = 42/5 = 8.4\%$$

Hence, question can be answered by using either statement alone.

Hence, option (c) is the answer.

40. M & M Opponent
 $a - 3$ a First half
 Using statement (A) alone:
 M & M Opponent
 $a - 3 + 4$ Ind half
 $a + 1$?
 Using statement (B) alone:
 M & M Opponent
 Total = ? Total = 4
 Combining both the statement together, we get
 Opponent scored a max of 4 goals
- | | | |
|-------------------|-------|----------|
| | M & M | Opponent |
| Initial condition | 0 | 3 |
| or | 1 | 4 |
| After second half | 4 | 4 |
| Or, | 5 | 4 |
- Hence, there are 2 conditions possible: In 1st one, M & M ties the match and in second it wins.
 Questions cannot be answered.
 Hence, option (e) is the answer.
41. Using statement A alone
 60% of the top academic performers were not athletes $\rightarrow$ 40% of them were athletes
 From the question 10 top performers were athlete.
 So 40% of top performers = 10.
 Total number of top performers = 25.
 Statement A is sufficient while statement B is not sufficient.
 Hence, option (a) is the answer.
42. Given conditions are:
 D
 $\uparrow$
 E
 And
 B
 $\uparrow$
 X
- If we assign ranks as 1, 2, 3, 4, 5 median = 3. Then C's rank can be 4 or 5.
 Using Statement A alone:
 Statement (A) : Rank of A = 5, So, rank of C = 4
 Following position can be obtained:
- | Rank | 1 | 2 | 3 | 4 | 5 |
|--------|---|---|---|---|---|
| Case 1 | D | E | B | C | A |
| Case 2 | B | D | E | C | A |

Hence unique answer is NOT obtained. So, statement (A) alone is not sufficient.

Using Statement B alone is not sufficient.

Using both the statements together, we get the following rank:

Rank	1	2	3	4	5
Case 1	D	E	B	C	A

Hence option (d) is the answer.

43. Observing the values through the years, we can say that Material, Labour and Operating costs directly vary with the change in volume of production.

The other costs are almost constant.

If the production is x units, the variable cost for material, labour and operation is $50x$, $20x$ and $30x$ respectively.

$\therefore$ Total variable cost = $100x$.

Total fixed cost (using information for 2006)

$$= 1400 + 1200 + 400 + 800 + 5800$$

$$= 9600$$

$\therefore$ Total cost of producing x units = $100x + 9600$

Now, $x = 1400$

Cost per unit = $(1400 \times 100 + 9600)/1400$

$$= 106.85$$

Hence, the correct option is (b).

44. From the explanation given in the previous question, to avoid any loss, $100x + 9600 \leq 125x$

$$\therefore x \geq 384$$

Hence, the correct option is (c).

45. The new reduced price

$$= 0.95 \times 125$$

$$= 118.75$$

Profit

$$= 118.75x - 100x - 9600$$

$$= 18.75x - 9600$$

Profit will be maximum when $18.75x$ is maximum.

As the maximum production capacity is 2000 units, profit is maximum when 2000 units are produced.

Hence, the correct option is (e).

46. Profit for 1400 units

$$= 1400 \times 125 - (1400 \times 100 + 9600)$$

$$= 25400$$

Profit for $(1400 + m)$ units

$$(1400 + m) \times 120 - ((1400 + m) \times 100 + 9600)$$

$$18400 + 20m$$

Maximum value of $m = 300$

Maximum profit for 1400 + 300 units = 24400

∴ Maximum profit that the company can earn is 25400.

Hence, the correct option is (a).

47. From the table given in the question,

Total students = 800

Students in Secondary = 0.8×800
= 640

Students in Class 11 = $(800 - 640)/2$
= 80

∴ Students in Class 12 = 80

Males in class 11 = 0.55×80
= 44

Males in Class 12 = 0.6×80
= 48

Males in Secondary = $0.475 \times 800 - 44 - 48$
= 288

Vegetarians in Class 11 = 0.5×80
= 40

Vegetarians in Secondary = $0.55 \times 640 = 352$

Vegetarians in Class 12 = $800 \times 0.53 - 40 - 352 = 32$

Now, the percentage of male students in secondary section.

= $288 \times 100/640$
= 45%

Hence, the correct option is (b).

48. (This question was not considered for evaluation as there was an error in the question)

“50% of the students are vegetarian males” contradicts the data given initially. Interpreting it as “50% of the males are vegetarian” we have the following;

In secondary,

Vegetarian males = 144

Non-vegetarian males = 144

Vegetarian females = $352 - 144 = 208$

Non-vegetarian females = $352 - 208 = 144$

∴ Except vegetarian females, all other groups have same number of students.

Hence, the correct option is (c).

49. In solution for Q47, we derived the number of vegetarians in Class 12 as 32 and the total number of students in the class as 80.

∴ The percentage vegetarians in Class 12
= $32 \times 100/80 = 40\%$

Hence, the correct option is (a).

50. Vegetarian Males in Class 12

= 0.25×48
= 12

∴ Non-Vegetarian Males in Class 12 = 36

∴ Vegetarians females in Class 12

= Vegetarians in Class 12 – Male vegetarians in Class 12

= $32 - 12 = 20$

(We derived the number of vegetarians in the class in the previous question)

∴ Required difference = $36 - 20 = 16$

Hence, the correct option is (e).

CAT 2006

INSTRUCTIONS

- ☐ All questions carry four marks each.
 - ☐ Each wrong answer will attract a penalty of one marks.
 - ☐ Do your rough work on Test Booklet and not on the Answer Sheet.
-

SECTION I: DATA INTERPRETATION/DATA SUFFICIENCY/LOGICAL REASONING

Directions for questions 1 to 5: *Answer questions 1 to 5 on the basis of the information given below.*

K, L, M, N, P, Q, R, S, U and W are the only ten members in a department. There is a proposal to form a team from within the members of the department, subject to the following conditions:

- A team must include exactly one among P, R, and S.
- A team must include either M or Q, but not both.
- If a team includes K, then it must also include L, and vice-versa
- If a team includes one among S, U, and W, then it must also include the other two.
- L and N cannot be members of the same team.
- L and U cannot be members of the same team.
- The size of a team is defined as the number of members in the team.

1. Who cannot be a member of a team of size 3?
(a) L (b) M
(c) N (d) P
(e) Q

2. Who can be a member of a team of size 5?
(a) K (b) L
(c) M (d) P
(e) R
3. What would be the size of the largest possible team?
(a) 8 (b) 7
(c) 6 (d) 5
(e) Cannot be determined
4. What could be the size of a team that includes K?
(a) 2 or 3 (b) 2 or 4
(c) 3 or 4 (d) Only 2
(e) Only 4
5. In how many ways a team can be constituted so that the team includes N?
(a) 2 (b) 3
(c) 4 (d) 5
(e) 6

Directions for questions 6 to 10: *Answer questions 6 to 10 on the basis of the information given below.*

In a Class X Board examination, ten papers are distributed over five groups—PCB, Mathematics, Social Science, Vernacular and English. Each of the ten papers is evaluated out of 100. The final score of a student is

calculated in the following manner. First, the Group Scores are obtained by averaging marks in the papers within the Group. The final score is the simple average of the Group Scores. The data for the top ten students are presented below. (Dipan's score in English Paper II has been intentionally removed in the table.)

Name of the Student	PCB Group			Mathematics	Social Science Group		Vernacular Group		English Group		Final Score
	Phy	Chem	Bio		Hist	Geo	Paper I	Paper II	Paper I	Paper II	
Ayesha (G)	98	96	97	98	95	93	94	96	96	98	96.2
Ram (B)	97	99	95	97	95	95	96	94	96	98	96.1
Dipan (B)	98	98	98	95	96	95	96	94	96	??	96.0
Sagnik(B)	97	98	99	96	96	98	94	97	92	94	95.9
Sanjiv (B)	95	96	97	98	97	96	92	93	95	96	95.7
Shreya (G)	96	89	85	100	97	98	94	95	96	95	95.5
Joseph (B)	90	94	98	100	94	97	90	92	94	95	95
Agni (B)	96	99	96	99	95	96	82	93	92	93	94.3
Pritam (B)	98	98	95	98	83	95	90	93	94	94	93.9
Tima (G)	96	98	97	99	85	94	92	91	87	96	93.7

Note: B or G against the name of a student respectively indicates whether the student is a boy or a girl.

- How much did Dipan get in English Paper II?
(a) 94 (b) 96.5
(c) 97 (d) 98
(e) 99
- Among the top ten students, how many boys scored at least 95 in at least one paper from each of the groups?
(a) 1 (b) 2
(c) 3 (d) 4
(e) 5
- Had Joseph, Agni, Pritam and Tirna each obtained Group Score of 100 in the Social Science Group, then their standing in decreasing order of final score would be
(a) Pritam, Joseph, Tirna, Agni
(b) Joseph, Tirna, Agni, Pritam
(c) Pritam, Agni, Tirna, Joseph
(d) Joseph, Tirna, Pritam, Agni
(e) Pritam, Tirna, Agni, Joseph
- Students who obtained Group Scores of at least 95 in every group are eligible to apply for a prize. Among those who are eligible, the student obtaining

the highest Group Score in Social Science Group is awarded this prize. The prize was awarded to

- Shreya
 - Ram
 - Ayesha
 - Dipan
 - No one from the top ten
- Each of the ten students was allowed to improve his/her score in exactly one paper of choice with the objective of maximizing his/her final score. Everyone scored 100 in the paper in which he or she chose to improve. After that, the topper among the ten students was
(a) Ram (b) Agni
(c) Pritam (d) Ayesha
(e) Dipan

Directions for questions 11 to 15: Answer questions 11 to 15 on the basis of the information given below.

Mathematicians are assigned a number called Erdős number (named after the famous mathematician, Paul Erdős). Only Paul Erdős himself has an Erdős number of zero. Any mathematician who has written a research

paper with Erdős has an Erdős number of 1. For other mathematicians, the calculation of his/her Erdős number is illustrated below:

Suppose that a mathematician X has co-authored papers with several other mathematicians. From among them, mathematician Y has the smallest Erdős number. Let the Erdős number of Y be y . Then X has an Erdős number of $y + 1$. Hence any mathematician with no co-authorship chain connected to Erdős has an Erdős number of infinity.

In a seven day long mini-conference organized in memory of Paul Erdős, a close group of eight mathematicians, call them A, B, C, D, E, F, G and H, discussed some research problems. At the beginning of the conference, A was the only participant who had an infinite Erdős number. Nobody had an Erdős number less than that of F.

- On the third day of the conference F co-authored a paper jointly with A and (c) This reduced the average Erdős number of the group of eight mathematicians to 3. The Erdős numbers of B, D, E, Go through the options. and H remained unchanged with the writing of this paper. Further, no other co-authorship among any three members would have reduced the average Erdős number of the group of eight to as low as 3.
 - At the end of the third day, five members of this group had identical Erdős numbers while the other three had Erdős numbers distinct from each other.
 - On the fifth day, E co-authored a paper with F which reduced the group's average Erdős number by 0.5. The Erdős numbers of the remaining six were unchanged with the writing of this paper.
 - No other paper was written during the conference.
11. How many participants in the conference did not change their Erdős number during the conference?
 - (a) 2 (b) 3
 - (c) 4 (d) 5
 - (e) Cannot be determined
 12. The person having the largest Erdős number at the end of the conference must have had Erdős number (at that time)
 - (a) 5 (b) 7
 - (c) 9 (d) 14
 - (e) 15
 13. How many participants had the same Erdős number at the beginning of the conference?
 - (a) 2 (b) 3
 - (c) 4 (d) 5
 - (e) Cannot be determined

14. The Erdős number of C at the end of the conference was
 - (a) 1 (b) 2
 - (c) 3 (d) 4
 - (e) 5
15. The Erdős number of E at the beginning of the conference was
 - (a) 2 (b) 5
 - (c) 6 (d) 7
 - (e) 8

Directions for questions 16 to 20: Answer questions 16 to 20 on the basis of the information given below.

Two traders, Chetan and Michael, were involved in the buying and selling of MCS shares over five trading days. At the beginning of the first day, the MCS share was priced at ₹100, while at the end of the fifth day it was priced at ₹110. At the end of each day, the MCS share price either went up by ₹10, or else, it came down by ₹10. Both Chetan and Michael took buying and selling decisions at the end of each trading day.

The beginning price of MCS share on a given day was the same as the ending price of the previous day.

Chetan and Michael started with the same number of shares and amount of cash, and had enough of both.

Below are some additional facts about how Chetan and Michael traded over the five trading days.

- Each day if the price went up, Chetan sold 10 shares of MCS at the closing price. On the other hand, each day if the price went down, he bought 10 shares at the closing price.
 - If on any day, the closing price was above ₹110, then Michael sold 10 shares of MCS, while if it was below ₹90, he bought 10 shares, all at the closing price.
16. If Chetan sold 10 shares of MCS on three consecutive days, while Michael sold 10 shares only once during the five days, what was the price of MCS at the end of day 3?
 - (a) ₹90 (b) ₹100
 - (c) ₹110 (d) ₹120
 - (e) ₹130
 17. If Chetan ended up with ₹1300 more cash than Michael at the end of day 5, what was the price of MCS share at the end of day 4?
 - (a) ₹90 (b) ₹100
 - (c) ₹110 (d) ₹120
 - (e) Not uniquely determinable
 18. If Michael ended up with 20 more shares than Chetan at the end of day 5, what was the price of the share at the end of day 3?

- (a) ₹90 (b) ₹100 (c) Chetan had 10 more shares than Michael
 (c) ₹110 (d) ₹120 (d) Chetan had 20 more shares than Michael
 (e) ₹130 (e) Both had the same number of shares

19. If Michael ended up with ₹100 less cash than Chetan at the end of day 5, what was the difference in the number of shares possessed by Michael and Chetan (at the end of day 5)?

(a) Michael had 10 less shares than Chetan.
 (b) Michael had 10 more shares than Chetan

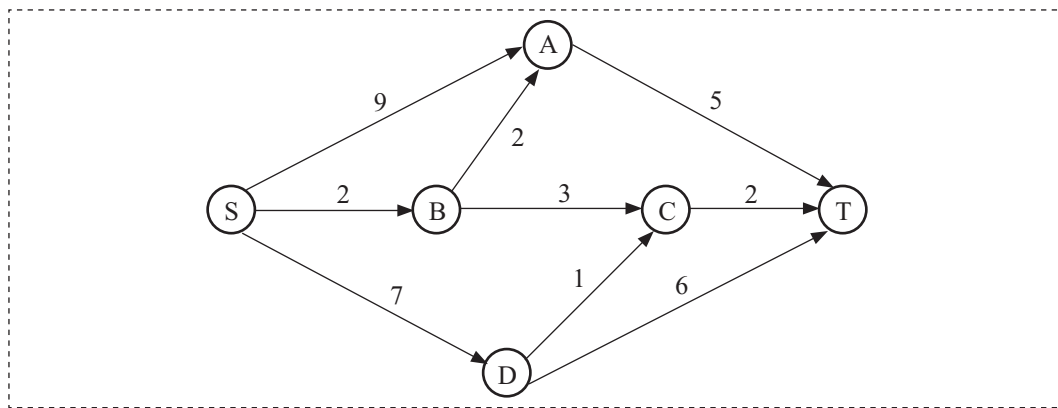
20. What could have been the maximum possible increase in combined cash balance of Chetan and Michael at the end of the fifth day?

(a) ₹3700 (b) ₹4000
 (c) ₹4700 (d) ₹5000
 (e) ₹6000

Directions for questions 21 to 25: *Answer questions 21 to 25 on the basis of the information given below.*

A significant amount of traffic flows from point S to point T in the one-way street network shown below.

Points A, B, C, and D are junctions in the network, and the arrows mark the direction of traffic flow. The fuel cost in rupees for travelling along a street is indicated by the number adjacent to the arrow representing the street.



Motorists travelling from point S to point T would obviously take the route for which the total cost of traveling is the minimum. If two or more routes have the same least travel cost, then motorists are indifferent between them. Hence, the traffic gets evenly distributed among all the least cost routes.

The government can control the flow of traffic only by levying appropriate toll at each junction. For example, if a motorist takes the route S-A-T (using junction A alone), then the total cost of travel would be ₹14 (i.e., ₹9 + ₹5) plus the toll charged at junction (a)

21. If the government wants to ensure that no traffic flows on the street from D to T, while equal amount of traffic flows through junctions A and C, then a feasible set of toll charged (in rupees) at junctions A, B, C, and D respectively to achieve this goal is
- (a) 1, 5, 3, 3 (b) 1, 4, 4, 3
(c) 1, 5, 4, 2 (d) 0, 5, 2, 3
(e) 0, 5, 2, 2
22. If the government wants to ensure that all motorists travelling from S to T pay the same amount (fuel costs and toll combined) regardless of the route they

choose and the street from B to C is under repairs (and hence unusable), then a feasible set of toll charged (in rupees) at junctions A, B, C, and D respectively to achieve this goal is

- (a) 2, 5, 3, 2 (b) 0, 5, 3, 1
(c) 1, 5, 3, 2 (d) 2, 3, 5, 1
(e) 1, 3, 5, 1
- 23.** If the government wants to ensure that the traffic at S gets evenly distributed along streets from S to A, from S to B, and from S to D, then a feasible set of toll charged (in rupees) at junctions A, B, C, and D respectively to achieve this goal is
- (a) 0, 5, 4, 1 (b) 0, 5, 2, 2
(c) 1, 5, 3, 3 (d) 1, 5, 3, 2
(e) 0, 4, 3, 2
- 24.** If the government wants to ensure that all routes from S to T get the same amount of traffic, then a feasible set of toll charged (in rupees) at junctions A, B, C, and D respectively to achieve this goal is
- (a) 0, 5, 2, 2 (b) 0, 5, 4, 1
(c) 1, 5, 3, 3 (d) 1, 5, 3, 2
(e) 1, 5, 4, 2

25. The government wants to devise a toll policy such that the total cost to the commuters per trip is minimized. The policy should also ensure that not more than 70 per cent of the total traffic passes through junction (b). The cost incurred by the commuter travelling from point S to point T under this policy will be
- (a) ₹7 (b) ₹9
(c) ₹10 (d) ₹13
(e) ₹14

ANSWER KEYS

1. (a) 2. (c) 3. (d) 4. (e) 5. (e) 6. (c) 7. (a) 8. (a) 9. (a) 10. (e)
11. (d) 12. (b) 13. (b) 14. (b) 15. (c) 16. (c) 17. (b) 18. (a) 19. (e) 20. (d)
21. (e) 22. (*) 23. (a) 24. (c) 25. (c)

* See Hints and Explanations

HINTS AND EXPLANATIONS

1 to 5

1. In the team of size 3, one member will be from P, R and S and one member will be from M and Q.

Now only one member has to be determined and we know that K and L will be always in team and since there is place for only 1 member, hence K and L will not be in team of 3 members.

Hence, the option (a) is the answer.

2. If we take K and L we can not take N and U so the size of team will be 4 only. Now we will take S from first statement so U and W will also be there. Now as U is there so L cannot be there and hence K will also not be there. As L is not in team so we can take N so 4 members of team are S, U, W and N and because of the second statement any one of M or Q will be there and only M is given in the options

Hence, the option (c) is the answer.

3. Using the first statement, if we take P or R, U and W cannot be in team. To get maximum members in team we should take S and from 4th statement U and W will also be in the team. Now either M or Q will be included in the team, and since U is there L can't be included in the team hence K will also not be there.

Now as L is not in the team, N can be included in the team. So team with maximum numbers of members will be S, W, U, N and any one from M and Q.

Hence maximum possible size of team of team is 5.

Hence, the option (d) is the answer.

4. If we have to take K, L will always be there so U and N will not be in the team. As U is not in the team so S and W will also not be included in the team.

As any one from P and R will always be there in team and same is the case with M and Q, so the size of team that includes K will always be 4.

Hence, the option (e) is the answer.

5. Following are the ways in which a team can be constituted:

- (a) P, M, N (b) P, Q, N
(c) R, M, N
(d) R, Q, N (e) S, U, W, N, M
(f) S, U, W, N, Q

Hence, the correct answer option is (e).

6 to 10

6. Dipan's total score = 480

Hence, Dipan's score in English group = 96.5

Hence, Dipan's score in English paper II = $(96.5 \times 2) - 96 = 97$

Hence, the option (c) is the answer.

7. This is actually a very simple question based on observation of the data only.

Only Dipan scored at least 95 in at least one paper from each of the groups.

Hence, the option (a) is the answer.

8. Let us calculate the scores after including the group score of 100 in the Social Science Group score of each person:

$$\text{Joseph} = 475 + 100 - 95.5 = 479.5$$

$$\text{Agni} = 471.5 + 100 - 95.5 = 476$$

$$\text{Pritam} = 469.5 + 100 - 89 = 480.5$$

$$\text{Tirna} = 468.5 + 100 - 89.5 = 479$$

Hence the correct decreasing order would be Pritam, Joseph, Tirna, Agni.

Hence, the option (a) is the answer.

9. Going through the options, we can see that Sherya, Ram and Ayesha do not satisfy the given criteria and we can observe that only Dipan satisfies all the criteria.

Hence, the option (a) is the answer.

10. Here, the final score will be improved according to the number of marks he improved in the particular group and it can be given as follows.

For improvement of 15 marks in PCB group the marks will be improved by 1 in the final score i.e., in the ratio 15 : 1.

For improvement of 5 marks in mathematics group the marks will be improved by 12 in the final score i.e., in the ratio 5 : 1, and similarly for other subjects.

We can see now that after improvement:

Ram's maximum total score will be = $96.1 + 0.6 = 96.7$.

Agni's maximum total score will be = $94.3 + 1.8 = 96.1$.

Pritam's maximum total score will be = $93.9 + 1.7 = 94.6$

Ayesha's maximum total score will be = $96.2 + 0.7 = 96.9$.

Dipan's maximum total score will be = $96.0 + 1 = 97.0$.

Hence, the option (e) is the answer.

11 to 15

Following information is given:

- There are eight Participants—A, B, C, D, E, F, G and H.
- At the beginning A's Erdős number is infinity.
- None of them is having an Erdős number less than that of F.
- On the 3rd day, (after F, A and C co-authored the paper) the average of their Erdős number is 3 (i.e., total Erdős number of the group is 4) that is the least possible.
- No other combination of three participants was possible that reduces the average upto 3 at this time.
- At this point of time, 5 members have same Erdős numbers, and the other 3 have distinct Erdős number.
- On the 5th day, E and F co-authored the paper; this reduces the average Erdős number by 0.5 (i.e., the total is reduced by 4).
- No other paper was written during the conference.
- Each time the change in Erdős number occurs, it occurs only for those who co-authored a paper.
- Each time a participant co-authors a paper his Erdős number becomes exactly one more than that of the F.

Assume that the Erdős numbers of A, B, C, D, E, F, G and H be a, b, c, d, e, f, g and h.

Then from (iv) after the 3rd day:

$$a = c = f + 1;$$

$$\text{And } a + b + c + d + e + f + g + h = 24$$

5 of them have same Erdős number, and other 3 have distinct numbers. So the other 5 members should have an Erdős number same as that of A and C, i.e., $(F + 1)$.

Hence, $5(F + 1) + f + p + q = 24$ (where p and q represents the Erdős numbers which are distinct)
 $= 6f + p + q = 19$

Hence, the possible values of f are 1, 2 and 3 only. Now 3 can be discarded because it will give rise to

$$p + q = 1.$$

Hence one of the p and q will be 0 (which is not possible).

$$\text{Let us check for } f = 2$$

$$p + q = 7$$

Possible values of p and q are $(1 + 6)$ $(2 + 5)$ and $(3 + 4)$. None of these is possible.

Hence, for $f = 1$ and $a = c = 2$ and other 3 participants will also have their Erdős number as 2.

Now, if $c = 2$ at the beginning of the conference, then there are 3 other possibilities (F, A and any one of B, D, G and H; who doesn't have an Erdős number. 7) that could have brought the total Erdős number equal to 24, which violates the condition (v) written above. So c must be greater than 2 at the starting.

So at the starting:

$$A = \text{infinity}, c > 2, f = 1 \text{ and } e = 6$$

And one of the b, d, g and h will be 7 and other three will be 2

At the end:

$$a = c = 2, f = 1, e = 2$$

And one of the b, d, g and h will be 7 and other three will be 2.

16 to 20

On the 1st day, the price was ₹100 per share. Now we can have the following cases:

Cases	1	2	3	4	5	6	7	8	9	10
At the end of 1st day	90	110	90	110	110	90	110	110	90	110
At the end of 2nd day	100	100	80	120	100	100	120	120	100	120
At the end of 3rd day	90	90	90	110	110	110	130	110	110	110
At the end of 4th day	100	100	100	100	100	100	120	120	120	120
At the end of 5th day	110	110	110	110	110	110	110	110	110	110

16. Obviously, from case-1, at the end of 3rd day, price of share is ₹110.
Hence, the option (c) is the answer.
17. Obviously, from case-5, we get price of share at the end of Day 4 is ₹100
Hence, the option (b) is the answer.
18. Obviously, from case-3, we get price of share at the end of day 3 is ₹90.
Hence, the option (a) is the answer.
19. Obviously, from cases 5 and 9, we have

	Chetan	Michael
110	+10	0
120	+10	+10
110	-10	0
100	-10	0
110	+10	0

	Chetan	Michael
90	-10	0
100	+10	0
110	+10	0
120	+10	+10
110	-10	0

Using 1st table, Chetan has invested ₹1300 and Michael has invested ₹1200.

Michael has ₹100 less than Chetan, so both have same number of shares.

Hence, the option (e) is the answer.

20. Obviously, from case-7, we get maximum possible increase in combined cash balance at the end of 5th day, that is $(1200 + 1300 + 1200) = 3700$ for Chetan and $(-1100 - 1200 + 1300 - 1100 - 1200) = 1300$ for Michael

Hence maximum possible increase in combined balance = $3700 + 1300 = ₹5000$.

Hence, the option (d) is the answer

21 to 25

21. Assume that the toll tax at A, B, C and D be a, b, c and d respectively. For this question we are required to equalize the cost on each road except SDT
Hence, $14 + a = 9 + a + b = 7 + b + c = 10 + d + c$
Or, $b = 5$
Now, $14 + a = 12 + c = 10 + d + c$
Or, $d = 2$ and $c - a = 2$
Now, from the answer options only option (e) satisfies the above values so the correct option is (e).

Alternatively this question can be done by options also.

22. Now for this question we have to equalize the cost on each road except SBCT
So, $14 + a = 9 + a + b = 10 + d + c = 13 + d$
Or, $b = 5$ and $c = 3$
Now, $14 + a = 13 + d$
Or, $d - a = 1$.
Now, from the answer options (b) and (c) satisfies the above. So, none of the option given in the CAT paper is correct.

Even later on CAT also accepted its mistake and announced both these options as its answer.

More can be seen at: http://www.iimk.ac.in/TestBooklet_SolKey2006.pdf

Alternatively, this question can be done by options also.

23. So as to minimize the cost the traffic will be equally divide between the roots SAT, SBAT and SDT. Hence, the answer option is (a).
24. Minimum cost considering toll tax on any of the given four junctions = Zero. We can say that 100% traffic will be attracted by the route S-B-C-T (Total cost – 7). If the cost of this route is increased to 8, condition will remain same. Again if we increase it to 9 then traffic will get distributed into two routes S-B-C-T and S-B-A-T as the costs are same. However

still B caters 100% traffi(c) In order to avoid this, the respective costs of these two routes are increased to 10 then the traffic will get distributed into three routes S-B-C-T, S-B-A-T and S-D-C-T. It can be seen now that traffic will get distributed evenly means 33.33%in each route. Total traffic flow through B = $33.33\% + 33.33\% = 66.66\%$ that is less then 70%.

Hence answer is option (c).

25. Answer is option (c).

CAT 2005

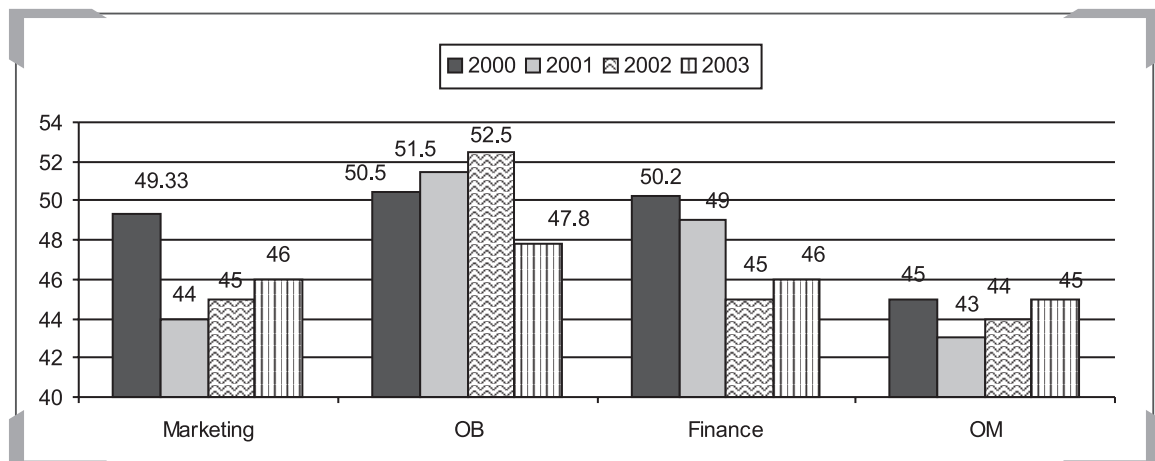
INSTRUCTIONS

- ☐ Read the instruction carefully before attempting the questions.
- ☐ Do your rough work on the Test Booklet and not on the Answer Sheet.
- ☐ Total Questions = 50

SUB-SECTION III-A

Directions for questions 61 to 64: *Answer the questions on the basis of the information given below:*

A management institute was established on January 1, 2000 with 3, 4, 5, and 6 faculty members in the Marketing, Organisational Behaviour (OB), Finance, and Operations Management (OM) areas respectively, to start with. No faculty member retired or joined the institute in the first three months of the year 2000. In the next four years, the institute recruited one faculty member in each of the four areas. All these new faculty members, who joined the institute subsequently over the years, were 25 years old at the time of their joining the institute. All of them joined the institute on April 1. During these four years, one of the faculty members retired at the age of 60. The following diagram gives the area-wise average age (in terms of number of completed years) of faculty members as on April 1 of 2000, 2001, 2002, and 2003.



61. From which area did the faculty member retire?
 (a) Finance (b) Marketing
 (c) OB (d) OM
62. Professors Naresh and Devesh, two faculty members in the Marketing area, who have been with the Institute since its inception, share a birthday, which falls on 20th November. One was born in 1947 and the other one in 1950. On 1 April 2005, what was the age of the third faculty member, who has been in the same area since inception?
 (a) 47 (b) 50
 (c) 51 (d) 52
63. In which year did the new faculty member join the Finance area?
 (a) 2000 (b) 2001
 (c) 2002 (d) 2003
64. What was the age of the new faculty member, who joined the OM area, as on 1 April 2003?
 (a) 1.25 (b) 26
 (c) 27 (d) 28

Directions for questions 65 to 67: Answer the questions on the basis of the information given below:

The table below reports annual statistics related to rice production in select states of India for a particular year.

State	Total Area (in million hectares)	% of Area Under Rice Cultivation	Production (in million tons)	Population (in millions)
Himachal Pradesh	6	20	1.2	6
Kerala	4	60	4.8	32
Rajasthan	34	20	6.8	56
Bihar	10	60	12	83
Karnataka	19	50	19	53
Haryana	4	80	19.2	21
West Bengal	9	80	21.6	80
Gujarat	20	60	24	51
Punjab	5	80	24	24
Madhya Pradesh	31	40	24.8	60
Tamil Nadu	13	70	27.3	62
Maharashtra	31	50	48	97
Uttar Pradesh	24	70	67.2	166
Andhra Pradesh	28	80	112	76

65. Which two states account for the highest productivity of rice (tons produced per hectare of rice cultivation)?
 (a) Haryana and Punjab
 (b) Punjab and Andhra Pradesh
 (c) Andhra Pradesh and Haryana
 (d) Uttar Pradesh and Haryana
66. How many states have a per capita production of rice (defined as total rice production divided by its population) greater than Gujarat?
 (a) 3 (b) 4
 (c) 5 (d) 6

67. An intensive rice producing state is defined as one whose annual rice production per million of population is at least 400,000 tons. How many states are intensive rice producing states?
- | | |
|-------|-------|
| (a) 5 | (b) 6 |
| (c) 7 | (d) 8 |

Directions for questions 68 to 70: *Answer the questions on the basis of the information given below:*

The table below reports the gender, designation and age-group of the employees in an organization. It also provides information on their commitment to projects coming up in the months of January (Jan), February (Feb), March (Mar) and April (Apr), as well as their interest in attending workshops on: Business Opportunities (BO), Communication Skills (CS), and E-Governance (EG).

S. No.	Name	Gender	Designation	Age group	Committed to projects during	Interested in workshop on
1	Anshul	M	Mgr	Y	Jan, Mar	CS, EG
2	Bushkant	M	Dir	I	Feb, Mar	BO, EG
3	Charu	F	Mgr	I	Jan, Feb	BO, CS
4	Dinesh	M	Exe	O	Jan, Apr	BO, CS, EG
5	Eashwaran	M	Dir	O	Feb, Apr	BO
6	Fatima	F	Mgr	Y	Jan, Mar	BO, CS
7	Gayatri	F	Exe	Y	Feb, Mar	EG
8	Hari	M	Mgr	I	Feb, Mar	BO, CS, EG
9	Indira	F	Dir	O	Feb, Apr	BO, EG
10	John	M	Dir	Y	Jan, Mar	BO
11	Kalindi	F	Exe	I	Jan, Apr	BO, CS, EG
12	Lavanya	F	Mgr	O	Feb, Apr	CS, EG
13	Mandeep	M	Mgr	O	Mar, Apr	BO, EG
14	Nandlal	M	Dir	I	Jan, Feb	BO, EG
15	Parul	F	Exe	Y	Feb, Apr	CS, EG
16	Rahul	M	Mgr	Y	Mar, Apr	CS, EG
17	Sunita	F	Dir	Y	Jan, Feb	BO, EG
18	Urvashi	F	Exe	I	Feb, Mar	EG
19	Yamini	F	Mgr	O	Mar, Apr	CS, EG
20	Zeena	F	Exe	Y	Jan, Mar	BO, CS, EG

M = Male, F = Female; Exe = Executive, Mgr = Manager, Dir = Director; Y = Young,
I = In-between, O = Old

For each workshop, exactly four employees are to be sent, of which at least two should be Females and at least one should be Young. No employee can be sent to a workshop in which he/she is not interested in. An employee cannot attend the workshop on

Communication Skills, if he/she is committed to internal projects in the month of January.

Business Opportunities, if he/she is committed to internal projects in the month of February.

E-governance, if he/she is committed to internal projects in the month of March.

68. Assuming that Parul and Hari are attending the workshop on Communication Skills (CS), then which of the following employees can possibly attend the CS workshop?

- (a) Rahul and Yamini
- (b) Dinesh and Lavanya
- (c) Anshul and Yamini
- (d) Fatima and Zeena

69. How many Executives (Exe) cannot attend more than one workshop?

- (a) 2
- (b) 3
- (c) 15
- (d) 16

70. Which set of employees cannot attend any of the workshops?

- (a) Anshul, Charu, Eashwaran and Lavanya
- (b) Anshul, Bushkant, Gayatri, and Urvashi
- (c) Charu, Urvashi, Bushkant and Mandeep
- (d) Anshul, Gayatri, Eashwaran and Mandeep

SUB-SECTION III-B

Note: Questions 71 to 90 carry two marks each.

Directions for questions 71 to 74: Answer the questions on the basis of the information given below.

In the table below is the listing of players, seeded from highest (#1) to lowest (#32), who are due to play in an Association of Tennis Players (ATP) tournament for women. This tournament has four knockout rounds before the final, i.e., first round, second round, quarterfinals, and semi-finals. In the first round, the highest seeded player plays the lowest seeded player (seed #32) which is designated match No. 1 of first round; the 2nd seeded player plays the 31st seeded player which is designated match No. 2 of the first round, and so on. Thus, for instance, match No. 16 of first round is to be played between 16th seeded player and the 17th seeded player. In the second round, the winner of match No. 1 of first round plays the winner of match No. 16 of first round and is designated match No. 1 of second round. Similarly, the winner of match No. 2 of first round plays the winner of match No. 15 of first round, and is designated match No. 2 of second round. Thus, for instance, match No. 8 of the second round is to be played between the winner of match No. 8 of first round and the winner of match No. 9 of first round. The same pattern is followed for later rounds as well.

Seed #	Name of Player	Seed #	Name of Player	Seed #	Name of Player
1	Maria Sharapova	12	Mary Pierce	23	Silvia Farina Elia
2	Lindsay Davenport	13	Anastasia Myskina	24	Tatiana Golovin
3	Amelie Mauresmo	14	Alicia Molik	25	Shinobu Asagoe
4	Kim Clijsters	15	Nathalie Dechy	26	Francesca Schiavone
5	Svetlana Kuznetsova	16	Elena Bovina	27	Nicole Pietrangeli
6	Elena Dementieva	17	Jelena Jankovic	28	Gisela Dulko
7	Justine Henin	18	Ana Ivanovic	29	Flavia Pennetta
8	Serena Williams	19	Vera Zvonareva	30	Anna Chakvetadze
9	Nadia Petrova	20	Elena Likhovtseva	31	Ai Sugiyama
10	Venus Williams	21	Daniela Hantuchova	32	Anna-lena Groenefeld
11	Patty Schnyder	22	Dinara Safina		

71. If there are no upsets (a lower seeded player beating a higher seeded player) in the first round, and only match Nos. 6, 7, and 8 of the second round result in upsets, then who would meet Lindsay Davenport in quarter finals, in case Davenport reaches quarter finals?
 (a) Justine Henin (b) Nadia Petrova
 (c) Patty Schnyder (d) Venus Williams
72. If Elena Dementieva and Serena Williams lose in the second round, while Justine Henin and Nadia Petrova make it to the semi-finals, then who would play Maria Sharapova in the quarterfinals, in the event Sharapova reaches quarterfinals?
 (a) Dinara Safina (b) Justine Henin
 (c) Nadia Petrova (d) Patty Schnyder
73. If, in the first round, all even numbered matches (and none of the odd numbered ones) result in upsets, and there are no upsets in the second round, then who could be the lowest seeded player facing Maria Sharapova in semi-finals?
 (a) Anastasia Myskina
 (b) Flavia Pennetta
 (c) Nadia Petrova
 (d) Svetlana Kuznetsova
74. If the top eight seeds make it to the quarterfinals, then who, amongst the players listed below, would definitely not play against Maria Sharapova in the final, in case Sharapova reaches the final?
 (a) Amelie Mauresmo
 (b) Elena Dementieva
 (c) Kim Clijsters
 (d) Lindsay Davenport

Directions for questions 75 to 78: Answer to questions on the basis of the information given below.

Venkat, a stockbroker, invested a part of his money in the stock of four companies—A, B, C and D. Each of these companies belonged to different industries, viz., Cement, Information Technology (IT), Auto, and Steel, in no particular order. At the time of investment, the price of each stock was ₹100. Venkat purchased only one stock of each of these companies. He was expecting returns of 20%, 10%, 30%, and 40% from the stock of companies A, B, C and D, respectively. Returns are defined as the change in the value of the stock after one year, expressed as a percentage of the initial value. During the year, two of these companies announced extraordinarily good results. One of these two companies belonged to the Cement or the IT industry, while the other one belonged to either the Steel or the Auto industry. As a result, the returns on the stocks of these two companies were higher than the initially expected returns. For the company belonging

to the Cement or the IT industry with extraordinarily good results, the returns were twice that of the initially expected returns. For the company belonging to the Steel or the Auto industry, the returns on announcement of extraordinarily good results were only one and a half times that of the initially expected returns. For the remaining two companies, which did not announce extraordinarily good results, the returns realized during the year were the same as initially expected.

75. What is the minimum average return Venkat would have earned during the year?
 (a) 30% (b) $31\frac{1}{4}\%$
 (c) $32\frac{1}{2}\%$ (d) Cannot be determined
76. If Venkat earned a 35% return on average during the year, then which of these statements would necessarily be true?
 I. Company A belonged either to Auto or to Steel Industry.
 II. Company B did not announce extraordinarily good results.
 III. Company A announced extraordinarily good results.
 IV. Company D did not announce extraordinarily good results.
 (a) I and II only (b) II and III only
 (c) III and IV only (d) II and IV only
77. If Venkat earned a 38.75% return on average during the year, then which of these statement(s) would necessarily be true?
 I. Company C belonged either to Auto or to Steel Industry.
 II. Company D belonged either to Auto or to Steel Industry.
 III. Company A announced extraordinarily good results.
 IV. Company B did not announce extraordinarily good results.
 (a) I and II only (b) II and III only
 (c) I and IV only (d) II and IV only
78. If Company C belonged to the Cement or the IT industry and did announce extraordinarily good results, then which of these statement(s) would necessarily be true?
 I. Venkat earned not more than 36.25% return on average.
 II. Venkat earned not less than 33.75% return on average.
 III. If Venkat earned 33.75% return on average, Company A announced extraordinarily good results.

IV. If Venkat earned 33.75% return on average, Company B belonged either to Auto or to Steel Industry.

- (a) I and II only (b) II and IV only
(c) II and III only (d) III and IV only

Directions for questions 79 to 82: Answer the questions on the basis of the information given below.

The year is 2089. Beijing, London, New York, and Paris are in contention to host the 2096 Olympics. The eventual winner is determined through several rounds of voting by members of the IOC with each member representing a different city. All the four cities in contention are also represented in IOC.

- In any round of voting, the city receiving the lowest number of votes in that round gets eliminated. The survivor after the last round of voting gets to host the event.

- A member is allowed to cast votes for at most two different cities in all rounds of voting combined. (Hence, a member becomes ineligible to cast a vote in a given round if both the cities (s)he voted for in earlier rounds are out of contention in that round of voting.)
- A member is also ineligible to cast a vote in a round if the city (s)he represents is in contention in that round of voting.
- As long as the member is eligible, (s)he must vote and vote for only one candidate city in any round of voting.

The following incomplete table shows the information on cities that received the maximum and minimum votes in different rounds, the number of votes cast in their favour, and the total votes that were cast in those rounds.

Round	Total votes cast	Maximum votes cast		Eliminated	
		City	No. of Votes	City	No. of Votes
1		London	30	New York	12
2	83	Paris	32	Beijing	21
3	75				

It is also known that:

- All those who voted for London and Paris in round 1, continued to vote for the same cities in subsequent rounds as long as these cities were in contention. 75% of those who voted for Beijing in round 1, voted for Beijing in round 2 as well.
- Those who voted for New York in round 1, voted either for Beijing or Paris in round 2.
- The difference in votes cast for the two contending cities in the last round was 1.
- 50% of those who voted for Beijing in round 1, voted for Paris in round 3.

- What percentage of members from among those who voted for New York in round 1, voted for Beijing in round 2?
(a) 33.33 (b) 50
(c) 66.67 (d) 75
- What is the number of votes cast for Paris in round 1?
(a) 16 (b) 18
(c) 22 (d) 24

- What percentage of members from among those who voted for Beijing in round 2 and were eligible to vote in round 3, voted for London?
(a) 33.33 (b) 38.10
(c) 50 (d) 66.67
- Which of the following statements must be true?
(1) IOC member from New York must have voted for Paris in round 2.
(2) IOC member from Beijing voted for London in round 3.
(a) Only 1 (b) Only 2
(c) Both 1 and 2 (d) Neither 1 nor 2

Directions for questions 63 to 86: Answer the questions on the basis of the information given below.

The table below presents the revenue (in million rupees) of four firms in three states. These firms, Honest Ltd, Aggressive Ltd, Truthful Ltd, and Profitable Ltd are disguised in the table as A, B, C and D, in no particular order.

States	Firm A	Firm B	Firm C	Firm D
UP	49	82	80	55
Bihar	69	72	70	65
MP	72	63	72	65

Further, it is known that:

- In the state of MP, Truthful Ltd has the highest market share.
 - Aggressive Ltd's aggregate revenue differs from Honest Ltd's by ₹5 million.
83. What can be said regarding the following two statements?
Statement 1: Profitable Ltd has the lowest share in MP market.
Statement 2: Honest Ltd's total revenue is more than Profitable Ltd.
(a) If Statement 1 is true then Statement 2 is necessarily true.
(b) If Statement 1 is true then Statement 2 is necessarily false.
(c) Both Statement 1 and Statement 2 are true.
(d) Neither Statement 1 nor Statement 2 is true.
84. What can be said regarding the following two statements?
Statement 1: Aggressive Ltd's lowest revenues are from MP.
Statement 2: Honest Ltd's lowest revenues are from Bihar.
(a) If Statement 2 is true then Statement 1 is necessarily false.
(b) If Statement 1 is false then Statement 2 is necessarily true.
(c) If Statement 1 is true then Statement 2 is necessarily true.
(d) None of the above
85. What can be said regarding the following two statements?
Statement 1: Honest Ltd has the highest share in the UP market.
Statement 2: Aggressive Ltd has the highest share in the Bihar market.
(a) Both statements could be true.
(b) At least one of the statements must be true.
(c) At most one of the statements is true.
(d) None of the above.
86. If Profitable Ltd's lowest revenue is from UP, then which of the following is true?

- (a) Truthful Ltd's lowest revenues are from MP.
- (b) Truthful Ltd's lowest revenues are from Bihar.
- (c) Truthful Ltd's lowest revenues are from UP.
- (d) No definite conclusion is possible.

Directions for questions 87 to 90: Answer the questions on the basis of the information given below.

Help Distress (HD) is an NGO involved in providing assistance to people suffering from natural disasters. Currently, it has 37 volunteers. They are involved in three projects: Tsunami Relief (TR) in Tamil Nadu, Flood Relief (FR) in Maharashtra, and Earthquake Relief (ER) in Gujarat. Each volunteer working with Help Distress has to be involved in at least one relief work project.

- A maximum number of volunteers are involved in the FR project. Among them, the number of volunteers involved in FR project alone is equal to the volunteers having additional involvement in the ER project.
 - The number of volunteers involved in the ER project alone is double the number of volunteers involved in all the three projects.
 - 17 volunteers are involved in the TR project.
 - The number of volunteers involved in the TR project alone is one less than the number of volunteers involved in ER project alone.
 - Ten volunteers involved in the TR project are also involved in at least one more project.
87. Based on the information given above, the minimum number of volunteers involved in both FR and TR projects, but not in the ER project is
(a) 1 (b) 3
(c) 4 (d) 5
88. Which of the following additional information would enable to find the exact number of volunteers involved in various projects?
(a) Twenty volunteers are involved in FR
(b) Four volunteers are involved in all the three projects
(c) Twenty three volunteers are involved in exactly one project
(d) No need for any additional information
89. After some time, the volunteers who were involved in all the three projects were asked to withdraw from one project. As a result, one of the volunteers opted out of the TR project, and one opted out of the ER project, while the remaining ones involved in all the three projects opted out of the FR project. Which of the following statements, then, necessarily follows?

- (a) The lowest number of volunteers is now in TR project
 (b) More volunteers are now in FR project as compared to ER project
 (c) More volunteers are now in TR project as compared to ER project
 (d) None of the above
90. After the withdrawal of volunteers, as indicated in Question 89, some new volunteers joined the NGO.

Each one of them was allotted only one project in a manner such that, the number of volunteers working in one project alone for each of the three projects became identical. At that point, it was also found that the number of volunteers involved in FR and ER projects was the same as the number of volunteers involved in TR and ER projects. Which of the projects now has the highest number of volunteers?

- (a) ER (b) FR
 (c) TR (d) Cannot be determined

ANSWER KEYS

61. (a) 62. (d) 63. (c) 64. (c) 65. (a) 66. (b) 67. (d) 68. (a) 69. (b) 70. (b)
 71. (d) 72. (c) 73. (a) 74. (c) 75. (a) 76. (b) 77. (c) 78. (b) 79. (d) 80. (d)
 81. (d) 82. (a) 83. (b) 84. (c) 85. (c) 86. (c) 87. (b) 88. (c) 89. (c) 90. (d)

HINTS AND EXPLANATIONS

61 to 78

61. There are two dips in the Finance only. Hence, finance is the area where the prof. retired from. Option (a)
 62. Age of Prof. Naresh + Age of Prof. Devesh = 101
 Sum of ages of all profs. of marketing at the time of inception = 148
 Hence, the age of 3rd prof. At the time of inception = 47
 Hence, his age in 2005 = 52 years. Option (d)
 63. In 2001, one professor retires from the Finance area and the next year 2002, a new professor joins finance. Option (c)
 64. Option (c).27
 65. Let us first find out the productivity.

State	Productivity (tons per hectare)
Haryana	$\frac{19.2}{3.2} = 6$
Punjab	$\frac{24}{4} = 6$
Andhra Pradesh	$\frac{112}{22.4} = 5$
Uttar Pradesh	$\frac{67.2}{16.8} = 4$

Hence, Haryana and Punjab have the highest productivity.

66. For Gujarat per capita production is $\frac{24}{51} = 0.47$

So, we can conclude that for only per capita production of rice for Haryana, Punjab, Maharashtra and Andhra Pradesh are greater than Gujarat's (0.47).

67. It can be seen from the table that Haryana, Gujarat, Punjab, MP, Tamil Nadu, Maharashtra, UP and AP are intensive rice producing states.
 68. Rahul and Yamini
 69. Gayatri, Urvashi and Zeena, cannot attend more than one workshop.
 70. Anshul, Bushkant, Gayatri and Urvashi cannot attend any of the workshops.
 71. We will be required to draw two tables in question 71. Winners after round two would be 1, 2, 3, 4, 5, 11, 10, 9 for 8 rounds respectively. Since Lindsay is 2 she will play opposite Venus Williams in quarter-final.
 72. Elena is at number 6, Serena Williams is at number 8
 If they loose then table would be like this:

1	9
2	7
3	11
4	5

Maria is number 1 she will play Number 9, i.e., Nadia Petrova

73.

1	32
2	31
3	30
4	29
5	28
6	27
7	26
8	25
9	24
10	23
11	22
12	21
13	20
14	19
15	18
16	17

Matches in bold letters had upsets.

Then from table would be winners are: 1, 31, 29, 5, 27, 7, 25, 9, 23, 11, 21, 12, 19, 15, 17.

So the table for the next round would be—

1	17
31	15
3	19
29	13
5	21
27	11
7	23
25	9

Since there is no upset in second round, hence table in next round will be like:

1	9
15	7
3	11
15	5

We have Maria Sharapova in the semi final. Since we are not sure what is the result of other games, table is drawn as given below: Table in next round would be like:

1	5/13
7/15	3/11

74.

1	8
2	7
3	6
4	5

In this case, Kim Clijster will either not reach semi final or she will play Maria Sharapova in semi-finals.

In that case, one of these two will be eliminated. Hence, she cannot play Maria Sharapova in final.

75. We will have the minimum returns if the extraordinary performing stocks (double and 1.5 growth) are the one's whose expected returns are lowest (i.e., 10% and 20%). Taking the minimum value of the expected returns as 10%, we will be required to see that which of the two values of 10 and 20 multiplied by 2 and 1.5 and vice versa will give the minimum value.

Hence, comparing the minimum value between $20 \times 2 + 10 \times 1.5$ and $20 \times 1.5 + 10 \times 2$, we find that the 2nd one is minimum.

So, the minimum average return is

$$\frac{20 \times 1.5 + 10 \times 2 + 30 + 40}{4} = 30\%$$

76. Total return is $35 \times + = 4 = 140$ (Average return is 35%)

There is only one possible arrangement of 140 ($40 \times 1.5 + 30 + 20 \times 2 + 10$)

A = 20×2 (Cement of IT)

B = 10

C = 30

D = $40(1.5)$ (Steel or auto)

Using the data given in the question, we can see that A has to be Cement of IT, D is Steel or Auto.

Hence statement (II) and (III) are correct.

77. Total return is 38.75×4

The possible arrangement is $20 + 10 + 30 \times 1.5 + 40 \times 2$

Hence, $A = 20$, $B = 10$, $C = 30$ (Steel or Auto),
 $D = 40$ (cement or IT)

So, statements (i) and (iv) are correct.

So, option (c) is the answer.

78. Given (c) belongs to Cement or IT industry

C's return is $30 \times 2 = 60\%$

Among the other values we see that following are the possible arrangements:

$10 \times 1.5 + 20 + 40$, $10 + 20 \times 1.5 + 40$, $40 + 20 + 40 \times 1.5$

The average returns will be in each case

$$\frac{10 \times 1.5 + 20 + 40 + 60}{4} = (33.75\%)$$

$$\frac{10 + 20 \times 1.5 + 40 + 60}{4} = (35\%)$$

$$\frac{40 + 20 + 40 \times 1.5 + 60}{4} = (45\%)$$

Considering 33.75% as the valid value, then B belongs to the Auto industry.

So, (II) and (IV) are correct.

Hence, option (b) is the correct answer.

79 to 82

$L = \text{London}$, $\text{Paris} = P$, $\text{New York} = \text{NY}$,
 $\text{Beijing} = B$

In round III, one of the two cities, either London or Paris will get 38 votes and the other 37. Now start decoding the information given:

1. It is given that the representatives of London, Paris, Beijing and New York can not vote as long as their own cities are in contention. In round 1, New York gets eliminated and hence the representative from New York becomes eligible for voting in the round II. So, for round II, total votes increases by 1. Hence we can conclude that the total votes in round I should be equal to $83 - 1 = 82$.
2. Post round II, representative of Beijing votes in the III round. This should have increased the number of total votes by 1 and so the total votes = $83 + 1 = 84$.
 It is known that the total votes in round III are 75 only. It is possible only if $84 - 75 = 9$ people who voted in round I and II have become ineligible for voting in round III.
3. Let us understand that how come these nine people who have voted in round I and II become

ineligible for voting in round III. The reason of their ineligibility is the fact that till round I and II, they have already voted for two different cities which are not available for contention in round II. We can again see that all of these nine voters must have been those who voted for New York in round I and then voted for Beijing in round II.

4. It is also given that 75% of the people voting for Beijing in round I voted again for Beijing in round II as well. Hence, 16 people must have voted for Beijing in round I.
5. Given that Beijing's vote in round II is 21. This includes 9 votes from people who voted for NY in the first round also. Therefore $21 - 9 = 12$ people voted for Beijing in both round I and II.
6. We can have now for round I: $82 = L + P + \text{NY}$ Or $82 = 30 + P + 16 + 12$
 Giving $P = 24$
7. And similarly for round II we have:
 $83 = L + 32 + 21$, Giving $L = 30$
8. New York had 12 votes in round I, 9 of these votes went to B (using point 2). The rest 3 went to P.
9. Now, B gets 16 votes in round I and 12 of them still vote for (b) The rest 4 voted for either L or P. As L has the same number of votes in both the rounds I and II so we can conclude that in round II, these 4 votes must have gone to Paris only.
10. Representative of NY didn't vote in round I, but he has voted in round II. (30 votes in both the rounds I and II) we know the exact break up of B in II. Hence, NY representative vote must go to Paris. Further, in order to avoid ineligibility, this NY representative must vote for Paris only in round III also.
11. We can see the composition of votes obtained by Paris (in round II):
 $32 = 24$ (From round I) + 4 (out of the 16, who voted for Beijing in round I) + 3 (out of 12, who voted for NY in round I) + 1 (NY)
12. We know that Beijing gets eliminated in round II. So the Beijing can vote in round III.
13. 12 people (out of 21) who voted for Beijing in round II are still eligible for vote in round III.
14. Half of the members who voted for Beijing in Round I (i.e., 8 people) voted for Paris in round II. These 8 members include those four members too, who voted for Paris in round II also. Hence a total of four members (out of 12, who voted for Beijing in round II and are still eligible for vote in round III) have voted for Paris in round III.
15. This means that the remaining B (out of 12 who voted for Beijing in round II are still eligible for

vote in round III) can vote for London only. This makes London's vote = 30 + 8 or 38 in round III. It means that Paris got 37 votes.

16. Beijing is eligible to vote in round III must have voted for Paris only.

Now we obtain the final votes tally:

Round	Total Votes	London (L)	Paris (P)	Beijing (B)	New York
I	82	30	24	16	12
II	83	30	32	21(12 + 9)	X
III	75	38 = (30 + B)	37	X	X

79. Percentage = $(9/12) \times 100 = 75\%$

81. Percentage = $(8/12) \times 100 = 66.67\%$

82. Based on the table members from NY must have voted for Paris in round II

83 to 86

States	Firm A	Firm B	Firm C	Firm D
UP	49	82	80	55
Bihar	69	72	70	65
MP	72	63	72	65
Total	190	217	222	185

Combination of Aggressive Ltd and Honest Ltd is possible only for— Firm A + Firm D or Firm B and Firm (c)

And Truthful Ltd can be only be with Firm A or Firm C

83. According to statement 1 of question 83, B is profitable, then A and D are Aggressive and Honest. Then Honest's total revenue cannot be more than that of Profitable. So statement 2 is not true.

84. According to statement 1 Aggressive is Firm (b). So, Honest Ltd will be (c) Then statement 2 is also true. So, Honest Ltd's lowest revenue is from Bihar. Hence Option (c).

85. Firm B is Honest Ltd (according to statement 1)

86. Profitable can be either A or D. Then Aggressive and Honest has to be B and (c) Hence, Truthful Ltd is either Firm A or D. And for both A and D lowest revenue is from UP. Hence, Option (c).

CAT 2004

INSTRUCTIONS

- ☐ Read the instruction carefully before attempting the questions.
 - ☐ Do your rough work on the Test Booklet and not on the Answer Sheet.
 - ☐ Total Questions = 38
-

Directions for question 1 to 4: *Answer the questions on the basis of the information given below.*

The Dean's office recently scanned student results into the central computer system. When their character reading software cannot read something, it leaves the space blank. The scanner output reads as follows:

Name	Finance	Marketing	Statistics	Strategy	Operations	GPA
Aparna		B	F			1.4
Bikas	D	D	F	F		
Chandra		D	A	F	F	2.4
Deepak	A	B		D	D	3.2
Fazal	D	F	B		D	2.4
Gowri	C	C	A		B	3.8
Hari		B	A		D	2.8
Ismet			B		A	
Jagdeep	A	A	B		C	3.8
Kunal	F		A	F	F	1.8
Leena	B	A		B	F	3.2
Manab			A	B	B	
Nisha	A	D	B	A	F	3.6
Osman	C		B	B	A	4.6

(Continued)

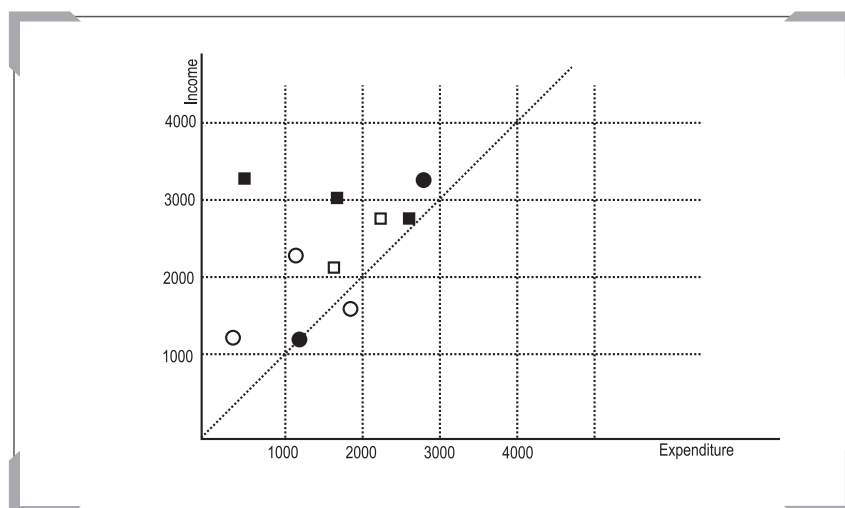
Name	Finance	Marketing	Statistics	Strategy	Operations	GPA
Preeti	F	D		D		3.2
Rahul	A	C	A		F	4.2
Sameer		C	F	B		
Tara	B					2.4
Utkarsh			F	C	A	3
Vipul	A		C	C	F	2.4

In the grading system, A, B, C, D and F grades fetch 6, 4, 3, 2 and 0 grade points respectively. The grade point average (GPA) is the arithmetic mean of the grade points obtained in the five subjects. For example, Nisha's GPA is $(6 + 2 + 4 + 6 + 0)/5 = 3.6$. Some additional facts are also known about the student's grades. These are

- Vipul obtained the same grade in marketing as aparna obtained in finance and strategy.
 - Fazal obtained the same grade in strategy as Utkarsh did in marketing.
 - Tara received the same grade in exactly three courses.
- What grade did Preeti obtain in statistics?
 - A
 - B
 - C
 - D
 - In operations, Tara could have received the same grade?
 - Ismet
 - Hari
 - Jagdeep
 - Manab
 - In strategy, Gowri's grade point was higher than that obtained by
 - Fazal
 - Hari
 - Nisha
 - Rahul
 - What grade did Utkarsh obtain in finance?
 - B
 - C
 - D
 - F

Directions for questions 5 to 8: Answer the questions on the basis of the information given below.

The data points in the figure below represent monthly income and expenditure data of individual members of the Ahuja family (■), the Bose family (□), the Coomer family (○), and the Dubey family (●). For these questions, saving is defined as



5. Which family has the lowest average income?
 (a) Ahuja (b) Bose
 (c) Coomar (d) Dubey
6. Which family has the highest average expenditure?
 (a) Ahuja (b) Bose
 (c) Coomar (d) Dubey
7. Which family has the lowest average saving?
 (a) Ahuja (b) Bose
 (c) Coomar (d) Dubey
8. The highest amount of savings accrues to a member of which family?
 (a) Ahuja (b) Bose
 (c) Coomar (d) Dubey

Directions for questions 9 to 12: *Answer the questions on the basis of the information given below.*

Prof. Singh has been tracking the number of visitors to his homepage. His service provider has provided him with the following data on the country of origin of the visitors and the university they belong to.

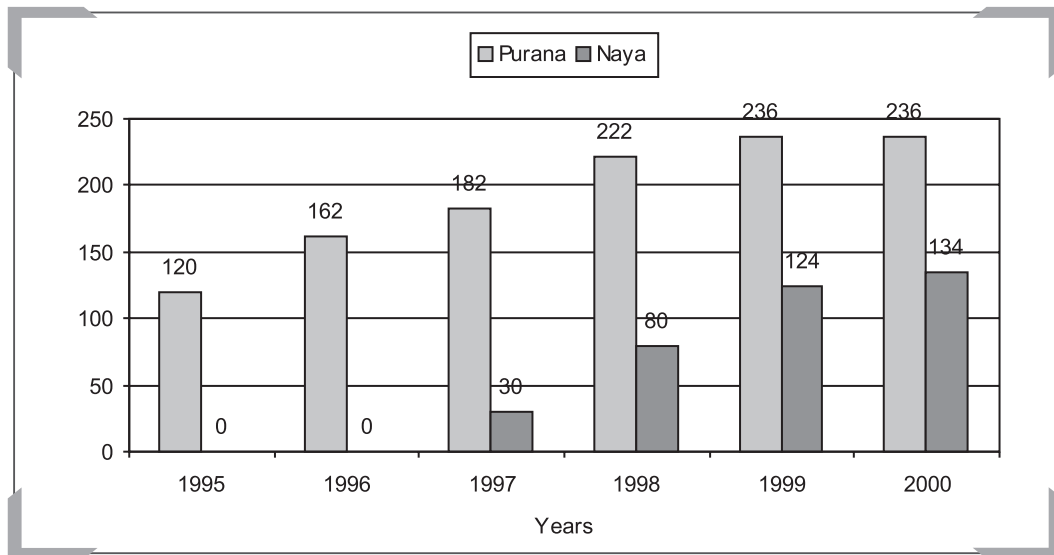
Number of visitors			
	Day		
Country	1	2	3
Canada	2	0	0
Netherlands	1	1	0
India	1	2	0
UK	2	0	2
USA	1	0	1

Number of visitors			
	Day		
University	1	2	3
University 1	1	0	0
University 2	2	0	0
University 3	0	1	0
University 4	0	0	2
University 5	1	0	0
University 6	1	0	1
University 7	2	0	0
University 8	0	2	0

9. To which country does university 5 belong?
 (a) India and Netherlands but not USA
 (b) India or USA but not Netherlands
 (c) Netherlands or USA but not India
 (d) India or USA but not UK
10. University 1 can belong to
 (a) UK (b) Canada
 (c) Netherlands (d) USA
11. Which among the listed countries can possibly host three of the eight listed universities?
 (a) None (b) Only UK
 (c) Only India (d) Both India and UK
12. Visitors from how many universities from UK visited Prof. Singh's homepage in the three days?
 (a) 1 (b) 2
 (c) 3 (d) 4

Directions for questions 13 to 16: Answer the questions on the basis of the information given below.

Purana and Naya are two brands of kitchen mixer-grinders available in the local market. Purana is an old brand that was introduced in 1990, while Naya was introduced in 1997. For both these brands, 205 of the mixer-grinders bought in a particular year are disposed off as junk exactly two years later. It is known that 10 Purana mixer-grinders were disposed off in 1997. The following figures show the number of Purana and Naya mixer-grinders in operation from 1995 to 2000, as at the end of the year.



13. How many Naya mixer-grinders were purchased in 1999?
 (a) 44 (b) 50
 (c) 55 (d) 64
14. How many Naya mixer-grinders were disposed off by the end of 2000?
 (a) 10 (b) 16
 (c) 22 (d) Cannot be determined
15. How many Purana mixer-grinders were disposed off in 2000?
 (a) 0 (b) 5
 (c) 6 (d) Cannot be determined
16. How many Purana mixer-grinders were purchased in 1999?
 (a) 20 (b) 23
 (c) 50 (d) Cannot be determined

Directions from questions 17 to 20: Answer the questions on the basis of the information given below:

A study was conducted to ascertain the relative importance that employees in five different countries assigned to five different traits in their Chief executive officers. The traits were compassion (C), decisiveness (D), negotiation skills (N), public visibility (P), and vision (V). The level

of dissimilarity between two countries is the maximum difference in the ranks allotted by the two countries to any of the five traits. The following table indicates the rank order of the five traits for each country.

Rank	Country				
	India	China	Japan	Malaysia	Thailand
1	C	N	D	V	V
2	P	C	N	D	C
3	N	P	C	P	N
4	V	D	V	C	P
5	D	V	P	N	D

17. Which of the following pairs of countries are most dissimilar?
 (a) China and Japan
 (b) India and China
 (c) Malaysia and Japan
 (d) Thailand and Japan

18. Which of the following countries is least dissimilar to India?
 (a) China (b) Japan
 (c) Malaysia (d) Thailand
19. Which amongst the following countries is most dissimilar to India?
 (a) China (b) Japan
 (c) Malaysia (d) Thailand
20. Three of the following four pairs of countries have identical levels of dissimilarity. Which pair is the odd one out?
 (a) Malaysia and China
 (b) China and Thailand
 (c) Thailand and Japan
 (d) Japan and Malaysia

Directions for questions 21 to 26: Each question is followed by two statements, A and B. Answer each question using the following instructions.

- Choose (a) if the question can be answered by using one of the statements alone but not by using the other statement alone.
 Choose (b) if the question can be answered by using either of the statements alone.
 Choose (c) if the question can be answered by using both statements together but not by either statement alone.
 Choose (d) if the question cannot be answered on the basis of the two statements.

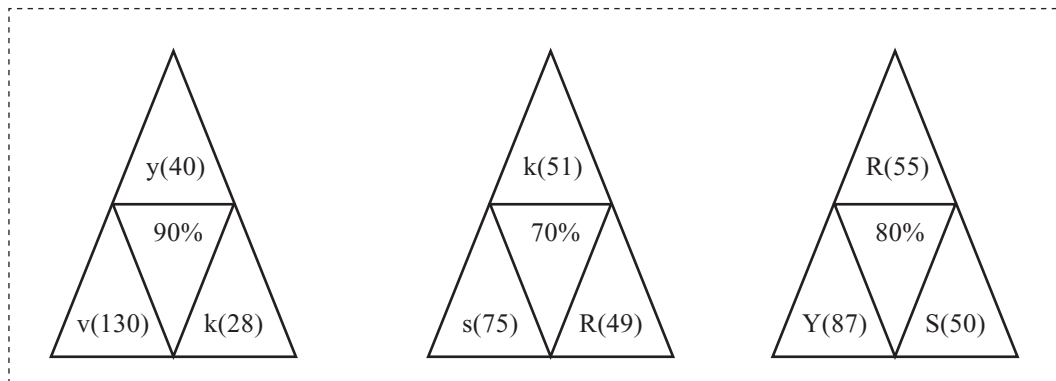
21. Zakib spends 30% of his income on his children's education, 20% on recreation and 10% on healthcare. The corresponding percentages for Supriyo are 40%, 25% and 13%. Who spends more on children's education?
 (a) Zakib spends more on recreation than Supriyo.
 (b) Supriyo spends more on health than Zakib.
22. Four candidates for an award obtain distinct scores in a test. Each of the four casts a vote to choose the winner of the award. The candidate who gets the largest number of votes wins the award. In case of a tie in the voting process, the candidate with the highest score wins the award. Who wins the award?
 (a) The candidate with top three scores each vote for the top score amongst the other three.
 (b) The candidate with the lowest score votes for the player with the second highest score.
23. In a class of 30 students, Rashmi secured the third rank among the girls, while her brother Kumar studying in the same class secured the sixth rank in the whole class. Between the two, who had a better

overall rank?

- (a) Kumar was among the top 255 of boys merit list in the class in which 60% were boys.
 (b) There were three boys among the top five rank holders, and three girls among the top ten rank holders.
24. Tarak is standing 2 steps to the left of red mark and 3 steps to the right of a blue mark. He tosses a coin. If it comes up heads, he moves one step to the right; otherwise he moves one step to the left. He keeps doing this until he reaches one of the two marks, and then he stops. At which mark does he stop?
 (a) He stops after 21 coins tossed.
 (b) He obtains three more tails than heads.
25. Ravi spent less than ₹75 to buy one kilogram each of potato, onion, and gourd. Which one of the three vegetables bought was the costliest?
 (a) 2 kg potato and 1 kg gourd cost less than 1 kg potato and 2 kg gourd.
 (b) 1 kg potato and 2 kg onion together cost the same as 1 kg onion and 2 kg gourd.
26. Nandini paid for an article using currency notes of denominations ₹1, ₹2, ₹5, and ₹10 using at least one note of each denomination. The total number of five and ten rupee notes used was one more than total number of one and two rupee notes used. What was the price of the article?
 (a) Nandini used a total of 13 currency notes.
 (b) The price of the article was a multiple of ₹10.

Directions for questions 27 to 30: Answer the questions on the basis of the information given below.

Coach John sat with the score cards of Indian players from the 3 games in a one day cricket tournament where the same set of players played for India and all the major batsman got out. John summarized the batting performance through three diagrams, one for each game. In each diagram, the three outer triangles communicate the number of runs scored that was scored by the three top scores from India, where K, R, S, V and Y represents Kaif, Rahul, Saurav, Virender and Yuvraj respectively. The middle triangle in each diagram denotes the percentage of the total score that was scored by the top three Indian scorers in that game. No two players score the same number of runs in the same game. John also calculated two batting indices for each player based on his scores in the tournaments; the R-index of a batsman is the difference between his highest and lowest scores in the 3 games while the M-index is the middle number, if his scores are arranged in a non-increasing order.



27. For how many Indian players is it possible to calculate the exact M-index?
- (a) 0 (b) 1
(c) 2 (d) More than 2
28. Among the players mentioned, who can have the lowest R-index from the tournament?
- (a) Only Kaif, Rahul or Yuvraj
(b) Only Kaif or Rahul
(c) Only Kaif or Yuvraj
(d) Only Kaif
29. How many players among those listed definitely scored less than Yuvraj in the tournament?
- (a) 0
(b) 1
(c) 2
(d) More than 2
30. Which of the players had the best M-index from the tournament?
- (a) Rahul
(b) Saurav
(c) Virender
(d) Yuvraj
- Directions for question 31 to 34: Answer the question on the basis of the information given below.**
- Twenty one participants from four continents (Africa, America, Australasia, and Europe) attended a United Nations conference. Each participant was an expert in one of four fields, labour, health, population studies and refugee relocation. The following five facts about the participants are given.
- (a) The number of labour experts in the camp was exactly the half the number of experts in each of the other three fields.
- (b) Africa did not send any labour expert. Otherwise every continent, including Africa, sent at least one expert in each categories.
- (c) None of the continents sent more than three experts in any category.
- (d) If there had been one less Australian expert, then the Americas would have had twice as many experts as each of the other continents.
- (e) Mike and Alfonzo are leading experts of population studies who attended the conference. They are from Australasia.
31. Which of the following combination is not possible?
- (a) 2 experts in population studies from the Americas and 2 health experts from Africa attended the conference.
- (b) 2 experts in population studies from the Americas and 1 health expert from Africa attended the conference.
- (c) 3 experts in refugee relocation from the Americas and 1 health expert from Africa attended the conference.
- (d) Africa and America each had 1 had 1 expert in population studies attending the conference.
32. If Ramos is the lone American expert in population studies, which of the following is not true about the numbers of experts in the conference from the four continents?
- (a) There is one expert in health from America
- (b) There is one expert in refugee relocation from Africa
- (c) There are two experts in health from Americas
- (d) There are three experts in refugee relocation from the Americas
33. Alex, an American expert in refugee relocation, was the first keynote speaker in the conference. What can be inferred the number about the number of American experts in refugee relocation in the conference, excluding Alex?
- i. At least one
ii. At most two

- (a) Only i and not ii.
- (b) only ii and not i.
- (c) Both i and not ii
- (d) Neither i nor ii.

34. Which of the following numbers cannot be determined from the information given?

- (a) Number of labour experts from Americas
- (b) Number of health experts from Europe.
- (c) Number of health experts from Australasia.
- (d) Number of experts in refugee relocation from Africa.

Directions for question 35 to 38: *Answer the question on the basis of the information given below.*

The year was 2006. All six teams in Pool A of World Cup hockey, play each other exactly once. Each win earns a team three points, a draw earns one point and a loss earns zero point. The two teams with the highest points qualify for the semi finals. In case of a tie, the team with the highest goal difference (Goal for – Goal against) qualifies.

In the opening match, Spain lost to Germany. After the second round (after each team played two matches), the pool table looked as shown below.

Teams	Games Played	Won	Drawn	Lost	Goals for	Goals against	Points
Germany	2	2	0	0	3	1	6
Argentina	2	2	0	0	2	0	6
Spain	2	1	0	1	5	2	3
Pakistan	2	1	0	1	2	1	3
New Zealand	2	0	0	2	1	6	0
South Africa	2	0	0	2	1	4	0

In the third round, Spain played Pakistan, Argentina played Germany, and New Zealand played South Africa. All the third round matches were drawn. The following are some results from the fourth and fifth round matches:

- (a) Spain won both the fourth and fifth round matches.
 - (b) both Argentina and Germany won their fifth round matches by 3 goals to 0.
 - (c) Pakistan won the both fourth and fifth round matches by 1 goal to 0.
35. Which one of the following statement is true about matches played in the first two rounds?
- (a) Germany beat New Zealand by 1 goal to 0.
 - (b) Spain beat New Zealand by 4 goals to 0.
 - (c) Spain beats South Africa by 2 goals to 0.
 - (d) Germany beats South Africa by 2 goals by 1.

36. Which one of the following statements is true about matches played in the first two rounds?

- (a) Pakistan beat South Africa by 2 goals to 1.
- (b) Argentina beat Pakistan by 1 goal to 0.
- (c) Germany beat Pakistan by 2 goals to 1.
- (d) Germany beat Spain by 2 goals to 1.

37. If Pakistan qualified as one of the two teams from pool A, which was the other team that qualified?

- (a) Argentina
- (b) Germany
- (c) Spain
- (d) Cannot be determined

38. Which team finished at the top of the pool after five rounds of matches?

- (a) Argentina
- (b) Germany
- (c) Spain
- (d) Cannot be determined

ANSWER KEYS

1. (a)	2. (d)	3. (b)	4. (c)	5. (c)	6. (d)	7. (d)	8. (a)	9. (a)	10. (c)
11. (a)	12. (b)	13. (b)	14. (c)	15. (d)	16. (a)	17. (d)	18. (a)	19. (b)	20. (d)
21. (a)	22. (a)	23. (a)	24. (b)	25. (c)	26. (d)	27. (c)	28. (a)	29. (b)	30. (b)
31. (d)	32. (c)	33. (c)	34. (d)	35. (d)	36. (b)	37. (b)	38. (d)		

HINTS AND EXPLANATIONS

1. GPA of Preeti = 3.2

i.e.,

$$\frac{F + D + X + D + Y}{5} = 3.2$$

$$0 + 2 + X + 2 + Y = 16$$

$$X + Y = 12$$

The only possible combination is A, A.

So Preeti obtained A grade in statistics.

2. Tara got same grade in three courses. We know that Tara has got B grade in one of the subject and her GPA is 2.4. So B is the grade which Tara has scored in three of the subjects. So Tara has received the same Grade as Maanav.

3. GPA of Gouri is 3.8

$$\text{i.e., } 3 + 3 + 6 + x + 4 = 3.8 \times 5.$$

$$16 + x = 18$$

$$x = 2$$

So, the grade of Gouri in strategy is C.

Rahul's grade in Strategy = $(4.2 \times 5) - 15 = 6$, i.e., A.Fazal's grade in strategy = $(2.4 \times 5) - 8 = 4$ i.e., B.

Hence, Gouri's grade will be higher than that of Hari.

4. As Fazal's GPA = 2.4

$$\text{So } D + F + B + P + D = 2.4 \times 5$$

$$2 + 0 + 4 + P + 2 = 12 \quad P = 4$$

So, his grade in strategy is B.

Utkarsh has also scored grade B in Marketing.

$$\text{So, for Utkarsh, } X + B + F + C + A = 3 \times 5$$

$$X + 4 + 0 + 3 + 6 = 15 \quad X = 2$$

So, grade of Utkarsh in finance = D.

- 5.

$$\text{Average income of Ahuja} = \frac{700 + 1700 + 1800}{3} = \frac{4200}{3}$$

$$\text{Average income of Bose} = \frac{800 + 1600 + 2300}{3} = \frac{4700}{3}$$

$$\text{Average income of Coomar} = \frac{300 + 1100 + 1900}{3} = \frac{3300}{3}$$

$$\text{Average income of Dubey} = \frac{1200 + 2800}{2} = \frac{4000}{2}$$

Thus, Coomer has the lowest income.

6. In the figure, draw a line parallel to the expenditure and mid way between observations of each families' values.

7. The figure shows the first member of Dubey family is on the line indicating income = expenditure. The second member is just above the line.

8. Look at the left most member of Ahuja's family.

9 to 12

When we compare table 1 and 2, university 4 corresponds to UK and university 6 corresponds to USA (after day 3 onwards values are concerned and university 8 corresponds to India and university 3 to Netherlands and now Indian or Netherlands can take university 1 or university 5. now university 2 and 7 belongs to either UK or Canada (Only one).

University	Day			Country
	1	2	3	
University 1	1	0	0	India/Netherlands
University 2	2	0	0	UK/Canada
University 3	0	1	0	Netherlands
University 4	0	0	2	UK
University 5	1	0	0	India/Netherlands
University 6	1	0	1	USA
University 7	2	0	0	UK/Canada
University 8	0	2	0	India

13. In the year 1999, total number of Naya mixer grinder = 124

Number of Naya new mixer grinder disposed = 20 % of 30 = 6

$$\text{Number of mixer bought } 124 = (50 + 24 + 50)$$

14. Number of Naya mixer grinder disposed in the 1999 = 6

Number of Naya mixer grinder disposed in the 2000 = 10

Total disposed by the end of 2000 = 16

15. Initial number of Purana mixer grinder not available, hence cannot be determined.

16. 20 Purana mixer grinder purchased in the year 1999.
 17. Thailand and Japan because they have the maximum difference of 4 ranks (5 – 1)
 18. China because maximum difference between two parameters is 2.
 19. Maximum difference = 4.
 20. Japan and Malaysia
 22. Let us assume that A, B, C, D are 4 people getting a score of 10, 8, 6, 4.

A	B	C	D
10	8	6	4

Statement A:

According to the conditions A will give vote to

B.

According to the conditions B will give vote to A.

According to the conditions C will give vote to A.

Even if D gives to A/B/C – 2 situation arises.

Either A will win or there will a tie when D gives vote to B.

Even then A will win.

Answer (a).

23. Statement A:

Cannot say anything.

Statement B:

Because amongst the top5, 3 are boys.

2 are girls. And Rashmi is third among the girls and kumar is 6th.

Hence, answer (a) statement (b) is sufficient.

24. Statement A:

We can find, that there are 12 tails and 9 heads.

This will give us the answer. So statement A is sufficient.

Statement B:

3 more tails than heads. So we will reach at blue point after tosses.

Hence statement b is not sufficient.

25. It is simple equation solving.

26. Statement A:

13 currency notes will give different values.

Statement B:

It will not give us the solution.

Even if we combine both the statements, we dont get a unique value.

Answer is (d).

27 to 30

Let us have a tabular presentation of the data given:

	Pakistan	South Africa	Australia
K	28	51	<48
R	<22	49	55
S	<22	75	50
V	130	<49	<48
Y	40	<49	87
Top 3 batsman	198	175	192
India total	220	250	240

31 to 34

Let us have a tabular presentation of the data given:

	Africa	America	Australasia	Europe
L	0	1	1	3
H			1	6
P			2	6
R			1	6
	4	8	5	4
				21

- (i) Because the labour experts is half of eachother, so the only possible combination is

L -3

H

P

R

} 6 each

- (ii)

	Africa	America	Australaia	Europe	
L	0	1	1	1	3
H	2	2	1	1	6
P	1	2	2	1	6
R	1	3	1	1	6
	4	8	5	4	
					21

	Africa	America	Australasia	Europe	
L	0	1	1	1	3
H	1	3	1	1	6
P	1	2	2	1	6
R	2	2	1	1	6
	4	8	5	4	
					21

	Africa	America	Australasia	Europe	
L	0	1	1	1	3
H	1	3	1	1	6
P	2	1	2	1	6
R	1	3	1	1	6
	4	8	5	4	
					21

35 and 36

After 2nd round, table can be drawn like:

Team	Round 1 and round 2 combinations	
	Goals for→Goals against	Goals for→Goals against
Germany	2→1	
Argentina	1→0	
Spain	4→0	1→2 not possible
	5→1	0→1 possible

Pakistan	2→0	0→1 possible
N-Z	1→2	0→4 not possible
	0→1	1→5 possible
S A	1→2	0→2

37 and 38

From the statements (a), (b), (c) given in the problem four teams (Spain, Argentina, Germany, Pakistan) appear to win their matches in the fifth round. However, there are only three matches per round and so only three teams can win their matches in any round.

So, this data set seems to have some inconsistency.

CAT 2003 (RETEST)

INSTRUCTIONS

- ☐ Read the instruction carefully before attempting the questions.
 - ☐ Do your rough work on the Test Booklet and not on the Answer Sheet.
 - ☐ Total Questions = 50
-

Directions for questions 1 to 4: Each question is followed by two statements, A and (b) Answer each question using the following instructions.

Choose (a) if the question can be answered by using statement A alone but not by using B alone.

Choose (b) if the question can be answered by using statement B alone but not by using A alone.

Choose (c) if the question can be answered by using either statement alone.

Choose (d) if the question can be answered by using both the statements together but not by either statement.

1. In a cricket match, the 'man of the match' award is given to the player scoring the highest number of runs. In case of a tie, the player (out of those locked in the tie) who has taken the higher number of catches is chosen. Even thereafter if there is a tie, the player (out of those locked in the tie) who has dropped fewer catches is selected. Aakash, Biplab and Chirag who were contenders for the award dropped at least one catch each. Biplab dropped 2 catches more than Aakash did, scored 50, and took 2 catches. Chirag got two chances to catch and dropped both. Who was the 'man of the match'?
(A) Chirag made 15 runs less than both Aakash and Biplab.

(B) The catches dropped by Biplab are 1 more than the catches taken by Aakash.

2. Four friends, A, B, C and D got the top four ranks in a competitive examination, but A did not get the first, B did not get the second, C did not get the third, and D did not get the fourth rank. Who secured which rank?
(A) Neither A nor D were among the first 2.
(B) Neither B nor C was third or fourth.
3. The members of a local club contributed equally to pay ₹600 towards a donation. How much did each one pay?
(A) If there had been five fewer members, each one would have paid an additional ₹10.
(B) There were at least 20 members in the club, and each one paid no more than ₹30.
4. A family has only one kid. The father says "after 'n' years, my age will be 4 times the age of my kids." The mother says "after 'n' years, my age will be 3 times that of my kid." What will be the combined ages of the parents after 'n' years?
(A) The age difference between the parents is 10 years.
(B) After 'n' years, the kid is going to be twice as old as she is now.

Directions for questions 5: *Answer the question independently.*

5. Seventy per cent of the employees in a multinational corporation have VCD players, 75 per cent have microwave ovens, 80 per cent have ACs and 85 per cent have washing machines. At least what percentage of employees has all four gadgets?
- (a) 15 (b) 5
(c) 10 (d) Cannot be determined

Directions for questions 6 to 9: *Answer the questions on the basis of following information.*

Four families decided to attend the marriage ceremony of one of their colleagues. One family has no kids, while the others have at least one kid each. Each family with kids has at least one kid attending the marriage. Given below is some information about the families, and who reached when to attend the marriage.

The family with 2 kids came just before the family with no kids.

Shanthi who does not have any kids reached just before Sridevi's family.

Sunil and his wife reached last with their only kid.

Anil is not the husband of Joya.

Anil and Raj are fathers.

Sridevi's and Anita's daughters go to the same school.

Joya came before Shanthi and met Anita when she reached the venue.

Raman stays the farthest from the venue.

Raj said his son could not come because of his exams.

6. Which woman arrived third?
(a) Shanthi (b) Sridevi
(c) Anita (d) Joya
7. Name the correct pair of husband and wife.
(a) Raj and Shanthi
(b) Sunil and Sridevi
(c) Anil and Sridevi
(d) Raj and Anita
8. Of the following pairs, whose daughters go to the same school?
(a) Anil and Raman
(b) Sunil and Raman
(c) Sunil and Anil
(d) Raj and Anil
9. Whose family is known to have more than one kid for certain?
(a) Raman's (b) Raj's
(c) Anil's (d) Sunil's

Directions for questions 10 to 14: *Answer the questions on the basis of the following information.*

Recently, the answers of a test held nationwide were leaked to a group of unscrupulous people. The investigative agency has arrested the mastermind and nine other people A, B, C, D, E, F, G, H and I in this matter. Interrogating them, the following facts have been obtained regarding their operation.

Initially, the mastermind obtains the correct answer-key. All the others create their answer-key from one or two people who already possess the same. These people are called his/her "sources". If the person has two sources, then he/she compares the answer-keys obtained from both sources. If the key to a question from both sources is identical, it is copied, otherwise it is left blank. If the person has only one source, he/she copies the source's answers into his/her copy. Finally, each person compulsorily replaces one of the answers (not a blank one) with a wrong answer in his/ her answer key.

The paper contained 200 questions; so the investigative agency has ruled out the possibility of two or more of them introducing wrong answers to the same question. The investigative agency has a copy of the correct answer key and has tabulated the following data. These data represent question numbers.

Name	Wrong Answer(s)	Blank Answer(s)
A	46	--
B	96	46, 90, 25
C	27, 56	17, 46, 90
D	17	--
E	46, 90	--
F	14, 46	92, 90
G	25	--
H	46, 92	--
I	27	17, 26, 90

10. Which one among the following must have two sources?
(a) A (b) B
(c) C (d) D
11. How many people (excluding the mastermind) needed to make answer keys before C could make his answer key?
(a) 2 (b) 3
(c) 4 (d) 5

12. Both G and H were sources to
 (a) F (b) B
 (c) I (d) None of them
13. Which of the following statements is true?
 (a) C introduced the wrong answer to question 27
 (b) E introduced the wrong answer to question 46
 (c) F introduced the wrong answer to question 14
 (d) H introduced the wrong answer to question 46
14. Which of the following two groups of people has identical sources?
 (I) A, D and G
 (II) E and H
 (a) Only (I)
 (b) Only (II)
 (c) Neither (I) nor (II)
 (d) Both (I) and (II)

Directions for questions 15 to 18: Answer the questions on the basis of following information.

The plan above shows an office block for six officers, A, B, C, D, E and F. Both B and C occupy offices to the right of corridor (as one enters the office block) and A occupies an office to the left of the corridor. E and F occupy offices on opposite sides of the corridor but their offices do not face each other. The offices of C and D face each other. E does not have a corner office. F's office is further down the corridor than A's, but on the same side.

15. If E sits in his office and faces the corridor, whose office is to his left?
 (a) A (b) B
 (c) C (d) D
16. Whose office faces A's office?
 (a) B (b) C
 (c) D (d) E
17. Who is/are F's neighbour(s)?
 (a) A only (b) A and D
 (c) C only (d) B and C
18. D was heard telling someone to go further down the corridor to the last office on the right. To whose room was he trying to direct that person?
 (a) A (b) B
 (c) C (d) F

Directions for questions 19 to 22: Answer the questions on the basis of the following information.

Seven faculty members at a management institute frequent a lounge for strong coffee and stimulating conversation. On being asked about their visit to the lounge last Friday we got the following responses.

JC — I came in first, and the next two persons to enter were SS and SM. When I left the lounge, JP and VR were present in the lounge. DG left with me.

JP — When I entered the lounge with VR, JC was sitting there. There was someone else, but I cannot remember who it was.

SM — I went to the lounge for a short while, and met JC, SS and DG in the lounge on that day.

SS — I left immediately after SM left.

DG — I met JC, SS, SM, JP and VR during my first visit to the lounge. I went back to my office with J(c) When I went to the lounge the second time, JP and VR were there.

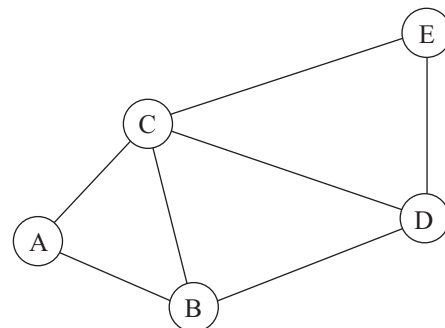
PK — I had some urgent work, so I did not sit in the lounge that day, but just collected my coffee and left. JP and DG were the only people in the lounge while I was there.

VR — No comments.

19. Based on the responses, which of the two JP or DG, entered the lounge first?
 (a) JP
 (b) DG
 (c) Both entered together
 (d) Cannot be determined
20. Who was sitting with JC when JP entered the lounge?
 (a) SS (b) SM
 (c) DG (d) PK
21. How many of the seven members did VR meet on Friday in the lounge?
 (a) 2 (b) 3
 (c) 4 (d) 5
22. Who were the last two faculty members to leave the lounge?
 (a) JC and DG (b) PK and DG
 (c) JP and PK (d) JP and DG

Directions for questions 23 and 24: Answer the questions on the basis of following information.

Shown below is a layout of major streets in a city:



Two days (Thursday and Friday) are left for campaigning before a major election, and the city administration has received requests from five political parties for taking out their processions along the following routes.

Congress	:	A-C-D-E
BJP	:	A-B-D-E
SP	:	A-B-C-E
BSP	:	B-C-E
CPM	:	A-C-D

Street B-D cannot be used for a political procession on Thursday due to a religious procession. The district administration has a policy of not allowing more than one procession to pass along the same street on the same day. However, the administration must allow all parties to take out their procession during these two days.

23. Congress procession can be allowed
- only on Thursday.
 - only on Friday.
 - on either day.
 - only if the religious procession is cancelled.
24. Which of the following is not true?
- Congress and SP can take out their processions on the same day.
 - The CPM procession cannot be allowed on Thursday.
 - The BJP procession can only take place on Friday.
 - Congress and BSP can take out their processions on the same day.

Directions for questions 25 to 28: Answer the questions on the basis of the following table.

Below is a table that lists countries region-wise. Each region-wise list is sorted, first by birth rate and then alphabetically by the name of the country. We now wish to merge the region-wise list into one consolidated list and provide overall rankings to each country based first on birth rate and then on death rate. Thus, if some countries have the same birth rate, then the country with a lower death rate will be ranked higher. Further, countries having identical birth and death rates will get the same rank.

For example, if two countries are tied for the third position, then both will be given rank 3, while the next country (in the ordered list) will be ranked 5.

Rank	Country	Birth Rate	Death Rate	Region
1	South Africa	36	12	Africa
2	Egypt	39	13	Africa
3	Cameroon	42	22	Africa
4	Mozambique	45	18	Africa
5	Zaire	45	18	Africa
6	Ghana	46	14	Africa
7	Angola	47	23	Africa
8	Madagascar	47	22	Africa
9	Morocco	47	16	Africa
10	Tanzania	47	17	Africa
11	Ethiopia	48	23	Africa
12	Ivory Coast	43	23	Africa
13	Rhodesia	48	14	Africa
14	Uganda	48	17	Africa
15	Nigeria	49	22	Africa
16	Saudi Arabia	49	19	Africa
17	Sudan	49	17	Africa
18	Algeria	50	16	Africa
19	Kenya	50	14	Africa
20	Uppw Volta	50	28	Africa

Rank	Country	Birth Rate	Death Rate	Region
1	Germany (FRG)	10	12	Europe
2	Austria	12	13	Europe
3	Belgium	12	12	Europe
4	Germany (DRG)	12	14	Europe

(Continued)

Rank	Country	Birth Rate	Death Rate	Region
5	Sweden	12	11	Europe
6	Switzerland	12	9	Europe
7	U K	12	12	Europe
8	Netherlands	13	8	Europe
9	France	14	11	Europe
10	Italy	14	10	Europe
11	Greece	16	9	Europe
12	Bulgaria	17	10	Europe
13	Hungary	18	12	Europe
14	Spain	18	8	Europe
15	USSR	18	9	Europe
16	Yugoslavia	18	8	Europe
17	Czech Rep.	19	11	Europe
18	Portugal	19	10	Europe
19	Romania	19	10	Europe
20	Poland	20	9	Europe

Rank	Country	Birth Rate	Death Rate	Region
1	Japan	16	6	Asia
2	Korea (ROK)	26	6	Asia
3	Sri Lanka	26	9	Asia
4	Taiwan	26	5	Asia
5	Malaysia	30	6	Asia
6	China	31	11	Asia
7	Thailand	34	10	Asia
8	Turkey	34	12	Asia
9	India	36	15	Asia
10	Burma	38	15	Asia
11	Iran	42	12	Asia

12	Vicujam	42	17	Asia
13	Korea (DPRK)	43	12	Asia
14	Pakistan	44	14	Asia
15	Nepal	46	20	Asia
16	Bangladesh	47	19	Asia
17	Syria	47	14	Asia
18	Iraq	48	14	Asia
19	Afghanistan	52	30	Asia

Rank	Country	Birth Rate	Death Rate	Region
1	US (a)	15	9	N. America
2	Canada	16	7	N. America
3	Cuba	20	6	N. America
4	Mexica	40	7	N. America
1	Australia	16	8	Pacific
2	Philippines	34	10	Pacific

Rank	Country	Birth Rate	Death Rate	Region
3	Indonesia	38	16	Pacific
1	Argentina	22	10	S. America
2	Chile	22	7	S. America
3	Colombia	34	10	S. America
4	Brazil	36	10	S. America
5	Venezuela	36	6	S. America
6	Gautemala	40	14	S. America
7	Peru	40	13	S. America
8	Ecuador	42	11	S. America

25. In the consolidated list, what would be the overall rank of the Philippines?
- (a) 32 (b) 33
(c) 34 (d) 35

26. In the consolidated list, how many countries would rank below Spain and above Taiwan?

(a) 9 (b) 8
(c) 7 (d) 6

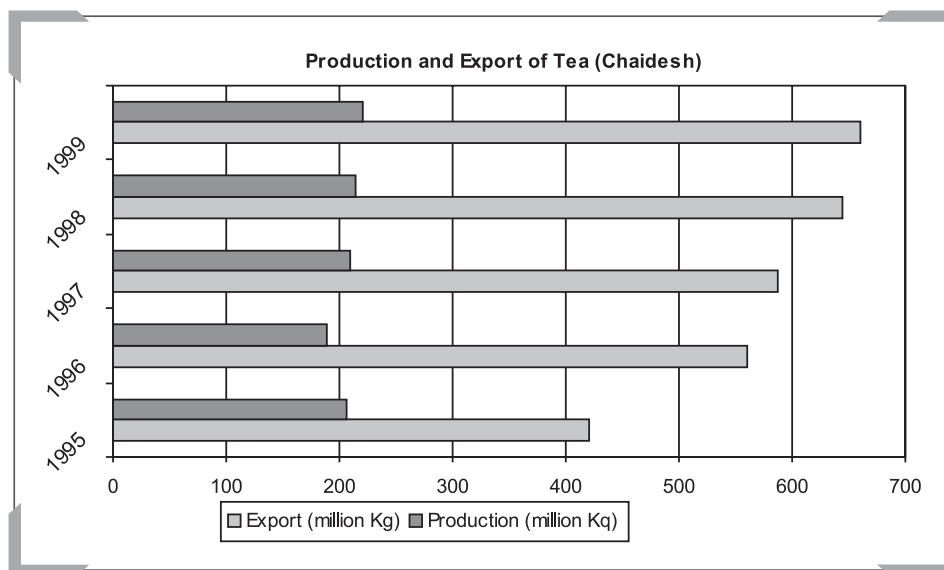
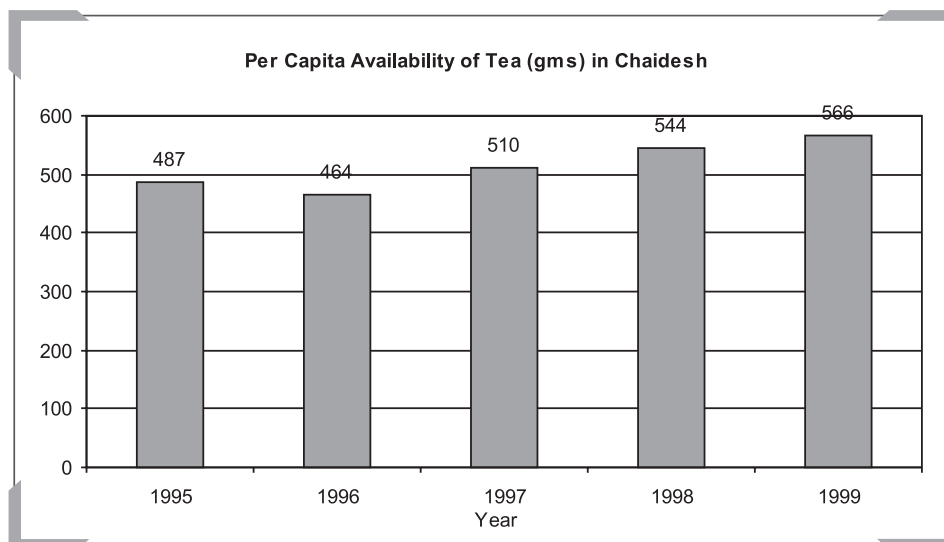
27. In the consolidated list, which country ranks 37th?

(a) South Africa (b) Brazil
(c) Turkey (d) Venezuela

28. In the consolidated list, how many countries in Asia will rank lower than every country in South America, but higher than at least one country in Africa?

(a) 8 (b) 7
(c) 6 (d) 5

Directions for questions 29 to 31: Answer the questions on the basis of the following charts.



(Note: Availability is defined as production less export.)

29. In which year during the period 1996–1999 was Chaidesh's export of tea, as a proportion of tea produced, the highest?

(a) 1996 (b) 1997
(c) 1998 (d) 1999

30. In which of the following years was the population of Chaidesh the lowest?

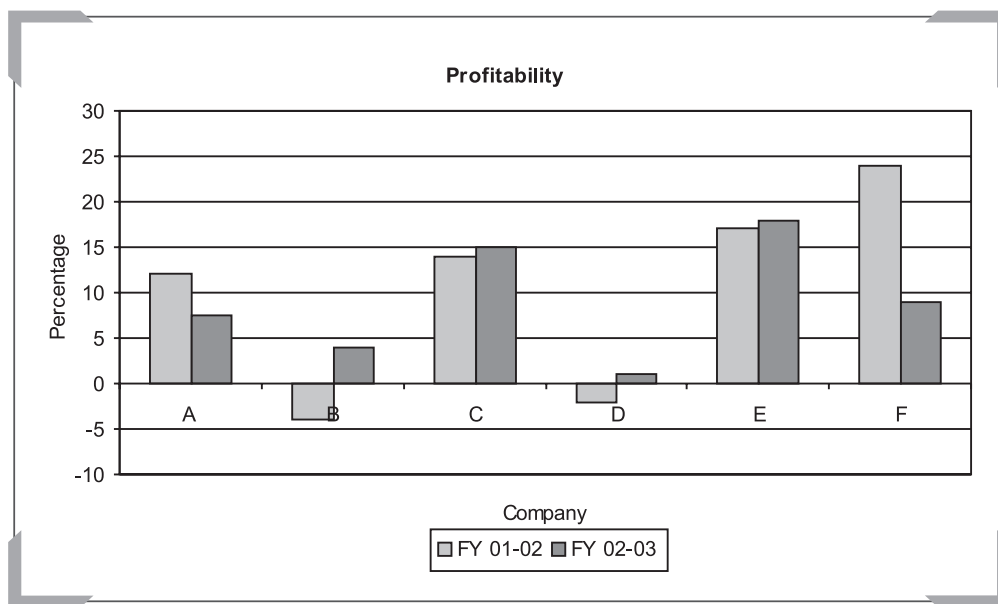
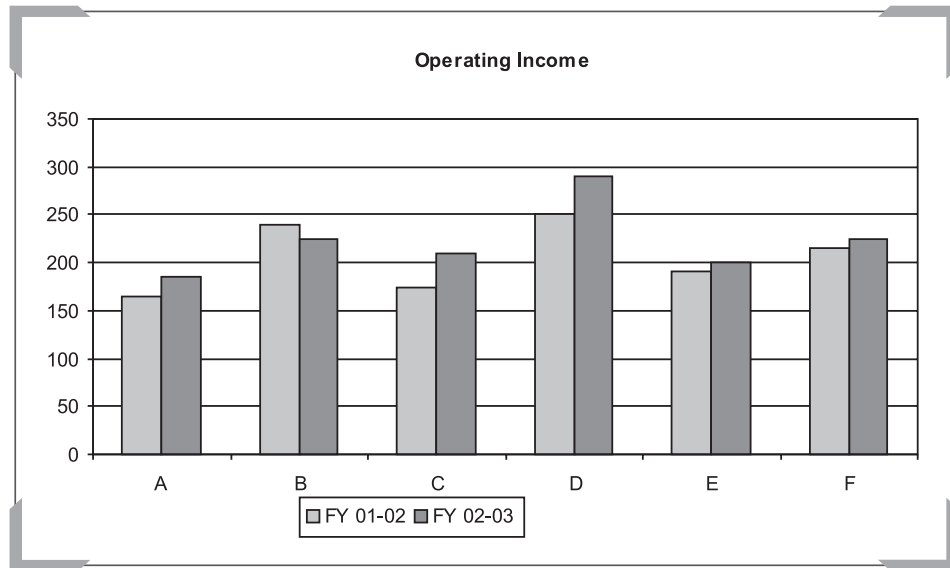
(a) 1995 (b) 1996
(c) 1997 (d) 1999

31. The area under tea cultivation continuously decreased in all four years from 1996 to 1999, by 10%, 7%, 4% and 1% respectively. In which year was tea productivity (production per unit of area) the highest?

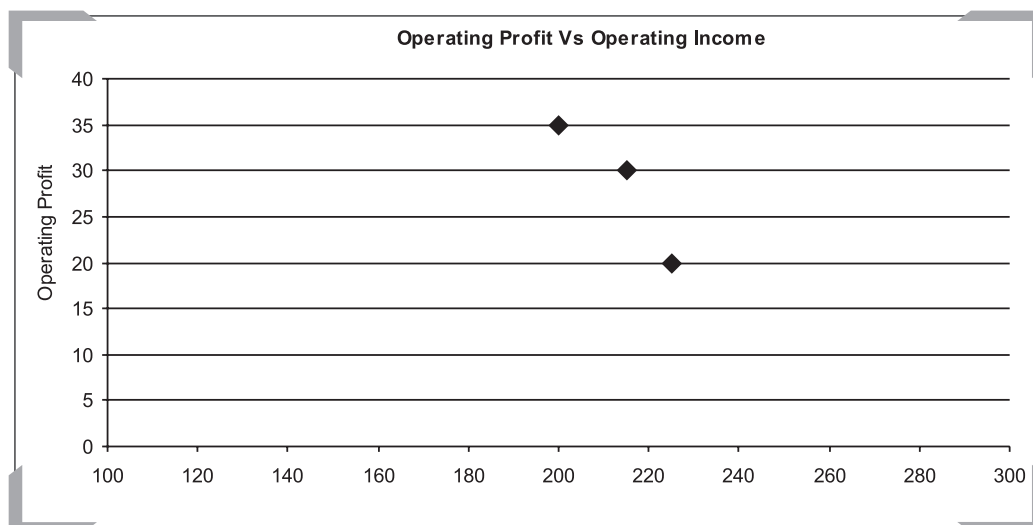
- (a) 1999 (b) 1998
(c) 1997 (d) 1996

Directions for questions 32 to 35: Answer the questions on the basis of following charts.

The profitability of a company is defined as the ratio of its operating profit to its operating income, typically expressed in percentage. The following two charts show the operating income as well as the profitability of six companies in the Financial Years (FYs) 2001–02 and 2002–03.

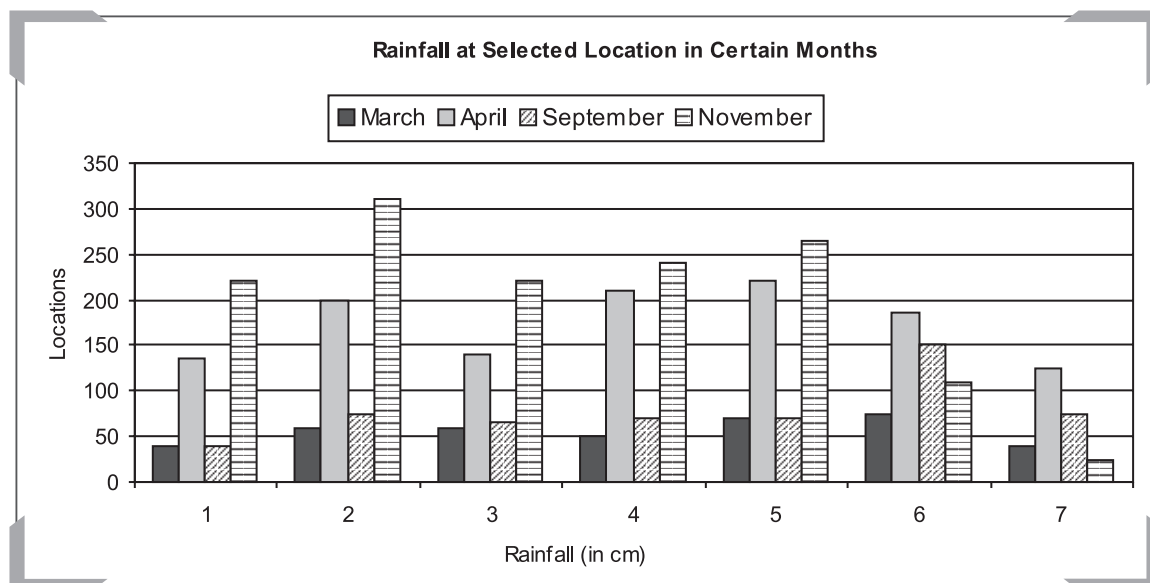


The operating profits of four of these companies are plotted against their respective operating income figures for the FY 2002–03, in the third chart given below.



32. What is the approximate average operating profit in FY 2001–2002, of the two companies excluded from the third chart?
- (a) –7.5 crore (b) 3.5 crore
(c) 25 crore (d) Cannot be determined
33. Which company recorded the highest operating profit in FY 2002–03?
- (a) A (b) C
(c) E (d) F
34. Which of the following statements is not true?
- (a) The company with the third lowest profitability in FY 2001–02 has the lowest operating income in FY 2002–03.
(b) The company with the highest operating income in the two financial years combined has the lowest operating profit in FY 2002–03.
(c) Companies with a higher operating income in FY 2001–02 than in FY 2002–03 have higher profitability in FY 2002–03 than in FY 2001–02.
(d) Companies with profitability between 10% and 20% in FY 2001–02 also have operating incomes between 150 crore and 200 crore in FY 2002–03.
35. The average operating profit in FY 2002–03, of companies with profitability exceeding 10% in FY 2002–03, is approximately
- (a) 17.5 crore
(b) 25 crore
(c) 27.5 crore
(d) 32.5 crore

Directions for questions 36 and 37: Answer the questions on the basis of the data presented in the figure below.



36. Which of the following statements is correct?
- (a) November rainfall exceeds 100 cm in each location
 - (b) September rainfall exceeds 50 cm in each location
 - (c) March rainfall is lower than September rainfall in each location
 - (d) None of the above
37. Locations 6 and 7 differ from all the rest because only in these two locations:
- (a) April rainfall exceeds March rainfall
 - (b) Peak rainfall occurs in April
 - (c) November rainfall is lower than March rainfall
 - (d) April rainfall is less than 20 cm

Directions for questions 38 to 40: Answer the questions on the basis of following information.

In a Decathlon, the events are 100 m, 400 m, 100 m hurdles, 1500 m, high jump, pole vault, long jump, discus, shot-put and javelin. The performance in the first four of these events is consolidated into Score 1, the next three into Score 2, and the last three into Score 3. Each such consolidation is obtained by giving appropriate positive weights to individual events. The final score is simply the total of these three scores. The athletes with the highest, second highest and the third highest final scores receive the gold, silver and bronze medals, respectively. The table given below gives the scores and performance of nineteen top athletes in this event.

Name	Country	Final Score	Score-1	Score-2	Score-3	100 m	High Jump	Pole-value
Eduard Hamalainen	BLS	8802	491	5322	2989	10.74	2.1	4.8
Michael Smith	CAN	8855	174	5274	3407	11.23	2.0	4.9
Tomas Dvorak	CZE	8796	499	5169	3128	10.63	1.9	4.7
Uwe Fririmuth	DDR	8799	441	5491	3124	11.06	2.0	4.8
Torsten Voss	DHK	8880	521	5234	5868	10.69	2.1	5.1
Erki Nool	EST	8768	408	5553	2808	10.71	2.0	5.4
Christian Plaziat	FRG	8775	563	5430	2781	10.72	2.1	5.0
Jurgen Hingsen	FRG	8792	451	5223	3033	10.95	2.0	4.9
Siegfried Wentz	FRG	8856	470	5250	3137	10.85	2.1	4.8
Guido Kratschmer	FGR	8861	575	8308	3064	10.58	2.0	4.6
Daisy Thompson	GBR		582		3003	10.55	2.1	4.6
Frank Busemann	GER	8905	568	5392	2945	10.60	2.0	4.8
Alexandr Apaichev	SOV	8803	492	5370	3115	10.92	2.0	4.8
Grigory Degtyarov	SOV	8823	339	5196	3114	11.05	2.1	4.9
Robert Zmelik	TCH	8832	494	5455	2883	10.78	2.1	5.1
Dave Johnson	USA	8811	666	5370	3114	10.78	2.1	5.0
Steve Fritz	USA	8887	427	5163	3119	10.75	2.0	5.0
Brice Jenner	USA	8846	483	5280	3200	10.94	2.0	4.8
Dan O'Brien	USA	8897	408	5331	3120	10.36	2.1	4.8

38. The athletes from FRG and USA decided to run a 4 x 100 m relay race for their respective countries with the country having three athletes borrowing the athlete from CZE. Assume that all the athletes ran their stretch of the relay race at the same speed as in Decathlon event. How much more time did the FRG relay team take as compared to the USA team?
 (a) 0.18 (b) 0.28
 (c) 0.78 (d) None of these
39. What is the least that Daley Thompson must get in Score 2 that ensures him a bronze medal?
 (a) 5309 (b) 5296
 (c) 5271 (d) 5270
40. At least how many competitors (excluding Daley Thompson) must Michael Smith have out-jumped in the long jump event?
 (a) 1 (b) 2
 (c) 3 (d) 4

Directions for questions 41 to 44: Answer the questions on the basis of the following information.

The following is the Wholesale Price Index (WPI) of a select list of items with the base year of 1993-94. In other words, all the item prices are made 100 in that year (1993-94). Price in all other years for an item are measured with respect to its price in the base year. For instance, the price of cement went up by 1% in 1994-95 as compared to 1993-94. Similarly, the price of power went up by 3% in 1996-97 as compared to 1993-94.

	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01	2001-02	2002-03
All Items	100	102.0	102.5	104.00	103.00	105.00	106.00	108.00	107.00	106.00
Cement	100	101.0	100.5	103.00	102.50	103.50	103.10	103.80	103.70	104.00
Limestone	100	102.0	102.5	102.75	102.25	103.00	104.00	105.00	104.50	105.00
Power	100	101.5	102.5	103.00	103.50	104.00	106.00	107.00	107.50	108.00
Steel	100	101.5	101.0	103.50	104.00	104.25	105.00	105.50	106.00	105.50
Timber	100	100.5	101.5	102.00	102.50	102.00	103.00	103.50	104.00	104.50
Wages	100	101.5	103.0	103.50	104.500	104.00	104.25	104.75	104.90	105.30

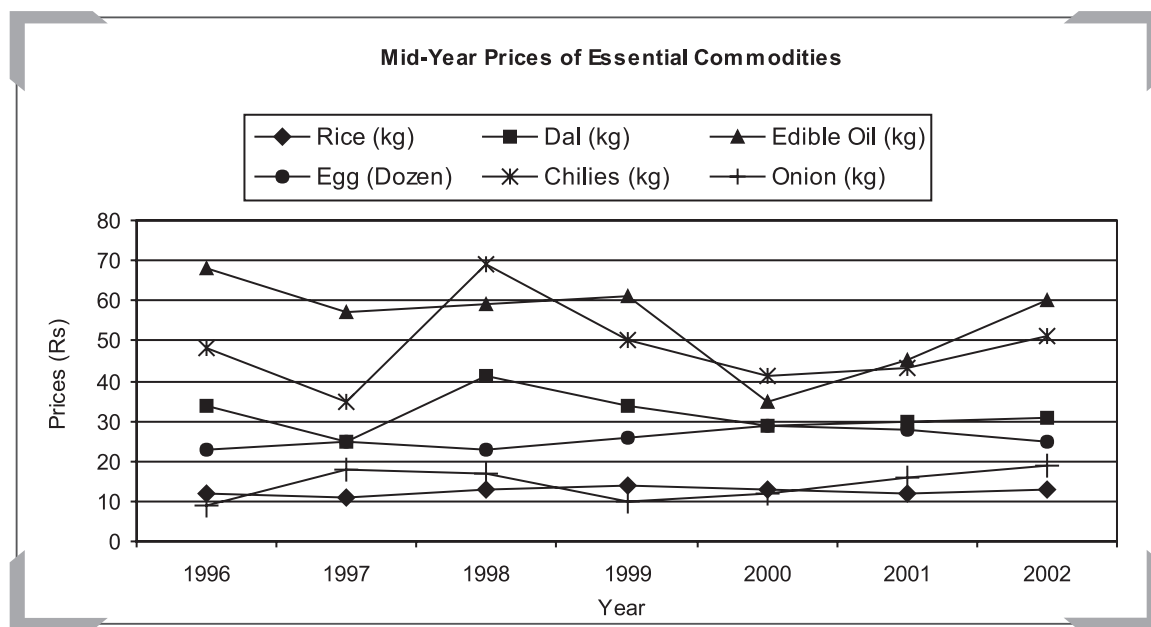
41. Let us suppose that one bag of cement (50 kgs) consumes 100 kgs of limestones and 10 units of power. The only other cost item in producing cement is in the form of wages. During 1993-94, limestone, power and wages contribute, respectively, 20%, 25%, and 15% to the cement price per bag. The average operating profit (% of price per cement bag) earned by a cement manufacturer during 2002-03 is closest to
 (a) 40 % (b) 39.5%
 (c) 38.5 % (d) 37.5 %
42. Steel manufacturing requires the use of iron ore, power and manpower. The cost of iron ore has followed the All Item Index. During 1993-94, power accounted for 30% of the selling price of steel, iron ore for 25%, and wages from 10% of the selling price of steel. Assuming the cost and price data for cement as given in the previous question, the operating profit (% of selling price) of an average steel manufacture in 2002-03
 (a) is more than that of a cement manufacturer
 (b) is less than that of a cement manufacturer
 (c) is the same as that of a cement manufacturer
 (d) cannot be determined
43. Which item experienced continuous price rise during the ten-year period?
 (a) Power (b) Cement
 (c) Wages (d) Limestone
44. Which item(s) experienced only one decline in price during the ten-year period?
 (a) Steel and Limestone
 (b) Steel and Timber
 (c) Timber
 (d) Timber and Wages

Directions for questions 45 to 47: Answer the question on the basis of the table given below.

	1901	1911	1921	1931	1941	1951	1961	1971	1981	1991	2001
AP	985	992	993	987	980	986	981	977	975	972	978
Assam	919	915	896	874	875	868	869	896	910	923	932
Bihar	1061	1051	1020	995	1002	1000	1005	957	948	907	921
Goa	1091	1108	1120	1088	1084	1128	1066	981	975	967	960
Gujarat	954	946	944	945	941	952	940	934	942	934	921
Haryana	867	835	844	844	869	871	868	867	870	865	861
HP	884	889	890	897	890	912	938	958	973	976	970
J&K	882	876	870	865	869	873	878	878	892	896	900
Karnataka	983	981	969	965	960	966	959	957	963	960	964
Kerala	1004	1008	1011	1022	1027	1028	1022	1016	1032	1036	1058
MP	972	967	949	947	946	945	932	920	921	912	920
Maharashtra	978	966	950	947	949	941	936	930	937	934	922
Orissa	1037	1056	1086	1067	1053	1022	1001	988	981	971	972
Punjab	832	780	799	815	836	844	854	865	879	882	874
Rajasthan	905	908	896	907	906	921	908	911	919	910	922
TN	1044	1042	1029	1027	1012	1007	992	978	977	974	986
UP	938	916	908	903	907	998	907	876	882	876	898
WB	945	925	905	890	852	865	878	891	911	917	934
India	972	964	955	950	945	946	941	930	934	927	933

45. Each of the following statements pertains to the number of states with females outnumbering males in a given census year. Which of these statements is not correct?
- (a) This number never exceeded 5 in any census year.
- (b) This number registered its sharpest decline in the year 1971.
- (c) The number of consecutive censuses in which this number remained unchanged never exceeded.
- (d) Prior to the 1971 census, this number was never less than 4.
46. The two states which achieved the largest increases in sex ratio over the period 1991-2001 are:
- (a) Punjab and HP
- (b) HP and Kerala
- (c) Assam and J&K
- (d) Kerala and J&K
47. Among the states which have a sex ratio exceeding 1000 in 1901, the sharpest decline over the period 1901-2001 was registered in the state of:
- (a) Goa
- (b) Tamil Nadu
- (c) Bihar
- (d) Orissa

Directions for questions 48 to 50: Answer the questions on the basis of the data presented in the figure below.



48. During 1996-2002, the number of commodities that exhibited a net overall increase and a net overall decrease, respectively, were
 (a) 3 and 3
 (b) 2 and 4
 (c) 4 and 2
 (d) 5 and 1
49. The number of commodities that experienced a price decline for two or more consecutive years is
 (a) 2
 (b) 3
 (c) 4
 (d) 5
50. For which commodities did a price increase immediately follow a price decline only once in this period?
 (a) Rice, Edible oil, and Dal
 (b) Egg and Dal
 (c) Onion only
 (d) Egg and Onion

ANSWER KEYS

1. (d)	2. (c)	3. (c)	4. (a)	5. (c)	6. (a)	7. (b)	8. (c)	9. (b)	10. (b)
11. (c)	12. (d)	13. (c)	14. (d)	15. (c)	16. (d)	17. (a)	18. (b)	19. (b)	20. (c)
21. (b)	22. (d)	23. (a)	24. (d)	25. (b)	26. (a)	27. (d)	28. (a)	29. (b)	30. (a)
31. (a)	32. (a)	33. (c)	34. (d)	35. (d)	36. (c)	37. (c)	38. (a)	39. (b)	40. (d)
41. (c)	42. (b)	43. (a)	44. (d)	45. (c)	46. (b)	47. (c)	48. (c)	49. (d)	50. (d)

HINTS AND EXPLANATIONS

1. Statement A tells us that Aakash and Biplab both score 50 runs but provide no information about the number of catches taken by Aakash. Statement B alone does not tell anything about the runs scored by Aakash and Chirag. Therefore

nothing can be concluded from A alone or B alone. On combining both the statements, we get Aakash as the "man of the match." Ans.(d)

2. Statement A: B C D A

If A cannot score 1st or 2nd position and D also cannot score 1st, 2nd and 4th position, then D has to score 3rd position.

Now at the 2nd position, neither can A come, nor B, nor D or C comes at 2nd position.

Now at 1st position B will come and at the 4th position, A will come. Hence A, alone is sufficient.

Statement B: B C D A

B has to come on 1st position, and A has to come on 4th position as none of B, C and D can come on 4th position. C will come at 2nd and D at the 3rd position.

Therefore, both statements alone are sufficient to answer the question. Ans.(c)

3. Statement A: The following equation can be formed is $600/(x - 5) - 600/x = 10$. We can solve this to get the final answer.

Statement B: Statement B does not provide sufficient data to solve the problem as actual members of the club are not stated.

4. According to the problem, we have

Let the ages of father, mother and son be F, M and S respectively.

$$(F + n) = 4(S + n) \text{ and } (M + n) = 3(S + n)$$

Statement A: It gives that $F - M = 10$, and by subtracting the two equations given above we get

$$F + n - M - n = 4S - 3S + n = S + n$$

Gives us that $S + n$ (age of son after n years) is 10 years.

Adding the two above given equations we get $F + n + M + n = 7(S + n) = 70$. Thus statement A gives us an answer.

Statement B: $S + n = 2S$, so, $S = n$. This statement does not give any conclusive answer. Hence, Ans. (a)

5. 70% have VCD Players 30% do not have VCD Players

75% have microwave ovens 25% do not have microwave ovens

80% have ACs 20% do not have ACs

85% have washing machines 15% do not have washing machines

This information confirms that $(30 + 25 + 15 + 20)$ 90% of employees do not have at least 1 of

the gadgets. So minimum percentage of employees who has all four gadgets = $100 - 90 = 10\%$. Ans.(c)

6 to 9

On examining the information given to us, we get the following table:

Husband	Wife
Anil	Anita
Raj	Joya
Raman	Shanthi
Sunil	Sridevi

Following is their order of arrival:

Anil and Anita; Raj and Joya, followed by Raman and Shanthi and then Sunil and Sridevi. Therefore we get the answers to the questions .

11 to 14

11. D, E (source from where C gets its blank answers) and I (source where C gets Q 27 wrong) must have prepared their answers before C could mark the answers. E can prepare its answer key only by using the data from (a) So, four people must have made their answer keys before C could make it. Ans.(c)

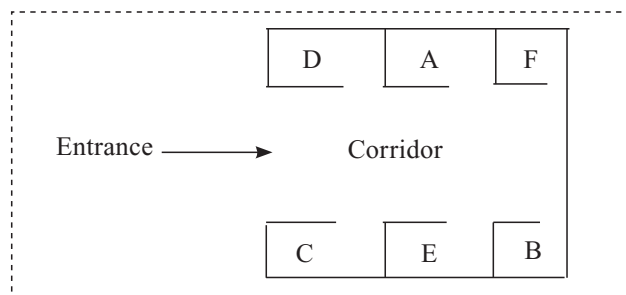
12. Only G got Q 25 wrong (as none of the other 9 people got the same question wrong), and the same is true for H. So, G and H were the sources to none of them. Ans.(d)

13. It can be seen that C got Q 56 wrong (27 wrong obtained from I), E got Q 90 wrong (46 obtained from A), H got Q 92 wrong (46 obtained from A). Hence, the only answer can be (c). Ans.(c)

14. Both E and H both got Q 46 wrong (90 and 92 were compulsorily wrong). So, both of them should have the same sources. Now A, D and G had just one wrong question each and had no blank answers. So, they should also have the same source. Ans.(d)

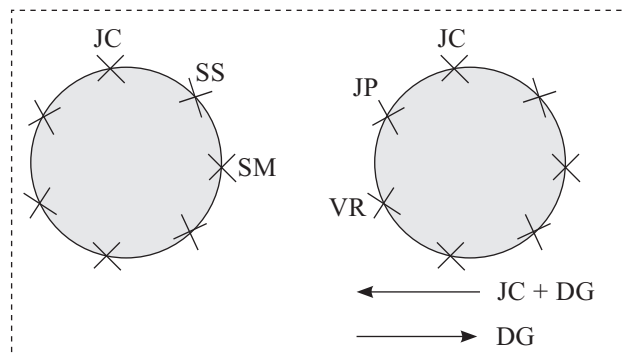
15 to 18

After analysing the given information, we can draw the following diagram:



So, answer to all these questions can be easily obtained.

19 to 22



19. The first one to enter the lounge was JC followed by SS and SM. Thereafter SM and SS left the lounge and JP, VR entered. Now, people to leave the lounge together were JC and DG and DG came back and met PK. Therefore, DG was the first to enter between JP or DG. Ans.(b)
20. DG was sitting when JP entered. Ans.(c)
21. VR met DG, JC and JP and the last two faculties to leave the lounge are JP and DG. Ans.(b)

23 and 24

After examining the information given to us, we can assign days for the parties in the following manner:

Congress	Thursday
BJP	Friday
SP	Thursday
BSP	Friday
CPM	Friday

25 to 28

After we obtain the list, we will get all the answers.

29 to 31

29. In the year 1997 there is highest export of tea as a proportion of total production. (approx.35%). Ans. (b)
30. To find the population we have to calculate (Availability of Tea) ÷ (Per capita Availability of Tea).
On finding the values for the given years, value for the year 1995 is seen to be the lowest. Ans.(a)
31. In the year 1999 there is highest Tea productivity because in the year 1999, production is the maximum and area under cultivation is the minimum. Ans.(a).

32 to 35

32. Companies B and D are excluded from the third chart because they had a negative profitability. Thus the answer has to be Ans.(a)
33. From 3rd chart. Ans.(c)
34. Options (a), (b) and (c) are correct. Ans.(d)
35. Companies with profitability exceeding 10% in F.Y.2002-03 are C and E. Their operating profits are 30 and 35 crores respectively. Their average is 32.5. Ans.(d)

38 to 40

38. Total time taken by FRG team = $(10.95 + 10.85 + 10.58 + 10.63) = 43.01$
Total time taken by USA team = $(10.78 + 10.75 + 10.94 + 10.36) = 42.83$
Difference = 0.18. Ans.(a)
39. The score of person who obtained 1st rank is 8905 and that of the 2nd rank holder is 8897. Therefore he must get a score of greater than 8880 but less than 8897. His present score is $582 + 3003 = 3585$. Now if he gets a score of 5296, his total score would become $3585 + 5296 = 8881$, and that would entitle him for a bronze medal. Ans.(b)
40. There were four competitors namely Torsten Voss, Jurgen Hingsen, Grigory Degtyarov and Steve Fritz in which Michael Smith has performed better than his competitors in long jump. Ans.(d)

41 to 44

Cement Cost	WPI	Weights	Cost
Limestone	105	0.2	21
Power	108	0.25	27
Wages	105.3	0.15	15.795

Total cost = ₹63.795

Thus, operating profit per bag of cement = $\{(104 - 63.795) \times 100\} \div 104 = 38.5\%$. Ans.(c)

43. It can be observed from the table that “Power” experiences continuous price rise during the ten-year period. Ans.(a)

44. It can be observed from the table that “Timber” and “Wages” experience only one decline in price during the ten-year period. Ans.(d)

48 to 50

48. Onion, rice, egg and chillies exhibited net overall increase and the ones that exhibited net overall decrease were dal and edible oil. Ans.(c)
49. Rice, egg, onion, dal and chillies experienced a price decline for two or more consecutive years. Ans.(d)
50. Onion and eggs satisfy the given condition. Ans.(d)

CAT 2002

INSTRUCTIONS

- ☐ Read the instruction carefully before attempting the questions.
 - ☐ Do your rough work on the Test Booklet and not on the Answer Sheet.
 - ☐ Total Questions = 50
-

Directions for questions 1 to 6: *Answer the question independently.*

Four students—Ashish, Dhanraj, Felix and Sameer sat for the Common Entrance Exam for Management (CEEM). One student got admission offer from three NIIMs (National Institutes of Management), another from two NIIMs, the third from one NIM, while the fourth got none. Below are some of the facts about who got admission offers from how many NIIMs and what is their educational background.

- (I) The one who is an engineer didn't get as many admissions as Ashish.
 - (II) The one who got offer for admissions in two NIIMs isn't Dhanraj nor he is a chartered accountant.
 - (III) Sameer is an economist.
 - (IV) Dhanraj isn't an engineer and received more admission offers than Ashish.
 - (V) The doctor got the most number of admission offers.
1. Which one of the following statement is necessarily true?
- (a) Ashish is a chartered accountant and got offer for admission in three NIIMs.

- (b) Dhanraj is a doctor and got admission in one NIM.
 - (c) Sameer is an economist who got admission offer in two NIIMs
 - (d) Felix who is not an engineer didn't get any offer for admission.
2. Five boys went to a store to buy sweets. One boy had ₹40, another boy had ₹30. Two other boys had ₹20 each. The remaining boy had ₹10. Below are some more facts about the initial and final cash position.
- (I) Alam started with more than Jugraj.
 - (II) Sandeep spent ₹1.50 more than Daljeet.
 - (III) Ganesh started with more money than just only one other person.
 - (IV) Daljeet started with $\frac{2}{3}$ of what Sandeep started with.
 - (V) Allam spent the most, but did not end with the least.
 - (VI) Jugraj spent the least and ended with more than Alam or Daljeet
 - (VII) Ganesh spent ₹3.50.
 - (VIII) Allam spent 10 times more than what Ganesh did.

In the choices given below, all statements except one are false. Which one of the following statements can be true?

- (a) Alam started with ₹40 and ended with ₹9.50.
 (b) Sandeep started with ₹30 and ended with ₹1.
 (c) Ganesh started with ₹20 and ended with ₹4.
 (d) Jugraj started with ₹10 and ended with ₹7.
3. In a hospital there were 200 diabetes, 150 hyperglycemia and 150 gastroenteritis patients. Of these, 80 patients were treated for both diabetes and hyperglycemia. Sixty patients were treated for gastroenteritis and hyperglycemia, while 70 were treated. Some of these patients all the three diseases. Doctor Dennis treats with only gastroenteritis. Doctor Paul is a generalist. Therefore, he can treat patient with multiple diseases. Patients always prefer specialist for their disease. If Doctor Dennis has 80 patients, then the other three doctors can be arranged in terms of number of patients treated as:
 (a) Paul > Gerard > Hormis
 (b) Paul > Hormis > Gerard
 (c) Gerard > Paul > Hormis
 (d) None of these
4. Three children won the prizes in the Bournvita quiz contest. They are from the schools: Loyala, Convent and Little Flowers which are located at different cities. Below are some of the facts about the schools, the children and the city they are from,
 (i) One of the children is Bipin
 (ii) Loyala School's contestant did not come first
 (iii) Little Flower's contestant was named Riaz
 (iv) Convent School is not in Hyderabad
 (v) The contestant from Pune is not from Loyala School
 (vi) The contestant from Bangalore did not come first
 (vii) Convent School's contestant's name is not Balbir
- Which of the following statements is true?
 (a) First prize: Riaz (Little Flowers), 2nd prize: Bipin (Convent), 3rd prize: Balbir (Loyala)
 (b) First prize: Bipin (Convent), 2nd prize: Riaz (Little Flowers), 3rd prize: Balbir (Loyala)
 (c) First prize: Riaz (Little flowers), 2nd prize: Balbir (Loyala), 3rd prize: Bipin (Convent)
 (d) First prize: Bipin (Convent), 2nd prize: Balbir (Loyala), 3rd prize: Riaz (Little flower)
5. Two boys are playing on a ground. Both the boys are less than 10 years old. Age of the younger boy is equal to the cube root of the product of the age of the two boys. If we place the digit representing the age of the younger boy to the left of the digit representing the age of the elder boy, we get the age of the father of the younger boy. Similarly, if we place the digit representing the age of the elder boy to the left of

the digit representing the age of the younger boy and divide the figure by 2, we get the age of the mother of the younger boy. The mother of the younger boy is younger to his father by 3 years. Then, what is the age of the younger boy?

- (a) 3 (b) 4
 (c) 2 (d) None of these
6. Flights A and B are scheduled from an airport within the next one hour. All the booked passengers of the two flights are waiting in the boarding hall after check-in. The hall has a seating capacity of 200, out of which 10% remained vacant. 40% of the waiting passengers are ladies. When boarding announcement came, passengers of flight A left the hall and boarded the flight. Seating capacity of each flight is two-third of the passengers who waited in the waiting hall for both the flights put together. Half the passengers who boarded flight A are women. After boarding for flight A, 60% of the waiting hall seats became empty. For every twenty of those who are still waiting in the hall for flight B, there is one airhostess in flight A. What is the ratio of empty seat in flight B to the number of airhostesses in flight A?
 (a) 10:1 (b) 5:1
 (c) 20:1 (d) 1:1

Directions for questions 7 to 10: Answer the questions based on the information given below.

A country has following types of traffic signals.

3 red lights	= Stop
2 red light	= turn left
1 red light	= turn right
3 green lights	= go at 100 km/h speed
2 green lights	= go at 40 km/h speed
1 green light	= go at 20 km/h speed

A motorist starts at a point on a road and follows all traffic signals. His car is heading towards the north. He encounters the following signals (the time mentioned in each case below is applicable after crossing the previous signal).

Starting point—1 green light

After half an hour, 1st signal—2 red and 2 green lights.

After 15 mins, 2nd signal—1 red light

After half an hour, 3rd signal—1 red and 3 green lights

After 24 mins, 4th signal—2 red and 2 green lights

After 15 min, 5th signals—3 red lights

7. The total distance travelled by the motorists from the starting point till the last signal is
 (a) 90 km
 (b) 100 km
 (c) 120 km
 (d) None of these
8. What is the position (radial distance) of the most motorists when he reaches the last signal?
 (a) 45 km directly north of the starting point
 (b) 30 km directly to the east of the starting point
 (c) 50 km away to the north-east of the starting point
 (d) 45 km away to the north-west of the starting point
9. After the starting point if the 1st signal were one red and 2 green lights, what would be the final position of the motorist?
 (a) 30 km to the west and 20 km to the south
 (b) 30 km to the west and 40 km to the north
 (c) 50 km to the east and 40 km to the north
 (d) Directly 30 km to the east
10. If at the starting point, the car was heading towards south, what would be the final position of the motorist?
 (a) 30 km to the east and 40 km to the south
 (b) 50 km to the east and 40 km to the south
 (c) 30 km to the west and 40 km to the south
 (d) 50 km to the west and 20 km to the north

Directions for questions 11 to 13: Answer these question based on the table given below.

The following tables provides data on the different countries and location of their capitals. (The data may not match the actual Latitude, Longitudes). Answer the following questions on the basis of this table.

S. No.	Country	Capital	Latitude	Longitude
1	Argentina	Buenos Aires	34.30 S	58.20 E
2	Australia	Canberra	3.15 S	149.08 E
3	Austria	Vienna	48.12 N	16.22 E
4	Bulgaria	Sofia	42.45 N	23.20 E
5	Brazil	Brasilia	15.47 S	47.55 E
6	Canada	Ottawa	45.27 N	75.42 E
7	Cambodia	Phnom Penh	11.33 N	104.55 E
8	Equador	Quito	0.15 S	78.35 E
9	Ghana	Accra	5.35 N	0.6 E
10	Iran	Tehran	35.44 N	51.30 E
11	Ireland	Dublin	53.20 N	6.18 E
12	Libya	Tripoli	32.49 N	13.07 E
13	Malaysia	Kuala Lumpur	3.9 N	101.41 E
14	Peru	Lima	12.05 S	77.0 E
15	Poland	Warsaw	52.13 N	21.0 E
16	New Zealand	Wellington	41.17 S	174.47 E

(Continued)

S.No.	Country	Capital	Latitude	Longitude
17	Saudi Arabia	Riyadh	24.41 N	46.42 E
18	Spain	Madrid	40.25 N	3.45 W
19	Sri Lanka	Colombo	6.56 N	79.58 E
20	Zambia	Lusaka	15.28 S	28.16 E

11. What percentage of cities located within 10° east and 40° east (20° east and 40° east) lie in the Southern Hemisphere?
 (a) 15% (b) 20%
 (c) 25% (d) 30%
12. The number of cities whose name begin with a consonant and are in the Northern Hemisphere in the table?
 (a) exceeds the number of cities whose names begin with a consonant and are in the southern hemisphere by 1.
 (b) exceeds the number of cities whose name begins with a consonant and are in southern hemisphere by 2.
 (c) is less than the number of cities whose name begin with a consonant and are in the east of the meridian by 1.
 (d) is less than the number of countries whose name begins with a consonant and are in the east of the meridian by 3.
13. The ratio of the number of countries whose name starts with vowels and located in the southern hemisphere, to the number of countries, the name of whose capital cities start with a vowel in the table above is
 (a) 3 : 2 (b) 3 : 3
 (c) 3 : 1 (d) 4 : 3
14. In a hockey match, the Indian team was behind by 2 goals with 5 min remaining. Did they win the match?
 (A) Deepak Thakur, the Indian striker, scored three goals in the last 5 mins of the match.
 (B) Korea scored a total of three goals in the match.
 (a) 1 (b) 2
 (c) 3 (d) 4
15. Four students were added to a dance class. Would the teacher be able to divide her students evenly into a dance team,(or teams) of 8?
 (A) If 12 students were added, the teacher could put every one in teams of 8 without any left lovers.
 (B) The number of students in the class is currently not divisible by 8.
 (a) 1 (b) 2
 (c) 3 (d) 4
16. Is $X = Y$?
 (A) $(X + Y)(1/X + 1/Y) = 4$
 (B) $(X - 50)^2 = (Y - 50)^2$
 (a) 1 (b) 4
 (c) 3 (d) 4
17. A dress was initially listed at a price that would have given the store a profit of 20% of the wholesale cost. What was the wholesale cost of the dress?
 (A) After reducing the listed price by 10%, the dress sold with a net profit of \$ 10.
 (B) The dress is sold for \$ 50.
 (a) 1 (b) 2
 (c) 3 (d) 4
18. Is 500 the average (arithmetic mean) score in the GMAT?
 (A) Half of the people who take the GMAT score above 500 and half of the people score below 500
 (B) The highest GMAT score is 800 and lowest score is 200.
 (a) 1 (b) 2
 (c) 3 (d) 4

Directions for questions 14 to 21: Each item is followed by two statements, (A) and (B) answer each question using the following instructions.

Choose 1 if the question can be answered by one of the statement alone but not by the other.

Choose 2 if the question can be answered by using either statement alone.

Choose 3 if the question can be answered by using both the statements together, but cannot be answered by using either statement alone.

Choose 4 if the question cannot be answered by either of the statements

19. Is $|x - 2| < 1$?
 (A) $|x| < 1$
 (B) $|x - 1| < 2$
 (a) 2 (b) 1
 (c) 3 (d) 4
20. People in a club either speak French or Russian or both. Find the number of people in a club who speak only French.
 (A) There are 300 people in the club and the number of people who speak both French and Russian is 196.
- (B) The number of people who speak only Russian is 58.
 (a) 1 (b) 2
 (c) 3 (d) 4
21. A sum of ₹38,500 was divided among Jagdish, Punit and Girish. Who received the minimum amount?
 (A) Jagdish received $\frac{2}{9}$ of what Punit and Girish received together.
 (B) Punit received $\frac{3}{11}$ of what Jagdish and Girish received together.
 (a) 1 (b) 2
 (c) 3 (d) 4

Directions for questions 22 to 25: Answer the questions based on the following information.

The following table gives details regarding the total earnings of 15 employees and the number of days they have worked on complex, medium and simple operation in the month of June 2002. Even though the employees might have worked on an operation, they would be eligible for earnings only if they have minimum level of efficiency.

Emp. No	Total Earnings				Total Days			
	Complex	Medium	Simple	Total	Complex	Medium	Simple	Total
2001147	82.98		636.53	719.51	3.00	0.00	23.00	26.00
2001148	51.53		461.73	513.26	3.33	1.67	16.00	21.00
2001149	171.1		79.10	250.81	5.50	4.00	8.50	18.00
2001150	100.47		497.47	597.95	6.00	4.67	7.33	18.00
2001151	594.43	159.64		754.06	9.67	13.33	0.00	23.00
2001156	89.70			89.70	8.00	0.00	1.00	9.00
2001158	472.31	109.73		582.04	1.39	9.61	0.00	11.00
2001164	402.25	735.22	213.67	1351.14	5.27	12.07	0.67	18.00
2001170	576.57			576.57	21.00	0.00	0.00	21.00
2001171	286.48	6.10		292.57	8.38	4.25	0.38	13.00
2001172	512.10	117.46		629.56	10.00	8.50	3.50	22.00
2001173	1303.88			1303.88	25.50	0.00	0.50	26.00
2001174	1017.94			1017.9	26.00	0.00	0.00	26.00
2001179	46.56	776.19		822.75	2.00	19.00	0.00	21.00
2001180	116.40	1262.79		1379.19	5.00	19.00	0.00	24.00

22. The number of employees who have earned more than ₹50 per day in complex operations is
 (a) 4 (b) 3
 (c) 5 (d) 6
23. The number of employees who have earned more than ₹600 and having more than 80% attendance (there are 25 regular working days in June 2002; some might be coming on overtime too) is
 (a) 4 (b) 5
 (c) 6 (d) 7
24. The employee number of the person who has earned the maximum earnings per day in medium operation is
 (a) 2001180 (b) 2001164
 (c) 2001172 (d) 2001179
25. Among the employees who were engaged in complex and medium operations, the number of employees whose average earning per day in complex operations is more than average earning per day in medium operations is
 (a) 2 (b) 3
 (c) 5 (d) 7

Directions for questions 26 to 33: Answer the questions based on the table given below:

The following table shows the revenue and expenses in millions of Euros (European currency) associated with REPSOL YPF company's oil and gas producing activities in operations in different parts of the world for 1998–2000.

REPSOL YPF'S Operations of Oil and Gas Producing Activities

S. No.	Item	Year	Total World	Spain	North Africa & Middle East	Argentina	Rest of Latin America	Far East	North Sea	Rest of the World
1	Revenue	1998	916	70	366	281	34	82	78	5
		1999	3374	55	666	2006	115	301	140	91
		2000	8328	394	1290	5539	482	603	0	20
2	Expenses	1998	668	39	255	187	57	63	52	15
		1999	1999	48	325	1168	131	204	65	58
		2000	3709	43	530	2540	252	311	0	33
3	Income before taxes and charges (Revenue-expenses) = [(a) – (b)]	1998	248	31	111	94	–23	19	26	–10
		1999	1375	7	341	838	–16	97	75	33
		2000	4619	351	760	2999	230	292	0	–13
4	Taxes and charges	1998	152	6	104	33	–3	9	6	–3
		1999	561	3	169	338	–6	39	21	–3
		2000	1845	126	404	1150	61	103	0	1
5	Net income taxes charges [= (c) – (d)]	1998	96	25	7	61	–20	10	20	–7
		1999	814	4	172	500	–10	58	54	36
		2000	2774	225	356	1849	169	189	0	–14

26. How many operations (Spain, North Africa and Middle east) of the company accounted for less than 5% of the total revenue earned in 1999?
 (a) 2 (b) 3
 (c) 4 (d) None of these
27. How many operations (Spain, North Africa and Middle East) of the company witnessed more than 200% revenue from 1999 to 2000?
 (a) 1 (b) 2
 (c) 3 (d) None of these
28. How many operations registered a sustained yearly increase in income before taxes and charges from 1998 to 2000?
 (a) 3 (b) 4
 (c) 5 (d) None of these
29. Ignoring the loss making operations of the company in 1998, for how many operations was the percentage increased in net income before taxes and charges higher than the average from 1998 to 1999?
 (a) 0 (b) 1
 (c) 2 (d) None of these
30. If profitability is defined as the ratio of net income after taxes and charges to expense, which of the following statements is true?
 (a) The Far East operations witnessed its highest profitability in 1998.
 (b) The North Sea operations increased its profitability from 1998 to 1999.
 (c) The operations in Argentina witnessed a decrease in profitability from 1998 to 1999.
 (d) Both (b) and (c) are true.
31. In 2000, which among the following countries had the best profitability?
 (a) North America and Middle East
 (b) Spain
 (c) Rest of Latin America
 (d) Far east
32. If efficiency is defined as the ratio of revenue to expenses, which operation was the least efficient in 2000?
 (a) Spain (b) Argentina
 (c) Far east (d) None of these
33. Of the following statements, which one is not true?
 (a) The operations in Spain had the best efficiency in 2000
 (b) The Far East operations witnessed an efficiency improvement from 1999 to 2000
 (c) The North Sea operations witnessed an efficiency improvement from 1998 to 1999

- (d) In 1998, the operations in Rest of Latin America were the least efficient

Directions for questions 34 and 35: Answer the questions based on the pie charts given below.

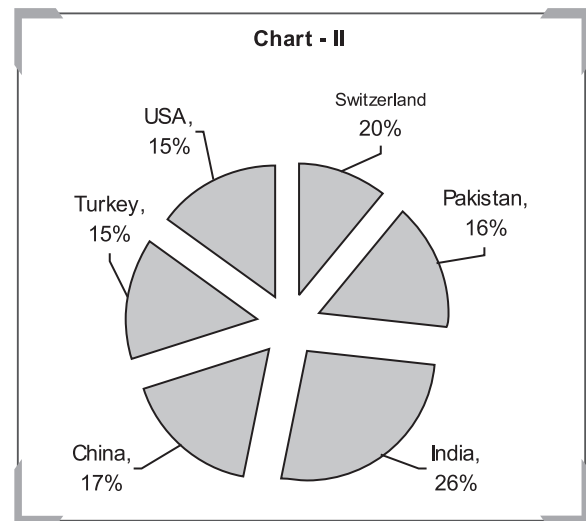
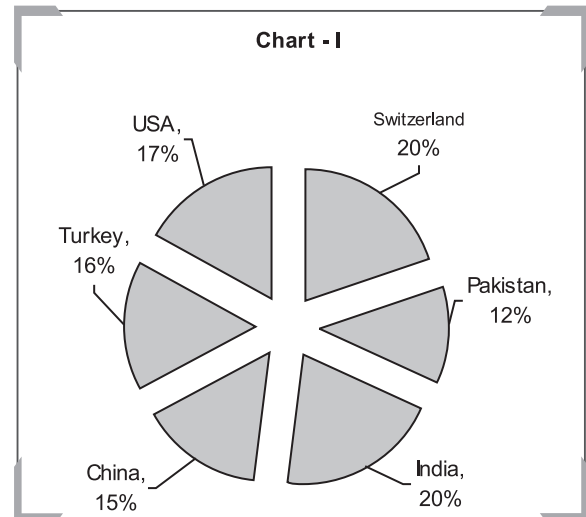


Chart I shows the distribution by value of top 6 suppliers of MFA textiles in 1995. Chart II shows the distribution by quantity of top 6 suppliers of MFA textiles in 1995. The total value is 5760 million Euro (European currency). The total quantity is 1.055 million tones.

34. The country which has the highest average price is
 (a) USA (b) Switzerland
 (c) Turkey (d) India
35. The average price in Euro per kilogram for Turkey is roughly
 (a) 6.20 (b) 5.60
 (c) 4.20 (d) 4.80

Directions for questions 36 to 41: *Answer these questions based on the tables given below.*

There are 6 refineries, 7 depots and 9 districts. The refineries are BB, BC, BD, BE, BF and BG. The depots are AA, AB, AC, AD, AE, AF and AG. The districts are AAA, AAB, AAC, AAD, AAE, AAF, AAG, AAH and AAI. Table A gives the cost of transporting one unit from refinery to depot. Table B gives the cost of transporting one unit from depot to a district.

Table 1

	BB	BC	BD	BE	BF	BG
AA	928.2	537.2	567.8	589.9	589.9	800.1
AB	311.1	596.7	885.7	759.9	759.9	793.9
AC	451.1	0	320.1	780.1	720.7	1000.1
AD	371.1	150.1	350.1	750.1	650.4	980.1
AE	1137.3	314.5	0	1157.7	1157.7	1023.4
AF	617.1	516.8	756.5	1065.9	1065.9	406.3
AG	644.3	299.2	537.2	1093.1	1093.1	623.9

Table 2

	AA	AB	AC	AD	AE	AF	AG
AAA	562.7	843.2	314.5	889.1	0	754.8	537.2
AAB	532.7	803.2	284.5	790.5	95.2	659.6	442
AAC	500.7	780.2	0	457.3	205.7	549.1	331.5
AAD	232.9	362.1	286.2	275.4	523.6	525.3	673.2
AAE	345.1	268.6	316.2	163.2	555.9	413.1	227.8
AAF	450.1	644.3	346.2	372.3	933.3	402.9	379.1
AAG	654.5	0	596.7	222.7	885.7	387.6	348.5
AAH	804.1	149.6	627.2	360.4	1035.3	537.2	498.1
AAI	646	255	433.5	137.7	698.7	112.2	161.5

36. What is the least cost of sending one unit from any refinery to any district?
(a) 95.2 (b) 0
(c) 205.7 (d) 284.5
 37. What is the least cost of sending one unit from any refinery to the district AAB?
(a) 0 (b) 284.5
(c) 95.2 (d) None of these
 38. What is the least cost of sending one unit from refinery BB to any district?
(a) 284.5 (b) 311.1
(c) 451.1 (d) None of these
 39. What is the least cost of sending petrol from refinery BB to district AAA?
(a) 765.6 (b) 1137.3
(c) 1154.3 (d) None of these

40. How many possible ways are there for sending petrol from any refinery to any district?

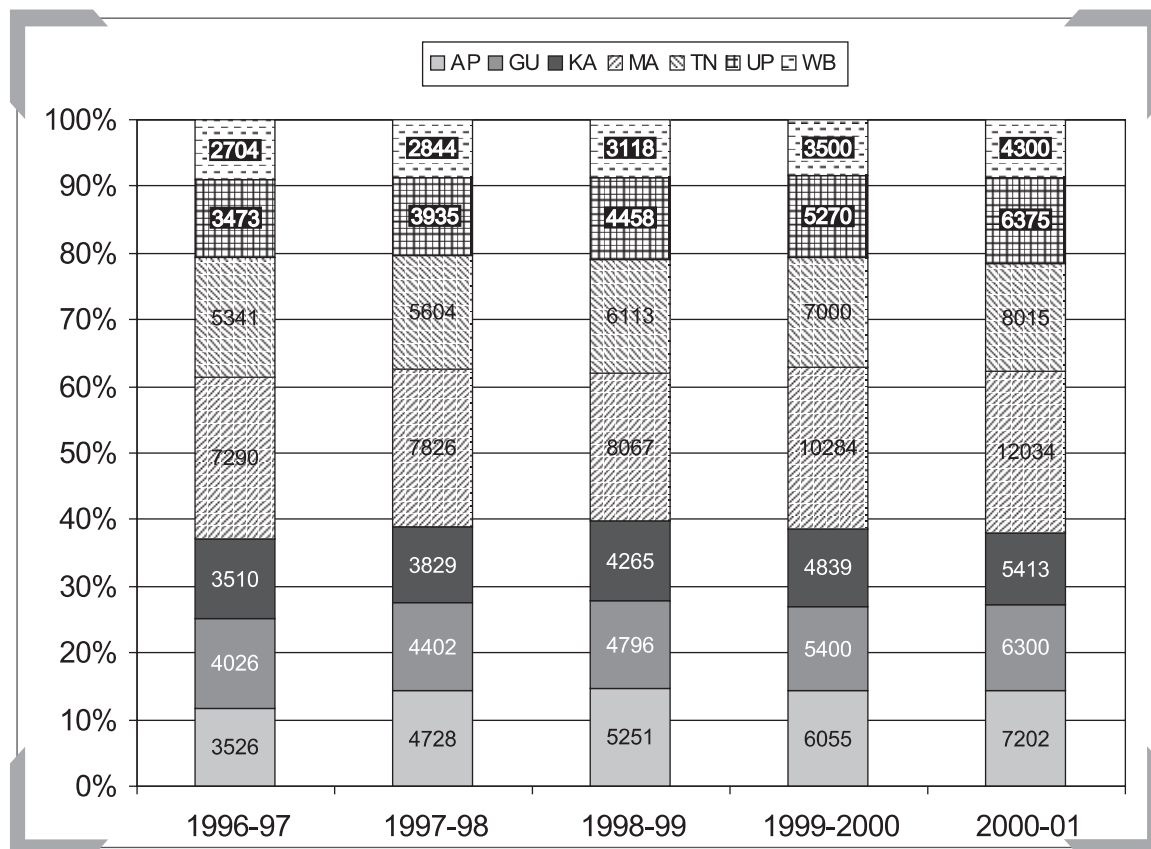
(a) 63 (b) 42
(c) 54 (d) 378

41. The largest cost of sending petrol from any refinery to any districts is

(a) 2172.6 (b) 2193.0
(c) 2091.0 (d) None of these

Directions for questions 42 to 47: Answer the questions based on the chart given below.

The chart given below indicates the annual sales tax revenue collections (in rupees in crores) of seven states from 1997 to 2001. The values given at the top of each bar represents the total collections in that year.



WB= West Bengal, UP= Uttar Pradesh, TN= Tamil Nadu, MA= Maharashtra, KA= Karnataka, GU= Gujarat, AP= Andhra Pradesh.

42. If for each year, the states are ranked in terms of the descending order of sales tax collections, how many states do not change the ranking more than over the five years?
- (a) 1 (b) 5
(c) 3 (d) 4
43. Which one of the following states has changed its relative ranking most number of times when you rank the states in the terms of the descending volume of states tax collections each year?
- (a) Andhra Pradesh (b) Uttar Pradesh
(c) Karnataka (d) Tamil Nadu

44. The percentage share of sales tax revenue of which state has increased from 1997 to 2001?
- (a) Tamil Nadu (b) Karnataka
(c) Gujarat (d) Andhra Pradesh
45. Which pair of successive years shows the maximum growth rate of tax rate of tax revenue in Maharashtra?
- (a) 1997 to 1998 (b) 1998 to 1999
(c) 1999 to 2000 (d) 2001 to 2001
46. Identify the state whose tax revenue increased exactly by the same amount in two successive pair of years.
- (a) Karnataka (b) West Bengal
(c) Uttar Pradesh (d) Tamil Nadu

47. Which state below has been maintaining a constant rank over the years in terms of its contribution to total tax collections?

(a) Andhra Pradesh (b) Karnataka
(c) Tamil Nadu (d) Uttar Pradesh

Directions for questions 48 to 50: Answer the questions based on the table given below.

The table below gives information about four different crops, their different quality, categories and the regions where they are cultivated. Based on the information given in the table answer the questions below.

Type of crop	Quality	Region
Crop-1	High	R1, R2, R3, R4, R5
	Medium	R6, R7, R8
	Low	R9, R10, R11
Crop-2	High	R5, R8, R12
	Medium	R9, R13
	Low	R6, R7, R8
Crop-3	High	R2, R6, R7, R13
	Medium	R3, R9, R11
	Low	R1, R4

Crop-4	High	R3, R10, R11
	Medium	R1, R2, R4
	Low	R5, R9

48. How many regions produce medium qualities of Crop-1 or Crop-2 and also produce low quality of Crop-3 or Crop-4?
- (a) Zero (b) One
(c) Two (d) Three
49. Which of the following statement is true?
- (a) All medium quality Crop-2 producing regions are also high quality Crop-3 producing regions
(b) All high quality Crop-1 producing regions are also medium and low Crop-4 producing regions.
(c) There are exactly four Crop-3 producing regions, which also produce Crop-4 but not Crop-2.
(d) Some Crop-3 producing regions produce Crop-1, but not high Quality Crop-2.
50. How many low quality Crop-1 producing regions are either high quality Crop-4 producing regions or medium quality Crop-3 producing regions?
- (a) One (b) Two
(c) Three (d) Zero

ANSWER KEYS

1. (c)	2. (d)	3. (d)	4. (c)	5. (c)	6. (a)	7. (a)	8. (c)	9. (c)	10. (c)
11. (b)	12. (d)	13. (a)	14. (d)	15. (a)	16. (a)	17. (a)	18. (d)	19. (b)	20. (c)
21. (c)	22. (c)	23. (d)	24. (a)	25. (c)	26. (c)	27. (b)	28. (d)	29. (b)	30. (b)
31. (b)	32. (d)	33. (d)	34. (b)	35. (b)	36. (b)	37. (a)	38. (b)	39. (a)	40. (d)
41. (b)	42. (b)	43. (b)	44. (d)	45. (c)	46. (a)	47. (c)	48. (b)	49. (d)	50. (c)

HINTS AND EXPLANATIONS

1. (c)
According to statement c.
(a) Ashish is not an engineer, (b) Ashish has got more offers than engineers.

Therefore, Ashish did not have 0 offers.
Now, we can put the above given information in the table like the one given below:

Profession	Names	Offers				
		3	2	1	0	X profession
CA	Ashish	X	X	X	X	X engineer
MD	Dhanraj	√	X	X	X	X engineer
Economist	Sameer	X	√	X	X	
Engineer		X	X	X	√	

From statement IV, Dhanraj is not 0 and 1.

- 2. (d)**

Option (c) is ruled out by statement VII.

Option (a) is ruled out by statement VII and VIII.

From statement IV, Sandeep had ₹30 to start with and Daljeet ₹20.

From statement II, Option (b) is not possible as Sandeep was left with ₹1, he spent ₹29 but according to (b) he spent ₹1.50 more than Daljeet. But Daljeet had only ₹20. Hence, option (d) is correct.

- 3. (d)**

Data insufficient, please check the question.

- 4. (c)**

Statements V and VI rule out the options (a) and (b). The contestants from Bangalore and Pune did not come first, so, school from Hyderabad can come first. Convent is not in Hyderabad which rules out option (d).

- 5. (c)**

Only two combinations possible are:

Younger	Older
2	4
3	9

Cubes of natural numbers are 1,8,27,64.....
Here, 64 and above is not possible as the age will go above 10. Only (b) and (c) satisfy the case of mother and father.

- 6. (a)**

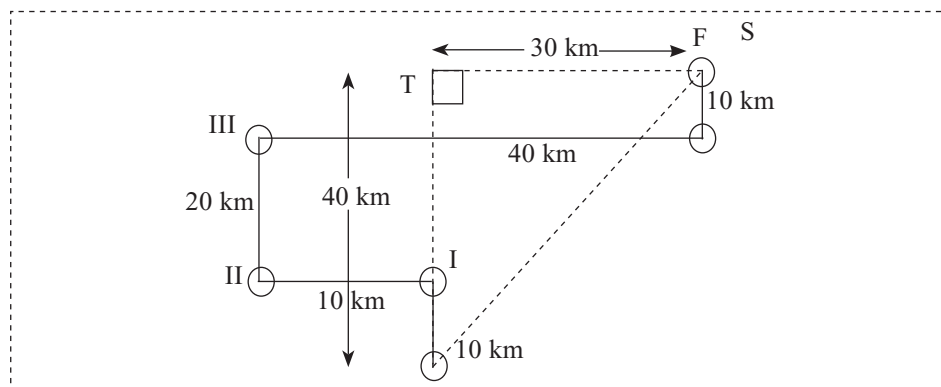
Total seats in the hall	200
Seats vacant	20
Total waiting	180
Ladies	72

Seating capacity of Flight 2/3 $\times$ 180	= 120
Number of people in Flight A	= 100
For flight B = 180 – 100	= 80
Thus, number of airhostess for A	= 4
Empty seats in flight B = 120 – 80	= 40
40: 4	= 10 : 1

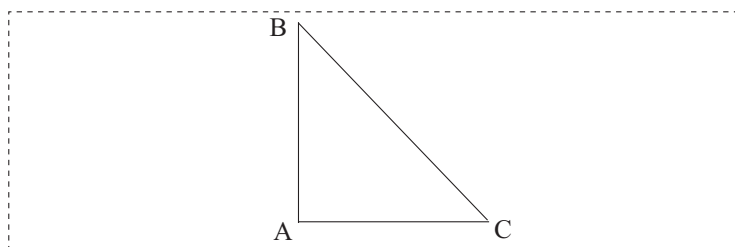
- 7. S = Distance covered; v = Velocity (Km/h)**

$t = \text{Time taken ; } s = v \times t$

The total distance travelled by the motorists from the starting point till last signal is $10 + 10 + 20 + 40 + 10 = 90$ km.



8. Applying Pythagoras theorem, for a right-angled triangle.

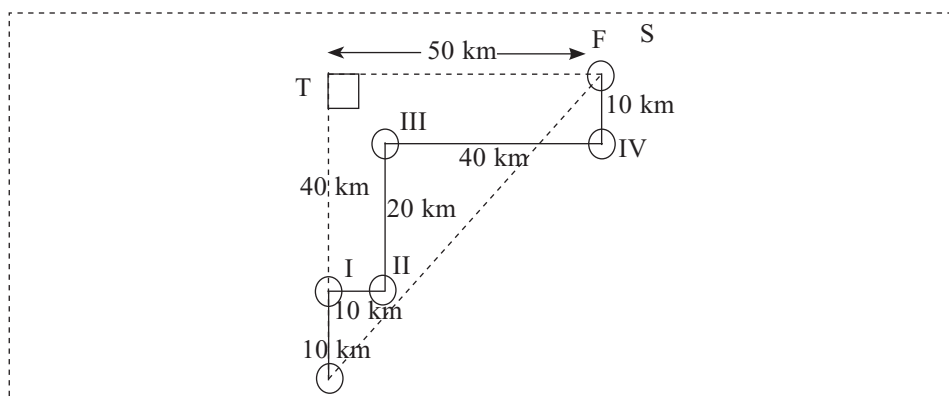


$$(BC)(BC) = (AB)(AB) + (AC)(AC)$$

$$BC = \sqrt{(AB)(AB) + (AC)(AC)} = 50 \text{ km.}$$

9. (c)

For the case when 1st signal were 1 red and 2 green lights, the surface diagram will be as given below.



$$TF = 50 \text{ km; } ST = 40 \text{ km}$$

Going by the above figure, option (c) is correct, 50 km to the east and 40 km to the north.

10. (c)

If the car heads towards south from here starting point.

Finish

From the figure given above we can infer that option (c) is correct.

11. (b)

Total five countries lie between 10 E and 40 E

Austria,	Bulgaria,	Libya,	Poland,	Zambia
N	N	N	N	S

$$1/5 = 20\%$$

12. (d)

Number of cities whose names are starting with consonants and are located in the northern hemisphere

$$= 10.$$

Number of countries whose names are starting with consonants and are located in the east of the meridian

$$= 13.$$

Hence, option (d), the difference is 3.

13. (a)

Three countries whose names are starting with vowels and are located in Southern Hemisphere—Argentina, Australia and Ecuador and two countries with capital's names beginning with vowels—Canada and Ghana.

14. (d)

Let us consider two cases:

- (a) If 5 mins are left with the score with 0–2. then final score could have been 3–3. [Assuming that there is no other Indian score]
 (b) But if the score before 5 mins was 1–3, then final score could have been 4–3.

15. (a)

From statement A, if by adding 12 student s, total number of students can be divided by by 8, then by adding 4 students, it will be divisible by 8.

16. (a)

$$\text{From (A), } (x + y) \left\{ \frac{1}{x} + \frac{1}{y} \right\} = 4$$

$$\text{or } (x+y) \left(\frac{x+y}{xy} \right) = 4$$

$$\Rightarrow (x+y)(x+y) = (4xy)$$

$$\Rightarrow (x-y)(x-y) = 0$$

$$\Rightarrow x = y \dots \dots (i)$$

$$\text{From B, } (x-50)(x-50) = (y-50)(y-50)$$

When we solve we get

$$x(x-100) = y(y-100) \dots \dots (ii)$$

Therefore, we can conclude that the value of x and y can either be 0 or 100.

17. (a)

Statement (A) Let the wholesale price be x .
Thus, listed prices = $1.2x$
After a discount of 10%, new price
= $0.9 \times 1.2x = 1.08x$
 $1.08x - x = 10$ \$. Now x can be found.

Statement (B) From what is known to us we do not know at what percentage profit, or at what amount of profit was the dress actually sold.

18. (d)

A gives 500 as median and β gives 600 as range. A and B together do not give average. Therefore, it cannot be answered from the given statements.

19. (b)

From statement A, we know that all $-1 < x < 1$,
We can determine $|x-2| < 1$ is not true.

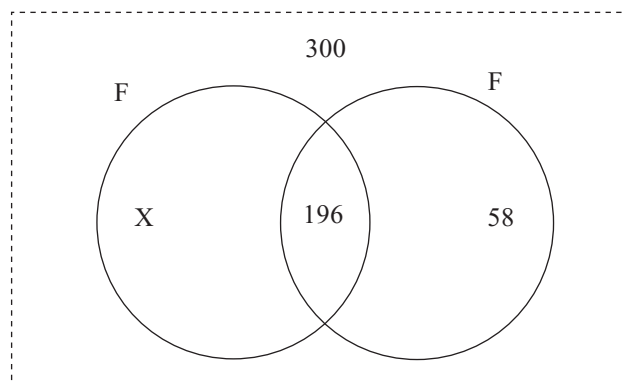
From B, $-1 < x < 3$, we cannot determine whether $|x-2| < 1$ or not. Therefore, statement B alone is sufficient.

20. (c)

From statement A, we cannot derive anything.

From B alone we cannot find anything.

From A and B,



$$x + 196 + 58 = 300.$$

21. (c)

Jagdish (J), Punit (P), Girish (G)

$$(A) J = \frac{2}{9}[P + Q]$$

$$P + G + J = 38500$$

Thus, only J can be found.

(B) Similarly, from this only P can be found.
Combining the two J, P and G can be found.

22. (c)

Emp. No 51, 58, 64, 72, 73 satisfy them

$$\text{Total} = 5$$

23. (d)

80% attendance = 80% of 25 = 20 days

Employee nos. 47, 51, 72, 73, 74, 79, 80.

Thus, total = 7

24. (a)

Emp. Number	Earnings E (medium)	Number of days D (medium)	E/D
2001151	159.64	13.33	11.97
2001158	109.72	9.61	11.41
2001164	735.22	12.07	6091
2001171	6.10	4.25	—
2001172	117.46	8.50	13.81
2001179	776.19	19.00	40.85
2001180	1262.79	19.00	66.46

25. (c)

If you know vedic mathematics you can easily compare the fraction in time. Thus, Emp. Number 1, 58, 64, 71, 72 satisfy the condition.

(for emp. 64, you see 12 is not the double of 5 and 735 is also not even double of 402.

Hence, $402/5 > 735/12$, (c)

26. (c)

Total revenue of 1999 = 3374

$$5\% \text{ of } 3374 = 3374 \times 5/100 = 168.7$$

For 1999, revenue of Spain is 55, of Latin America is 115, north is 140, rest of the world is 91.

Therefore, all four operations of the company accounted for less than 5% of the total revenue earned in the 1999.

27. (b)
For men 200% growth. The value should be more than 3 times.
28. (d)
Four operations that are given below:
1. North Africa and Middle east 2. Argentina
3. Rest of Latin America 4. Far east
Have registered yearly increase in income before taxes and charges from 1998–00.
29. (b)
There is % increase in net income before tax and charges for total world(1998–99) = $1375 - 248/248 \times 100 = 454.4\%$
Spain is running in loss.
There is % increase of north Africa and Middle east = $341 - 111/111 \times 100 = 207.2\%$
There is % increase for Argentina = $838 - 94/94 \times 100 = 791.5\%$
From table 1, we can directly say that there is no operation other than Argentina, whose % increase in net income before taxes and charges are higher than the average of the world.
30. (b)
Statement (a) is wrong.
(b) $54/65 > 20/52$. Hence, (b) is correct.
(c) $500/1168 > 61/187$. Statement (c) is again wrong.
31. (b)
The Profitability of North Africa and Middle east in 2000 = $356/530 = 0.67$
The Profitability of Spain in 2000 = $225/43 = 5.23$
The Profitability of the rest of Latin America in 2000 = $169/252$, which is less than 1.
The Profitability of far East in 2000 = $189/311 = < 1$
32. (d)
Except for the operations of the rest of Latin America and the Rest of the world all the other operations are greater than 2.
33. (d)
It will take alot of time to check option (d)
But if you happen to first rule out the options (a), (b) and (c), then you can mark (d).
34. (b)
By looking at the charts we see that Switzerland's ratio of chart 1 to chart 2 is $20/11$ has the highest prize per unit kilogram for its supply. Finding

the ratio of the value and quantity gives you the solution.

35. (b)
Total value for Turkey is 16% of 5760 million Euro
Total quantity for Turkey is 15 % of 1.055 million ton.
So average price in euro per kilogram for turkey is $(5760 \times 16/100)/(1055 \times 15/100) = 5.6$
36. (b)
 $BC \rightarrow AC \rightarrow AAC = 0$
37. (a)
 $BD \rightarrow AE \rightarrow AAB = 95.2$
The least cost to reach AAB is through AE. And that from BD to AE is 0.
38. (b)
 $BB \rightarrow AB \rightarrow AAG = 311.1$ Same as previous.
39. (a)
First we check the minimum cost of receiving at AA(A) We get 0 for AE. But from BB to AE is very high. Next is AC (314.5) BB to AC is 451.1. After AC the others are high. Hence, $314.5 + 45.1 = 765.6$
40. (d)
Number of refineries = 6
Number of depots = 7
Number of districts = 9
Therefore, Number of possible ways to send petrol from any refinery to any district is $6 \times 7 \times 9 = 378$.
41. (b)
If we look for large figures we would find them in both tables in AE. After adding them and we get $BE \rightarrow AE \rightarrow AAH$.
42. (b)

Position of States (rank)	Year				
	96–97	97–98	98–99	99–00	00–01
1	mA	MA	MA	MA	MA
2	TN	TN	TN	TN	TN
3	GU	AP	AP	AP	AP
4	AP	GU	GU	GU	UP

5	KA	UP	UP	UP	GU
6	UP	KA	KA	KA	KA
7	WB	WB	WB	WB	WB

43. (b)
When we observe the above table, we see that UP is the state which changes its relative ranking most nos. of time.
44. (d)
By looking at the graph we see that the sales tax revenue collection for AP has more than doubled from 1997-01.
45. (c)
Growth rate of Tax revenue can be calculated as:
(sales revenue of current year-sales tax revenue of previous year)
For the year 1997-98 = $7826 - 7290 / 7826 = 0.068$
For the year 1998-99 = $8067 - 7826 / 7826 = 0.030$
For the year 1999-00 = $10284 - 8067 / 8067 = 0.274$
For the year 2000-01 = $12034 - 10284 / 10284 = 0.170$
46. (a)
For finding this, we have to check every option
For Karnataka, sales tax revenue of states/total sales tax

1996-97	=>	3510/29870	= 0.11
1997-98	=>	3829/33168	= 0.11
1998-99	=>	4265/36068	= 0.11
1999-00	=>	4839/42348	= 0.11
2000-01	=>	5413/49638	= 0.11

So, Karnataka is the correct option and no further check is required.

47. (c)
By looking at the table prepared while solving question (11), we see that Tamil Nadu has maintained a constant rank over the years in terms of its contribution to total tax collections.
48. (b)
Only R9
49. (d)
Statement (a) is not satisfied by R9.
Statement (b) is not satisfied R2 and R3.
Statement (c) is incorrect as there are 5 such reason R1, R2, R3, R4 and R11.
Statement (d) is correct
50. (c)
All three R9, R10 and R11.

PART 5

MODEL PAPERS (BASED ON OTHER MBA ENTRANCES)

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MODEL SNAP PAPER

(Based upon Previous Years' SNAP Paper)

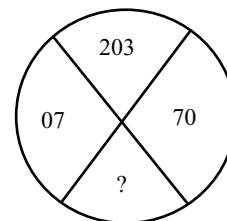
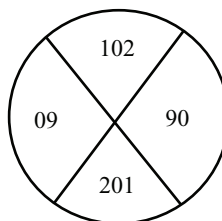
INSTRUCTIONS

- ☐ Directions for answering the questions are given before each group of questions. Read these directions carefully and answer the questions by darkening the appropriate circles Sheet. Each question has only one correct answer.
 - ☐ All questions carry four marks each. Each wrong answer will attract a penalty of one mark.
 - ☐ Do your rough work only on the Test Booklet and NOT on the Answer Sheet.
-

ANALYTICAL AND LOGICAL REASONING

Note: All questions carry two marks each.

1. Four children A, B, C & D are having some chocolates each.
A gives B as many as he already has, he gives C twice of what C already has and he gives D thrice of what D already has.
Now, D gives $(1/8)$ th of his own chocolates to B. Then A gives 10% chocolates he now owns to C and 20% to B.
Finally, all of them have 35 chocolates each.
What is the original number of chocolates each had in the beginning?
(1) A – 110, B – 10, C – 10, D – 10
(2) A – 90, B – 20, C – 20, D – 10
(3) A – 70, B – 25, C – 25, D – 20
(4) A – 125, B – 5, C – 5, D – 5
2. There are two similar figures below with some numbers. The left one is complete whereas one number is missing in the right one. Find a suitable number to fill in place of the question mark.



- (1) 280 (2) 303
(3) 362 (4) 382
3. Complete the following series by replacing the?:
(TBLD, VEPI, XHTN, ?)
(1) ZJVP (2) ZVJP
(3) ZKXS (4) ZKXP
 4. In a cricket team, three batsmen Ricky, Sachin and Brian are the top three run-scorers in any order. Each of them gives two replies to any question, one of which is true and the other is false, again, in any order. When asked about who the top scorer was, following were the replies they gave:
Sachin: I got the top score. Ricky was second.
Brian: I got the top score. Sachin was second.
Ricky: I got the top score. Sachin was third.

Which of the following is the correct order of batsmen who got the top score, second best and third best score respectively?

- (1) Brian, Ricky, Sachin
- (2) Brian, Sachin, Ricky
- (3) Ricky, Sachin, Brian
- (4) Sachin, Brian, Ricky

5. 60 employees in an office were asked about their preference for tea and coffee. It was observed that for every 3 people who prefer tea, there are 2 who prefer coffee. For every 6 people who prefer tea, there are 2 who drink both of tea and coffee. The number of people who drink both is the same as those who drink neither.

How many people drink both tea and coffee?

- (1) 10
- (2) 12
- (3) 14
- (4) 16

6. A clock strikes once at 1 O'clock, twice at 2 O'clock and so on. If it takes 6 seconds to strike at 3 O'clock, how much time will it take to strike at 9 O'clock,

- (1) 24 seconds
- (2) 18 seconds
- (3) 20 seconds
- (4) None of these

Directions for questions 7 to 8: E-1, E-2 and E-3 are three engineering students writing their assignments at night. Each of them starts at a different time and completes at a different time. The digit in their name and the order of their starting and completing the assignment is certainly not the same. The last student to start is the first to complete the assignment.

7. Who is the first student to start writing the assignment?

- (1) E-1
- (2) E-2
- (3) E-3
- (4) Cannot be decided

8. Who is the last student to complete the assignment?

- (1) E-1
- (2) E-2
- (3) E-3
- (4) Cannot be decided

Directions for questions 9 to 10: A, B and C are three students from Don School and P, Q and R are three students from Elite School. Q is brighter than R but duller than the Don School student who is brighter than A. The same Don School student is duller than P but is brighter than C.

9. Who is brightest amongst all?

- (1) B
- (2) P
- (3) R
- (4) Cannot be decided

10. Who is the duller amongst the three students from Elite School?

- (1) P
- (2) Q
- (3) R
- (4) Cannot be decided

11. When Rafael entered the class, there were already 10 students in the class. 5 students entered the class between Roger and Rafael. Total 10 students entered after Roger. Exactly how many students are in the class finally?

- (1) 15
- (2) 25
- (3) 27
- (4) Cannot be decided

Directions for questions 12 to 14: Arijit, Biplab, Chintan, Debashish, Elangovan, Frederick, Gautam and Himadri are sitting around a circular table. Some information about the order in which they are sitting is available as follows:

- (1) Debashish is sitting opposite to Himadri and to the immediate right of Gautam.
- (2) Elangovan is sitting to the immediate right of Biplab.
- (3) Arijit is sitting opposite Chintan who is not immediately next to Frederick on either side.

12. Who is sitting to the immediate right of Himadri?

- (1) Arijit
- (2) Debashish
- (3) Elangovan
- (4) Frederick

13. Who is sitting opposite Biplab?

- (1) Arijit
- (2) Debashish
- (3) Frederick
- (4) Himadri

14. Who is to the immediate right of Chintan?

- (1) Arijit
- (2) Biplab
- (3) Elangovan
- (4) Himadri

15. Select the alternative that logically follows the two given statements:

Some rocks are not tables

Some rocks are balloons

- (1) Some tables are not balloons
- (2) Some tables are balloons
- (3) Some balloons are not tables
- (4) None of the above

Directions for questions 16 to 17: A, B, C, D and E sit on a long bench. C does not sit next to A or E. A and E have three persons sitting between them.

16. Who is sitting in the middle of the bench?

- (1) B
- (2) C
- (3) D
- (4) None of these

17. Who are sitting at the extreme ends of the bench?

- (1) A & E
- (2) B & D
- (3) C & E
- (4) None of these

Directions for questions 18 to 19: *Observe the chart below and answer the following questions.*

Yearly commission earned by five salesmen

Year						Figures in Rupees
	1990	1991	1992	1993	1994	1995
Salesman						
A	27350	28500	25200	29800	24600	27000
B	26850	27900	27400	28000	28500	29000
C	26200	27900	28200	29100	29400	30000
D	27850	30040	29800	30060	29800	32000
E	28640	29000	28750	30000	29750	29700

18. In the year 1994, the commission earned by salesman D was approximately what percent more of the commission earned by A?
 (1) 18 (2) 82.5
 (3) 21 (4) 17
19. In the year 1993, the commission of B was approximately what per cent of the total commission earned by five salesmen that year?
 (1) 30 (2) 20
 (3) 40 (4) 80
20. Find the missing numbers in the following set.
- | | | | | |
|---|----|----|----|----|
| 2 | 4 | 6 | 8 | 10 |
| 2 | 14 | 34 | ?? | 98 |
- (1) 30 (2) 62
 (3) 42 (4) 78
21. There are 6 volumes of books on a rack kept in order (such as, vol. 1, vol. 2 and so on). After some readers used them, their order got disturbed. The changes are shown as follows:
 Vol.5 was directly to the right of Vol.2.
 Vol.4 has Vol.6 to its left and both were not at Vol.3's place.
 Vol.1 has Vol.3 on right and Vol.5 on left.
 An even numbered volume is at Vol.5's place.
 Find the order in which the books are kept now, from the 4 given alternatives:
 (1) 6, 3, 5, 1, 4, 2 (2) 4, 6, 3, 5, 1, 2
 (3) 3, 4, 1, 6, 5, 3 (4) 2, 5, 1, 3, 6, 4
22. All German philosophers, except for Marx, are idealists. From which of the following can the statement above be most properly inferred?
 (1) Except for Marx, if someone is an idealist philosopher, then he or she is German.
 (2) Marx is the only non-German philosopher who is an idealist.
 (3) If a German is an idealist, then he or she is a philosopher, as long as he or she is not Marx.
 (4) Marx is not an idealist German philosopher.
23. Ramaswami was studying for his examinations and the lights went off. It was around 1:00 a.m. He lighted two uniform candles of equal length but one thicker than the other. The thick candle is supposed to last six hours and the thin one two hours less. When he finally went to sleep, the thick candle was twice as long as the thin one. For how long did Ramaswami study in candle light?
 (1) 2 hours (2) 3 hours
 (3) 2 hours 45 minutes (4) 4 hours
24. The numerator and denominator of a fraction is in the ratio 2:3. If 6 are subtracted from the numerator the value of the fraction becomes $\frac{2}{3}$ of the original fraction. The numerator of the original fraction is:
 (1) 16 (2) 21
 (3) 18 (4) 30
25. A person wanted to withdraw X rupees and Y paise from the bank. But cashier made a mistake and gave him Y rupees and X paise. Neither the person nor the cashier noticed that. After spending 20 paise, the person counts the money. To his surprise, he has double the amount he wanted to withdraw.
 Find X and Y. (1 Rupee = 100 Paise)
 (1) X = 3, Y = 6
 (2) X = 26, Y = 53
 (3) X = 15, Y = 30
 (4) X = 9, Y = 36
26. A drawer contains 10 black and 10 brown socks which are all mixed up. What is the fewest number of socks you can take from the drawer without looking and be sure to get a pair of the same color?
 (1) 7 pairs (2) 7 pieces only
 (3) 10 pieces only (4) 3 pieces only

27. A placement company has to assign 1000 SW personnel who are skilled in Java and .Net to a prospective outsourcing company. He finds that 750 are having .Net skills and 450 have Java skills. Some have skills in both Java and .Net. Find the numbers who have skills in both Java and .Net.
 (1) 250 (2) 200
 (3) 350 (4) 100
28. All good athletes who want to win are disciplined and have a well balanced diet. Therefore, athletes who do not have well balanced diets are bad athletes. Based on the sentence above which of the statement below strongly supports the view:
 (1) No bad athlete wants to win.
 (2) No athlete who does not eat a well balanced diet is good athlete.
 (3) Every athlete who eats a well balanced diet is good athlete.
 (4) All athletes who want to win are good athletes.
29. The numbers in these series are arranged in a triangle which has a logic as shown below. Find the missing numbers shown as (?) from the choices given below:

$$\begin{array}{c} 2 \\ 2 \ 2 \\ 2 \ 4 \ 2 \\ 2 \ 8 \ ? \ 2 \\ 2 \ 16 \ 64 \ 16 \ 2 \\ 2 \ 32 \ 1024 \ ? \ ? \ 2 \end{array}$$

 (1) {16, 32, 64} (2) {8, 1024, 32}
 (3) {24, 1024, 64} (4) {16, 32, 64}
30. If for a particular value of the variable x, the following holds good, $17 = 17x/(1+x)$, then compute the value of $(2x)*x$.
 (1) 17 (2) 1
 (3) 2 (4) $1/2$

ANSWER KEYS

1. (1) 2. (1) 3. (3) 4. (1) 5. (2) 6. (1) 7. (3) 8. (1) 9. (2) 10. (3)
 11. (4) 12. (1) 13. (3) 14. (2) 15. (4) 16. (2) 17. (1) 18. (3) 19. (2) 20. (2)
 21. (4) 22. (3) 23. (2) 24. (3) 25. (2) 26. (4) 27. (2) 28. (2) 29. (2) 30. (4)

HINTS AND EXPLANATIONS

1. Let A, B, C and D have a, b, c and d chocolates respectively.

A gives b, 2c and 3d number of chocolates to B, C and D respectively.

$\therefore$ At the end of 1st iteration the number of chocolates with each of them are,

A	B	C	D
$a-b-2c-3d$	2b	3c	4d

D gives $1/8$ th of his chocolates, i.e. $(d/2)$ chocolates to B

$\therefore$ At the end of 2nd iteration

A	B	C	D
$a-b-2c-3d$	$\left(2b + \frac{d}{2}\right)$	3c	$\frac{7d}{2}$

Now, note that D has no further transaction and has 35 chocolates at the end.

$$\therefore \frac{7d}{2} = 35$$

$$\therefore d = 10$$

$\therefore$ Option 3 and 4 can be eliminated.

Now, using $d = 10$, we check for the options 1 and 2. Only the number of chocolates in option 1 satisfies all the given conditions.

Hence, option 1.

2. $201 = 09 + 102 + 90$

$\therefore$ The lowermost number is the sum of the other three numbers.

$$\therefore \text{Missing number} = 07 + 203 + 70 = 280$$

Hence, option 1.

3. Consider 1st letter of each term of the series.

T + 2 alphabets = V, V + 2 alphabets = X

$\therefore$ The first letter of the missing term is X + 2 alphabets = Z

Consider 2nd letter of each term of the series.

B + 3 alphabets = E, E + 3 alphabets = H

$\therefore H + 3 \text{ alphabets} = K$
 Consider 3rd letter of each term of the series.
 $L + 4 \text{ alphabets} = P, P + 4 \text{ alphabets} = T$
 $\therefore T + 4 \text{ alphabets} = X$ Consider last letter
 $D + 5 \text{ alphabets} = I, I + 5 \text{ alphabets} = N, N + 5 \text{ alphabets} = S$
 $\therefore$ Missing term = ZKXS
 Hence, option 3.

4. Only one statement of each person is true.
 Only one of Sachin's statement is true.
 Assume that Sachin's first statement is true.
 If Sachin got the top score then the first statements of both Brian and Ricky turn out to be false.
 However, since Sachin got the top score the second statements of both Brian and Ricky also turn out to be false.
 This is not possible as both the statements of a person cannot be false.
 So Sachin's first statement is false.
 Hence, Ricky was second. Hence second statement is false. Hence, Brian got the top score and Sachin was third.
 Hence, option 1.

5. Let the number of people who drink tea = $6x$
 The number of people who drink coffee = $4x$ and
 $2x$ people drink both tea and coffee.
 Number of people who drink neither = $2x$
 Number of people who drink only tea = $6x - 2x = 4x$
 Number of people who drink only coffee = $4x - 2x = 2x$
 $4x + 2x + 2x + 2x = 60$
 $x = 6$
 $\therefore$ Number of people who drink both tea and coffee = $2x = 2 \times 6 = 12$
 Hence, option 2.

6. At n O'clock, the clock strikes n time. It takes 6 seconds to strike thrice. Assuming that the strikes are instantaneous, there are 3 seconds between two strikes.
 Hence, to strike 9 times there will be 8 striking intervals.
 Hence, time taken to strike 9 times at 9 O'clock = $8 \times 3 = 24$ seconds.
 Hence, option 1.
 Note: If the strikes are not instantaneous the answer will depend on the length of interval of the strike.
7. E-1, E-2, E-3 are writing assignments.
 It is given that the digit in their name and the order of their starting and completing the assignment is certainly not the same.

This means that E-1 was neither the first to start and nor the first to end.

Student	Start
E-1	2/3
E-2	3/1
E-3	1/2

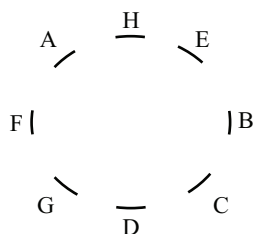
Now, the last student to start is the first to finish.
 Only, E-1 or E-2 can be the last to start.
 However, E-1 cannot be the first to finish.
 $\therefore$ E-2 was the last to start and first to finish.
 E-1 was the second to start and last to finish. E-3 was the first to start and second to finish.
 $\therefore$ Hence, the table becomes,

Student	Start	End
E-1	2	3
E-2	3	1
E-3	1	2

E-3 starts writing first.
 Hence, option 3.

8. From the table, E-1 is the last to complete the assignment.
 Hence, option 1.
9. A, B, C - Don school
 P, Q, R - Elite school
 If $X > Y$ denotes that X is brighter than Y then,
 $Q > R$
 $\therefore$ Q is duller than the Don School student who is brighter than A. The same student is brighter than C. So the student has to be B.
 $\therefore B > Q > R$ and $B > A, P > B > C$
 From the last statement we get, $P > B > C, B > Q > R$ and $B > A$
 $\therefore$ P is brightest.
 Hence, option 2.
10. Among the students from Elite School, R is the duller.
 Hence, option 3.
11. We have two possibilities.
 Case (i): Rafael entered before Roger
 Then we have:
 $10 \text{ students} + \text{Rafael} + 5 \text{ students} + \text{Roger} + 10 = 27 \text{ students}$
 Case (ii): Roger entered before Rafael
 Then we have:
 $4 \text{ students} + \text{Roger} + 5 \text{ students} + \text{Rafael} + 4 \text{ students} = 15 \text{ students}$
 Hence, there are two possible answers.
 Hence, option 4.

12. From the given information we get the arrangement as



∴ Arijit is sitting to the immediate right of Himadri.

Hence, option 1.

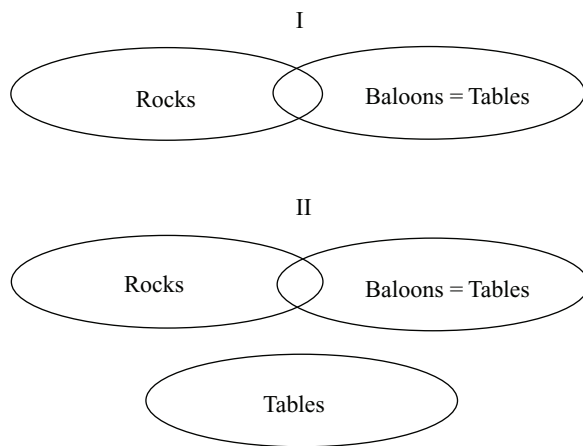
13. Fredrik is sitting opposite Biplab.

Hence, option 3.

14. Biplab is sitting to the immediate right of Chintan.

Hence, option 2.

15.



According to fig I, conclusions 1 and 3 are not valid. According to fig II, conclusion 2 is not valid.

Hence, option 4.

16. From the given information we get the seating arrangement as,

A/E B/D C B/D E/A

∴ C is sitting in the middle of the bench.

Hence, option 2.

17. A and E are sitting at the extreme ends of the bench.

Hence, option 1.

18. Commission earned by salesman D in 1994 = 29800
Commission earned by salesman A in 1994 = 24600

∴ The amount by which the commission earned by salesman D is more than that of A = 5200

∴ Required percentage = $\frac{5200}{24600} \times 100 \approx 21.1$

Hence, option 3.

19. In 1993, commission earned by B = 28000

Total commission earned in 1993 = 146960 = 147000

∴ Required percentage = $\frac{28000}{147000} \times 100 \approx 19\%$

The closest among the given options is 20.

Hence, option 2.

20. The number in the second row of the first column is 2 less than the square of the number in the first row of the same column.

∴ Missing number = $8^2 - 2 = 64 - 2 = 62$

Hence, option 2.

21. From the given options, only option 4 has vol.5 to the right of vol.2.

Also, now we can check that all the conditions are satisfied by option 4.

Hence, option 4.

22. This question was camouflaged. The inference was given as main data and the questions stem required you to identify the premise (given in the answer options) based on which the given inference was drawn.

Option 2 identifies Marx as a non-German and hence can be eliminated.

Option 4 provides incomplete data and hence can be eliminated as a premise for the inference.

Option 1 implies that all Germans are idealist philosophers.

Only Option 3 can be a premise that allows us to arrive at the inference given in the questions stem.

Hence, option 3.

23. Let the lengths of the two candles be h.

Rate of burning of the thicker candle = $h/6$ per hour. Rate of burning of the thinner candle = $h/4$ per hour. Let Ramaswami study for t hours.

∴ From the given information we get,

$$h - (h/6)t = 2[h - (h/4)t]$$

$$\therefore 1 - t/6 = 2 - t/2$$

$$\therefore t = 3$$

Hence, option 2.

24. Let the initial fraction be $\frac{2x}{3x}$

$$\therefore \frac{2x-6}{3x} = \left(\frac{2}{3}\right)\left(\frac{2x}{3x}\right)$$

$$\therefore \frac{2x-6}{3x} = \frac{4}{9}$$

$$x = 9$$

$\therefore$ Hence, numerator of the original fraction = $2x$
= 18

Hence, option 3.

25. Best way to solve this question is by evaluating options.

Consider Option 1:

$X = 3$ and $Y = 6$

Hence, he wanted to withdraw 306 paise but he got 603 paise.

But $603 - 20 \neq 2 \times 306$

Hence, option 1 is incorrect.

Consider Option 2:

We get $X = 26$ and $Y = 53$

Hence, he should have got 2653 paise but he got 5326 paise.

Note that $2(2653) = 5306$ which is same as $(5326 - 20)$

Hence, option 2 satisfies the given conditions.

Hence, option 2.

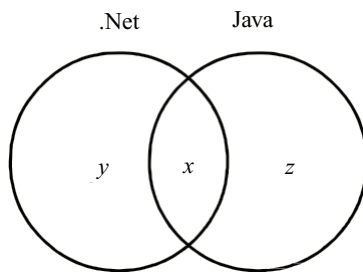
26. If one takes out 3 pieces, at least two of them will be of the same color.

Hence, a pair will be formed.

Hence, 3 pieces must be taken out.

Hence, option 4.

27.



From the data given

$$x + y + z = 1000$$

$$x + y = 750$$

$$x + z = 450$$

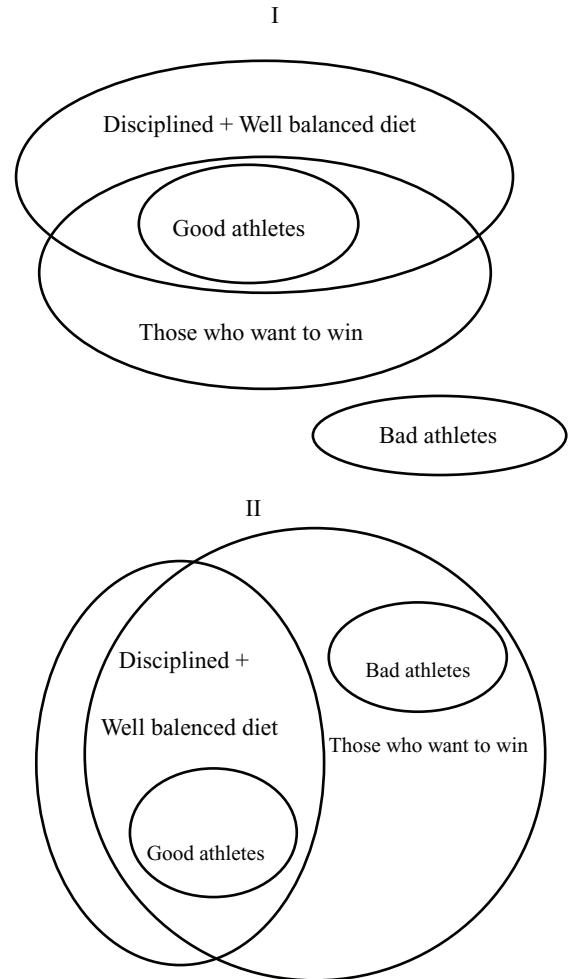
$$\therefore x = (x + y) + (x + z) - (x + y + z)$$

$$= 450 + 750 - 1000$$

$$= 200$$

Hence, option 2.

28.



Options 1 and 4 are true according to figure I but false according to figure II.

According to figure I and II, option 3 is not necessarily true.

Option 2 is true in both the figures.

Hence, option 2.

29. The triangle is symmetric across a line passing through the middle of the triangle.

Hence, the missing letter in third row should be 8. From the given options only option 2 has 8.

We can further verify that option 2 is correct by seeing that the triangle formed by substituting the values is symmetric.

Hence, option 2.

30. $17 = \frac{17x}{1-x}$
 $\therefore (1-x) = x$

$$\therefore x = \frac{1}{2}$$

$$\therefore 2x^2 = 2\left(\frac{1}{2}\right)^2 = \frac{1}{2}$$

Hence, option 4.

MODEL XAT PAPER

(Based upon Previous Years' XAT Paper)

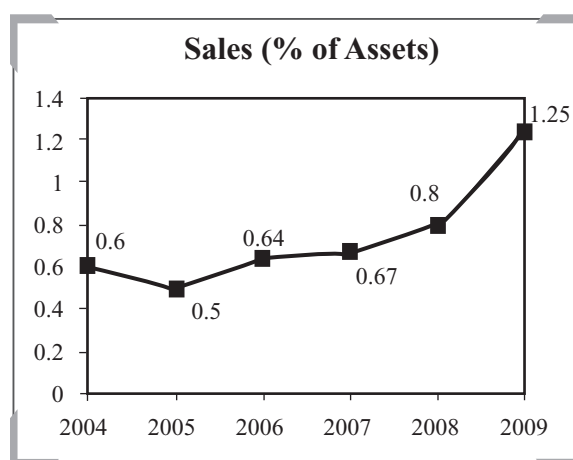
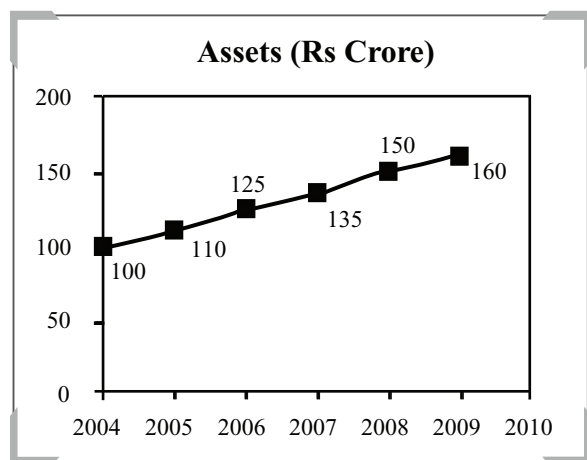
INSTRUCTIONS

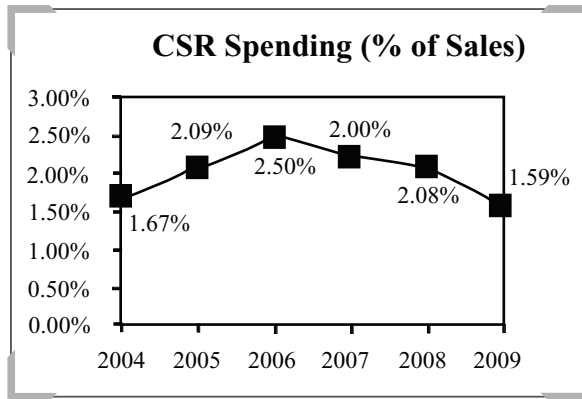
- ☐ Directions for answering the questions are given before each group of questions. Read these directions carefully and answer the questions by darkening the appropriate circles Sheet. Each question has only one correct answer.
 - ☐ All questions carry four marks each. Each wrong answer will attract a penalty of one mark.
 - ☐ Do your rough work only on the Test Booklet and NOT on the Answer Sheet.
-

SECTION A DATA INTERPRETATION AND QUANTITATIVE ABILITY

Answer question numbers 1 to 4 based on the following information:

The following graphs give annual data of *Assets*, *Sales* (as percentage of Assets) and *Spending on Corporate Social Responsibility (CSR)* (as percentage of Sales), of a company for the period 2004-2009.

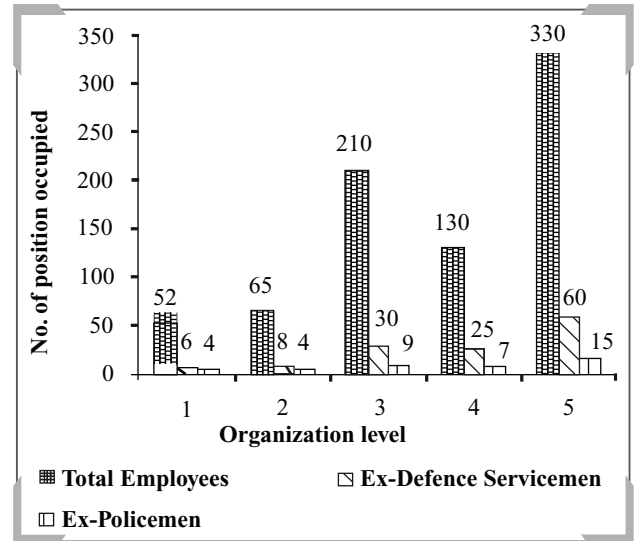




- In which year was the increase in spending on CSR, vis-à-vis the previous year, the maximum? (1 mark)
 (1) 2005 (2) 2006
 (3) 2007 (4) 2008
 (5) 2009
- Of the years indicated below, in which year was the ratio of CSR/Assets the maximum? (1 mark)
 (1) 2004 (2) 2005
 (3) 2006 (4) 2007
 (5) 2008
- What was the maximum value of spending on CSR activities in the period 2004-2009? (2 marks)
 (1) 0.5 Crore
 (2) 1.0 Crore
 (3) 2.0 Crore
 (4) 3.0 Crore
 (5) 4.0 Crore
- In which year, did the spending on CSR (measured in Rs) decline, as compared to previous year? (2 marks)
 (1) 2006
 (2) 2007
 (3) 2008
 (4) 2009
 (5) None of above

Answer question numbers 5 to 7 based on the following information:

Five years ago *Maxam Glass Co.* had estimated its staff requirements in the five levels in their organization as: Level-1: 55; Level-2: 65; Level-3: 225; Level-4: 255 and Level-5: 300. Over the years the company had recruited people based on ad-hoc requirements, in the process also selecting ex-defence service men and ex-policemen. The following graph shows actual staff strength at various levels as on date.



- The level in which the Ex-Defence Servicemen are highest in percentage terms is number of times. Then, (1 mark)
 (1) 1 (2) 2
 (3) 3 (4) 4
 (5) 5
- If the company decides to abolish all vacant posts at all levels, which level would incur the highest reduction in percentage terms? (1 mark)
 (1) 1 (2) 2
 (3) 3 (4) 4
 (5) 5
- Among all levels, which level has the lowest representation of Ex-policemen? (1 mark)
 (1) 1 (2) 2
 (3) 3 (4) 4
 (5) 5
- In a locality, there are ten houses in a row. On a particular night a thief planned to steal from three houses of the locality. In how many ways can he plan such that no two of them are next to each other? (1 mark)
 (1) 56 (2) 73
 (3) 80 (4) 120
 (5) None of the above
- If $x = (9 + 4\sqrt{5})\sqrt{48} = [x] + f$, where $[x]$ is defined as integral part of x and f is a fraction, then $x(1-f)$ equals (5 marks)
 (1) 1 (2) Less than 1
 (3) More than 1 (4) Between 1 and 2
 (5) None of the above

10. Let $a_n = 1 \ 1 \ 1 \ 1 \ 1 \ 1 \dots 1$, where 1 occurs n numbers of times. Then,

- a_{741} is not a prime.
- a_{534} is not a prime.
- a_{123} is not a prime.
- a_{77} is not a prime. (5 marks)

- (1) (i) is correct.
- (2) (i) and (ii) are correct.
- (3) (ii) and (iii) are correct.
- (4) All of them are correct.
- (5) None of them is correct.

Answer question numbers 11 and 12 based on the following information:

Income-Tax rates for Financial Year 2009-10

Individual & HUF below age of 65 years	Women below age of 65 years	Tax rates
Income up to ₹1,60,000	Income up to ₹1,90,000	Nil
₹1,60,001 to ₹3,00,000	₹1,90,001 to ₹3,00,000	10%
₹3,00,001 to ₹5,00,000	₹3,00,001 to ₹5,00,000	20%
Above ₹5,00,001	Above ₹5,00,001	30%

Total income tax payable is obtained by adding two additional surcharges on calculated income tax.

- *Education Cess*: An additional surcharge called 'Education Cess' is levied at the rate of 2% on the amount of income tax.

- *Secondary and Higher Education Cess*: An additional surcharge called Secondary and Higher Education Cess is levied at the rate of 1% on the amount of income tax.

11. Sangeeta is a young working lady. Towards the end of the financial year 2009-10, she found her total annual income to be ₹3,37,425. What % of her income is payable as income tax? (1 mark)

- (1) 5.64
- (2) 6.82
- (3) 7.38
- (4) 8.10
- (5) None of the above

12. Mr Madan observed his tax deduction at source, done by his employer, as ₹3,17,910. What was his total income (in ₹) if he neither has to pay any additional tax nor is eligible for any refund? (2 marks)

- (1) ₹13,48,835
- (2) ₹14,45,522
- (3) ₹14,47,169
- (4) ₹15,70,718
- (5) None of the above

Answer question numbers 13 to 15 based on the following information:

Mulchand Textiles produces a single product of only one quality waterproof synthetic fabric. Mr Sharma, the cost accountant of Mulchand Textiles, estimated the costs of Mulchand Textiles for different possible monthly output levels. Before he could tabulate his estimates his computer crashed, and Mr Sharma lost all data. Fortunately he had some printouts of some incomplete tables, charts and diagrams. The table titled "Variable Cost Estimates of Mulchand Textiles" provided the estimates of labour and material costs.

Variable Cost Estimates of Mulchand Textiles

Output (Square feet)	Labour cost (₹)	Material cost (₹)
25000	21500	11050
50000	41500	22000
75000	60000	33000
100000	78000	44000
125000	95000	54750
150000	111000	65700
175000	133000	76650
200000	160000	88000

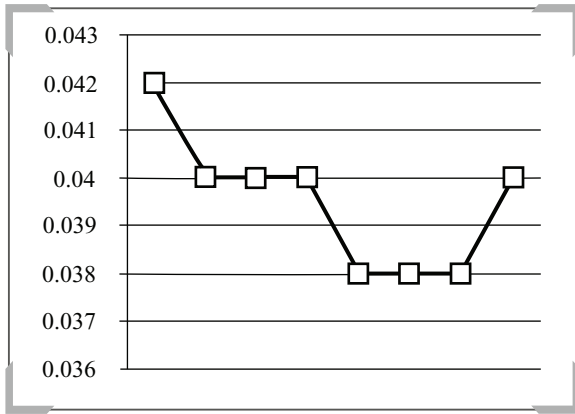
Apart from labour and material costs Mulchand Textiles incurs administrative costs of ₹40,000 per month, and electricity costs. Mr Sharma recalled that estimate data of variable electricity cost had certain peculiar characteristics. Values at every 25000 sq ft of output increased in geometric progression till 150000 sq ft of output, after which values increased in arithmetic progression for every 25000 sq ft of output. Mr Sharma remembered that the electricity cost was estimated to be ₹3800 for 25000 sq. ft. of output, ₹5700 for 50000 square feet of output and ₹38856.50 for 175000 square feet of output.

13. The estimated cost per square feet of output is least for: (3 marks)

- (1) 75000 square feet output
- (2) 100000 square feet output
- (3) 125000 square feet output
- (4) 150000 square feet output
- (5) 175000 square feet output

14. The estimated material cost given in the table titled "Variable Cost Estimates of Mulchand Textiles" included the cost of material that gets spoiled in the production process. Mr Sharma decomposed the estimated material cost into material spoilage cost and material usage cost, but he lost the data when his

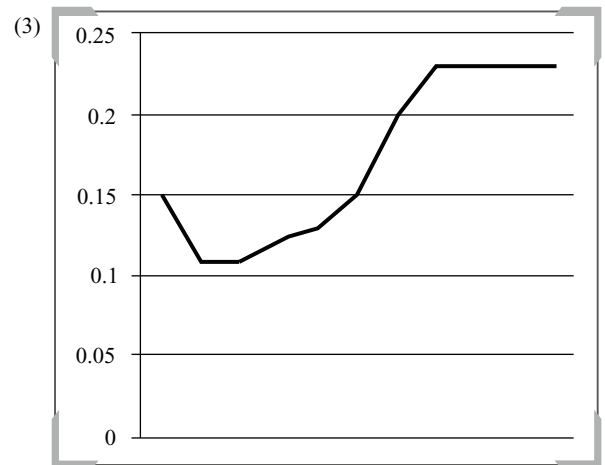
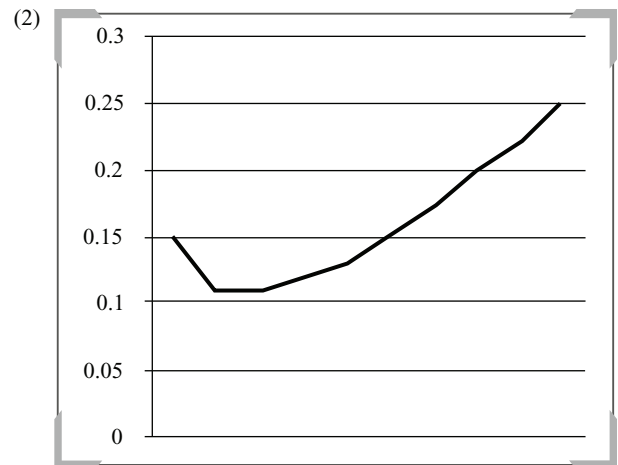
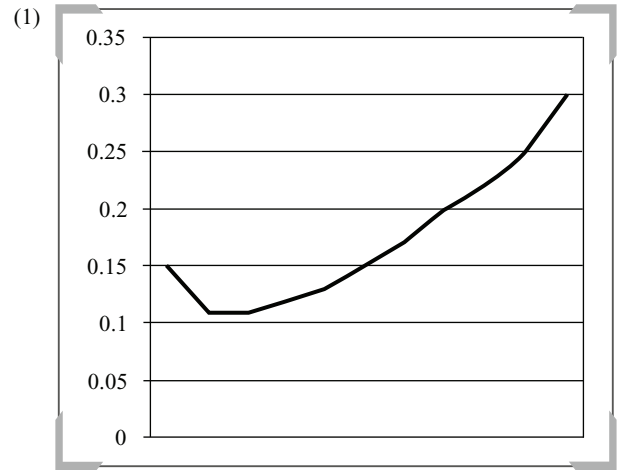
computer crashed. When he saw the following line diagram, he recalled that he measured the estimate of material spoilage cost per square feet of output on the y-axis and monthly output on the x-axis.

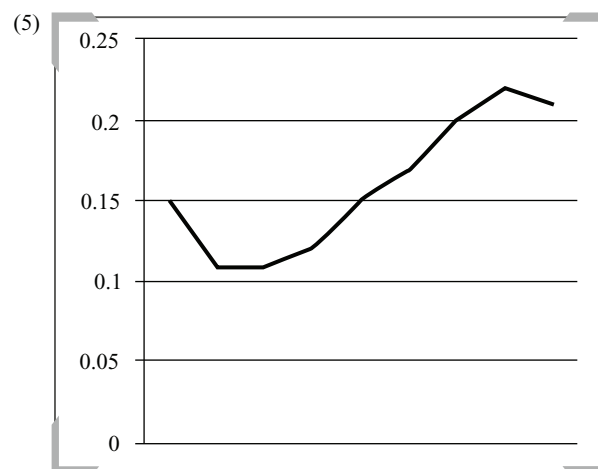
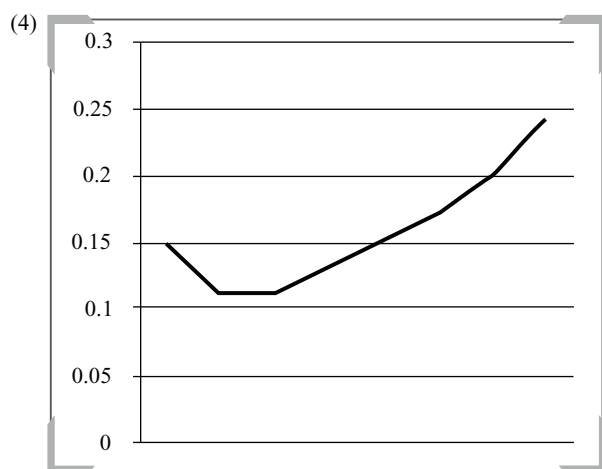


Estimated material usage cost per square feet of output
(3 marks)

- (1) Decreases up to 125000 square feet of monthly output and then increases monotonically.
- (2) Decreases up to 50000 square feet of monthly output, remains constant between 50000 and 100000, decreases between 100000 and 125000, remains constant between 125000 and 175000 and finally increases between 175000 and 200000 of monthly output.
- (3) Remains constant for all levels of monthly output.
- (4) Increases up to 50000 square feet of monthly output, remains constant between 50000 and 100000, increases between 100000 and 125000, remain constant between 125000 and 175000 and finally decreases between 175000 and 200000 of monthly output.
- (5) Increases up to 100000 square feet of monthly output and then decreases monotonically.

15. Mr Sharma found some printouts of line diagrams. The axes of the graphs were not marked, but Mr Sharma remembered that he measured monthly output on the x-axis. Which of the following diagrams would represent the estimates of electricity cost per square feet of output versus monthly output?
(3 marks)





Answer question numbers 16 to 19 based on the following information:

In the beginning of the year 2010, Mr Sanyal had the option to invest ₹800000 in one or more of the following assets gold, silver, US bonds, EU bonds, UK bonds and Japanese bonds. In order to invest in US bonds, one must first convert his investible fund into US Dollars at the ongoing exchange rate. Similarly, if one wants to invest in EU bonds or UK bonds or Japanese bonds one must first convert his investible fund into Euro, British Pounds and Japanese Yen respectively at the ongoing exchange rates. Transactions were allowed only in the beginning of every month. Bullion prices and exchange rates were fixed at the beginning of every month and remained unchanged throughout the month. Refer to the table titled “Bullion Prices and Exchange Rates in 2010” for the relevant data.

Bullion Prices and Exchange Rates in 2010

X	Gold prices ₹/ 10 gram	Sliver prices ₹/ 10 gram	US \$ ₹/ US \$	€ ₹/ €	£ ₹/£	¥ ₹/¥
January 1	20000	300	40	60	70	0.5
February 1	20100	302	41	61.5	71	0.51
March 1	20250	307	41	62	71	0.52
April 1	20330	310	42	62	71	0.52
May 1	20400	312	42	62.5	72	0.53
June 1	20500	318	42	62.5	72	0.54
July 1	20650	330	44	63	73	0.55
August 1	20720	335	45	63	73	0.55
September 1	20850	340	47	64	74	0.57
October 1	20920	342	49	65	74	0.58
November 1	20950	345	50	65	74.5	0.59
December 1	21000	350	50	65	75	0.6

Interest rates on US, EU, UK and Japanese bonds are 10%, 20%, 15% and 5% respectively.

16. Mr Sanyal invested his entire fund in gold, US bonds and EU bonds in January 2010. He liquefied his assets on 31st August 2010 and gained 13% on his investments. If instead he had held his assets for an additional month he would have gained 16.25%. Which of the following options is correct? (3 marks)

- (1) Mr Sanyal invested less than 40% in gold and more than 40% in EU bonds.
- (2) Mr Sanyal invested less than 40% in each of gold and US bonds.
- (3) Mr Sanyal invested less than 40% in gold, and less than 25% in US bonds.
- (4) Mr Sanyal invested more than 40% in gold, less than 25% in EU bonds.
- (5) Mr Sanyal invested more than 40% in each of US bonds and EU bonds.
17. At the beginning of every month, by sheer luck, Mr Sanyal managed to correctly guess the asset that gave maximum return during that month and invested accordingly. If he liquefied his assets on 31st December 2010, how much was the percentage gain from his investments? (2 marks)
- (1) 34.64% (2) 46.71%
- (3) 47.5% (4) 49.15%
- (5) 49.96%
18. Mr Sanyal adopted the following investment strategy. On 1st January 2010 he invested half of his investible fund in gold and the other half he kept in fixed deposit of an Indian bank that offered 25% interest per annum. At the beginning of every quarter he liquefied his assets to create his investible fund for that quarter. Every quarter he invested half of his fund in the bullion that gave maximum return in the previous quarter and the other half in the foreign bond that gave maximum return in the previous quarter. However, if in any quarter none of the foreign bonds gave a better return than the fixed deposit of his Indian bank, he invested half of his investible fund in the fixed deposit for the next quarter. On 31st December 2010, Mr Sanyal liquefied his assets and realized that all of the following options are true except: (2 marks)
- (1) By investing the entire amount in US bonds, he would have gained an additional ₹118395.
- (2) By investing the entire amount in UK bonds, he would have gained an additional ₹65035.
- (3) By investing the entire amount in EU bonds, he would have gained an additional ₹65035.
- (4) By investing the entire amount in Japanese bonds, he would have gained an additional ₹38395.
- (5) Option (5) None of the options is correct.
19. Advisors were asked to prepare an investment strategy that involved US Bonds, EU Bonds and Japanese Bonds, keeping at least 20% of the initial fund in each of these assets for the entire year, and allowing exactly

four additional transactions in the course of the year. On 2nd January 2011, while comparing five different recommendations that he had received from his financial advisors in the beginning of 2010, Mr Sanyal referred to the table “Bullion Prices and Exchange Rates in 2010”. One transaction is defined as the buying or selling of an asset. Which of the recommendation out of the following was the best one? (3 marks)

- (1) Two additional transactions each during the month of June and November.
- (2) Two additional transactions each during the month of June and October.
- (3) Two additional transactions each during the month of May and June.
- (4) Two additional transactions each during the month of March and November.
- (5) None of these.

Answer question numbers 20 to 22 based on the following information:

Alex Company has its office at the third floor of a multi-storied building in Mumbai. There are 5 rooms to be allotted to 5 managers (designated M1 to M5), each of whom will occupy one room. Each room has its own advantages and disadvantages. Some have the sea view, while others are closer to either the life or the dining room, while some are more spacious. Each of the five managers was asked to rank the room preferences amongst the rooms 301, 302, 303, 304 and 305. Their preferences were recorded as follows:

Preference	M1	M2	M3	M4	M5
1 st	302	302	303	302	301
2 nd	303	304	301	305	302
3 rd	304	305	304	304	305
4 th		301	305	303	
5 th			302		

Some managers did not indicate any preference for some rooms, as they did want to be there under any condition. The company decided to allot rooms to managers in such a way that the managers get rooms as per their best preference or close to that.

20. How many managers would get their rooms as per their best preference? (2 marks)
- (1) 1 (2) 2
- (3) 3 (4) 4
- (5) 5

21. If manager X gets his/her 1st choice, then his/her preference ranking is 1 and so on. Management decided to allot rooms so that *the sum of the preference ranking of all the managers is minimized*. What is the total preference ranking for the rooms allotted to all the managers? (3 marks)
- (1) 5 (2) 6
(3) 7 (4) 8
(5) 9
22. Suppose that Manager M2 decides not to join the new zonal office and Manager M6 takes his place. Manager M6 has the following preference ranking in decreasing order: 301, 302, 303, 304 in this case what would be the sum of the preference ranking allotted to all five managers? (2 marks)
- (1) 5 (2) 6
(3) 7 (4) 8
(5) 9

Answer question numbers 23 and 24 based on the following information:

Every Saturday, the members of Raja Harish Chandra Club meet in the evening. All the member of the club are honest and never lie. Last Saturday, the following conversation was heard at one of the table with five members sitting around it.

Satya Sadhan: In this club not all members are friends with each other.

Satyabrata: None of the pair of friends in this club has any common friend.

Satyajit: Every pair of member who are not friends has exactly two common friends in this club.

Satya Pramod: There are fewer than 22 people in this club.

23. How many members are there in the club? (5 marks)
- (1) 5 (2) 7
(3) 15 (4) 16
(5) 20
24. How many friends does Satya Sadhan have in the club? (3 marks)
- (1) 2 (2) 3
(3) 5 (4) 7
(5) 8

Answer question numbers 25 to 27 based on the following information:

On a certain day six passengers from Chennai, Bengaluru, Kochi, Kolkata, Mumbai, and Hyderabad boarded the New Delhi bound Rajdhani Express from

TataNagar. The following facts are known about these six passengers:

- The persons from Kochi and Chennai are less than 36 years of age.
 - Person Z, the youngest among all is a doctor.
 - The oldest person is from Kolkata and his/her profession is same as that of the person who got down at Mughal Sarai.
 - The person from Bengaluru, Chennai, Hyderabad and Mumbai got down at four different stations. The eldest among these four got down at Koderma and the youngest at Kanpur. The person who got down at New Delhi is older than the person who got down at Mughal Sarai.
 - The engineer from Bengaluru is older than the engineer from Chennai.
 - While arranging the teachers in increasing order of age it was observed that the middle person is as old as the engineer from Chennai.
 - Person Y who got down at Mughal Sarai is less than 34 year old.
 - The teacher from Kochi is four year older than the 31 year old doctor who is not from Mumbai.
 - In the past, three of the travellers have served in the Indian Army.
25. Which of the following options is true? (2 marks)
- (1) The person from Chennai is older than the person from Kochi.
(2) The oldest teacher is from Mumbai.
(3) The person from Mumbai is older than at least one of the engineers.
(4) The person from Kochi got down at Mughal Sarai, and was an engineer.
(5) The person who got down at New Delhi is older than Y, who in turn is older than the person from Hyderabad.
26. All six travellers are working in the same organization for at least one year. The organization recruits two categories of employees fresh graduates and those who have at least five years of experience in the Indian Army. In both cases a new recruit should be less than 30 years of age. Among the travellers from same profession, those with military background are at least five years older than the travellers who joined as fresh graduates. Identify the travellers who joined the organization as fresh graduate(s): (2 marks)

- (1) Only Y.
 (2) The person Y and the traveller from Chennai.
 (3) The person Y and the travellers from Kochi and Hyderabad.
 (4) The travellers from Kochi and Hyderabad.
 (5) The teacher from Mumbai, the traveller from Kochi and the younger engineer.
27. If W is neither the youngest nor the oldest among the travelers from her profession, which of the following is true about her? (2 marks)
- (1) She got down at Koderma.
 (2) She is 36 years old.
 (3) She got down at Mughal Sarai.
 (4) She is from Kochi.
 (5) None of the above

Answer question numbers. 28 to 30 based on the following information:

Mrs Sharma has a house which she wants to convert to a hostel and rent it out to students of a nearby women's college. The house is a two story building and each floor has eight rooms. When one looks from the outside, three rooms are found facing North, three found facing East, three found facing West and three found facing South. Expecting a certain number of students, Mrs Sharma wanted to follow certain rules while giving the sixteen rooms on rent:

All sixteen rooms must be occupied.

No room can be occupied by more than three students.

Six rooms facing north is called north wing. Similarly six rooms facing east, west and south are called as east wing, west wing and south wing. Each corner room

would be in more than one wing. Each of the wings must have exactly 11 students. The first floor must have twice as many students as the ground floor.

However Mrs Sharma found that three fewer students have come to rent the rooms. Still, Mrs Sharma could manage to allocate the rooms according to the rules.

28. How many students turned up for renting the rooms? (3 marks)
- (1) 24 (2) 27
 (3) 30 (4) 33
 (5) None of these
29. If Mrs Sharma allocates the north-west corner room on the ground floor to 2 students, then the number of students in the corresponding room on the first floor, and the number of students in the middle room in the first floor of the east wing are: (2 marks)
- (1) 2 and 1 respectively.
 (2) 3 and 1 respectively.
 (3) 3 and 2 respectively.
 (4) Both should have 3 students.
 (5) Such an arrangement is not possible.
30. If all the student that Mrs Sharma expected initially had come to rent the rooms, and if Mrs Sharma had allocated the north west corner room in the ground floor to 1 student, then the number of students in the corresponding room on the first floor, and the number of students in the middle room in the first of the east wing would have been: (2 marks)
- (1) 1 and 2 respectively.
 (2) 2 and 3 respectively.
 (3) 3 and 3 respectively.
 (4) Both should have 2 students.
 (5) Such an arrangement is not possible.

ANSWER KEYS

1. (2)	2. (5)	3. (4)	4. (5)	5. (4)	6. (4)	7. (3)	8. (1)	9. (1)	10. (4)
11. (1)	12. (1)	13. (4)	14. (3)	15. (2)	16. (2)	17. (2)	18. (5)	19. (5)	20. (3)
21. (3)	22. (5)	23. (4)	24. (3)	25. (5)	26. (5)	27. (4)	28. (2)	29. (2)	30. (1)

HINTS AND EXPLANATIONS

Detailed Solutions:

1. The data can be tabulated as follows:

Year	Assets	Sales (% of Assets)	Sales	CSR (% of sales)	CSR Spending	CSR/Assets
2004	100×10^7	0.6	60×10^5	$1.67 = \frac{5}{3}$	100×103	1×10^{-4}
2005	110×10^7	0.5	55×10^5	2.29	114.95×103	1.045×10^{-4}
2006	125×10^7	$0.64 = \frac{16}{25}$	80×10^5	$2.5 = \frac{5}{2}$	200×103	1.6×10^{-4}
2007	135×10^7	$0.67 = \frac{2}{3}$	90×10^5	$2.22 = \frac{20}{9}$	200×103	1.48×10^{-4}
2008	150×10^7	$0.8 = \frac{8}{10}$	120×10^5	2.06	247.2×103	1.648×10^{-4}
2009	160×10^7	$1.25 = \frac{5}{4}$	200×10^5	1.58	316×103	1.975×10^{-4}

Hence, the increase in spending on CSR was the maximum in 2006.

Hence, option 2.

2. From the table in the answer to the first question, the ratio of CSR/Assets was the maximum in 2008 in the years given in the options.

Hence, option 5.

3. From the table in the answer to the first question, maximum spending on CSR was approximately 3 crore.

Hence, option 4.

4. From the table in the answer to the first question, it is clear that CSR Does not decreases over the specified period.

Hence, option 5.

5. The data can be tabulated as follows:

Level	1	2	3	4	5
Requirements	55	65	225	255	300
Total Employees	52	65	210	130	330
Ex-Defence	6	8	30	25	60
Ex-Policemen	4	4	9	7	15
% Ex-Defence	11.54	12.31	14.2	19.23	18.18
% Ex-Policemen	7.69	6.15	4.28	5.38	4.54

From the table, the percentage of ex-defence servicemen is highest in level 4.

Hence, option 4.

Alternatively,

It is quite clear that the percentage of Ex-defence serviceman comes closer to 20 in level 4 and 5 only, while in other levels it is less than 15.

Now, as $25 \times 330 > 60 \times 130$, the percentage of Ex- defence servicemen is highest in level 4.

Hence, option 4.

6. From the table in the answer to the first question of the set, it is quite clear that level 4 will incur the highest reduction.

Hence, option 4.

7. From the table in the answer to the first question of the set, it is quite clear that Level three represents the lowest number of Ex-policeman.

Hence, option 3.

8. Out of the 10 houses, we first place the 7 houses in which the thief will not steal. There are 8 spaces in between and at either ends of these 7 houses where we can place the three houses in which he plans to steal. Thus, the three houses can be selected in ${}^8C_3$ = 56 ways.

Hence, option 1.

9. $x = (9 + 4\sqrt{5})^{48}$
 Let $y = (9 - 4\sqrt{5})^{48}$
 Now,
 $(9 + 4\sqrt{5})^{48} \times (9 - 4\sqrt{5})^{48} = (81 - 80)^{48} = 1$ (i)
 Also, $(9 + 4\sqrt{5})^{48} + (9 - 4\sqrt{5})^{48}$

$$\left[{}^{48}C_0 9^{48} + {}^{48}C_1 9^{47} (4\sqrt{5}) + {}^{48}C_2 9^{46} (4\sqrt{5})^2 + \dots + {}^{48}C_{47} (9)(4\sqrt{5})^{47} + {}^{48}C_{48} (4\sqrt{5})^{48} \right]$$

$$+ \left[{}^{48}C_0 9^{48} - {}^{48}C_1 9^{47} (4\sqrt{5}) + {}^{48}C_2 9^{46} (4\sqrt{5})^2 - \dots - {}^{48}C_{47} (9)(4\sqrt{5})^{47} + {}^{48}C_{48} (4\sqrt{5})^{48} \right]$$

$$= 2 \left[{}^{48}C_0 9^{48} + {}^{48}C_2 9^{46} (4\sqrt{5})^2 + \dots + {}^{48}C_{48} (4\sqrt{5})^{48} \right]$$

 $\therefore x + y = 2(k) = \text{even}$
 Now,
 $0 < 9 - 4\sqrt{5} < 1$
 $\therefore 0 < (9 - 4\sqrt{5})^{48} < 1$
 $\therefore 0 < y < 1$ (ii)
 Also $x = [x] + f$, $0 < f < 1$ (iii)
 $\therefore [x] + f + y$ is even
 As $[x]$ is an integer, $f + y$ is an integer
 From (ii) and (iii)
 $0 < f + y < 2$
 $\therefore f + y = 1$
 Now $x(1 - f) = xy$
 But from (i), $xy = 1$
 $\therefore x(1 - f) = 1$
 Hence, option 1.

10. a741 has 1 written 741 times.
 The sum of digits of a741 is divisible by 3.
 a741 is divisible by 3
 a534 and a123 are also not prime by the same logic.
 $\therefore$ (i), (ii), and (iii) are correct.
 Option (4) can be safely assumed to be the correct option.
 Hence, option 4.
11. Income = 3,37,425
 Tax up to ₹1,90,000 = 0

Tax for the next ₹1,10,000 = 10% of 1,10,000 = ₹11,000

Tax for the next ₹37,425 = 20% of 37,425 = ₹7,485

$\therefore$ Income tax = Rs 18,485

Education cess = 18,485 $\times$ 0.02

Secondary and higher education cess = 18,485 $\times$ 0.01.

$\therefore$ Total income Tax payable = 18,485 + 18,485 $\times$ 0.02 + 18,485 $\times$ 0.01 = Rs 19,039.55

$\therefore$ Required percentage

$$= \frac{19039.55}{337425} \times 100 \approx 5.64\%$$

Hence, option 1.

12. Let Madan's income be $(x + 5)$ lakhs.
 Then his income tax = $0 \times 160000 + 0.1 \times 140000 + 0.2 \times 200000 + 0.3 \times x = (54000 + 0.3x)$
 Total tax payable including surcharges = 1.03 (54000 + 0.3x)
 $\therefore 317910 = 1.03 (54000 + 0.3x)$
 $\therefore x \approx 848835$
 $\therefore$ Madam's income = 848833 + 500000 = ₹1348835
 Hence, option 1.

13. From the data, till 150000 sq. ft., the electricity cost increased in geometric progression with a common ratio of 1.5. Thereafter it increased in arithmetic progression with common difference of 10000.25.

Total cost = Labour + Material + Electricity + Administrative cost

We therefore have the following:

Output	Electricity	Total cost	Cost per sq. ft.
25000	3800	76350	3.054
50000	5700	109200	2.184
75000	8550	141550	1.8873
100000	12825	174825	1.7483
125000	19237.5	208987.5	1.6719
150000	28856.25	245556.25	1.6370
175000	38856.5	288506.5	1.6486
200000	48856.75	336856.75	1.6843

Thus the estimated cost per square foot of output is minimum for 150000 square feet output.

Hence, option 4.

14. Consider the following diagram:

Output	Material Cost	Spoilage cost per sq. ft.	Spoilage cost	Usage cost	Usage cost per sq. ft.
25000	11050	0.042	1050	10000	0.4
50000	22000	0.04	2000	20000	0.4
75000	33000	0.04	3000	30000	0.4
100000	44000	0.04	4000	40000	0.4
125000	54750	0.038	4750	50000	0.4
150000	65700	0.038	5700	60000	0.4
175000	76650	0.038	6650	70000	0.4
200000	88000	0.04	8000	80000	0.4

It is clear from the table that the estimated cost of material usage per square feet of output remains constant for all level s of monthly output.
Hence, option 3.

15. Consider the following table:

Output	Electricity cost	Electricity cost per sq. ft.
25000	3800	0.15
50000	5700	0.11
75000	8550	0.11
100000	12825	0.13
125000	19237.5	0.15
150000	28856.25	0.19
175000	38856.5	0.22
200000	48856.75	0.24

Comparing the values of Electricity cost per square feet, with the given options, we can conclude that the option B represents the graph which is closest to electricity cost per square feet.

Hence, option 2.

16. Let Mr Sanyal have ₹100 to invest on 1st January.

Let his investments in Gold, US bonds and UK bonds be x, y and z respectively.

Then $x + y + z = 100$ (i)

The value of his investment in gold on 31st August = $20720x/20000 = 1.036x$

The value of his investment in US bonds on 31st August

$$= \frac{45y}{40} + \frac{y \times 10 \times 8}{12 \times 100} = 1.192y$$

The value of his investment in EU bonds on 31st August

$$= \frac{63z}{60} + \frac{z \times 10 \times 8}{12 \times 100} = 1.183z$$

$$1.036x + 1.192y + 1.183z = 113 \quad (ii)$$

Calculating in a similar way for September,

$$1.0425x + 1.25y + 1.217z = 116.25 \quad (iii)$$

Solving (i), (ii) and (iii),

$$x \approx 38\%, y \approx 38\% \text{ and } z \approx 24$$

Hence, option 2.

17. It is easy to identify that the return on gold and silver was never highest.

The values of assets considering interest rates and exchange rates are as follows:

Month	Gold	Silver	US Bonds USD	EU Bonds Euros	UK Bonds Pounds	Jap Bonds Yen
January	20000	300	40.33	61.00	70.88	0.50
February	20100	302	41.68	63.55	72.78	0.51
March	20250	307	42.03	65.10	73.66	0.53
April	20330	310	43.40	66.13	74.55	0.53

(Continued)

Table (Continued)

May	20400	312	43.75	67.71	76.50	0.54
June	20500	318	44.10	68.75	77.40	0.55
July	20650	330	46.57	70.35	79.39	0.57
August	20720	335	48.00	71.40	80.30	0.57
September	20850	340	50.53	73.60	82.33	0.59
October	20920	342	53.08	75.83	83.25	0.60
November	20950	345	54.58	76.92	84.74	0.62
December	21000	350	55.00	78.00	86.25	0.63

The percentage increase in each asset over the previous month is as follows. The maximum returns are indicated in bold.

	Gold	Silver	US Bonds USD	EU Bonds Euros	UK Bonds Pounds	Jap Bonds Yen
February	0.50	0.67	3.35	4.18	2.68	2.42
March	0.75	1.66	0.82	2.44	1.22	2.38
April	0.40	0.98	3.27	1.59	1.20	0.41
May	0.34	0.65	0.81	2.38	2.62	2.34
June	0.49	1.92	0.80	1.54	1.18	2.30
July	0.73	3.77	5.59	2.33	2.57	2.27
August	0.34	1.52	3.08	1.49	1.15	0.40
September	0.63	1.49	5.26	3.08	2.52	4.05
October	0.34	0.59	5.06	3.03	1.12	2.16
November	0.14	0.88	2.83	1.43	1.79	2.13
December	0.24	1.45	0.76	1.41	1.78	2.10

$\therefore$ The value of Mr Sanyals's investment at the end of December = $800000 \times 1.0418 \times 1.0244 \times \dots \times 1.0210 \approx 800000 \times 1.462$, which is a gain of approximately 46.2%

The closest option is option 2.

Hence, option 2.

18.

	Gold	Silver	US Bonds USD	EU Bonds Euros	UK Bonds Pounds	Jap Bonds Yen
Q I	1.25	2.33	4.19	6.72	3.93	4.86
Q II	0.84	2.58	1.61	3.96	3.82	4.70
Q III	0.97	3.03	8.50	4.62	3.70	4.48
Q IV	0.38	2.34	3.61	2.86	3.60	4.28

We can see that silver consistently gave better returns than gold in the given period.

Mr Sanyal's investment strategy and corresponding returns are as follows:

Quarter	Bullion	Returns	Other instrument	Returns
Q I	Gold	1.25%	Indian FD	6.25%
Q II	Silver	2.58%	EU Bonds	3.96%
Q III	Silver	3.03%	Indian FD	6.25%
Q IV	Silver	2.34%	Indian FD	6.25%
Value	₹4,38,053		₹4,98,785	

Total value of his assets at the end of the year = ₹9,36,838

Had he invested in US bonds, he would have got $800000 \times 55/40.33 = ₹10,91,000$

Had he invested in UK Bonds, he would have got $800000 \times 86.25/70.88 = ₹9,73,476$

Had he invested in EU Bonds, he would have got $800000 \times 78/61 = ₹10,22,950$

Had he invested in Japanese Bonds, he would have got $800000 \times 0.63/0.50 = ₹10,08,000$

Had he invested the entire amount in his Indian bank, he would have got $8,00,000 \times 1.25 = ₹10,00,000$

∴ Hence option (5) is the answer.

19. Option (5) None of these is the answer.

20. Three managers have opted for Room No. 302.

Hence, only one among these three managers will get room as per their best preferences.

Hence at the most three professionals will get rooms as per their first preferences.

Hence, option 3.

21. At least two managers will not get their best preference as three managers have the same first preference.

Hence by this condition the sum of the preference ranking will be at least $1 + 1 + 1 + 2 + 2 = 7$.

Now, if we can allot the rooms with preference rankings such that their sum is 7, our answer will be 7.

Following arrangement has preference ranking sum 7.

M1	M2	M3	M4	M5
302	304	303	305	301

Hence, option 3.

22. We first allot the maximum possible first preferences.

Then one of the allotments for minimum preference ranking is:

M1	M6	M3	M4	M5
302	304	303	305	301
1	4	1	2	1

Hence minimum preference ranking = $1 + 4 + 1 + 2 + 1 = 9$

Hence, option 5.

23. Let members be represented by points, and friendships by lines between two points.

Consider a person X who has two friends A_1 and A_2 . By condition 2, A_1 and A_2 cannot be friends.

By condition 3, there has to be one more member so that we get a quadrilateral that satisfies all conditions.

∴ 4 can be the minimum possible number of members. But we know that the number of members ≥ 5 .

Now, let X have m friends $A_1, A_2, A_3, \dots, A_m$.

Extending the logic above, we can say that no two of $A_1, A_2, A_3, A_4, \dots, A_m$ can be friends.

Also, there have to be members $B_{12}, B_{13}, \dots, B_{ij}$.

(There are ${}^mC_2$ such members.) Note that no other A_i can join B_{ij} , else condition 3 is violated.

Now, by condition 3 every member is either X's friend or X's friend's friend.

It is important to note that X is an arbitrary person and any other person is as good as X and hence will himself have exactly m friends.

So, there are 3 kinds of members:

1. X

2. A_i 's who are X's friends and are m in number

3. B_{ij} 's who are X's friends' friends and are ${}^mC_2$ in number

$$\therefore \text{Number of members } n = 1 + m + \frac{m(m-1)}{2}$$

We know that the minimum value of n is 4, for $m = 2$

For $m = 3$, $n = 1 + 3 + 3 = 7$

In that case the members are X, $A_1, A_2, A_3, B_{12}, B_{13}$ and B_{23} .

A_3 cannot be B_{12} 's friend as condition 3 is violated with respect to X and B_{12}

B_{23} cannot be B_{12} 's friend as A_2, B_{12} and B_{23} form a triangle, thereby violating condition 2. So B_{12} can have only 2 friends, which contradicts the fact that every person has exactly $m (= 3)$ friends.

So $n = 7$ is not valid.

For $m = 4$, $n = 1 + 4 + 6 = 11$

The members are X, $A_1, A_2, A_3, A_4, B_{12}, B_{13}, B_{14}, B_{23}, B_{24}$ and B_{34} .

B_{12} 's friends are A_1, A_2, B_{34} . Considering any other person as his friend violates condition 2 or 3 as in the above case. So he has only 3 friends and not 4.

So, $n = 11$ is not valid.

For $m = 5, n = 16$

To evaluate this case we construct the following table indicating persons who can be friends.

	✓																
	✓																
	✓																
	✓																
	✓	x	x	x	x	x											
	x	✓	✓	x	x	x	x										
	x	✓	x	✓	x	x	x	x									
	x	✓	x	x	✓	x	x	x	x								
	x	✓	x	x	x	✓	x	x	x	x							
	x	x	✓	✓	x	x	x	x	✓	✓							
	x	x	✓	x	✓	x	x	✓	x	✓	x						
	x	x	✓	x	✓	x	✓	x	✓	✓	x	x					
	x	x	x	✓	✓	x	✓	x	✓	x	✓	x	x	✓			
	x	x	x	✓	x	✓	✓	x	✓	x	✓	x	✓	x	x		
	x	x	x	x	✓	✓	✓	✓	x	x	✓	x	x	x	x		

The table should be read as follows: B_{13} 's friends are the number of ticks in the row labeled B_{13} and column labeled B_{13} .

We see that each person has exactly 5 friends. Also, we can verify that conditions 2 and 3 are satisfied.

So, $m = 5$ and $n = 16$ is valid.

For values of $m \geq 6, n \geq 22$, which violates condition 4.

$\therefore$ There are 16 members in the club.

Hence, option 4.

Note: This question was based on an old olympiad.

24. From the answer to the first question of this set, each person has exactly 5 friends.

Hence, option 3.

25. There are 3 teachers, 2 engineers and 1 doctor.

Now, from third statement, we get that the traveller from Kolkata and the one who gets down at Mughal Sarai are Teachers.

Travellers from Bengaluru and Chennai are engineers and those from Kolkata and Kochi are teachers. The doctor does not belong to Mumbai, Hence the doctor must be from Hyderabad. The teacher who got down at Mughal Sarai must be from Mumbai.

Hence, by statement 4 we get that the youngest traveller, who is the doctor, gets down at Kanpur. Now, the teacher from Kochi, who is 35 years old, is as old as the engineer from Chennai.

Now among the persons from Bengaluru, Chennai, Hyderabad and Mumbai, the person from Bengaluru is the eldest.

Hence, we get the following table.

Name	Age	Profession	Belongs to	Destination
Z	31	Doctor	Hyderabad	Kanpur
	>35	Teacher	Kolkata	
Y	31-34	Teacher	Mumbai	Mughal Sarai
	35	Teacher	Kochi	
	> 35	Engineer		Koderma
	35	Engineer		New Delhi

Now from the given options, only option E is true. Hence, option 5.

26. The present ages of persons who are fresh graduates must be less than 35 years and more than 31 years.

Hence, option 5.

27. As W is neither the youngest nor the oldest among the travelers from her profession, she must be a teacher.

Hence, from the previous table, W is a teacher from Kochi and she is 35 years old. Only option D is correct.

Hence, option 4.

28.

n_4	c	n_3
d		b
n_1	a	n_2

Ground floor

n_4'	c'	n_3'
d'		b'
n_1'	a'	n_2'

First floor

$$\text{Let } a + b + c + d = A,$$

$$a' + b' + c' + d' = A'$$

$$n_1 + n_2 + n_3 + n_4 = N,$$

$$\therefore A + N = 2(A' + N')$$

$$\text{Total number of students} = 3(A' + N')$$

Now,

$$A + A' + 2(N + N') = 44$$

As, each room must be occupied,

$$A + A' \geq 8 \text{ and } (N + N') \geq 8$$

Hence, Mrs Sharma can expect at most 36 students when $N + N' = 8$ and $A + A' = 28$

Now, if number of students = 36, then

Number of students on first floor and ground floor are, 24 and 12 respectively.

$$\text{As, } N = 4, \text{ hence } A' = 20$$

But 20 students cannot be placed in four rooms. Hence, 36 is not possible.

If $N + N' = 11$ and $A + A' = 22$, the number of students = 33

Number of students on first floor and ground floor are, 22 and 11 respectively.

$$\text{Now, max } N' = 7, \text{ hence minimum } A' = 22 - 7 = 15$$

Still 15 students cannot be placed in four rooms. Hence, 33 students are not possible.

Now if number of students = 30. Then $N + N' = 14$ and $A + A' = 16$

and the number of students on first floor and ground floor are, 20 and 10 respectively.

Now, valid combination is possible without violating any rule.

Hence, 30 is possible.

Similarly if number of students is 27 then the ground floor and first floor have 18 and 9 students respectively.

$$\text{In this case } N + N' = 17$$

Now, if $N' = 12$, and $N = 5$ then a valid distribution is possible.

Hence 27 is possible.

Now, if number of students is 24 then $N + N' = 20$. Number of students on first floor and ground floor is 16 and 8 respectively.

Hence each room on the ground floor has only 1 student.

$$\text{Hence } N = 4,$$

$$\therefore N' = 16$$

This is not possible.

Hence, possible number of students must be 30 or 27. Hence 27 students turned up for renting the rooms.

Hence, option 2.

29. From the previous answer, total number of students = 27

$$N + N' = 17, N' = 12 \text{ and } N = 5$$

$$\text{And } A = 9 - 5 = 4$$

Hence all rooms on ground floor, except one, are occupied by only one student.

As $N' = 12$ hence all corner rooms on first floor are occupied by exactly 3 students each.

$$A' = 16 - 12 = 4$$

Hence, all middle rooms on the first floor are occupied by exactly one student.

Hence, the number of students in north-west corner room of first floor and middle room in first floor of east wing are 3 and 1 respectively.

Hence, option 2.

30. When the number of students is 30, $N + N' = 14$ and $A + A' = 16$

$$\text{Also, } N + A = 10$$

As the minimum value of A is 4, the maximum value of

N is 6. Also, the minimum value of N is 4.

We look at the possible values of the four variables:

first combination of values in the table, we get multiple possibilities, two of which are as below.

N	N'	A	A'
4	10	6	10
5	9	5	11
6	8	4	12

Case (i)

1	2	1
2		1
1	1	1

Ground Floor

1	3	3
3		2
3	2	3

First Floor

Here the required number of students are 1 and 2 respectively.

Case (ii)

1	1	1
1		3
1	1	1

Ground Floor

3	3	2
3		1
2	3	3

First Floor

Here the required number of students are 3 and 1 respectively.
Hence, option (1) is the answer.

MODEL IIFT PAPER

(Based upon Previous Years' IIFT Paper)

INSTRUCTIONS

- ☐ Directions for answering the questions are given before each group of questions. Read these directions carefully and answer the questions by darkening the appropriate circles Sheet. Each question has only one correct answer.
 - ☐ All questions carry four marks each. Each wrong answer will attract a penalty of one mark.
 - ☐ Do your rough work only on the Test Booklet and NOT on the Answer Sheet.
-

Directions for questions 1 to 5: Read the following information and choose the right alternative in the questions that follow.

During the cultural week of an institute six competitions were conducted. The cultural week was inaugurated in the morning of 19th October, Wednesday and continued till 26th October. In the span of 8 days six competitions namely debate, folk dance, fash-p, street play, rock band, and group song, were organized along with various other cultural programs. The information available from the institute is:

- i. Only one competition was held in a day
- ii. Rock band competition was not conducted on the closing day.
- iii. Fash-p was conducted on the day prior to debate competition
- iv. Group song competition was conducted neither on Wednesday nor on Saturday
- v. None of the competition was conducted on Thursday and Sunday
- vi. Street Play competition was held on Monday
- vii. There was gap of two days between debate competition and group song competition

1. The cultural week started with which competition?
(1) Fash-p competition
(2) Debate competition
(3) Street play competition
(4) Rock band competition
2. How many days gap is there between rock band competition and group song competition?
(1) Two
(2) Three
(3) Four
(4) Five
3. Which pair of competition was conducted on Wednesday?
(1) Rock band competition and debate competition
(2) Debate competition and fash-p competition
(3) Rock band competition and Folk dance competition
(4) None of these
4. Which competition exactly precedes the street play competition?
(1) Rock band competition
(2) Group song competition
(3) Debate competition
(4) Fash-p competition

5. Fash-p competition follows which competition?
- (1) Debate competition
 - (2) Street play competition
 - (3) Rock band competition
 - (4) None of these

Directions for questions 6 to 8: Read the information given below and answer the questions that follow the information.

A parking lot can accommodate only six cars. The six cars are parked in two rows in such a way that the front of the three cars parked in one row is facing the other three cars in the other row.

- i. Alto is not parked in the beginning of any row
 - ii. Esteem is second to the right of i10
 - iii. Punto, who is the neighbor of Alto is parked diagonally opposite to i10
 - iv. Swift is parked in front of Alto
 - v. SX4 is parked to the immediate right of Alto
6. If SX4 and Esteem exchange their positions mutually then car (s) adjacent to Esteem is (are)?
- (1) i10 and Swift
 - (2) Only Swift
 - (3) Only Alto
 - (4) Alto and Punto
7. If Alto changes position with i10 and Punto changes position with SX4 and Swift shifts one position to the right to accommodate Beatle then the car (s) parked adjacent to Beatle is (are)?
- (1) Punto only
 - (2) i10 and SX4
 - (3) Punto and Alto
 - (4) Alto and Swift
8. In the original parking scheme four new cars enter the parking lot such that Wagon-R is second to the right of i10 and Zen is second to the left of SX4. Jazz is parked second to the left to Wagon-R and Beat is parked to the right of Alto then the cars that moved out are?
- (1) Esteem and Swift
 - (2) Punto and Alto
 - (3) i10 and Alto
 - (4) Punto and SX4

Directions for questions 9 to 13: Read the information given below and answer the next five questions that follow:

- i. Six friends Rahul, Kabeer, Anup, Raghu, Amit and Alok were engineering graduates. All six of them were placed in six different companies and were posted in six different locations, namely Tisco- Jamshedpur, Telco-Pune, Wipro-Bangalore, HCL- Noida, Mecon-Ranchi and Usha Martin-Kolkata. Each of them has their personal e-mail id's with different email providers, i.e., Gmail,

Indiatimes, Rediffmail, Yahoo, Hotmail, Sancharnet, though not necessarily in the same order.

- ii. The one having e-mail account with Sancharnet works in Noida and the one having an e-mail account with Indiatimes works for Tisco.
 - iii. Amit does not stay in Bangalore and does not work for Mecon, the one who works for Mecon has an e-mail id with Gmail.
 - iv. Rahul has an e-mail id with Rediffmail and works at Pune.
 - v. Alok does not work for Mecon and the one who works for Wipro does not have an e-mail account with Yahoo.
 - vi. Kabeer is posted in Kolkata, and does not have an account with Hotmail.
 - vii. Neither Alok nor Raghu work in Noida.
 - viii. The one who is posted in Ranchi has an e-mail id which is not an account of Rediffmail or Hotmail.
 - ix. Anup is posted in Jamshedpur.
9. The man who works in Wipro has a e-mail account with?
- (1) Sancharnet
 - (2) Yahoo
 - (3) Rediffmail
 - (4) None of these
10. Which of the following e-mail-place of posting-person combination is correct?
- (1) Kabeer-Kolkata-Rediffmail
 - (2) Alok-Bangalore-Indiatimes
 - (3) Amit-Noida-Yahoo
 - (4) Raghu-Ranchi-Gmail
11. Which of the following is true?
- (1) Amit is posted at Ranchi
 - (2) Raghu is posted at Jamshedpur
 - (3) Kabeer has an e-mail id with Yahoo
 - (4) Rahul has an e-mail id with Indiatimes
12. Which of the following sequences of location represent Alok, Kabeer, Anup, Rahul, Raghu, and Amit in the same order?
- (1) Bangalore, Noida, Pune, Jamshedpur, Ranchi, Kolkata
 - (2) Bangalore, Kolkata, Jamshedpur, Pune, Noida, Ranchi
 - (3) Kolkata, Bangalore, Jamshedpur, Pune, Noida, Ranchi
 - (4) None of these
13. People who have e-mail account with Indiatimes, Sancharnet and Yahoo work for which companies, in the same sequence as the e-mail accounts mentioned?

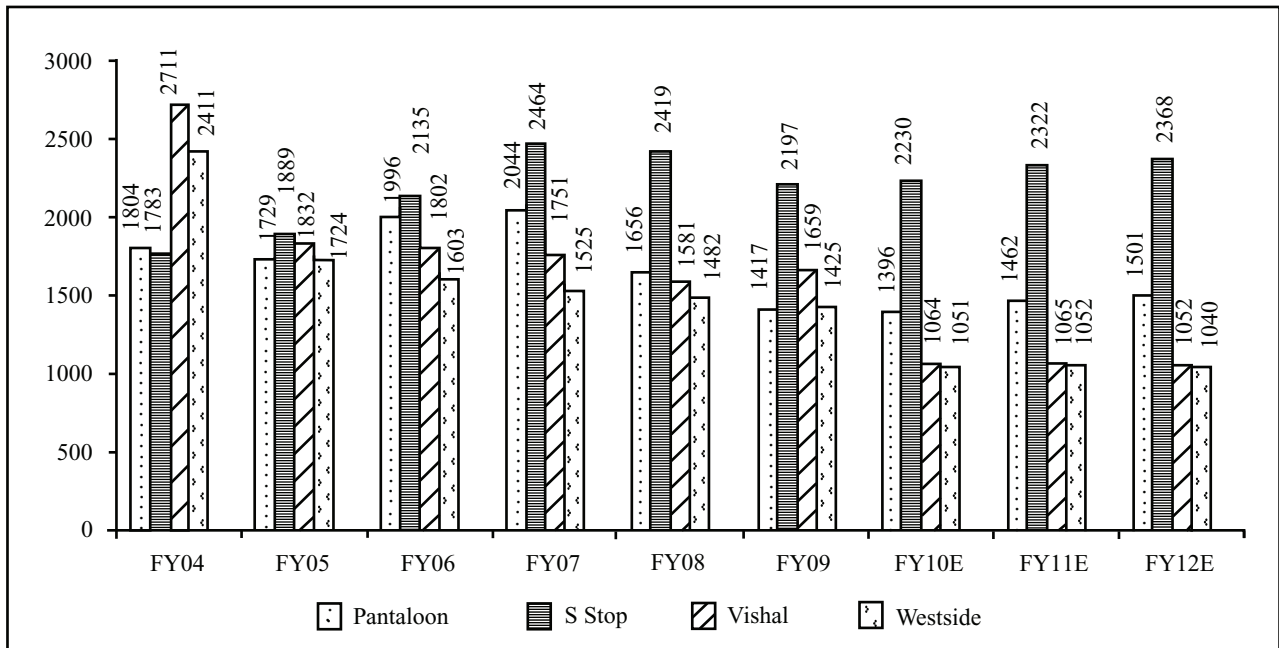
- (1) Usha Martin, HCL, Wipro
 (2) Tisco, Wipro, Usha Martin
 (3) HCL, Tisco, Wipro
 (4) Tisco, HCL, Usha Martin

14. How many 'zeroes' are there in the following sequence which are immediately preceded by a nine but not immediately followed by seven?
 7090070890702030045703907
 (1) One (2) Two
 (3) Three (4) Four
15. A Retail chain has seven branches in a city namely R1, R2, R3, R4, R5, R6, R7 and a central distribution center (DC). The nearest branch to the DC is R6 which is in the south of DC and is 9 Km away from DC. R2 is 17 Km away from DC in the west. The branch R1 is 11 Km away R2 further in the west. The branch R3 is 11 Km in the north east of R1. R4 is 13 Km from R3 in the east. R5 is 11 Km in the north east of the distribution

center. In the north east of R6 is R7 and distance between them is 15 Km. The distance between R1 and R6, R2 and R6, R6 and R5 is 23 Km, 19 Km, 13 Km respectively. R3 is 14 Km away from the DC in the north west direction, while R2 is also 14Km away from R4 in the north east direction of R2. A truck carrying some goods starts from the distribution center and has to cover at least four stores in a single trip. There is an essential good that has to be delivered in the store R7, but the delivery at R7 has to be done in the end, so what is the shortest distance the truck would travel?

- (1) 55 (2) 56
 (3) 63 (4) 66

Directions for questions 16 to 18: Following graph represents the cost per square feet of four retailers from the financial year 2004 to 2012. The expected cost per square feet for year 2010, 2011 and 2012 are forecasted figures.



16. Which retailer shows the sharpest decline in cost per square feet and in which year?
 (1) Westside, 2005 (2) Pantaloen, 2008
 (3) S. Stop, 2009 (4) Vishal, 2010
17. Which retailer has shown the maximum increase in its cost per square feet and in which year?
 (1) S. Stop, 2006 (2) S. Stop, 2007
 (3) Pantaloen, 2006 (4) Vishal, 2006
18. What is the average rate of change in the cost per square feet of the retail sector, if the sector

is represented by the above four retailers in the period FY07 to FY10E?

- (1) -8.12 (2) -10.86
 (3) -6.73 (4) None of these

Directions for questions 19 to 22: The table below represents the information collected by TRAI about the Service Area wise Access of (Wireless + Wire line) subscribers in India. On the basis of the information provided in the table answer the questions that follow.

Service Area	Subscribers (in Millions)		Service Area	Subscribers (in Millions)	
	Dec 2009	March 2010		Dec 2009	March 2010
U.P. (E)	39.68	45.53	Orissa	13.57	15.89
Bihar	33.17	38.36	Mumbai	27.21	29.43
Karnataka	35.5	39.91	Kerala	25.69	27.65
Andhra Pradesh	43.89	48.09	Punjab	20.03	21.7
TN (Chennai Included)	53.17	57.26	Delhi	29.38	31.01
Madhya Pradesh	29.89	33.55	Haryana	13.59	14.96
Maharashtra	43.02	46.53	Kolkata	16.55	17.87
U.P. (W)	28.47	31.97	Assam	8.11	9.06
West Bengal	22.68	26.07	North East	4.94	5.64
Gujarat	31.37	34.43	Jammu And Kashmir	5.22	5.78
Rajasthan	32.22	35.27	Himachal Pradesh	4.83	5.34

19. Which service area has observed maximum rate of change from Dec 2009 to March 2010 (in percentage)?

- (1) U.P. (E) (2) Bihar
(3) Orissa (4) Haryana

20. As a result of a decisions to allow only two or three telecom operator in a particular service area, TRAI allocates R-Com and Vodafone to operate only in the east of India and Idea and Airtel operate only in south. R-Com has got 28% subscribers in the east while Vodafone has 72% subscribers; similarly Idea has 48% subscribers in the south while Airtel has 52% subscribers. How many subscribers do these four players have in 2010?

- (1) R-Com-28.03, Vodafone-73.22, Idea-86.22, Airtel-89.5
(2) R-Com-30.03, Vodafone-72.82, Idea-85.02, Airtel-80.04
(3) R-Com-28.03, Vodafone-76.24, Idea-84.01, Airtel-85.67
(4) R-Com-30.03, Vodafone-77.22, Idea-82.99, Airtel-89.91

21. Due to operability issues early in 2010 Madhya Pradesh and entire UP was added to the eastern telecom circle. The telecom operators in Madhya Pradesh and entire UP namely R-Com, Vodafone and Idea had 28%, 40% and 32% subscribers

respectively. What is the percentage of subscribers that each player has in the newly formed eastern circle in March 2010?

- (1) R-Com-30.01%, Vodafone-55.72%, Idea-14.27%
(2) R-Com-32.01%, Vodafone-53.72%, Idea-14.27%
(3) R-Com-28%, Vodafone-55.72%, Idea-16.27%
(4) None of these

22. The all India rate of change in number of subscribers from December 2009 to March 2010 is?

- (1) 10.7% (2) 10.5%
(3) 11.8% (4) 12.4%

Directions for questions 23 to 27: In order to quantify the intangibles and incentives to the multi brand dealers (dealers who stock multiple goods as well as competing brands) and the associated channel members, a Company(X) formulates a point score card, which is called as brand building points. This brand building point is added to the sales target achieved points for redemption. The sales target achieved point is allotted as per the table 3 of this question. The sum of brand building point and sales achieved points is the total point that can be redeemed by the dealer against certain goods, as shown in the second table.

The detail of the system is shown in the tables below:

Table 1: Brands Building Score Card

Brand Building Criteria		Points that are allotted if any of the each is achieved				
Company(X) Signage	Only Company X signage on main entrance on the store	Company X signage on the main entrance along with other brands	Company X signage in the corner of the counter	Company X signage Outside the counter	No signage of Company X	Other brands signage only
Points	20	10	5	5	0	-20
Company(X) Wall painting in the exterior of the store	Only Company X painting in the walls of the store	Company X painting on main entrance with other brands	Company X painting on the side wall of the store	Company X painting outside the store on some other structure	No painting of Company X	Other brands painting only
Points	20	5	2.5	2.5	0	-10
Company(X) painting in the interior of the store	The interior of the store has only Company X painting	Company X painting in the Back side of the counter	Company X painting on the side wall in the interior	Not painted	Others painting only	
Points	10	5	2.5	2.5	-10	
POP (point of purchase) display of Company(X)	All POP display is of Company X	The POP display of company X is at the eye level with other brands	Above the eye level with other	Below the eye level with other brands	Store does not have any POP material	Store has only Other brands POP material
Points	25	10	5	5	0	-20
Stacking of Company (X) goods in the shelves	Goods of Company X only in the front row	Goods of Company X share front row with other brands	Company X goods are only in the back row	Goods of Other brands in the front row only		
Points	25	10	0	-20		

Table 2: Point Redemption Options

Sl.No	Goods in offer	Total Points required for Redemption
1	Umbrella	40
2	Nike Cap	100
3	T-Shirt	200
4	Tupperware Set	600
5	Ray Ban Glasses	800
6	Banarasi Silk Saree	2000
7	Kanjivaram Saree	4000

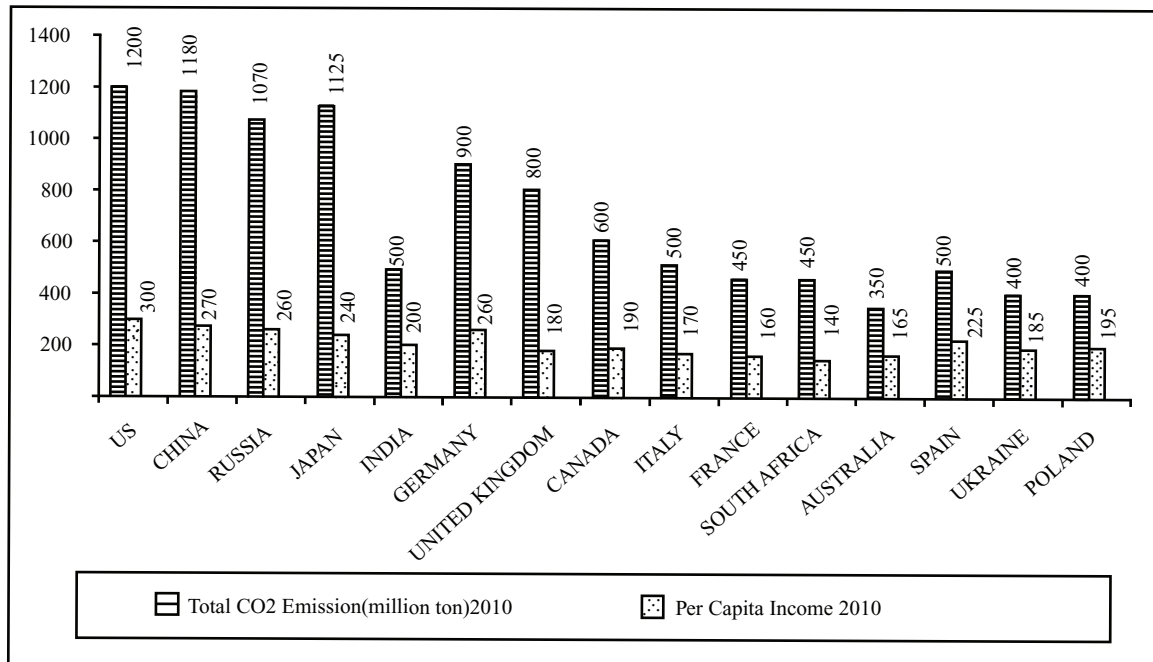
Table 3: The point calculation on sales target achieved is:

Sales Target	Points Assigned
<50% of the Sales Target	0
50% - 75%	10
75% - 99%	12
100%	15
Each extra unit sold above the sales target	0.25

There are 10 multi brand dealers in Nasik and the sales that they have achieved in the end of a quarter are:

Dealers	Sales Target (July-Sep) in units	Actual Sales
Bhoumik Brothers	25, 000	24, 378
Subhajit Traders	28, 000	29, 241
Srikrishna Traders	40, 000	42, 000
Nikil Choudhary & Co	43, 000	42, 000
M/s Dinesh Kumar	25, 000	25, 000
Variety Stores	22, 000	23, 000
Rajib & Co	22, 000	22, 000
Malling Enterprise	23, 000	24, 000
Saha H/W	24, 000	24, 512
Maheshwari & Co	50, 000	56, 241

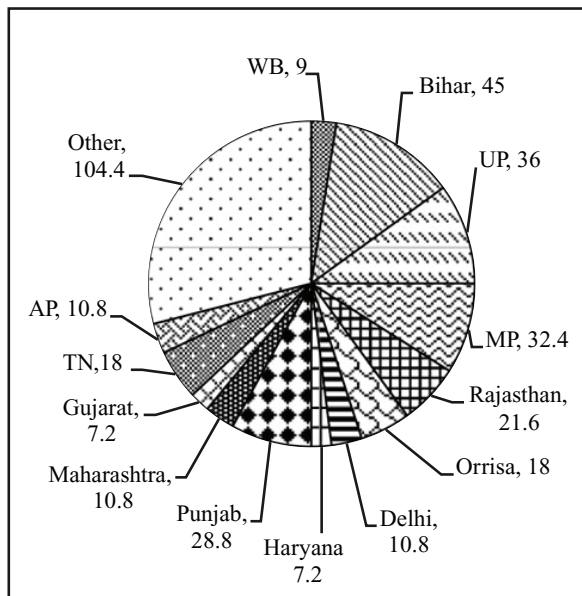
23. Maheshwari & Co has Company X signage along with other brand signage in the main entrance of the store, the exterior walls of the store have the painting of only company X, the side wall in the interior has the painting of Company X. The POP display of Company X is above the eye level with other brands while the stacking of goods of Company X is in the back row of the shelves. The brand building points when combined with the sales achieved points amounts to the total points that a dealer can accumulate in a quarter. The number of Tupperware Sets that Maheshwari & Co can redeem after the quarter (July to September) is?
- (1) 2 (2) 3
(3) 4 (4) 5
24. Bhowmik Brothers has only other brands signage in the front of the store, and company X painting on the side wall in the exterior of the store, Company X painting on the side wall in the interior of the store, no POP display of any Company and the goods of Company X is stacked in the front row with other brands. What is the total point Bhowmik Brothers need to accumulate to make them eligible for minimum redemption?
- (1) 27 (2) 37
(3) 38 (4) 33
25. The Brand building points of Saha H/W is 85, and Mr Saha the proprietor of the store wants to redeem a Kanjivaram Saree the next quarter by carrying forward the points accumulated this quarter to the next quarter. The sales target of Saha H/W is 25,000 units in the next quarter. It is assumed the brand building points for the next quarter is also going to be 85. How many extra units Saha H/W has to sell in order to get the Kanjivaram Saree?
- (1) 14688 (2) 12569
(3) 13658 (4) 15698
26. Malling Enterprise exhausted all its points while redeeming three Nike Caps and an Umbrella, what is its brand building points?
- (1) 75 (2) 85
(3) 95 (4) 90
27. If Srikrishna Trader has 80 brand building points then the goods that it can redeem are ____?
- (1) Tupperware set, Kanjivaram
(2) Umbrella and Tupperware set
(3) Tupperware set, Nike Cap
(4) Nike Cap and T-Shirt



Directions for questions 28 to 31 : Study the following graph and answer the questions that follow:

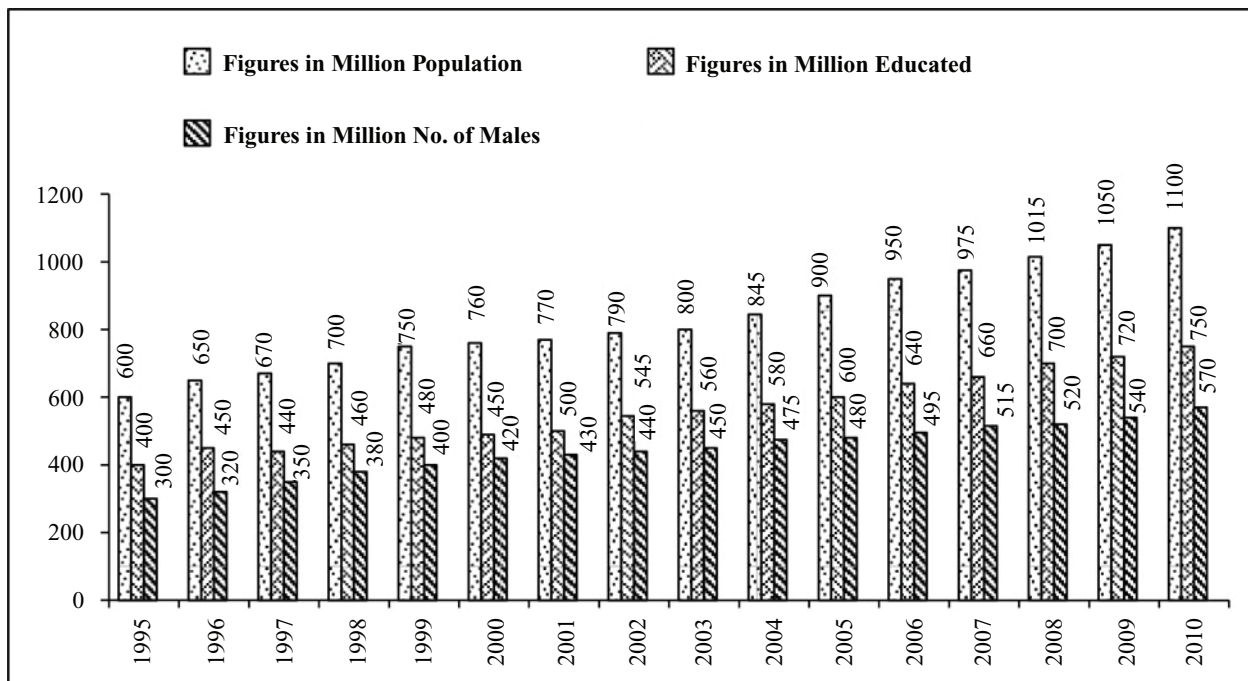
28. If the world energy council formulates a norm for high emission countries to reduce their emission each year by 12.5% for the next two years then what would be the ratio of CO_2 emission to per capita income of US, China and Japan after two years. The per capita income of China, Japan and US is expected to increase every year by 4%, 3% and 2% respectively.
- (1) 3.5, 3.8, 4.1 (2) 3.4, 3.5, 3.9
(3) 2.9, 3.1, 3.4 (4) None
29. If US and China, decide to buy carbon credits, from Spain and Ukraine to make up for their high emissions, then in how many years US, and China would be able to bring down its ratio of CO_2 emission (million ton) to per capita income to world standard benchmark of 0.75. (per capita income of the given countries remain same, 0.5 CO_2 emissions [million ton] is compensated by purchase of 1.25 units of carbon credit, and a country can buy carbon credit units in three lots of 15, 20 and 30 units in a single year.)
- (1) 3.8 years (2) 38 years
(3) 30 years (4) None
30. France, South Africa, Australia, Ukraine and Poland form an energy consortium which declares CO_2 emission of 350 million ton per annum as standard benchmark. The energy consortium decides to sell their carbon emission savings against the standard benchmark to high carbon emission countries. It is expected that the per capita income of each country of the energy consortium increases by 2%, 2.5% and 3.5% p.a. for the next three years respectively. The ratio of CO_2 emission to per capita income of the each energy consortium country reduces by 50% and remains constant for the next three years. By selling 0.5 CO_2 emissions [million ton] the energy consortium earns 1.25 carbon credits, then determine the total carbon credits earned by energy consortium in three years.
- (1) 3560 (2) 450
(3) 5060 (4) None
31. Select the wrong statement in reference to the position of India vis-à-vis other countries in the graph in terms of the ratio of CO_2 emission to per capita income (increasing order).
- (1) India stands at 5th position if 50 is added to the given per capita income figures of each country.
(2) India stands at 5th position at the given CO_2 emission level and per capita income of each country.
(3) India stands at 5th position if 200 million ton CO_2 emission is deducted from the given CO_2 emission figures of each country.
(4) India stands at 5th position if 200 million ton CO_2 emission is deducted from the given CO_2 emission figures of each country and 50 is added to the given per capita income of each country.

Directions for question 32: Refer to the following pie chart and answer the question that follows. The chart shows the number of units produced in degrees, by Company X in different States of India for the quarter July-Sep 2010.



32. By how many units does the number of units produced in Bihar exceed the number of units produced in Madhya Pradesh, if the total production in the quarter is 72,000 units?
- (1) 2300 units (2) 2520 unit
(3) 3516 units (4) 2860 units

Directions for questions 33 to 35: The following graph shows population data (males and females), educated people data (males and females) and number of male in the population for a given period of 1995 to 2010. All data is in million.



From the information given in the graph answer the questions that follow:

33. In which year the percentage increase in the number of females over the previous year is highest?
 (1) 1996 (2) 1999
 (3) 2004 (4) 2005
34. In 2002 if the ratio of number of educated male to professionally educated female was 5:4. If the number of educated males increased by 25% in 2003. What is the percentage change in number of uneducated females in 2003?

- (1) +25% (2) +30%
 (3) +34% (4) +56%

35. In year 2005 total population living in urban area is equal to sixty eight percent of educated population. The ratio of number of people living in urban area to people living in rural area is 43:12 in 2010. What is the ratio of the rural population in 2005 to that in 2010?
 (1) 0.8 (2) 0.47
 (3) 2.05 (4) None

ANSWER KEYS

1. (4) 2. (4) 3. (3) 4. (3) 5. (3) 6. (3) 7. (4) 8. (4) 9. (4) 10. (4)
 11. (3) 12. (4) 13. (4) 14. (1) 15. (3) 16. (1) 17. (2) 18. (4) 19. (3) 20. (4)
 21. (4) 22. (2) 23. (1) 24. (4) 25. (1) 26. (1) 27. (4) 28. (3) 29. (2) 30. (3)
 31. (4) 32. (2) 33. (4) 34. (4) 35. (3)

HINTS AND EXPLANATIONS

1. Create a table with three columns– date, day and competition – as shown below:

Date	Day	Competition
19	Wed	
20	Thu	
21	Fri	
22	Sat	
23	Sun	
24	Mon	
25	Tue	
26	Wed	

Since there were 6 competitions and 8 days, and only one competition was held per day; it means that exactly 2 days were completely free, i.e. there was no competition on that day. It is given that these two days were Thursday and Sunday. Now, street play was held on Monday. Thus, the table becomes:

Date	Day	Competition
19	Wed	
20	Thu	n/a
21	Fri	
22	Sat	
23	Sun	n/a
24	Mon	Street Play
25	Tue	
26	Wed	

Flash-p was conducted a day before the debate and there was a gap of 2 days between the debate and the group song competition.

Therefore, there are 2 possibilities: GS _ Flash-p Debate or Flash-p Debate _ _GS

Now, for flash-p and the debate to be on consecutive days, only two possibilities exist – Friday and Saturday or Tuesday and Wednesday.

If the debate is on Wednesday, the group song will have to be on Sunday, which is not possible.

Therefore, the flash-p competition and debate were on Friday and Saturday respectively. Therefore, the Group Song competition has to be on Tuesday. Since the rock band competition was not held on the last day, it could have only been conducted on the first day i.e. October 19.
Therefore, the folk dance competition was held on the last day i.e. 26 October.
Thus, the final table is as shown below:

Date	Day	Competition
19	Wed	Rock Band
20	Thu	n/a
21	Fri	Flash-p
22	Sat	Debate
23	Sun	n/a
24	Mon	Street Play
25	Tue	Group Song
26	Wed	Folk Dance

Thus, the cultural week started with the rock band competition.
Hence, option 4.

2. Consider the final table obtained in the solution to the first question.
The rock band competition and the group song competition were held on October 19 and October 25 respectively.
Thus, there were five days in between.
Hence, option 4.
3. Consider the final table obtained in the solution to the first question.
The rock band and folk dance competitions were conducted on Wednesday.
Hence, option 3.
4. Consider the final table obtained in the solution to the first question.
The debate competition exactly precedes the street play competition.
Hence, option 3.
5. Consider the final table obtained in the solution to the first question.
The flash-p competition follows the rock band competition.
Hence, option 3.

6. The parking lot can be as shown below:

— — —
— — —
Esteem is second to the right of i10.
Therefore, there are 2 possibilities:
— — —
i10 — Esteem
or
Esteem — i10
— — —

Punto is parked diagonally opposite i10 and Alto is next to Punto.

Thus, we get:
— Alto Punto
i10 — Esteem
or
Esteem — i10
Punto Alto —
Now, SX4 is to the immediate right of Alto and Swift is opposite Alto.
Therefore, we get
SX4 Alto Punto
i10 Swift Esteem
or
Esteem Swift i10
Punto Alto SX4
Now, if SX4 and Esteem interchange their position, in either case, the car next to Esteem will be Alto.
There is no other car next to Esteem.
Hence, option 3.

7. Alto changes position with i10, Punto changes position with SX4 and Swift shifts one position to the right to accommodate Beatle.
Therefore, the arrangements are as shown below:
Swift Beatle Alto
SX4 i10 Punto
or
Punto i10 SX4
Alto Beatle Swift
In either case, the cars next to Beatle are Alto and Swift.
Hence, option 4.
8. 4 new cars have entered the car park.
Wagon-R is second to the right of i10, Zen is second to the left of SX4, Jazz is second to the left of Wagon-R and Beat is to the right of Alto.
Using these conditions, the arrangement is as shown below:
Wagon R Swift Jazz

Zen Alto Beat

Or

Beat Alto Zen

Jazz Swift Wagon R

Thus, the cars that have gone out are Esteem, i10, Punto and Sx4.

Alto and Swift have not gone out.

Options 1, 2 and 3 mention either Swift or Alto.

Hence, options 1, 2 and 3 can be eliminated.

Hence, option 4.

9. Construct a table with the names of the graduates, companies, locations and email providers.

Note that the company and location are given as a pair.

Thus, if one of these two parameters is known for a person or corresponding to an email provider, the other is also automatically known.

From (ii), we get: HCL – Noida – Sancharnet and Tisco – Jamshedpur – Indiatimes.

Now, consider the information which directly mentions the location, company or provider for a person.

Rahul works for Telco in Pune and uses Rediffmail.

Kabeer works for Usha Martin in Kolkata and Anup works for Tisco in Jamshedpur.

Thus, the table is as shown below:

Graduate	Company	Location	Email Provider
Rahul	Telco	Pune	Rediffmail
Kabeer	Usha Martin	Kolkata	
Anup	Tisco	Jamshedpur	
Raghu			
Amit			
Alok			

Now, since neither Alok nor Raghu work in Noida, Amit works for HCL in Noida.

Therefore, Amit uses Sancharnet.

Similarly, Anup uses Indiatimes.

Thus, the table becomes:

Graduate	Company	Location	Email Provider
Rahul	Telco	Pune	Rediffmail
Kabeer	Usha Martin	Kolkata	
Anup	Tisco	Jamshedpur	Indiatimes
Raghu			
Amit	HCL	Noida	Amit
Alok			

Since Alok does not work for Mecon, Raghu works for Mecon and Alok works for Wipro.

Therefore, Alok and Raghu work in Bangalore and Ranchi respectively.

Since the person who works in Mecon has an account with Gmail, Raghu has an account with Gmail.

Since the person who works in Wipro does not have a Yahoo account, Alok has to have a Hotmail account and Kabeer has to have a Yahoo account.

Thus, the final table is as shown below:

Graduate	Company	Location	Email Provider
Rahul	Telco	Pune	Rediffmail
Kabeer	Usha Martin	Kolkata	Yahoo
Anup	Tisco	Jamshedpur	Indiatimes
Raghu	Mecon	Ranchi	Gmail
Amit	HCL	Noida	Sancharnet
Alok	Wipro	Bangalore	Hotmail

Thus, the person who works in Wipro has an e-mail account with Hotmail.

Hence, option 4.

10. Consider the final table obtained in the solution to the first question.

It can be seen that only the Raghu-Ranchi-Gmail combination is correct.

Hence, option 4.

11. Consider the final table obtained in the solution to the first question.

Among the options, the only statement that is true is that

Kabeer has an email-id with Yahoo.

Hence, option 3.

12. Consider the final table obtained in the solution to the first question.

The sequence of location for Alok, Kabeer, Anup, Rahul, Raghu and Amit, in that order, is Bangalore, Kolkata, Jamshedpur, Pune, Ranchi and Noida.

Hence, option 4.

13. Consider the final table obtained in the solution to the first question.

The people who have an email account with Indiatimes, Sancharnet and Yahoo work for Tisco, HCL and Usha Martin respectively.

Hence, option 4.

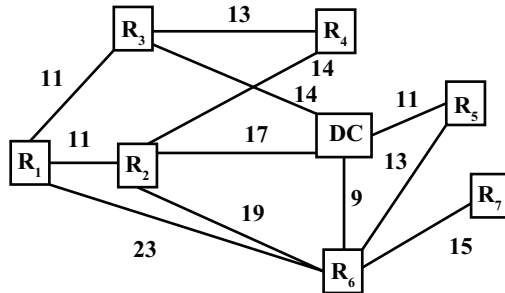
14. Consider the given sequence

7090070890702030045703907

There is only one zero that is immediately preceded by a nine and is not immediately followed by seven.

Hence, option 1.

15. According to the given conditions, the relative position of each city is as shown in the figure below:



The shortest route for the truck would be DC-R3-R1-R6-R7.

Thus, the total distance travelled would be $14 + 11 + 23 + 15 = 63$ km

Hence, option 3.

16. The sharpest decline in cost per square feet will be for a retailer having the maximum slope for the cost line; with the cost per square feet on the y-axis and years on the x-axis.

Now, since the change in the x-axis, i.e. number of years is constant for all 4 options, i.e. 1 year, the sharpest decline will be for the retailer having the maximum drop in the cost per square feet for that particular year.

Decline in cost per square feet for the retailers given in the options is:

Westside, 2005 : $2411 - 1724 = 687$

Pantaloon, 2008 : $2044 - 1656 = 388$

S.Stop, 2009 : $2419 - 2197 = 222$

Vishal, 2010 : $1659 - 1064 = 595$

Hence, the sharpest decline is for Westside in the year 2005.

Hence, option 1.

17. The increase in cost per square feet for the retailers in the given options is:

S.Stop, 2006 : $2135 - 1889 = 246$

S.Stop, 2007 : $2464 - 2135 = 329$

Pantaloon, 2006 : $1996 - 1729 = 267$

Vishal, 2006 : $1802 - 1832 = -30$

Hence, the maximum increase in cost per square feet among the given options is for S.Stop in 2007.

Hence, option 2.

18. The rate of change for the each retailer in the period FY07 to FY10E is:

For Pantaloons:

$$\{(1396 - 2044) / 2044\} \times 100 = -31.70\%$$

$$\text{For S. Stop: } \{(2230 - 2464) / 2464\} \times 100 = -9.5\%$$

$$\text{For Vishal: } \{(1064 - 1751) / 1751\} \times 100 = -39.23\%$$

$$\text{For Westside: } \{(1051 - 1525) / 1525\} \times 100 = -31.08\%$$

Hence, the average rate of change in the cost per square feet of the retail sector in the period FY07 to FY10E is:

$$(31.70 + 9.5 + 39.23 + 31.08) / 4, \text{ i.e. } -27.88\%$$

Hence, option 4.

19. The rate of change from Dec 2009 to March 2010 for U.P. (E), Bihar, Orissa and Haryana are:

$$\text{U.P. (E): } \frac{45.53 - 39.68}{39.68} = 14.74\%$$

$$\text{Bihar: } \frac{38.36 - 33.17}{33.17} = 15.64\%$$

$$\text{Orissa: } \frac{15.89 - 13.57}{13.57} = 17.09\%$$

$$\text{Haryana: } \frac{14.96 - 13.59}{13.59} = 10.08\%$$

$\therefore$ Orissa has shown the maximum rate of change from Dec 2009 to March 2010.

Hence, option 3.

20. Since R-com has 28% subscribers in the east and Vodafone has 72% subscribers in the east, these two are the only operators in the east.

Similarly, Idea and Airtel are the only players in the south.

Now, Karnataka, Andhra Pradesh, TN (including Chennai) and Kerala are in the south.

Hence, the number of subscribers in the south in 2010 = $39.91 + 48.09 + 57.26 + 27.65 = 172.91$ million

Now, Idea has 48 % of these subscribers.

Hence, the number of subscribers that Idea had in the south = $172.91 \times 0.48 = 82.99$ million

Similarly, the number of subscribers that Airtel had in the south = $172.91 \times 0.52 = 89.91$ million

Only option D shows these values for Idea and Airtel.

Hence, option 4.

Alternatively,

As R-com has 28% and Vodafone has 72% of the subscribers in the east, the number of subscribers for R-com and Vodafone mentioned in the options must satisfy this condition, i.e. the number of subscribers mentioned for R-com must be 28% of

the sum of number of subscribers mentioned for R-com and Vodafone in that option.

Only option 4 satisfies this condition.

Hence, option 4.

21. Percentage share of R-com, Vodafone and Idea in Madhya Pradesh and entire UP is given.

However, the percentage breakup of these players in the other eastern states is not known.

Also, the other operators (if any) in the other eastern states are not known.

Hence, a definite conclusion about the percentage share of these players in the newly formed eastern region is not possible.

Hence, among the given options, only option 4 is feasible.

Hence, option 4.

Note: Since the question does not state explicitly that data from the previous question can be used, the percentage break up given in the previous question cannot be assumed in this question.

22. Find the total number of subscribers in Dec 2009 (in million) and Mar 2010 (in million).

Total number of subscribers in Dec 2009 (in million) = 562.18

Total number of subscriber in March 2010 (in million) = 621.30

∴ The required rate of change

$$= \frac{(621.3 - 562.18)}{562.18} \times 100 = 10.5\%$$

Hence, option 2.

23. The points earned by Maheshwari & Co. are as follows:

Points for Company Signage = 10

Points for Company X wall painting in the exterior of the store = 20

Points for Company X painting in the interior of the store = 2.5

Points for POP display of company X = 5

Points for stacking of company X goods in the shelves = 0

Thus, total brand building points

$$= 10 + 20 + 2.5 + 5 + 0 = 37.5$$

As Maheshwari & Co. has achieved more than 100% sales target, they will get 15 points for the first 100% and then additional points on a per unit basis.

Maheshwari & Co. had sold 56241 50000 = 6241 extra units and they will get 0.25 points for each extra unit sold.

Therefore, they will get $6241 \times 0.25 = 1560.25$ extra points.

Hence total points earned

$$= 37.5 + 15 + 1560.25 = 1612.75$$

600 points are required to redeem 1 Tupperware set. Hence, Maheshwari & Co. will be able to redeem only 2 Tupperware sets. Hence, option 1.

24. The points earned by Bhowmik Brothers are as follows: Points for company Signage = -20

Points for company X wall painting in the exterior of the store = 2.5

Points for company X painting in the interior of the store = 2.5

Points for POP display of company X = 0

Points for stacking of company X goods in the shelves = 10

Thus, total brand building points

$$= -20 + 2.5 + 2.5 + 0 + 10 = -5$$

As Bhowmik Brothers has achieved 75–99% of the sales target, it will get 12 points for sales.

Hence total points = -5 + 12 = 7

For minimum redemption, they should have atleast 40 points (for an umbrella).

Therefore, they need 33 more points.

Hence, option 4.

25. Brand building points of Saha H/W = 85.

Since Saha H/W had achieved more than 100% of the sales target, they get 15 points for the sales.

Also, they sold 512 extra units and so get $512 \times 0.25 = 128$ extra points.

Saha H/W will get 85 points again for brand building in the next quarter.

Also, since Saha H/W will have to sell extra units, it would have achieved more than 100% of the sales. Therefore, it will also get 15 points for achieving 100% sales.

Therefore, excluding the extra points earned next quarter, the total points for Saha H/W at the end of next quarter are $85 + 15 + 128 + 85 + 15 = 328$

To redeem a Kanjivaram saree, Saha H/W must have 4000 points.

Hence, the extra points that need to be earned in the Second quarter = $4000 - 328 = 3672$

For every extra sale, Saha H/W gets 0.25 points.

Therefore, to get 3672 extra points, the extra sales should be $3672 \times 4 = 14688$

Hence, option 1.

26. One Nike cap and one umbrella can be redeemed using 40 and 100 points respectively.

Therefore, to redeem 3 Nike caps and 1 Umbrella, Malling Enterprise used $3 \times 100 + 40 = 340$ points.

Since Mallong Enterprise has exhausted all its points, they had a total of 340 points.

Now, Mallong had achieved more than 100% of the sales target and so will get 15 points for sales.

Since, they had sold 1000 extra units, they get $1000 \times 0.25 = 250$ extra points for this.

Therefore, total points through sales = $15 + 250 = 265$

The remaining points have to be through brand building.

Hence, brand building points = $340 - 265 = 75$

Hence, option 1.

27. Srikrishna Trader had 80 brand building points.

Since they have achieved more than 100 % of the sales target, they get 15 points for achieving the target.

Additionally, they had sold 2000 extra units and so get $2000 \times 0.25 = 500$ extra points for it.

Hence, total points of Srikrishna Trader = $500 + 15 + 80 = 595$

One Tupperware set requires 600 points for redemption and so cannot be redeemed using these points.

Observe that options 1, 2 and 3 mention a Tupperware set and so are not possible.

Therefore, options 1, 2 and 3 get eliminated.

Srikrishna Trader can redeem a Nike cap (100 points) and a T-shirt (200 points) using their points.

Hence, option 4.

28. The ratio of CO₂ emission to per capita income for USA, China and Japan after two years will be:

$$\text{USA} = \frac{1200 \times 0.875 \times 0.875}{300 \times 1.02 \times 1.02} = 2.9$$

$$\text{China} = \frac{1180 \times 0.875 \times 0.875}{270 \times 1.04 \times 1.04} = 3.1$$

$$\text{Japan} = \frac{1125 \times 0.875 \times 0.875}{240 \times 1.03 \times 1.03} = 3.4$$

Hence, option 3.

29. To bring down the ratio of CO₂ emission to per capita income to meet the standard benchmark of 0.75, US and China will have to bring down their CO₂ emission

to (300×0.75) and (270×0.75) respectively, i.e. 225 and 202.5 million tons respectively.

Hence, the amount of CO₂ emission US and China have to cut down to meet the standard benchmark is $(1200 - 225)$ and $(1180 - 202.5)$, i.e. 975 and 977.5 million tons respectively.

To reduce 0.5 million tons of CO₂ emission, a country has to purchase 1.25 units of carbon credits.

Therefore, to reduce 1 million tons of CO₂ emission 2.5 units of carbon credits need to be purchased.

Hence, to reduce CO₂ emission by 975 and 977.5 million tons, the amount of carbon credits that need to be purchased by the US and China are (975×2.5) and (977.5×2.5) , i.e. 2437.5 and 2443.75 respectively.

The number of carbon credits that a country can buy in a year is 65 $(15 + 20 + 20)$.

Therefore, the number of years that U.S. and China will respectively take to get the ratio to the required level is $(2437.5/65)$, i.e. 37.5 years and $(2443.75/65)$, i.e. 37.6. Hence, in 38 years US and China will be able to bring down its CO₂ emission to per capita income to the world standard benchmark of 0.75.

Hence, option 2.

30. By selling 0.5 CO₂ emissions the energy consortium earns 1.25 carbon credits.

∴ The number of carbon credits earned by any country in the consortium

$$= (\text{Total CO}_2 \text{ emission saved}) \times (1.25/0.5)$$

Total CO₂ emission saved by any country in the consortium = $350 - \text{revised CO}_2 \text{ emission by that country}$.

Revised total CO₂ emission per year for each country in the consortium = Revised ratio $\times$ revised per capita income per year.

The per capita income increases by 2%, 2.5% and 3.5% in the first, second and third year respectively.

The ratio of CO₂ emissions to per capita income becomes half and stays constant for three years after that.

Thus, all the revised values are as shown in the table below:

Country	Revised CO ₂ emission to per capita ratio (r)	Per capita income for year one (PC1)	Per capita income for year two (PC2)	Per capita income for year three (PC3)	CO ₂ emission for year one (C1 = r × PC1)	CO ₂ emission for year two (C2 = r × PC2)	CO ₂ emission for year three (C3 = r × PC3)	Saving of CO ₂ emission for year one (S1 = 350 – PC1)	Saving of CO ₂ emission for year two (S2 = 350 – PC2)	Saving of CO ₂ emission for year three (S3 = 350 – PC3)
France	1.41	163.2	167.3	173.1	230.1	235.9	244.1	120	114	106
SA	1.61	142.8	146.4	151.5	229.9	235.6	243.9	120	114	106
Australia	1.06	168.3	172.5	178.5	178.4	182.8	189.2	171	167	161
Ukraine	1.08	188.7	193.4	200.2	203.8	208.9	216.2	146	141	134
Poland	1.02	198.9	203.9	211	202.9	207.9	215.2	147	142	135
Total	-	-	-	-	-	-	-	704	678	642

Therefore, the total CO₂ emissions saved by France, SA, Australia, Ukraine and Poland over three years

$$= S1 + S2 + S3$$

$$= 2024 \text{ million tons}$$

Hence, the number of carbon credits earned by the energy consortium in three years

$$= 2024 \times (1.25/0.5)$$

$$= 5060 \text{ units}$$

Hence, option 3.

31. Start with the statement in option 2 as it requires the figures to be used as they are given in the bar graph.

Country	CO ₂ emission/Per capita income
US	4
China	4.37
Russia	4.12
Japan	4.7
India	2.5
Germany	3.46
UK	4.44
Canada	3.16
Italy	2.94
France	2.81
SA	3.21
Australia	2.18
Spain	2.22
Ukraine	2.16
Poland	2.05

From the above table, we can conclude that India stands at the 5th position at the given CO₂ emission level and per capita income of each country (in increasing order).

Hence, the statement in option 2 is true.

Consider option 1. Since 50 is added to the per capita income for each country, the ratio given in the above table decreases for each country and for India it becomes 2.

This implies that any country having CO₂ emission value greater than twice the revised per capita income will have a ratio greater than India.

Only four countries (Australia, Spain, Ukraine and Poland) have the required ratio less than India. Hence, India stands at the 5th position in this case also.

Hence, the statement in option 1 is also true.

Consider option 3. Since 200 million tons are deducted from the given CO₂ emission value, the ratio given in the above table decreases for each country and for India it becomes 1.5.

This implies that any country having CO₂ emission value greater than one and half times the revised per capita income will have a ratio greater than India.

Only four countries (Australia, Spain, Ukraine and Poland) have the required ratio less than India.

Hence India stands at the 5th position in this case also. Hence, the statement in option 3 is also true.

Since the statement in options 1, 2 and 3 is true, the statement in option 4 is false. Hence, option 4.

32. Note that the units are given in degrees.
 $\therefore$ Number of units in Bihar $\sim$ Number of units in MP

$$= \frac{(45 - 32.4)}{360} \times 72000 = 2520$$

Hence, option 2.

33. Female population = (Total population – Male population)

Therefore, the percentage increase in Female population in 1996, 1999, 2004 and 2005 is as given below:

$$1996: \frac{330 - 300}{300} \times 100 = 10\%$$

$$1999: \frac{350 - 320}{320} \times 100 = 9.375\%$$

$$2004: \frac{370 - 350}{320} \times 100 = 5.71\%$$

$$2005: \frac{420 - 370}{370} \times 100 = 13.51\%$$

Thus, the percentage change in the number of females over the previous year is the highest in 2005.

Hence, option 4.

34. Number of educated people in 2002 = 545
 Therefore, number of educated males in 2002
 $= (5/9) \times 545 \approx 303$
 and, number of educated females in 2002

$$= 545 - 303 = 242$$

Now, number of females in 2002
 $=$ Total population – Total male population
 $= 350$

Hence, number of uneducated females in 2002
 $= 350 - 242 = 108$

The number of educated males increases by 25% in 2003

Hence, number of educated males in 2003
 $= 1.25 \times 303 \approx 379$

Therefore, number of educated females in 2003
 $= 560 \times 379 \approx 181$

Now, number of females in 2003
 $=$ Total population – Total male population
 $= 350$

Hence, number of uneducated females in 2003
 $= 350 - 181 \approx 169$

Hence, percentage change in uneducated females
 $= (169 - 108)/108 \times 100 \approx 56\%$

Hence, option 4.

35. Total population of urban area in 2005

$$= 0.68 \times 600 = 408 \text{ million}$$

Total population in 2005 = 900 million

Therefore, population of rural area in 2005

$$= 900 - 408 = 492 \text{ million}$$

Population of rural area in 2010

$$= \frac{12}{55} \times 1100 = 240 \text{ million}$$

Therefore, the required ratio = $492/240 = 2.05$

Hence, option 3.

PART 6

TESTING YOUR METTLE

SECTION 1

PRACTICE SET

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PRACTICE EXERCISE BASED ON RECENT CAT PATTERN

INSTRUCTIONS

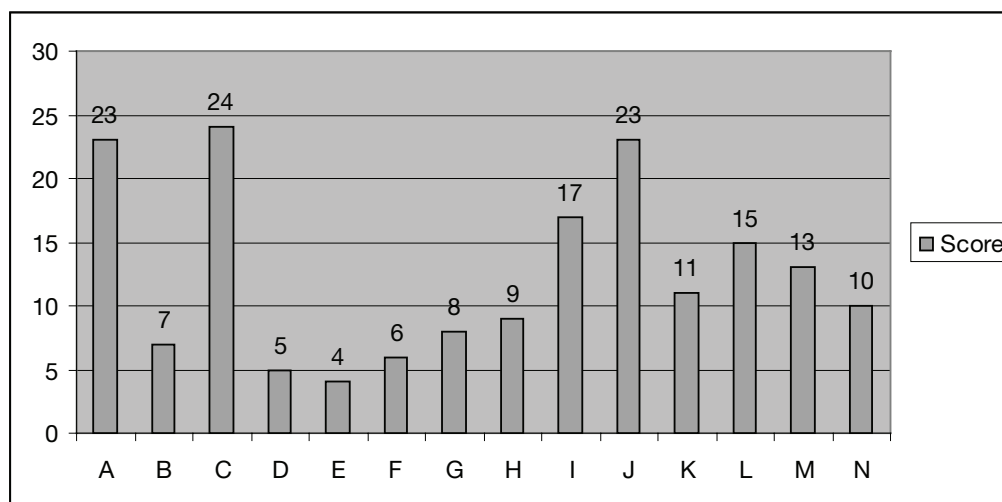
- ☐ Directions for answering the questions are given before each group of questions. Read these directions carefully and answer the questions by darkening the appropriate circles Sheet. Each question has only one correct answer.
- ☐ All questions carry three marks each. Each wrong answer will attract a penalty of one mark.
- ☐ Do your rough work only on the Test Booklet and NOT on the Answer Sheet.

Direction for questions 1 to 4: *Go through the direction given below and solve the questions based on it.*

During annual sporting event (Varchshva), 2019 held at IIM L, two different hostels H9 and H10 sent their teams comprising seven members each. Teams did not want to reveal the whole team information beforehand, and so only partial data was put in open domain. The two teams had players- A, B, C, D, E, F, G, H, I, J, K, L, M and N. Following information is known about the teams-

- D and E were in H9, and K and G were in H10.
- H and B were in the same team but not in the team in which F was.
- The sum of the scores of the members of H10 was not greater than 80.

Bar chart provides the individual score obtained by the players:



Score of a team is sum of individual score obtained by the team members.

6.4 Testing Your Mettle

1. Which of these players was definitely in H10?
(a) L (b) M
(c) N (d) None of these
2. If the score of H10 was less than 75, then what could be the score of H9?
(a) 100 (b) 102
(c) 104 (d) Cannot be determined
3. Which of these players could not be in H10, if the score of H10 was 80?
(a) A (b) L
(c) M (d) N
4. Which of these players was definitely in H9, if the score of H10 was 77?
(a) I (b) L
(c) M (d) N

Directions for questions 5–8: Read the following passage and solve the questions based on it.

The Rapid Fire Chess tournament will be organised by Friend's club in Nagpur. There are 16 players who will participate in this event for the prize of ₹ 1 lakh cash with golden trophy. The rules for the tournament are as follows. The tournament is conducted in 2 stages.

- (i) In 1st stage, the 16 players will be divided in 2 groups. Each group has 8 players, with each player competing with every other player of his group exactly once. Winner gets 1 point while loser gets no point
- (ii) At the end of 1st stage, the top 4 players on the basis of scores of each group qualifies for 2nd stage while remaining players will be eliminated.
- (iii) There are several rounds in 2nd stage. A round involves 1 match for each team.
- (iv) Only the winner of a match in a round goes to next round, while the loser is eliminated.

- (v) The player who will remain undefeated in 2nd stage will be declared the champion.
 - (vi) For all the matches of 1st or 2nd stage, there will always be a definite winner. So, there will be no draw for any match.
 - (vii) In case 2 or more players scored same number of points after stage 1st, matches of super rapid fire rules (10 seconds per move) will be played among these players to decide the qualifiers for 2nd stage.
5. What will be the total number of matches (including both stages) in the tournament?
(a) 28 (b) 35
(c) 55 (d) 63
 6. What is the minimum number of wins in 1st stage which can guarantee a player to qualify for 2nd stage?
(a) 4 (b) 5
(c) 6 (d) 7
 7. What will be the highest number of wins for a player in the 1st stage in spite of which he would be eliminated in the end of 1st stage?
(a) 2 (b) 3
(c) 4 (d) None of these
 8. What is the number of rounds in the 2nd stage of the tournament?
(a) 1 (b) 2
(c) 3 (d) 4

Direction for questions 9–12: Read the following passage and solve the questions based on it.

Mannu bus service operates buses seven days in a week. A trip from Delhi to Dehradun takes six hours by bus. A typical time table of the bus service in both directions is given below:

Delhi – Dehradun			Dehradun – Delhi		
Bus No.	Departure from Delhi	Arrival at Dehradun	Bus No.	Departure from Dehradun	Arrival at Delhi
A	6.00	12.00	1	5.30	11.30
B	7.30	13.30	2	9.00	15.00
C	11.30	17.30	3	15.00	21.00
D	19.00	1.00	4	18.30	00.30
E	00.30	6.30	5	00.00	6.00

The cost of providing this service by the transport company depends upon the time spent by the bus crew (driver and conductor) away from their places in addition

to service times. There are five crews. There is a constraint that every crew should be provided with more than 4 hours of rest before the return trip and should

not wait for more than 24 hours for the return trip. The company has residential facilities for the crew of Delhi as well as of Dehradun. Find which line of service be connected with which other line so as to reduce the waiting time to the minimum.

9. What is the minimum possible time such that buses in both the directions have matched their crew to complete the round journey and cost is minimum?
(a) 36.5 hours (b) 33.5 hours
(c) 32 hours (d) 34.5 hours
10. Which of the following is a right match between bus number (Delhi to Dehradun with Dehradun to Delhi) and crew for minimizing the cost of return journey?
(a) D1 (b) D2
(c) B1 (d) B2
11. Which of the following is NOT a right match between bus number (Delhi to Dehradun with Dehradun to Delhi) and crew for minimizing the cost of return journey?

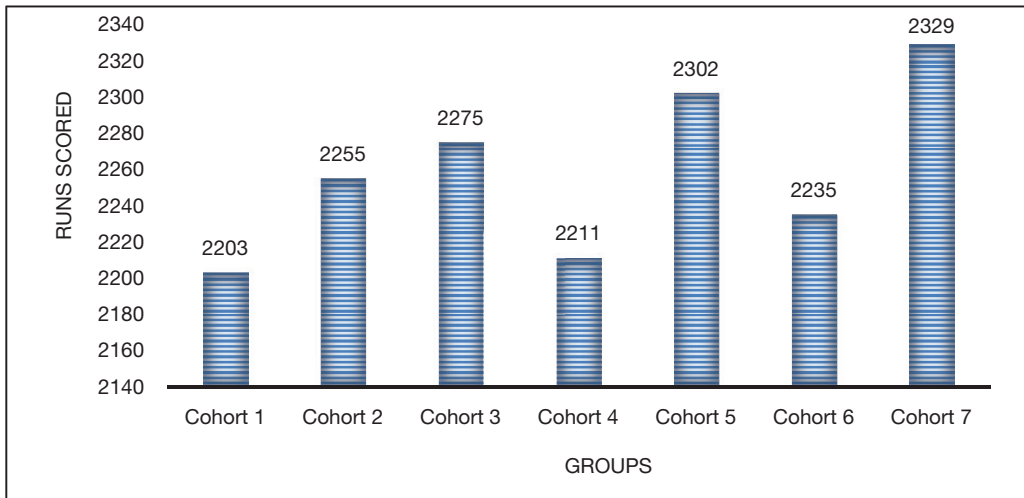
- (a) C5 (b) B4
(c) E2 (d) A1

12. Which of the following is a right match between bus number (Delhi to Dehradun with Dehradun to Delhi) and crew for minimizing the cost of return journey?

- (a) C5 (b) C4
(c) E4 (d) E3

Directions for questions 13 to 16: Answer the questions on the basis of the information below.

In the recently concluded IPL, the batsmen who were the top seven run scorers were Gayle, Rohit, Gautam, Dhoni, Shaun, Piyush and Virat not necessarily in that order. Seven cohorts namely Cohort 1, Cohort 2, Cohort 3, Cohort 4, Cohort 5, Cohort 6 and Cohort 7 were formed such that each cohort had six of the above mentioned batsmen and no two cohorts has same six batsmen. Following bar chart gives aggregate runs scored by batsmen in each cohort.



13. What is the minimum runs scored by any batsman?
(a) 304 (b) 305
(c) 306 (d) 307
14. How many batsmen have scored not more than 400 runs?
(a) 2 (b) 3
(c) 4 (d) 5

Additional information for questions 15 and 16: Runs scored by Dhoni is the average of runs scored by Virat and Gautam and the number of runs scored by Gayle is the average of runs scored by Gautam and Piyush.

15. Find the number of runs scored by Gautam.
(a) 333 (b) 360
(c) 306 (d) 380

16. If Virat did not score the minimum amongst the seven batsmen, then find the number of runs scored by Gayle.

- (a) 333 (b) 360
(c) 306 (d) 380

Directions for questions 17–20: Read the following passage and solve the questions based on it.

The BCCI conducted a meeting in which eight people - A, B, C, D, E, F, G and H - are sitting around a circular table, facing the center. Each of them is of a different profession - Captain, Coach, Doctor, Manager, Vice-Captain, Lawyer, Trainer and Selector, but not necessarily in the same order. B is sitting second to the left of F. The Selector is an immediate neighbour of F. There are only three people between the Selector and A. Only one person sits between

the manager and A. The Coach is on the immediate right of the manager. H is second to the right of F. D is the Selector. C and E are immediate neighbours of each other. Neither C nor E is Manager. The Vice-captain is on the immediate left of B. The Lawyer is third to the right of the Coach. The Trainer is an immediate neighbour of the manager. C is second to the right of the captain.

17. Who is sitting second to the right of A?
(a) The Lawyer (b) C
(c) The Manager (d) B
18. Who among the following is the Trainer?
(a) B (b) G
(c) H (d) F
19. What is the position of G with respect to the Selector?
(a) Third to the left
(b) Second to the right
(c) Second to the left
(d) Third to the right
20. Which of the following statements is true according to the given arrangement?
(a) The Lawyer is second to the left of the Doctor.
(b) A is an immediate neighbour of the Vice-Captain.
(c) D sits exactly between B and the Vice-Captain.
(d) All of the given statements are false.

Directions for questions 21-24: Read the following passage and solve the questions based on it.

After successful completion of FIFA world cup 2018, the top 5 scorers (of goals) of FIFA world cup were being photographed for award ceremony for 'Golden boot'. Starting from the left, the players were occupying positions in the order in which they scored in FIFA world cup, i.e., highest scorer of FIFA world cup 2018 occupied the 1st place and so on. Their names were Rivaldo, Neymar, Ronaldo, Messi and Rooney not in any order. They were playing for 4 teams Avengers,

PK, BCR and Bingo such that each team had at least 1 representation in the top 5 positions. The T-shirts which these 5 players were wearing are having numbers which are the first 5 prime numbers but not in any particular order. Rivaldo is not from Bingo and had only 1 person sitting next to him. The person with number 7 occupied the 4th position. Team BCR had 2 players & both are among top 3 scorers of FIFA world cup 2018. Ronaldo represents Avengers and was 3rd highest scorer of FIFA world cup 2018. Rooney wearing T-shirt with number 2 was 5th highest scorer of FIFA world cup 2018. While the T-shirt number of one of the BCR players was greater than that of Messi, the T-shirt number of the other was lower than that of Messi.

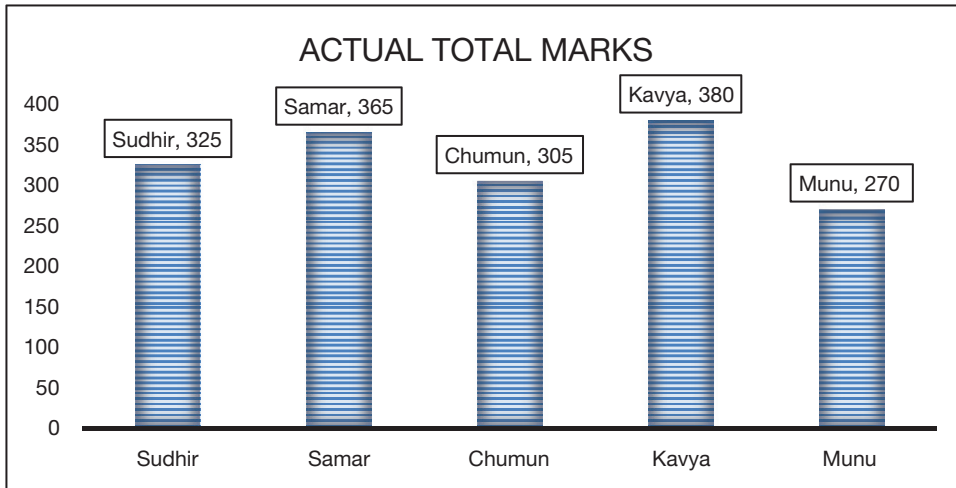
21. If Rooney represents PK, then which team is represented by Messi?
(a) Bingo (b) BCR
(c) Avengers (d) PK
22. If Neymar wears T-shirt number 5, then what is the number worn by Rivaldo?
(a) 3 (b) 7
(c) 11 (d) Cannot be determined
23. Which player represents Team Bingo?
(a) Neymar (b) Messi
(c) Rooney (d) Cannot be determined
24. Which player wears T-shirt number 2?
(a) Neymar (b) Messi
(c) Rooney (d) Cannot be determined

Direction for questions 25–29: Read the information given below and solve the questions based on it.

Instead of giving the actual marks scored by five students in five subjects, the evaluator has given a table titled "NOT MORE THAN", i.e., numbers entered in the table is such that any student in any subject has definitely not scored more than the marks entered in the cell. The total marks are the exact marks scored by the student.

		Sudhir	Samar	Chumun	Kavya	Munu
NOT MORE THAN						
Group A	Marketing	80	95	60	85	35
	Strategy	70	95	70	90	65
Group B	Social Studies	70	65	60	75	65
Group C	Communication	80	65	80	75	60
	HRM	55	75	40	70	55

Following bar chart gives the actual marks obtained by them:



Further the subjects are grouped as follows: Group A: Marketing and Strategy; Group B: Social Studies; and Group C: Communication and HRM

25. What is the least possible total actual marks obtained by the five students in HRM?
 (a) 270 (b) 235
 (c) 205 (d) Cannot be determined
26. Which of the following statement is definitely false?
 (a) Actual marks obtained by Munu and Chumun in Social Studies is same.
 (b) In Strategy, Samar obtained less marks than Sudhir.
 (c) Scores of Samar in each of the subjects is less than that obtained by Kavya in the respective subjects.
 (d) Marks obtained by Munu and Kavya are equal in two subjects.

Additional information for questions 27 to 29: The marks entered of Social Studies are the actual marks earned by the students.

27. If the total marks scored by Samar in Group C are 130, then the maximum difference in marks scored by him in Marketing and HRM could have been:
 (a) 0 (b) 10
 (c) 20 (d) 30
28. If the difference in marks scored by Kavya in Strategy and HRM is 10 marks, then the difference in her marks in Communication and Marketing is:
 (a) 5 (b) 10
 (c) 15 (d) Cannot be determined

29. What is the minimum difference between the marks scored in Group A and Group B by any student?
 (a) 5 (b) 10
 (c) 15 (d) None of these

Directions for questions 30–32: Read the information given below and solve the questions based on it.

Nine people Manoj, Narendra, Omkar, Pawan, Qadir, Rohit, Sachin, Tarun and Umesh stay in different floors of a 9-storey building. The ground floor is numbered 1 and the topmost floor is numbered 9. All of them own one bike each, and each bike is of a different colour, i.e., blue, golden, grey, black, green, yellow, orange, red and silver, not necessarily in that order.

Further information is as follows-

- Qadir stays on the second floor and his bike is of golden colour
- Omkar owns a grey coloured bike. There are three floors between him and Sachin.
- There are two floors between the floors on which the people owning the red and the black coloured bikes stay.
- Tarun stays on an even numbered floor & also owns a black coloured bike.
- The person, who stays on the fourth floor, owns the orange coloured bike.
- Rohit does not own the silver coloured bike and does not stay on the ground floor.
- The person who owns the blue bike stays on the top-most floor.
- Manoj does not own a green coloured bike

- (ix) There is one floor between the floors on which Rohit and Sachin stay.
- (x) Pawan stays on a floor immediately above floor in which Umesh stays
- (xi) Manoj stays on any even numbered floor below the floor on which Tarun stays
- (xii) The person who stays on the third floor owns a silver coloured bike.
30. Who owns the yellow coloured car?
 (a) Pawan (b) Rohit
 (c) Narendra (d) Manoj
31. How many persons are staying between Narendra and Sachin?
 (a) 3 (b) 4
 (c) 2 (d) 1
32. Who stays on floor no. 8?
 (a) Pawan (b) Rohit
 (c) Narendra (d) None of these

Direction for questions 33–36: Read the following passage and solve the questions based on it.

The state elections were conducted in state of Uttarakhand in year 2017. There were 2 major parties – ADN & APU. A study was conducted to understand the voting pattern of young rural voters who were in age group of 18-25. For the study, the 100 young voters each from 150, 200 & 250 villages of 3 districts- Dehradun, Haridwar & Nainital were studied. It was observed that 50% of total voters studied voted for ADN and only 20% voted for others (others means independent candidates and all the political parties other than 2 main parties).

Now, further it was also studied that whether the parents of these young voters casted their votes or not. The following table shows the voting pattern for those young voters who's both the parents casted their votes (irrespective of the party or candidate they voted for)

	ADN	APU	Others	Total
Dehradun	6400	1000	600	8000
Haridwar	8400	3800	1400	13600
Nainital	9200	600	1600	11400
Total	24000	5400	3600	33000

It is also known that:

- (i) 30% of the voters who voted for ADN were from Haridwar
- (ii) Among those young voters whose both the parents did not casted their vote, the young voters who

- voted for others from Nainital were thrice the young voters who voted for others from the Dehradun
- (iii) The young voters from Haridwar who voted for others were only those whose both the parents cast their vote in the election
- (vi) Among the young voters from Dehradun who voted for APU, only 25% were those whose both the parents also cast their vote.
33. The ratio of young voters from Dehradun who voted for APU to the young voters from Nainital who voted for APU is
 (a) 5:8 (b) 8:10
 (c) 10:11 (d) None of these
34. The difference between the number of young voters from Nainital who voted for APU & number of young voters from Haridwar who voted for others is
 (a) 3000 (b) 4000
 (c) 5000 (d) 6000
35. Among the young voters from Haridwar who voted for ADN, what is the percentage of those whose both the parents also voted in the election (irrespective of the party they voted for)?
 (a) Less than 40%
 (b) More than 40% but less than 50%
 (c) More than 55% but less than 65%
 (d) More than 66%
36. What is the difference between young voters from Nainital who voted for ADN & young voters from Dehradun who voted for others?
 (a) 10000 (b) 7500
 (c) 5000 (d) 2500

Directions for questions 37–40: Read the following passage and solve the questions based on it.

The Vijay Restaurant in main market offers stuffed parathas, kheer & 3 types of vegetables- paneer, mix veg & chhole for dinner. The time taken to make 1 paratha is exactly 10 min (of any stuff) & time taken for kheer is 2 minutes. For vegetables, they use same gravy for all 3 items which is prepared in the evening at 7:00 pm. They also keep fried paneer, mix veg & chhole always ready. Whenever they receive any order, they just heat up the gravy using the electric pan whose capacity is 3 bowls & mix it with fried vegetable or paneer or chole to serve the order. For each vegetable they use exactly 1 bowl of gravy. Alok & Rakesh are the only 2 employees for cooking. Each of them can prepare exactly 1 item from stuffed paratha or kheer at one time. They need exactly 5 min to heat up the gravy irrespective of the amount of gravy they need to put in electric pan. They can heat up the gravy without giving extra time to it along with their

task of preparing stuffed parathas or Kheer. Now there is additional information available for orders of their 3 customers Mr. sharma, Mr. Verma & Mr. Singh.

- (i) Mr. Singh gave his order at exactly 8:12 pm which has 1 aloo-pyaz paratha, 1 ice cream & 1 bowl of each- paneer, mix veg & chhole.
- (ii) Mr. Verma entered gave his order exactly after 2 minutes of after Mr. Sharma. His order has 1 paneer paratha & 1 bowl of chhole.
- (iii) Mr. Sharma came after Mr. singh & gave his order 5 minutes after Mr. Singh gave his order. He ordered 1 Ice cream, 1 bowl of mix veg & 1 bowl of chhole (he has Chapatis with him from home).

Neglecting the time required to mix gravy with fried vegetable, answer the following questions-

37. The Vijay Restaurant follows the strategy of completing the order of 1st customer before the preparation of order of 2nd customer. Find the time for which Mr. Sharma will have to wait after giving his order?
- (a) 5 min (b) 12 min
(c) 19 min (d) None of these
38. If the condition that the new order will start only after the order of a customer is served is relaxed, then find the difference between the waiting times of Mr. Sharma as compared to earlier case (given in question no. 37)?
- (a) 2 min (b) 5 min
(c) 7 min (d) None of these
39. If Vijay restaurant can prepare the orders of different customers simultaneously, at what time the order of Mr. Verma will be served?
- (a) 8:25 pm (b) 8:30
(c) between A & B (d) After 8:30 pm
40. If a person has to order 1paratha, then what are total numbers of different number of bowls of vegetables he can order so that he get his order at exactly 10 minutes (assuming kheer is not ordered)?
- (a) 2 (b) 3
(c) 4 (d) 9 or above

Directions for questions 41–44: Read the following passage and solve the questions based on it.

Microsoft conducted placement drive in ABC engineering college where there were 6 candidates who reached the final round of HR interview. Their names were Manish, Nitin, Omkar, Pawan, Qadir & Robert. They all belong to 6 different branches such that each one of them belong to a different branch which were Aerospace, Civil, Computer Science, Electrical,

Electronics & Mechanical not necessarily in the same order as their names are given. The HR interview panel gave their final assessment on the scale of 30. There is some additional information available:

- (i) Omkar got better score than Manish
 - (ii) All of them got marks as a multiple of 3
 - (iii) The student from electrical branch got the highest marks
 - (iv) The name of the student from the mechanical branch is Robert
 - (v) Omkar is not from electrical branch
 - (vi) The student from electronics branch got better score than the student from Aerospace branch
 - (vii) Only 2 students got score which is multiple of 6
 - (viii) The score obtained by student from Computer Science branch is more than the student from electronics branch
 - (ix) The score of Omkar is twice to the score of Qadir
 - (x) Nitin got the lowest score which is multiple of 6
 - (xi) Each of the 6 students got different score than the remaining students
41. What is the average score obtained by them?
- (a) 14 (b) 16
(c) 18 (d) None of these
42. What is the branch of Pawan?
- (a) Aerospace (b) Civil
(c) Electronics (d) None of these
43. If Omkar is from computer science branch & Nitin is not from Aerospace branch, then what is the score obtained by student from electronics branch?
- (a) 6 (b) 9
(c) 15 (d) Cannot be determined
44. If Nitin's branch is Aerospace, then whose branch is Civil?
- (a) Manish (b) Nitin
(c) Omkar (d) Cannot be determined

Direction for questions 45–48: Read the following passage and solve the questions based on it.

Two friends Jai and Veeru are playing a game of throwing the dice such that Jai will win if he gets a 5 while Veeru will win if he gets a 2. They both take turns till one of them wins the game. If a person gets a number other than that required to win, then he will pay the other person triple the number obtained. For example, if Jai gets a 3, he will give Veeru ₹9 and if Veeru gets a 5, he will give Jai ₹15. Each of them had ₹50 before the beginning of the game. Jai is the first one to play. If any one of them has got a particular number during the game, then that number will not be further considered. For the winning throw, the winner will not give any amount to the other player.

45. If Veeru wins the game on his 2nd throw, then find the maximum value of the amount with Veeru at the end of the game?
 (a) ₹ 80 (b) ₹ 83
 (c) ₹ 86 (d) None of these
46. If one round is completed when each one gets a chance, then find the average amount with Jai and Veeru together at the end of the 2nd round?
 (a) ₹ 40 (b) ₹ 50
 (c) ₹ 60 (d) Cannot be determined
47. Find the probability of Jai winning in the 2nd round?
 (a) $\frac{1}{6}$ (b) $\frac{1}{3}$
 (c) $\frac{1}{2}$ (d) Cannot be determined
48. If Veeru begins the game and wins it in the 2nd round and all numbers obtained are prime, then what is the number obtained by Veeru in the 1st round?
 (a) 2 (b) 5
 (c) 3 (d) Cannot be determined

Directions for questions 49–52: Read the following passage and solve the questions based on it.

ZYX Ltd is recruiting students from MII institute of technology for 2 profiles- technical trainee & management trainee. The selection procedure for technical trainee has 3 rounds- Aptitude test, Technical Interview & HR Interview. There are total 4000 students who were eligible for the job. Each student has to appear in all 3 rounds. They are giving grades for each round which are A⁺, A, B⁺, B, C⁺, C, D⁺, D, E⁺ & E where these grades are in order of their equivalent score, i.e., A⁺ is best & E is worst grade & in between the order is as shown above. They are also giving an overall grade which reflects overall performance of a student in all 3 areas. Now, for selection for the post of technical trainee a student must get B⁺ grade in at least 2 rounds from the 3 rounds with overall grade of at least A (i.e., A⁺ or A). There are 400 students who got at least A grade for overall performance & it is also known that:

- (i) None of them got B grade or worse in all 3 rounds.
- (ii) Exactly 300 students got B⁺ or better grade in exactly 2 rounds.
- (iii) The equal number of students got B⁺ or better grade in exactly 1 round.

The selection process for the management trainee profile is done in such a way that

- (i) Anyone who got at least A as overall grade with at least B⁺ in aptitude round is selected
- (ii) Those students who got at least B⁺ in aptitude but got below A overall will have to appear again for management Interview round. Further it is known

there were total 700 students who got at least B⁺ grade in Aptitude round.

49. What could be the possible value of students who got at least A in overall performance of 3 rounds, but got at least B⁺ in exactly 1 round & also were not eligible for management trainee profile selection process?
 (a) 7 or 10 (b) 5 or 20
 (c) 10 or 20 (d) 5 or 7
50. If the number of students who got at least B⁺ in all 3 rounds is a multiple of 10 & also more than 15 & less than 65 then the number of students who were selected for technical trainee is
 (a) 320 (b) 330
 (c) 350 (d) None of these
51. If it's known that the percentage of students who got at least B⁺ in aptitude among those who got at least A as overall grade is more than 25% & less than 40%, then which among following is the possible value of students who appeared in management interview round?
 (a) 520 (b) 560
 (c) 600 (d) None of these
52. If number of students who got at least B⁺ grade in exactly 2 rounds with overall A for all 3 rounds is same for any possible combination & also the number of students who got at least B⁺ in all 3 rounds is exactly 55, then the number of students who will appear in management interview round is
 (a) 380 (b) 430
 (c) 480 (d) 530

Directions for questions 53–56: Read the following passage and solve the questions based on it.

The Haryana transport corporation is planning to start a new service which will be entirely for intrastate transportation purpose. The plan involves to purchase new buses which will be used to connect 10 different cities – A, B, C, D, E, F, G, H, I & J. The plan is that the buses will cover all the routes which connects any of these 2 cities without connecting to any of the other 8 cities. The minimum & maximum time need for any 1 sided journeys are 2 hours & 7 hours respectively. Each day the 2 buses start at 7:00 am & 4:00 pm for each route connecting 2 cities without connecting to any of other 8 cities towards each other. For example, for cities A & B at 7:00 am 1 bus will start from A towards B & 1 bus will start from B towards A.

53. What is the total number of different ticket slips needed to be produced for implementing this plan?
 (a) 45 (b) 90
 (c) 135 (d) 180

54. What is the minimum number of buses Haryana transportation would need to implement this system?
 (a) 135 (b) 180
 (c) More than 180 (d) Less than 135
55. Suppose that the success of this plan resulted in extension of this service to 5 more cities-K, L, M, N & O. These cities are such that the distance between these to any other (among them or 10 cities for which the service was originally started) is exactly 2 hours. The So, with inclusion of these new cities a new system is used in which any bus will either start or end its journey in any of these 5 cities. For 2 cities such that 1 is among the 10 cities for which the service was initially started & one is among 5 new cities, each day there will be 2 buses which will start at same time between 2 stations four times a day at 6:00 am, 10:00 am, 2:00 pm & 6:00 pm. Also for 2 cities among the 5 new cities (which will not be connected to any 3rd city), there will be 2 buses which will start moving towards each other twice a day at 8:00 am & 4:00 pm (the maximum time for such journey will be 5 hours). What the difference between the numbers of ticket slips which were required earlier & the number of ticket slips which are required after the inclusion of 5 new cities?
 (a) 30 (b) 40
 (c) More than 40 (d) Between 30 & 40
56. Suppose that the success of this plan resulted in extension of this service to 5 more cities-K, L, M, N & O. These cities are such that the distance between these to any other (among them or 10 cities for which the service was originally started) is exactly 2 hours. So, with inclusion of these new cities a new system is used in which any bus will either start or end its journey in any of these 5 cities. For 2 cities such that 1 is among the 10 cities for which the service was initially started & one is among 5 new cities, each day there will be 2 buses which will start at same time between 2 stations four times a day at 6:00 am, 10:00 am, 2:00 pm & 6:00 pm. Also for 2 cities among the 5 new cities (which will not be connected to any 3rd city), there will be 2 buses which will start moving towards each other twice a day at 8:00 am & 4:00 pm (the maximum time for such journey will be 4 hours). What is the minimum number of buses required after the inclusion of 5 new cities if a bus can be used for journey upto 5 hours a day?
 (a) Between 100 & 150 (b) between 150 & 200
 (c) Between 200 & 250 (d) More than 250

Direction for questions 57–60: Go through the information given below and solve the questions based on it.

Eleven students from five specializations (ECE, Civil, CSE, Mechanical and IT) got calls from various IIMs (A, B, L and K). Each student belongs to one of these specializations. One student can get more than one calls from any IIM (for more than one course s/he applied). The information about the calls got by these eleven students is given in the table below:

Students	IIM A	IIM B	IIM L	IIM K
Akash	1	1	1	1
Bhawna	2	0	0	1
Chander	2	0	0	0
Dheeraj	0	1	3	0
Ekta	0	1	1	2
Feroz	0	1	2	2
Gopal	0	1	0	1
Harish	0	0	2	1
Inder	0	2	1	0
Jai	2	0	1	0
Kishen	1	1	1	0

The standings of the specializations as per the calls are also given:

Specialization	IIM A	IIM B	IIM L	IIM K
ECE	3	2	4	1
Civil	2	1	3	2
CSE	1	3	2	1
Mechanical	2	1	1	2
IT	0	1	2	2

57. Which of the following statements may be correct, but not necessarily correct?
 (a) Gopal and Harish are from same specialization.
 (b) Feroz and Gopal are from different specializations.

- (c) Chander and Dheeraj are from same specialization.
 (d) Gopal and Jai are from different specializations.
58. Which of the following is definitely the specialization that Gopal is from?
 (a) ECE (b) Civil
 (c) CSE (d) Cannot be determined
59. How many students got calls from ECE?
 (a) 3 (b) 4
 (c) 5 (d) More than 5
60. Which of the following is a student from CSE?
 (a) Akash (b) Gopal
 (c) Harish (d) Jai

Direction for questions 61–64: Read the following passage and solve the questions based on it.

There are 6 software engineers from India from same batch of same college TII Institute of technology whose names are- Ajay, Amit, Aman, Alok, Anmol & Anish. They are currently posted on overseas locations which are- Paris, London, New York, Zurich, Moscow & Singapore not necessarily in the same order. No two of them are posted in same location. They all are currently working in different software companies which are – TCS, HCL, Infosys, Capgemini, Wipro & Tech Mahindra. Each of them is expert of 1 specific programming language from C, C++, Java, SQL, Python & PHP. Further we have the following information:

- (i) The employee of company TCS is currently posted in London
 - (ii) Alok & Ajay is working in Wipro & Infosys respectively. None of them is currently posted in Moscow
 - (iii) The employees of Tech Mahindra, HCL & Capgemini are neither expert of C nor C++
 - (iv) Alok is an expert of Java
 - (v) The employees currently posted in Paris & Singapore are experts of Python & C++ respectively
 - (vi) Anish started his career with TCS, but currently he is working in Tech Mahindra.
 - (vii) Aman is expert of C language & he was posted in Zurich last year
 - (viii) Anmol is currently posted in Zurich
 - (ix) Aman is currently working in London
 - (x) The person who is currently posted in Moscow is expert of SQL
61. The one who is expert of Java is posted to which location?
 (a) London (b) New York
 (c) Zurich (d) Cannot be determined

62. Amit is working for which software company?
 (a) Capgemini (b) HCL
 (c) Tech Mahindra (d) Cannot be determined
63. The person posted in Singapore is working for which company?
 (a) Infosys (b) Tech Mahindra
 (c) Wipro (d) Cannot be determined
64. Anmol is expert of which software language?
 (a) C (b) C++
 (c) PHP (d) Python

Directions for questions 65–68: Read the following passage and solve the questions based on it.

MII institute of management is offering 3 new courses to be chosen as minor with major in Finance for its MBA programme. Each student has to choose exactly one of these 3 courses which are- Analytics, Investment management & Risk Management. There are 8 friends namely Omkar, Parminder, Qadir, Rehman, Stephan, Tilakraj, Umesh & Varun. They are all students of MBA programme in 2nd year with major in Finance. They have chosen their minor courses such that each one of them is studying his minor with at least one other friend. Further it is also known that:

- (i) If Parminder chooses Analytics, then Qadir & Tilakraj also chooses Analytics.
 - (ii) Stephan & Umesh do not choose the same minor course.
 - (iii) Omkar & Varun will choose the same minor course.
 - (iv) If Umesh chooses Investment Management, then Qadir also chooses Investment management as minor.
 - (v) Rehman cannot choose Analytics as minor course.
65. Which of the following is not possible if it is known that Omkar & Umesh has chosen Investment Management as their minor course?
 (a) Rehman has chosen Risk Management as minor course.
 (b) Stephan has chosen Analytics as minor course.
 (c) Tilakraj has chosen Risk Management as minor course.
 (d) Qadir has chosen Investment Management as minor course.
66. If Omkar & Varun are the only ones who have chosen Risk Management, then which of the following is a complete list of students who might have chosen Analytics as their minor course?
 (a) Parminder, Stephan, Umesh
 (b) Rehman, Stephan, Umesh
 (c) Parminder, Qadir, Stephan, Umesh
 (d) Parminder, Qadir, Stephan, Tilakraj, Umesh

67. If 4 friends have chosen Risk Management out of which 2 are Qadir & Stephan, then which of the following is not possible?
- Tilakraj has chosen Risk Management as minor course.
 - Parminder & Rehman have chosen the same minor course.
 - Omkar & Varun have chosen Investment Management as minor course.
 - Parminder & Stephan have chosen the same minor course.
68. If Parminder & Umesh have chosen the same minor course, while Qadir & Varun have chosen Analytics, then which of the following may be true?
- Stephan has chosen Risk Management as minor course.
 - Exactly 3 friends have chosen Risk Management as minor course.
 - Umesh has chosen Analytics as minor course.
 - Rehman, Stephan & Tilakraj have chosen Investment Management.

Directions for questions 69–72: Read the following passage and solve the questions based on it.

Bollywood star RKK wants to go for international tour of 2 months starting from month of July. Today is last day of April. So, in next 2 months he has to rehearse for his international shows & by that time he must complete his ongoing assignments. He has to complete promotion of his movie which will be released in the last week of June. He has to complete shooting of his pending movie before his international tour starts. He has also committed his shoot for his endorsement of a new product being launched. He is also host of a popular program on TV which must be completed by June. So, he decided he will make schedule for next 2 months (May & June) such that he will rehearse for his international tour only on Thursday & Sunday. The other 4 tasks, i.e., Movie shooting, Movie promotion, Hosting of Game show & Endorsement will be done in other 5 days of the week. These 5 days will be divided in 2 parts morning & evening. In each of these 5 days he will perform exactly 1 task in the morning & exactly 1 task in the evening. For each week his work schedule must also satisfy these conditions:

- On Saturday, he will neither promote his movie nor will host the TV program
- He will host the TV program in evenings only & that must be done on exactly 2 consecutive calendar days
- He will do endorsement on exactly 1 morning
- He will do promotion of his movie which is going to be released in June on exactly 3 mornings

- He will shoot for the pending movie on exactly 1 morning & 3 evenings
 - If he promotes his upcoming movie on Monday, he will not do promotion on Tuesday & vice versa
69. Which one of the following can be his possible schedule for Wednesday?
- Endorsement in the morning & Movie shooting in the evening
 - Hosting of Game show in the morning & Movie shooting in the evening
 - Movie promotion in the morning & Hosting of Game show in the evening
 - Movie promotion in the morning & Endorsement in the evening
70. If RKK promotes the upcoming movie on Tuesday, then his schedule for shooting of pending movie could be
- Monday morning, Monday evening, Wednesday Evening, Friday evening
 - Monday morning, Monday evening, Saturday morning, Saturday evening
 - Monday morning, Monday evening Friday evening, Saturday morning
 - Monday morning, Monday evening, Friday evening, Saturday evening
71. On which of the following day RKK must be hosting the TV game show?
- Monday
 - Tuesday
 - Wednesday
 - Friday
72. Which of the following must be true if Endorsement is scheduled on Monday?
- There is a day on which RKK shoots for the pending movie both in the morning & in the evening
 - Endorsement is done on the same day on which he hosts the game show
 - Endorsement is done on the same day on which he promotes his upcoming movie
 - He hosts the game show on the same day on which he shoots for the pending movie

Direction for questions 73–76: Read the following passage and solve the questions based on it.

During an IPL match between CSK & KKR, the toss was won by CSK & they decided to bat first. At the end of their inning, their score board was 172/5. It was known that their opening batsmen Parthiv & Morkel scored 32 & 28 runs respectively. Arun missed the match

after 2 wickets were down & wanted to know the score of the other batsmen named Andrew, Bravo, Mahendra, Ravindra & Suresh. His friend Rakesh instead of giving scores directly gave the following information

- (i) The runs scored by Andrew & Bravo were in ratio 3:4
 - (ii) The runs scored by Suresh were 3 more than the cube of an integer
 - (iii) Mahindra scored the same number of runs as Ravindra & Suresh scored together
 - (iv) The number of runs scored by Ravindra was same as either the square or cube of an integer
 - (v) There were total 12 extra runs given by KKR
 - (vi) The number of runs scored by Mahindra was same as the square of an integer
 - (vii) None of the batsman scored 0
73. How many of the batsmen scored individual number of runs which was/were prime number/numbers (including the batsmen for opening partnership)?
- (a) 0
 - (b) 1
 - (c) 2
 - (d) 3
74. What was the number of runs scored by Ravindra?
- (a) 8
 - (b) 16
 - (c) 25
 - (d) 27
75. What was the number of runs scored by Mahindra?
- (a) 16
 - (b) 25
 - (c) 36
 - (d) 49
76. What is the difference between the numbers of runs scored by Suresh & Bravo?
- (a) Less than 9
 - (b) 9 or 10
 - (c) 11 or 12
 - (d) 13 or more

Directions for questions 77–80: Read the following passage and solve the questions based on it.

IRB bank Jammu branch initiated a new scheme for its employees in which the employees can get interest free loan to buy washing machine & TV. There are 5 employees Dipika, Eshita, Fatima, Gayatri & Hanah who took loan to buy both Washing Machine & TV. Further it is known that all of them purchased 10 Kg capacity Washing Machine & 32-inch LCD TV. The following table gives the prices in ₹ of the various brands for Washing Machine (10 kg) & TV (32 inch, LCD). Assuming the entire loan was used for purchasing these 2 items only.

Brand	Washing Machine (10 Kg)	T.V. (32 inch LCD)
Micromax	15,000	12,500
Philips	22,500	15,000

Intex	12,500	12,500
LG	25,000	25,000
Samsung	20,000	35,000

Further it is known that:

- (i) Transportation & other costs were not covered by loan. It covers only purchase price of these items
 - (ii) All of them purchased Washing Machines of different brands.
 - (iii) Exactly 2 people purchased both the items of the same brand.
 - (iv) The amount of loan taken by Gayatri is twice the amount spent by Dipika.
 - (v) Exactly one of Fatima or Hanah purchased both items of different brands.
 - (vi) The price of the Washing Machine and the TV purchased by Dipika was the same but this was not true for Gayatri.
 - (vii) Eshita spent a lower amount in purchasing a TV of the same brand as Washing Machine but overall she took the loan of higher amount as compared to Hanah.
 - (viii) All of them purchased TV of different brands.
77. What is the total amount of loan taken by Gayatri?
- (a) ₹ 60,000
 - (b) ₹ 55,000
 - (c) ₹ 50,000
 - (d) ₹ 35,000
78. Which of the following shows combination related to the Washing Machine purchased by Hanah?
- (a) Samsung, 20,000/-
 - (b) LG, 25,000/-
 - (c) Intex, 12,500/-
 - (d) Cannot be determined
79. Who purchased the TV of LG company?
- (a) Dipika
 - (b) Fatima
 - (c) Gayatri
 - (d) None of these
80. What is the difference between amounts of loans taken by Fatima & Gayatri?
- (a) ₹ 0
 - (b) ₹ 5,000
 - (c) ₹ 12,000
 - (d) ₹ 12,500

Directions for questions 81–84: Read the following passage and solve the questions based on it.

For the upcoming IPL season, the team Delhi Daredevils has included 7 new batsmen M, N, O, P, Q, R & S such that none of them is a wicket-keeper. They want to give chance to each of them in preliminary 3 matches & selection for further matches will depend on their performance & circumstances in their respective debut matches. But the selection of these 7 batsmen for these

3 preliminary matches depends of their Bowling & fielding abilities. R & S are good fielders but none of them can be used as a bowler. N & O are both good fielders & they can be used for bowling too. M, P & Q are capable of bowling, but they are not good in fielding.

The specific conditions for these 3 matches were as:

1st Match:

- (i) At least 2 new batsmen must be given chance.
- (ii) At least one of the new batsman must be a good fielder
- (iii) At least one of the new batsman must be a capable of bowling

2nd Match:

- (i) No more than 2 new batsmen can be given chance
- (ii) At least 1 new batsman must be a good fielder

3rd Match:

- (i) There will be exactly 3 new batsmen to be included in this match
- (ii) At least 1 of the new batsman must be capable of bowling

81. Which one of the following is a feasible assignment of new batsman for their IPL debut matches?

- (a) R & S for 1st Match, M & N for the 2nd Match
- (b) Q & S for 2nd Match, N & O for the 3rd Match
- (c) M & S for 1st Match, O & Q for the 2nd Match
- (d) R & S for 1st Match, N & O for the 3rd Match

82. In addition, assume that R & S cannot be given chance in same match as they are not in good terms with each other. Further P & R are having similar batting style & so they must not be given chance in same match. Which of the following arrangement is feasible?

- (a) P & S for 1st Match, O & Q for the 2nd Match
- (b) Q & S for 2nd Match, N & O for the 3rd Match
- (c) M & S for 1st Match, O & Q for the 2nd Match
- (d) R & S for 1st Match, N & O for the 3rd Match

83. Assume that the initial plans by Delhi Daredevils team management was to keep O & S in 1st Match; M, N & P were supposed to make debut in 3rd Match. Suddenly due to a senior player taking off for 2nd Match & returning for 3rd Match (who was earlier supposed to take rest for 3rd Match after playing in 2nd Match) it was decided that 3 new batsmen will make their debut in 2nd Match & only 2 new batsmen will make their debut in 3rd Match. Further, at least 2 debutant batsmen must be good fielders & both must be capable of bowling too (as the senior player taking rest for 2nd Match is one of the best all-

rounder in addition of being extremely good fielder). In addition, it was also decided that the debutant batsmen for 1st Match need to be good fielders (they won't be used for bowling so whether they can be used for bowling or not is not important) & debutant batsmen for 3rd Match must be capable of bowling (if they are good fielders fine, even if they are not it will work). Which of the following action will give a feasible arrangement?

- (a) Move N to 1st Match & S to 2nd Match
- (b) Move S to 3rd Match
- (c) Move R to 1st Match & P to 2nd Match
- (d) Move R to 1st Match & N and O to 2nd Match

84. Suppose the player P was injured during net practice. Now the team management decided that the 6 suitable new batsmen will make their debut in 3 matches strictly as per the additional skill requirement (regarding fielding & bowling capabilities). Which of the following is a feasible arrangement?

- (a) S for the 2nd Match; M, N & Q for 3rd Match,
- (b) R & S for the 1st Match; M, O & Q for 3rd Match
- (c) N & O for the 1st Match; M, R & S for 3rd Match
- (d) All of the above

Direction for questions 85 to 90: Go through the data set given below and solve the questions based on it.

Nikita is trying to place all the animals in the table so that no animal adjacent, horizontally or vertically, has any letter in common.

Some animals have already been placed (as shown in the 1st table):

Animals are: Wolf, Dog, Worm, Pig, Penguin, Stoat, Fly, Emu, Toad, Rat and Cod.

Her sister Kavya has supplied more information:

The worm is not next to the pheasant.

Emu is directly left of the stoat.

Pig is somewhere right of the penguin.

Fly is above the rat.

Table 1

Elephant			
	Eel		Puffin
Pheasant			
		Shark	

6.16 Testing Your Mettle

Boxes in the above grid are named in the same order as:

A1	B1	C1	D1
A2	B2	C2	D2
A3	B3	C3	D3
A4	B4	C4	D4

85. Which animal is placed at the place A2?
 (a) Cod (b) Dog
 (c) Stoat (d) Worm
86. Which animal is placed at the place C2?
 (a) Cod (b) Rat
 (c) Fly (d) Toad
87. Which animal is placed at the place B3?
 (a) Cod (b) Stoat
 (c) Worm (d) Toad
88. Which animal is placed at the place D3?
 (a) Cod (b) Stoat
 (c) Dog (d) Cannot be determined

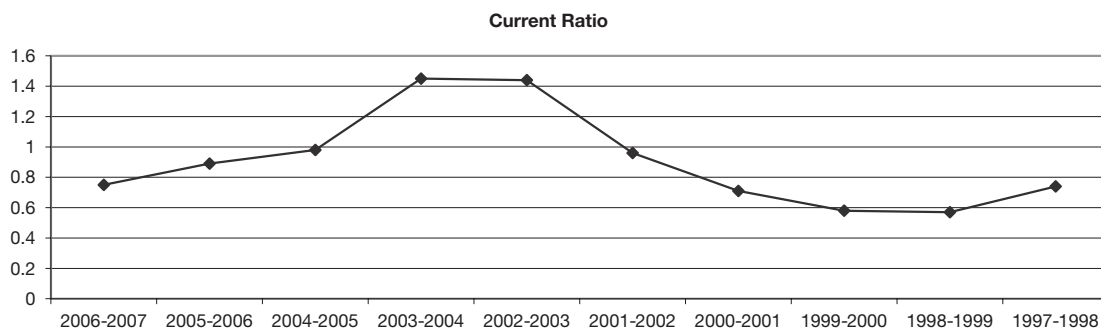
89. For how many animals, is it not possible to ascertain the exact place?
 (a) 0 (b) 1
 (c) 2 (d) 3
90. At how many different places, 'worm' can be placed?
 (a) 1 (b) 2
 (c) 3 (d) Cannot be determined

Direction for questions 91–94: Read the following passage and solve the questions based on it.

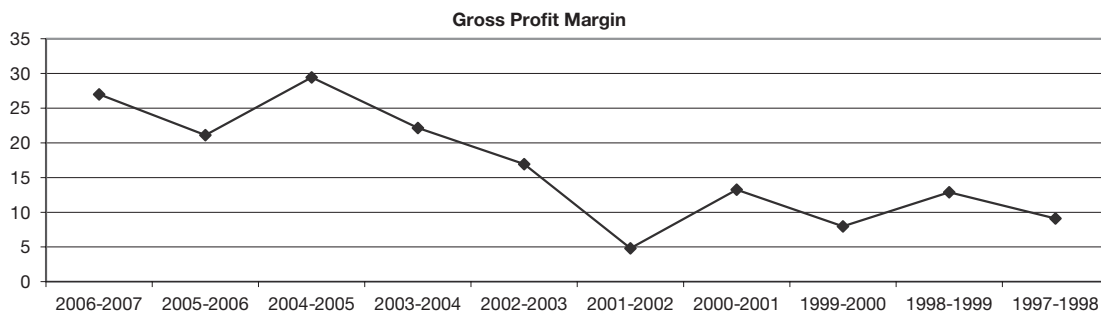
Prof. Bansal has been teaching his students basic terminology involved in deciding the financial health of a company ABC Ltd. Go through the following charts given for ABC Ltd. and answer the questions based on it.

Terms defined:

- (a) $\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liability}}$
 This ratio is mainly used to have an idea of the company's ability to pay back its short-term liabilities (debt and payables) with its short-term assets (cash, inventory, receivables).



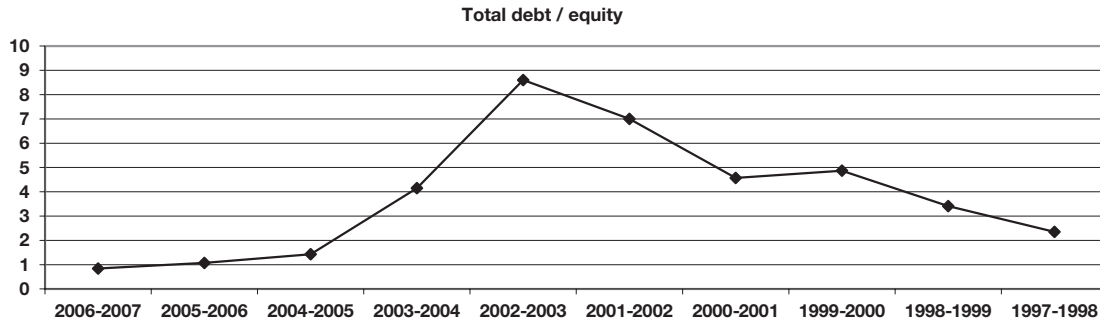
- (b) Gross profit margin - Gross profit margin presents the percentage of revenue / sales value left after subtracting the cost of goods sold.



- (c) Total Debt / Equity ratio - The debt-to-equity ratio offers one of the best pictures of a company's leverage.

A company without any debt may be missing an opportunity to increase earnings by financing projects

that could have been used to generate a better return. A little debt can be good for a company's earnings. On the other hand, a high debt-to-equity ratio translates into higher risk for shareholders.



91. For how many years, company ABC Ltd. has a total debt to equity ratio more than 2 with current ratio less than 0.8 and gross profit margin more than 15%?
 (a) 0 (b) 1
 (c) 2 (d) 3
92. Assume that the total equity for the company ABC Ltd. is ₹ 9 million in 2002–03 which is 1/4th of the total current asset for the same year. If current liability is to be serviced through total debt, then how much surplus would be generated in 2002–03 after servicing current liability through total debt?
 (a) Between ₹ 35 million to ₹ 40 million
 (b) Between ₹ 40 million to ₹ 45 million
 (c) Between ₹ 45 million to ₹ 50 million
 (d) Between ₹ 30 million to ₹ 35 million
93. A Company is said to be “Going Northward” any year if its Gross profit margin as well as current ratio show the same trend over the previous year. For how many years company ABC Ltd. can be said to be “Going Northward”?
 (a) 2 (b) 3
 (c) 4 (d) None of these
94. If Gross profit margin is calculated over total current assets (instead of the current system of calculating over the total sales revenue minus cost of goods sold), then which year will show the maximum Gross profit margin?
 (a) 2005–06 (b) 2001–02
 (c) 2004–05 (d) Cannot be determined

Direction for questions 95–96: Go through the data set given below and solve the questions based on it.

Toyota racing teams A, B, C, D, E and F are racing new car models competing in a championship comprising of 6 races. Points awarded for rank 1, 2, 3, 4, 5 and 6 are 10, 8, 5, 3, 1 and 0 respectively. Points scored by five teams in the first 4 races are given in the table below.

Race	Team A	Team B	Team C	Team D	Team E
1	1	10	0	3	8

2	0	1	3	10	8
3	10	3	5	0	1
4	10	5	8	1	0

The Championship is won by the team which scores the highest.

Mark (A): If the question can be answered by using one of the statements alone, but cannot be answered by using other statement alone.

Mark (B): If the question can be answered by using either statement alone.

Mark (C): If the question can be answered by using both statements together, but cannot be answered by using either statement alone.

Mark (D): If the question cannot be answered even by using both the statements together.

95. If Team C wins the next two races, then who wins the championship?

Statement A: Team F finishes second in the fifth race.

Statement B: Team F does not finish second in the sixth race.

96. If Team E wins the fifth race and finishes second in the last race, then who wins the championship?

Statement A: Team D finishes second in one of the races.

Statement B: Team F does not win any race.

Direction for questions 97–100: Solve these questions independently.

97. Last Friday 4 people visited the local open-all-hours supermarket (though not known if AM or PM):

Bill at 5 O’Clock, Jay at 7 O’clock, Kate at 8 O’clock and Jess at 11 O’clock. One person shopped between Bill & Jay.

Bill did not shop before Kate and Jess both. Kate did not shop between Jay & Jess. Who was the last to go shopping?

- (a) Kate (b) Bill
 (c) Jay (d) Jess

98. Two Fathers, two sons and a grandson walked into a restaurant and ordered food such that each person was fed with 1 plate each. What is the minimum number of dishes they would have to order if they were minimum number of persons possible?
 (a) 1 (b) 2
 (c) 3 (d) 4
99. India, Pakistan, Sri Lanka and Bangladesh were to play a cricket tournament. Akshay, Arjun, John made the following statements regarding results.
 (i) Akshay said either India or Bangladesh will definitely win.
 (ii) Arjun said he is confident that Bangladesh will not win.
 (iii) John said he is confident that neither Bangladesh nor Sri Lanka will win.

When the result came out, it was found that only one of the above three had made a correct statement. Who has made the correct statement and who has won the tournament?

- (a) Akshay, India (b) Arjun, Sri Lanka
 (c) Akshay, Pakistan (d) John, Bangladesh
100. DuSiDo and DeeSiDO look alike, but DuSiDo lies on Monday, Tuesday, and Wednesday, whereas DeeSiDO lies on Thursday, Friday and Saturday. They both tell the truth on Sunday. You come upon the two of them, and they make the following statements.
 A : I will lie tomorrow.
 B : I lied yesterday, and I will lie tomorrow.
 Who is lying?
 (a) A (b) B
 (c) Both are lying (d) Data insufficient

ANSWER KEYS

1. (d)	2. (b)	3. (a)	4. (c)	5. (d)	6. (c)	7. (d)	8. (c)	9. (b)	10. (a)
11. (d)	12. (a)	13. (c)	14. (d)	15. (b)	16. (a)	17. (c)	18. (a)	19. (c)	20. (d)
21. (a)	22. (c)	23. (d)	24. (c)	25. (c)	26. (d)	27. (d)	28. (d)	29. (d)	30. (d)
31. (a)	32. (d)	33. (c)	34. (a)	35. (d)	36. (a)	37. (d)	38. (b)	39. (c)	40. (b)
41. (b)	42. (d)	43. (c)	44. (d)	45. (a)	46. (b)	47. (a)	48. (d)	49. (c)	50. (d)
51. (b)	52. (b)	53. (d)	54. (d)	55. (a)	56. (c)	57. (d)	58. (d)	59. (a)	60. (a)
61. (b)	62. (d)	63. (a)	64. (c)	65. (c)	66. (d)	67. (a)	68. (d)	69. (c)	70. (d)
71. (b)	72. (a)	73. (b)	74. (c)	75. (c)	76. (a)	77. (c)	78. (a)	79. (b)	80. (a)
81. (c)	82. (a)	83. (d)	84. (a)	85. (b)	86. (b)	87. (a)	88. (b)	89. (a)	90. (a)
91. (a)	92. (b)	93. (c)	94. (d)	95. (c)	96. (d)	97. (a)	98. (c)	99. (b)	100. (b)

HINTS AND EXPLANATIONS

Solutions and Explanation for 1 to 4: H9 and H10 sent one team each comprising seven members for a tournament. There are total 14 members & the two teams had players- A, B, C, D, E, F, G, H, I, J, K, L, M and N. D and E were in H9, and K and G were in H10. H and B were in the same team but not in the team in which F was. So, we have 2 possible cases for now depending on the team for F:

Case 1- If F is member of H9
 H9- D, E, F
 H10- K, G, H, B

Case 2- If F is member of H10
 H9- D, E, H, B
 H10- K, G, F

The sum of the scores of the members of H10 was not greater than 80. By adding the scores of members of H9 & H10 in both cases, we get:

Case 1- If F is member of H9
 H9- D, E, F. The score is $(5+4+6) = 15$
 H10- K, G, H, B. The score is $(11+8+9+7) = 35$

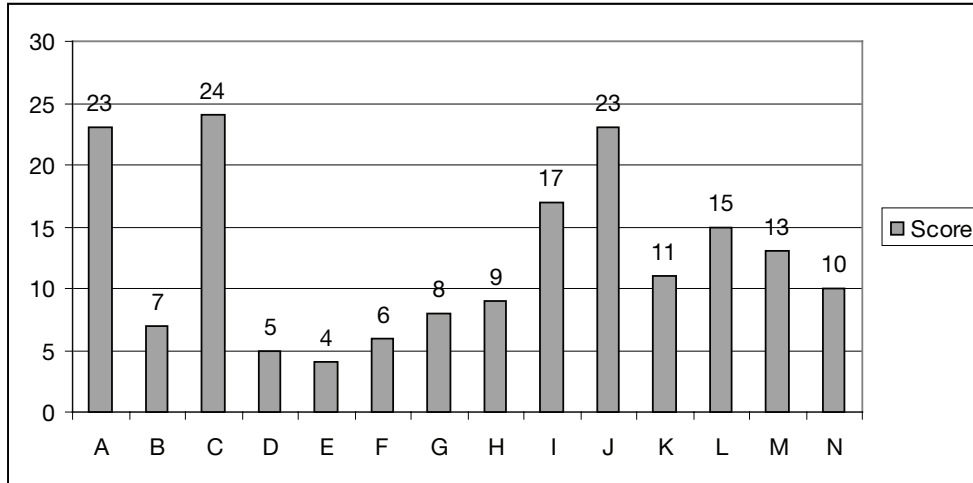
Case 2- If F is member of H10
 H9- D, E, H, B. The score is $(5+4+9+7) = 25$
 H10- K, G, F. The score is $(11+8+6) = 25$

Now, for both case we should try to find the remaining members of H10 keeping in mind the condition that the score of all 7 members must be less than 80.

In both case we have fixed total 7 members in either H9 or H10. These 7 fixed members (in increasing order of score) are E(4), D(5), F(6), B(7), G(8), H(9) and K(11). Now, we have to choose remaining members in terms of lower scores for H10.

The remaining 7 members (in increasing order of score) are N(10), M(13), L(15), I(17), A(23), J(23) and C(24)

Following are the scores of each of the players:



Case 1

We already have 4 members in H10 with total score of 35. So, we need 3 more members & they must be N, M & L (in increasing order of score). So, now the total score will be $35 + 10(N) + 13(M) + 15(L) = 73$. Total score is less than 80. Hence, it is a feasible arrangement. So, we have this feasible arrangement-

H9- D, E, F, I, A, J & C

H10- K, G, H, B, N, M & L

Now, we can make more arrangements of H10 till the score crosses 80. So, if we replace L (15) by I(17), still the sum will be 75. So, it will be a feasible arrangement. But, if we use A(23) instead of L(15), the sum of score will be 81 (i.e., exceeds 80). So, it will not be feasible arrangement. If we replace N(10) by I (17), the sum will be exactly 80 & so it will also be feasible arrangement. But, if we replace N(10) by A(23), the sum of score will exceed 80 & so it won't be a feasible arrangement. If we replace M(13) by I(17), then the sum will be 77 which is still less than 80 & so it will also be a feasible arrangement for H10. But if we replace M(13) by A(23), it won't be feasible arrangement as sum will exceed 80. So, for Case 1 we have possible arrangement for H10.

Arrangement 1- H10- K, G, H, B, N, M & L (Score- 73)

Arrangement 2- H10- K, G, H, B, N, M & I (Score-75)

Arrangement 3- H10- K, G, H, B, M, L & I (Score- 80)

Arrangement 4- H10- K, G, H, B, N, L & I (Score- 77)

Case 2

We already have 3 members in H10 with total score of 25. So, we need 4 more members & they must be N, M, L and I (in increasing order of score). So, now the total score will be $25 + 10(N) + 13(M) + 15(L) + 17(I) = 80$. Total score is exactly 80. Hence, it is a feasible arrangement as it is not more than 80

So, we have this feasible arrangement-

H9- D, E, H, B, A, J & C

H10- K, G, F, N, M, L & I

As the total score of 7 members of H10 must not be more than 80, so it is clear that we cannot make any other possible arrangement for H10 in case 2.

So, in total we have 5 possible arrangements for H10 in both cases.

Case 1- If F is member of H9

Arrangement 1- H10- K, G, H, B, N, M & L (Score- 73)

Arrangement 2- H10- K, G, H, B, N, M & I (Score-75)

Arrangement 3- H10- K, G, H, B, M, L & I (Score- 80)
 Arrangement 4- H10- K, G, H, B, N, L & I (Score- 77)

Case 2- If F is member of H10

Arrangement 5-H10- K, G, F, N, M, L & I (Score- 80)

1. We have 5 possible arrangements for H10 members. In all 5 arrangements only K & G are members of H10. No other member (including L, M & N) is part of H10 in all 5 possible arrangements. So, required answer is none of these. Hence, option (d) is the answer
2. From general solution we know that the Arrangement 1 of Case 1 was the only arrangement in which we get score of H10 as 73, i.e., less than 75. In all other possible arrangements, the sum is 75 or more (up to 80). So, the only possible case for H9 in this scenario will be the H9 obtained in Case1 – arrangement 1. So, H9 will be as:
 H9- D, E, F, I, A, J & C. The score of H9 is $5(D) + 4(E) + 6(F) + 17(I) + 23(A) + 23(J) + 24(C) = 102$
 Hence, option (b) is the answer
3. We have total 5 possible arrangements for H10. In these arrangements there are 2 cases in which the score is exactly 80. Each 1 from L, M & N is part of at least one of these 2 arrangements. But, A is not part of any possible arrangement for H10. So, required answer is A. Hence, option (a) is the answer
4. We have total 5 possible arrangements for H10. In these arrangements there is 1 arrangement in which the score was exactly 77. The members of H10 in this arrangement were K, G, H, B, N, L & I. So, from given options only M is not present in H10. So, M must be part of H9 if the score of H10 is 77. So, our required answer is M. Hence, option (c) is the answer

Solutions and Explanation for 5 to 8:

5. Total number of matches to be played each group in 1st stage must be ${}^8C_2 = 28$.
 Total number of matches to be played in 1st stage must be $2 \times 28 = 56$.
 For 2nd round, there are 8 teams & 7 teams will be eliminated. So, there must be 7 matches in 2nd stage
 So, total number of matches must be $56 + 7 = 63$
 (Actually in 2nd stage there will be quarter final, semifinal & final rounds of 4, 2 & 1 matches)
 The correct answer is option (d).

6. There are 28 matches in both group for 1st stage. So, there will be 28 wins & 28 losses in total. If a player wins 4 or less matches, then there is possibility he won't be able to end up in top 4 of his group. If a player wins 5 matches, even then it is possible that 5 teams win 5 matches & the player may be out in tie break. But, as it is not possible that more than 4 teams could win 6 matches in 1st stage. So, if a player win 6 matches, he will surely be qualified for 2nd stage

The correct answer is option (c).

7. To answer this question, we must try to find the minimum possible wins with which a player may get chance to qualify (by tie break). So, try to maximize wins for 1st 3 teams. Let the 3 teams' wins 7, 6 & 5 matches respectively. So, there are 18 wins. Next 2 teams can win 2 matches & 1 of them will be selected in tie break. But, such chance won't be possible if a player wins only 1 match. So, maximum possible wins for definite elimination is 1

The correct answer is option (d).

8. There are 3 possible rounds in 2nd stage which are quarter final, semifinal & final

The correct answer is option (c).

Solutions and Explanation for 9 to 12:

If bus no. A is combined with bus no. 1, the crew after arriving at Dehradun at 12 noon starts at 5.30 next morning. Thus, the waiting time is 17.30 hours as shown in table 1. Some of the assignments are infeasible, e.g., bus no. 3 leaves Dehradun at 15.00 hours. Thus, the crew of bus no. A after reaching Dehradun at 12 noon are unable to take the minimum required rest of four hours, if they are asked to leave by bus no. 3. Hence, A3 is an infeasible assignment.

Table 1

Crew based at Delhi					
Bus no.	1	2	3	4	5
A	17.5	21	--	6.5	12
B	16	19.5	--	5	10.5
C	12	15.5	21.5	--	6.5
D	4.5	8	14	17.5	23
E	23	--	8.5	12	17.5

Similarly, if the crew are assumed to stay at Dehradun, then the waiting times of the crew in hours at Delhi are given in **table 2**.

Table 2

Crew based at Dehradun					
Bus no.	1	2	3	4	5
A	18.5	15	9	5.5	24
B	20	16.5	10.5	7	--
C	24	20.5	14.5	11	5.5
D	7.5	--	22	18.5	13
E	13	9.5	--	24	18.5

The composite layover time matrix (table 3) is obtained by selecting the smaller element from the two corresponding elements of table 1 & 2. The layover time marked with (*) represents that the crew is based at Delhi, otherwise based at Dehradun.

Table 3

Bus no.	1	2	3	4	5
A	17.5*	15	9	5.5	12*
B	16*	16.5	10.5	5*	10.5*
C	12*	15.5*	14.5	11	5.5
D	4.5*	8*	14*	17.5*	13
E	13	9.5	8.5*	12*	17.5*

Following is the final solution:

D – 1, C – 5, B – 4, E – 2, A – 3

The optimal solution is $4.5 + 5.5 + 5 + 9.5 + 9 = 33.5$ hours

9. Option (b) is the answer.
10. Option (a) is the answer.
11. Option (d) is the answer.
12. Option (a) is the answer.

Solutions and Explanation for 13 to 16:

There are 7 cohorts with each cohort representing the runs scored by exactly 6 players. No cohort of six batsmen was repeated. Therefore, each batsman must be present in exactly 6 cohorts. So, if we add the runs on

these given 7 cohorts we will get the 6 times the addition of runs scored by the top 7 batsmen.

$$6 \times \text{Sum of runs scored by 7 batsmen} = 2329 + 2235 + 2302 + 2211 + 2275 + 2255 + 2203$$

$$6 \times \text{Sum of runs scored by 7 batsmen} = 15810$$

$$\text{Sum of runs scored by 7 batsmen} = 15810/6 = 2635$$

To find runs scored by each batsman, we need to subtract the sum of runs scored by 6 batsmen for all 7 cohorts from the total runs scored by 7 batsmen.

The runs scored by 7 batsman are = $2635 - 2329$, $2635 - 2235$, $2635 - 2302$, $2635 - 2211$, $2635 - 2275$, $2635 - 2255$, $2635 - 2203 = 306, 400, 333, 424, 360, 380, 432$

13. The runs scored by the batsmen who scored minimum runs out of the given batsmen is 306. Hence, option (c) is the answer
14. There are 5 batsmen who have scored not more than 400 runs (scoring 306, 400, 333, 360 & 380 runs respectively). Hence, option (d) is the answer
15. The number of runs scored by Dhoni is the average of the number of runs scored by Virat and Gautam and the number of runs scored by Adam is the average of the number of runs scored by Gautam and Piyush. So, we need 2 set of 3 numbers each among the 7 numbers which shows the runs scored by these 7 batsmen such that 1 number is average of other 2 numbers. The average in 1 of these 2 set will be the number of runs scored by Dhoni & other 2 numbers will be the runs scored by Virat & Gautam. Similarly, for 2nd set of 3 numbers, 1 of the number is average of other two & one such number is common in 2 numbers in 1st set of 3 numbers. The average in other set is number of runs scored by Adam & other 2 numbers will show runs scored by Gautam & Piyush. These 2 sets are as:
 Set 1 – 360, 380 & 400 (380 is average of 360 & 400)
 Set 2 – 306, 333 & 360 (333 is average of 306 & 360)
 The common number on both sets must be the number of runs scored by Gautam. So, Gautam scored 360 runs. Hence, option (b) is the answer
16. Using solution for previous question, Virat did not score the least number of runs among these 7 batsmen. So, Virat did not scored 306 runs. So, the Set 2 shown in solution of 3 do not have Virat, Dhoni & Gautam. So, set 2 is for Gautam, Gayle & Piyush.

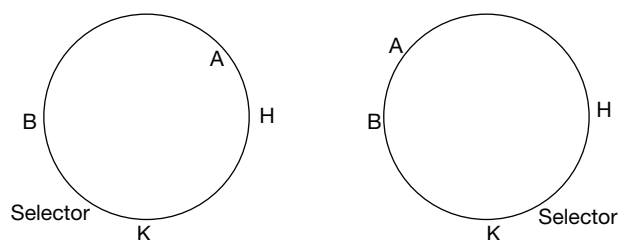
So, Gayle scored 333 runs. Hence, option (a) is the answer.

Solutions and Explanation for 17 to 20:

B is sitting second to the left of F. So we should 1st give a position to F & accordingly the position of B can be decided. H is second to the right of F, so position of M can also be obtained.

The Selector is an immediate neighbour of F. There are only 3 people between the A and Selector. So, we have 2 different possible positions for Selector & accordingly position of A can be obtained as it must be opposite to that of Selector.

So, we have 2 possibilities now which are shown below.



Now we have to fill the positions as per given conditions for both of these possible scenarios.

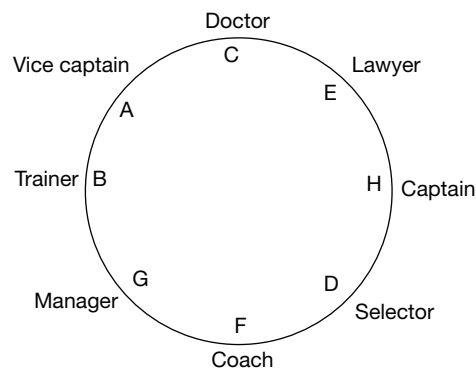
D is the scientist & this can be easily filled in both the diagrams above. C & E are immediate neighbours of each other. In both the diagrams only 2 possible adjacent positions are available & so those must be filled by C & E. Only 1 person is there between the Manager and A. Neither C nor E is the Manager. So, there is just 1 possibility for fixing the position of Manager.

The Coach is to the immediate right of Manager. So, in the 1st diagram H & in the 2nd diagram F is the Coach. The Vice-Captain is on the immediate left of B. In 1st diagram C or E is the Vice-Captain & for the 2nd diagram A is the Vice-Captain. The Lawyer is 3rd to the right of the Coach. But in 1st diagram it is not possible as both lawyer & Vice Captain are at the same position & so we can conclude that the diagram 1st is not feasible. Therefore, the only possible diagram is diagram 2 only.

So, we now fill position of Vice Captain in the diagram. The Trainer is an immediate neighbour of the Manager. So, B is the Trainer. C is 2nd to the right of the Captain. It is possible only if H is the Captain. C must be 2nd to the right of H & so E is 1st to the right of H.

C must be the Doctor.

The final arrangement is given below



17. G is sitting 2nd to the right of A & he/she is manager.
Correct option is (c).
18. B is the Trainer
Correct option is (a).
19. G is 2nd to the left & 6th to the right of D who is scientist
Correct option is (c).
20. All the 3 given statements are false.
Correct option is (d).

Solutions and Explanation for 21 to 24:

The numbers on T-shirts of these 5 players are first 5 prime numbers, i.e., 2, 3, 5, 7 & 11. Ronaldo from Avengers was 3rd highest scorer of FIFA world cup 2018. Also, BCR had 2 players among top 3 scorers. So, BCR players must be highest scorer & 2nd highest scorer of FIFA world cup 2018. Rooney wearing number 2 was 5th highest scorer. Also, Rivaldo had only one person sitting next to him, i.e., Rivaldo must be either at position number 1 or 5 but since Rooney is at position 5, Rivaldo must be at position 1. The positions left are 2 and 4. But the person at position 2 is from BCR and Messi is not from BCR. Therefore, Messi wearing number 7 must be at position 4 and Neymar from BCR must be at position 2. T-Shirt number of one of the BCR players must be 11. The other BCR player and Ronaldo are wearing shirts numbered 3 and 5 in no particular order.

The partial information can be compiled in table as follows:

Position (from left)	Name	Team	T-shirt number
1	Rivaldo	BCR	11/3/5
2	Neymar	BCR	11/3/5
3	Ronaldo	Avengers	3/5
4	Messi	PK/Bingo	7
5	Rooney	PK/Bingo	2

21. It is clear from table that Messi & Rooney are from PK & Bingo. So, if Rooney represents PK, then Messi must be from team Bingo

The correct answer is option (a).

22. If Neymar wears T-shirt number 5, then Ronaldo must be wearing T-shirt with number 3 & T-shirt number of Rivaldo must be 11. The table will be as follows:

Position (from left)	Name	Team	T-shirt number
1	Rivaldo	BCR	11
2	Neymar	BCR	5
3	Ronaldo	Avengers	3
4	Messi	PK/Bingo	7
5	Rooney	PK/Bingo	2

The correct answer is option (c).

23. Either Messi or Rooney represents team Bingo. So, it cannot be determined.

The correct answer is option (d).

24. Rooney was wearing T-shirt with number 2.

The correct answer is option (c).

Solutions and Explanation for 25 to 29:

We can add 1 more row in the given table which adds the marks given (not more than) for each students as it will give us idea how much marks must be deducted from addition of total not more than marks for each student

		Sudhir	Samar	Chumun	Kavya	Munu
		NOT MORE THAN				
Group A	Marketing	80	95	60	85	35
	Strategy	70	95	70	90	65
Group B	Social Studies	70	65	60	75	65
Group C	Communication	80	65	80	75	60
	HRM	55	75	40	70	55
		ACTUAL MARKS				
Total		325	365	305	380	270
Addition of not more than marks		355	395	310	395	280
Marks to be subtracted from total of not more than marks		30	30	05	15	10

25. We can assume that the actual marks obtained by each student in HRM are minimum possible marks they can obtain in HRM. So, we can assume that the “not more than” marks for all subjects but HRM is actual marks too. So, the marks in HRM must be

obtained by subtracting the marks shown in last row from HRM only for each student. So,

Minimum possible marks obtained by Sudhir in HRM = $55 - 30 = 25$

Minimum possible marks obtained by Samar in HRM = $75 - 30 = 45$

Minimum possible marks obtained by Chumun in HRM = $40 - 05 = 35$

Minimum possible marks obtained by Kavya in HRM = $70 - 15 = 55$

Minimum possible marks obtained by Munu in HRM = $55 - 10 = 45$

So, the least possible total of the 5 student's actual marks in HRM = $25 + 45 + 35 + 55 + 45 = 205$

Hence, option (c) is the answer

26. We need to check each option individually.

Option (a) - It is a possibility that Chumun scored 60 in Social Studies (his actual & not more than score may be same in this subject). The actual score of Munu may also be 60 in Social studies (her not more than score is 65 & the difference between her actual total marks & sum of not more than marks in all subjects is 10, so it is possible that her actual score is 5 less than not more than score in social studies). So, statement of option (a) may be true & so it is not definitely false.

Option (b) - The actual score of Samar may be 65 in Strategy (his not more than score is 95 & the difference between her actual total marks & sum of not more than marks in all subjects is 30, so it is possible that his actual score is 30 less than not more than score in Strategy). It is a possibility that Sudhir scored 70 in Strategy (her actual & not more than score may be same in this subject). So, statement of option (b) may be true & so it is not definitely false.

Option (c) - The total of not more than score for both Samar & Kavya is 395 each. But their actual scores are 365 & 380 respectively. So, difference between actual & not more than score of Samar in all subjects is 30 & for Kavya it is 15. Samar might have scored 84, 89 & 69 (or lesser) in Marketing, Strategy & HRM. Kavya might have scored 85, 90 & 70 in the same subjects. Samar might have scored exactly 65 in Social studies & Communication. Kavya might have scored between 65 & 75 in these two subjects. So, in this way it is possible that Scores of Samar in each of the subjects is less than that scored by Kavya in the respective subjects. So, statement of option (b) may be true & so it is not definitely false.

Option (d) - The difference between actual marks of Kavya in all subjects & sum of not more than marks in these subjects is 15. So, in total she has

to score 15 less than not more than marks in all subjects taken together. If Kavya score 15 less in Marketing or Strategy while Munu score same as her not more than marks in these subjects, then score for them won't be same in any of these 2 subjects. If Munu score same as her not more than marks in 3 remaining subjects, then Kavya must score 10, 15 & 15 marks less in these 3 subjects to be equal to Munu. But in total the difference between her actual marks & sum of not more than marks is 15. So, at most her score can be equal to Munu in any one of these three subjects, i.e., social studies, Communication & HRM. So, statement of option (d) is definitely false.

Hence, option (d) is the answer

27 to 29: The marks entered of Social Studies are the actual marks obtained by the students.

27. The difference between actual & not more than score of Samar in all subjects is 30. His actual score in social studies is 65. The total marks scored by Samar in Group C are 130. The sum of not more than marks in subjects of group C (Communication & HRM) = $65 + 75 = 140$. The difference between actual marks & not more than marks of Samar in group C subjects is 10. The difference between actual marks & not more than marks of Samar in group A subjects (Marketing & Strategy) must be 20. The maximum difference in marks scored by him in Marketing and HRM can be obtained by giving maximum possible marks in Marketing & minimum possible marks in HRM. If we assume that Samar scored 95 in Marketing which is same as his not more than marks given in this subject (& scored 75 in Strategy, i.e., in group A he scored 20 less than not more than marks in Strategy only) & 65 in HRM (& 65 in Communication, i.e., in group C he scored 10 less than not more than marks in HRM only), the required difference = $95 - 65 = 30$. Hence, option (d) is the answer

28. The difference between actual marks of Kavya in all subjects and sum of not more than marks in these subjects is 15. So, in total she has to score 15 less than not more than marks in all subjects taken together. The difference in marks scored by Kavya in Strategy and HRM can 10 marks in three possible ways:

Case 1 - she scored 80 in Strategy & 70 in HRM (she scored 10 less than not more than marks in Strategy & her score in HRM is same as her not more than marks in it)

Case 2- she scored 79 in Strategy & 69 in HRM (she scored 11 less than not more than marks in Strategy & 01 less than not more than marks in HRM)

Case 3- she scored 78 in Strategy & 68 in HRM (she scored 12 less than not more than marks in Strategy & 02 less than not more than marks in HRM)

The difference in her marks in Communication and Marketing will depend on the choice of these 3 possible cases. So, we cannot get 1 single feasible value for this. So, it cannot be determined.

Hence, option (d) is the answer

29. Group A has 2 subjects- Marketing & Strategy. Group B has 1 subject Social studies only. So, the minimum difference between the marks scored in Group A and Group B by any student can be calculated by 1st giving minimum possible marks for group A while for group B we know that actual marks are same as not more than marks. The minimum possible marks for group A subjects can be given if we assume the total difference between total actual marks & sum of total more than marks of all subjects taken together is due to group A subjects only. It means we need to make an assumption that each student got same marks in group C subjects as not more than marks of group C subjects.

Minimum possible marks in Group A subjects for Sudhir = $(80 + 70) - 30 = 120$

Marks scored in Group B by Sudhir = 70

Required difference = $120 - 70 = 50$

Minimum possible marks in Group A subjects for Samar = $(95 + 95) - 30 = 160$

Marks scored in Group B by Samar = 65

Required difference = $160 - 65 = 95$

Minimum possible marks in Group A subjects for Chumun = $(60 + 70) - 05 = 125$

Marks scored in Group B by Chumun = 60

Required difference = $125 - 60 = 65$

Minimum possible marks in Group A subjects for Kavya = $(85 + 90) - 15 = 160$

Marks scored in Group B by Kavya = 75

Required difference = $160 - 75 = 85$

Minimum possible marks in Group A subjects for Munu = $(35 + 65) - 10 = 90$

Marks scored in Group B by Munu = 65

Required difference = $90 - 65 = 25$

So, the minimum possible value for required difference is 25. Hence, option (d) is the answer.

Solutions and Explanation for 30 to 32:

- A. it is a tabular arrangement problem. We need to make a table with 3 column & 9 rows as we have to arrange 9 people on basis of floor, name & colour of bike.
- B. Tarun owns a black coloured bike and he stays on an even numbered floor, i.e., any floor from 2nd, 4th, 6th or 8th. Also, Manoj is staying on any even numbered floor below the floor on which Tarun stays. So, we can conclude that Tarun must be staying in 4th or 6th or 8th floor & Manoj must be in 2nd or 4th or 6th floor.
- C. Qadir owns the golden bike & stays on the 2nd floor and. So, Manoj is in 4th or 6th floor & Tarun is in 6th or 8th floor.
- D. The person who owns a silver bike stays on the 3rd floor. Omkar owns a grey bike. The information so far can be filled as shown below:

Name	Floor	Colour of Bike
Tarun	6/8	Black
Manoj	4/6	
Qadir	2	Golden
	3	Silver
Omkar		Grey

- E. Now, the person who owns the blue bike stays on the top-most floor, i.e., 9th floor.
- F. There are two floors between the floors on which the people owning the red and the black bikes stay. Tarun is having Black bike & he is staying either at 6th or 8th floor. If he stays in 6th floor, then the person having Red bike must be in either 3rd or 9th floor. But, both of these cases are not possible. So, Tarun must be staying in the 8th floor & person having Red bike is staying in the 5th floor. Now, the table can be modified as

Name	Floor	Colour of car
Tarun	8	Black
Manoj	4/6	X green
Qadir	2	Golden
	3	Silver
Omkar		Grey

- G. Pawan stays on a floor immediately above floor in which Umesh stays. So, we can make the possible floors for them both. These possibilities are as- Umesh, Pawan = (3rd, 4th) or (4th, 5th) or (5th, 6th) or (6th, 7th).
- H. There is one floor between the floors on which Rohit and Sachin stay. There are three floors between Omkar and Sachin. Rohit does not own the silver coloured bike and does not stay on the ground floor. Rohit do not stay on 3rd floor (as the person living in 3rd floor has silver bike).

With all these conditions & the table we have so far, we can find possibilities for floors of Sachin, Rohit & Omkar. We need to 1st fix floor for Sachin (from available floors in above table) & then fix floors for Rohit & Omkar by keeping all the conditions & availability of floors in mind.

The possibilities are – (Sachin, Rohit, Omkar) = (3rd, 5th, 7th) or (5th, 7th, 1st)

- I. If we look for possibilities for both points above, we get 2 feasible cases.

1. (Sachin, Rohit, Omkar) = (5th, 7th, 1st) & (Umesh, Pawan) = (3rd, 4th)

The final arrangement will look like this:

Name	Floor	Colour of car
Tarun	8	Black
Manoj	6	Yellow
Qadir	2	Golden
Umesh	3	Silver
Omkar	1	Grey
	9	Blue
Sachin	5	Red
Pawan	4	Orange
Rohit	7	Green

We can reconstruct this table in descending order of floors (for better understanding & some visual idea of their relative position)

Floor	Person	Car colour
9	Narendra	Blue
8	Tarun	Black

7	Rohit	Green
6	Manoj	Yellow
5	Sachin	Red
4	Pawan	Orange
3	Umesh	Pink
2	Qadir	White
1	Omkar	Grey

30. Manoj owns yellow coloured bike
Correct option is (d).
31. There are three people who are staying between Narendra & Sachin. They are Tarun, Rohit & Manoj
Correct option is (a).
32. Tarun stays on floor no. 8
Correct option is (d).

Solutions and Explanation for 33 to 36:

The number of young voters studied from Dehradun = $150 \times 100 = 15,000$

The number of young voters studied from Haridwar = $200 \times 100 = 20,000$

The number of young voters studied from Nainital = $250 \times 100 = 25,000$

Total number of young voters studied is $15,000 + 20,000 + 25,000 = 60,000$

These voters are of 2 kinds:

- Whose both the parents also cast their votes (irrespective of party they voted for)
- Whose at least 1 parent do not cast their votes

Further it is known that 50% voters gave their votes to ADN, 20% to others. So, the votes for APU must be 30%.

So, numbers of votes for ADN (from young voters) = 50% of 60,000 = 30,000

So, numbers of votes for APU (from young voters) = 30% of 60,000 = 18,000

So, numbers of votes for Others (from young voters) = 20% of 60,000 = 12,000

Let the voters whose both parents did not cast their votes be divided as

A = voters from Dehradun who voted for ADN

B = voters from Haridwar who voted for AND

C= voters from Nainital who voted for AND
 D= voters from Dehradun who voted for APU
 E= voters from Haridwar who voted for APU
 F= voters from Nainital who voted for APU
 G= voters from Dehradun who voted for Others
 H= voters from Haridwar who voted for Others
 I = voters from Nainital who voted for Others

The table we get is as follows-

	ADN	APU	Others	Total
Dehrudun	A + 6400	D + 1000	G + 600	15,000
Haridwar	B + 8400	E + 3800	H + 1400	20,000
Nainital	C + 9200	F + 600	I + 1600	25,000
Total	30,000	18,000	12,000	60,000

As, the young voters from Haridwar who voted for others were only those whose both the parents cast their vote in the election. So, $H = 0$

The 30% of the voters who voted for ADN were from Haridwar.

It means that $B + 84,000 = 30\%$ of $30,000 = 9,000$.
 Therefore, $B = 600$

Further for Haridwar, we know $B + E + H + 8,400 + 3,800 + 1,400 = 20,000$

$H = 0$ & $B = 600$. So, $E = 5,800$

It is also given that among those young voters whose both the parents did not casted their vote, the young voters who voted for others from Nainital were thrice the young voters who voted for others from the Dehradun. So, we can conclude that $I = 3G$.

Also, $G + H + I + 600 + 1,400 + 1,600 = 12000$

$H = 0$ & $I = 3G$

Solving this we get, $G = 2,100$ & $I = 6,300$

It is given that among the young voters from Dehradun who voted for APU, only 25% were those whose both the parents also cast their vote. So, 1000 is 25% of $D + 1000$. It gives $D = 3,000$.

The remaining values can be easily calculated by the help of other known values. We get A, C & F as 1900, 3500 & 3800 respectively.

The table is complete as

	ADN	APU	Others	Total
Dehrudun	$1900 + 6400 = 8,300$	$3000 + 1000 = 4,000$	$2100 + 600 = 2,700$	15,000
Haridwar	$600 + 8400 = 9,000$	$5800 + 3800 = 9,600$	$0 + 1400 = 1,400$	20,000
Nainital	$3500 + 9200 = 12,700$	$3800 + 600 = 4,400$	$6300 + 1600 = 7,900$	25,000
Total	30,000	18,000	12,000	60,000

33. The required ratio = $4000:4400 = 10:11$
 Correct option is (c).
34. Required difference = $4400 - 1400 = 3,000$
 Correct option is (a).
35. Required percentage = $8400/9000 \times 100 = 93.33\%$
 Clearly it is more than 66%
 Correct option is (d).
36. Required difference = $12,700 - 2,700 = 10,000$
 Correct option is (a).

Solutions and Explanation for 37 to 40:

37. Mr. Singh is the 1st person to give the order. He gave his order at 8:12 pm. So, at 8:12 pm 1 person must start preparing the aloo-pyaz paratha which must be completed by 8:22pm. Also, other person must be preparing the ice-cream at 8:12 pm which

would be completed by 8:14 pm. Also, by 8:17pm the vegetables must also be ready (as we need only 5 min to heat the curry & ignore the time needed for other activities related to it). So, the order of Mr. Singh must be served at 8:22 pm

So, they will start preparing the order of Mr. Sharma at 8:22 pm. One person will start preparing Kheer which will be completed by 8:24 while the other person has nothing to do. The 2 bowls of vegetables (mix veg & chhole) will be kept on heating at 8:22 pm & it will be completed by 8:27 pm (also remember no person is engaged for this task). So, the order of Mr. Sharma will be ready by 8:27 pm

Mr. Sharma gave his order at 8:17 pm & it was ready by 8:27. So, he has to wait for 10 minutes for his order to be delivered

Correct option is (d).

38. If the relaxation is applied as given in statement of question, then the person who was free at 8:14 pm (who prepared kheer for Mr. Singh) would have started preparing kheer for Mr. Sharma at 8:17 pm. Also the heating of curry for Mr. Sharma would be started at 8:17 pm. So, his order must be ready by 8:22 pm. So, there is difference of 5 minutes in his waiting time in both scenarios

Correct option is (b).

39. Mr. Verma gave his order at 8:19 pm. Using the information of solution for 38, his order must be started at 8:19 pm. The person who prepared Kheer for Mr. Singh & Mr. Sharma would have started preparing paneer paratha for Mr. Verma at 8:19 pm which would be prepared at 8:29 pm. At 8:22 pm his order for 1 bowl of chhole would be started. It will be completed at 8:27 pm. So, the order of Mr. Verma will be served at 8:29 pm

The correct answer is option (c).

40. They can heat up maximum 3 bowls in the electric pan & it take same time 5 min to heat the gravy irrespective of the volume of gravy used put into it. So, customer can order 1 or 2 or 3 bowl, the time needed to prepare his order will be same, i.e., 5 minutes (as we ignore time needed to mix fried vegetable with gravy etc.). The time needed to prepare paratha is exactly 10 minutes. If the customer orders 1 or 2 or 3 bowls of vegetable, then it will be prepared before the paratha. So, the customer must order 4 or 5 or 6 bowls of vegetables. So, the required number is 3

The correct answer is option (b).

Solutions and Explanation for 41 to 44:

In this case we have to arrange 6 students on the basis of their names, Branch (of engineering they are studying) & the score they obtained in HR interview (from 30) So, it is the problem of tabular arrangement with 3 columns for name, branch & score.

We can fill their names in the 1st column. They all got scores which are multiples of 3 & are unique (using statements 2 & 11)

Now, using statement 4 & 5 in the table we get branch of Robert & we know Omkar is not studying Electrical engineering. Using statement 10, the score of Nitin is multiple of 6 & so it can be 6/12/18/24/30. Also, it is lowest score so, it cannot be 30 or 24 or 18 (as 5 got better score than Nitin, so if we give them maximum possible scores, i.e., 30, 27, 24, 21 & 18). So, Nitin scored either 6 or 12. Now, using statement 9 we can assume score of Qadir to x , then score of Omkar will be $2x$. The table will be obtained as:

Name	Branch	Score
Manish		
Nitin		6/12
Omkar	x Electrical	$2x$
Pawan		
Qadir		x
Robert	Mechanical	

Now, Qadir cannot score 30 (as his score is lesser than Omkar). Also, he cannot score lower than Nitin whose minimum possible score is 6. So, score of Qadir cannot be 3 or 6. Also, using statement 7, the score of only 2 is multiple of 6. Now, Nitin already scored multiple of 6. So, only 1 more people can get a score which is multiple of 6. So, score obtained by Omkar must be a multiple of 6. Therefore, Qadir's score must not be multiple of 6. So, possible score of Qadir is 9/15 & possible score of Omkar is 18/30. But, as the highest score is obtained by electrical engineer & Omkar is not from electrical branch, so Omkar's score must be 18 & 9 must be the score of Qadir. Now as score of Nitin is least & so it must be 6 The table is now as:

Name	Branch	Score
Manish		
Nitin		6
Omkar	x Electrical	18
Pawan		
Qadir		9
Robert	Mechanical	

Now using statement 1, the score of Manish must be 15. Using 3, we can conclude that Pawan must be from electrical branch & hence he is the top scorer. His score must not be multiple of 6, so there are 2 possibilities 21 & 27 for his score. Now Robert must have lower score than Pawan & the possible scores for both are 21 & 27. So, Robert's score is 21 & Pawan's score is 27

Name	Branch	Score
Manish		15
Nitin		6
Omkar		18
Pawan	Electrical	27
Qadir		9
Robert	Mechanical	21

41. The average score is $(15 + 6 + 18 + 27 + 9 + 21)/6 = 96/6 = 16$

Correct option is (b).

42. Pawan is from Electrical branch

Correct option is (d).

43. If Omkar is from computer science branch & Nitin is not from Aerospace, as the Electronics Engineer scored more than Aerospace engineer, Manish must be from Electronics branch & Qadir must be from aerospace branch. Nitin must be from Civil branch. The table obtained is as:

Name	Branch	Score
Manish	Electronics	15
Nitin	Civil	6
Omkar	Computer Science	18
Pawan	Electrical	27
Qadir	Aerospace	9
Robert	Mechanical	21

The score obtained by electronics engineer is 15

Correct option is (c).

44. If Nitin's branch is Aerospace, then electronics is branch of either Qadir or Manish. Similarly, the computer science is the branch of either Manish or Omkar. Therefore, we cannot determine whose branch is Civil

Correct option is (d).

Solutions and Explanation for 45 to 48:

45. Jai must loose in both chances & Veeru must have lost in 1st chance for Veeru to win in 2nd chance. For Veeru to have maximum amount Jai must have paid maximum possible amounts in both chances & Veeru must have paid minimum possible amount after 1st chance. So let Jai & Veeru both got 6 in 1st chances (as if Veeru get same number as Jai, he will not have to pay any amount). Now, after 1st round Jai has to pay ₹ 18 to Veeru & Veeru has to pay nothing to Jai. So, after 1st round Jai has ₹ 32 & B had ₹ 68. In 2nd throw Jai must get 4 for maximizing value of Veeru. & so Veeru will have ₹ 80 before the match ends.

Correct option is (a).

46. The total amount of money with Jai & Veeru will always be ₹ 100 (their individual amount changes only, not the total). So, average must always be ₹ 50

Correct option is (b).

47. As probability of getting 5 in a throw of dice is $1/6$. So, Probability of Jai winning in 2nd round is $1/6$.

Correct option is (a).

48. Veeru could have obtained 3 or 5. So, it can't be determined.

Correct option is (d).

Solutions and Explanation for 49 to 52: Let us consider the 400 students who got at least A as their overall grade. Now, as we know none of these 400 students got less than B⁺ in all 3 rounds. So, let they are shown as figure below. In this figure we have

1' = the students who got at least B⁺ only in Aptitude

2' = the students who got at least B⁺ only in Technical Interview

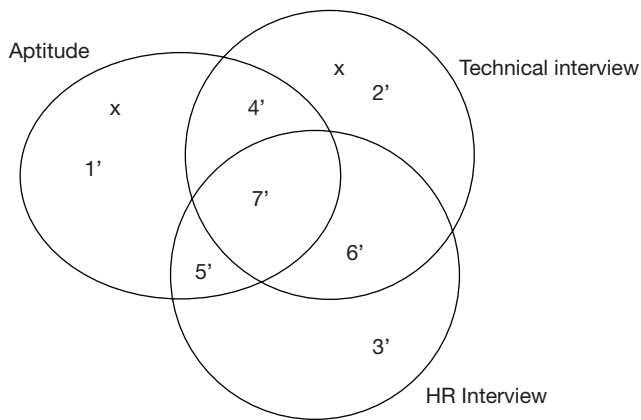
3' = the students who got at least B⁺ only in HR Interview

4' = the students who got at least B⁺ in exactly 2 rounds- Aptitude & Technical Interview

5' = the students who got at least B⁺ in exactly 2 rounds- Aptitude & HR Interview

6' = the students who got at least B⁺ in exactly 2 rounds- Technical Interview & HR Interview

7' = the students who got at least B⁺ in each of the 3 rounds



It is given that

The students who got at least B^+ in exactly 2 subjects are 300

$$\text{So, } n(4' + 5' + 6') = 300$$

Also, the number of students who got at least B^+ in only Aptitude = the number of students who got at least B^+ in only Technical Interview = the number of students who got at least B^+ in only HR Interview

$$\text{So, } n(1') = n(2') = n(3') = x \text{ (say)}$$

49. The required number is $n(2') + n(3') = x + x = 2x$

We do not know the value, but this must be an even number irrespective of whether x is even or odd. Only option C has both even values. So, 10 or 20 may be the required value

Correct option is (c).

50. We know $n(1' + 2' + 3' + 4' + 5' + 6' + 7') = 400$

$$\text{Also, } n(4' + 5' + 6') = 300$$

$$\text{So, } n(1' + 2' + 3' + 7') = 100$$

$$\text{So, } n(1') + n(2') + n(3') + n(7') = 100$$

$$\text{It gives } x + x + x + n(7') = 100$$

$$3x + n(7') = 100$$

We know $7'$ represents the students who got at least B^+ in all of the 3 rounds.

Any possible value of $n(7')$ must give integral value of x . The values of $n(7')$ which do not give integral value for x are not feasible. The possible given values of $n(7')$ are 20, 30, 40, 50 & 60. From these, only 40 is feasible as it gives $x=20$.

The students selected of technical trainee are those who got at least A as their overall grade & at least B^+ in at least 2 rounds (i.e., 2 or 3 rounds) This value is $n(4' + 5' + 6') + n(7') = 300 + 40 = 340$

Correct option is (d).

51. The number of students who got at least B^+ in aptitude with at least A for overall performance are in range of

25% to 40% of the students who got at least A grade for overall performance. So, this range is 100 to 160.

For management interview round the students who will appear for interview are those who got at least B^+ grade in Aptitude but do not got overall grade of at least A. This value can be obtained as

Total number of students who got at least B^+ in Aptitude - Total number of students who got overall grade of at least A with at least B^+ in Aptitude

$$700 - (100 \text{ to } 160) = 540 \text{ to } 600. \text{ The only possible value is 560 from given options}$$

Correct option is (b).

52. We are given that $n(4') = n(5') = n(6')$

$$\text{We know } n(4') + n(5') + n(6') = 300$$

$$\text{So, } n(4') = n(5') = n(6') = 100$$

$$\text{Also given } n(7') = 55$$

$$\text{Further we know } n(1') = n(2') = n(3') \text{ \& } n(1') + n(2') + n(3') + n(7') = 100$$

$$\text{So, } n(1') = n(2') = n(3') = 15$$

For management interview round the students who will appear for interview are those who got at least B^+ grade in Aptitude but do not got overall grade of at least A. This value can be obtained as

Total number of students who got at least B^+ in Aptitude - Total number of students who got overall grade of at least A with at least B^+ in Aptitude

$$700 - \{n(1') + n(4') + n(5') + n(7')\} = 700 - (15 + 100 + 100 + 55) = 430$$

Correct option is (b).

Solutions and Explanation for 53 to 56:

53. We first need to find the number of pairs of 2 cities among these 10 cities. This value is ${}^{10}C_2$. For any

such pair there is requirement of 2 ticket slips. So, total number of ticket slips required are $2 \times {}^{10}C_2 = 90$

Correct option is (b).

54. We know from last solution that there is ${}^{10}C_2$ number of pairs of 2 cities. For each pair we need minimum 2 buses. So, there will be requirement of minimum $2 \times {}^{10}C_2$ buses = 90 buses.

(For each pair of 2 cities we need minimum 2 buses as for example for 2 cities A & B, there could be 1 bus which go from A to B at 7:00 am & at 4:00 pm the same bus may return to A from B. Similarly the 2nd bus may go B to A at 7:00 am & from A to B at 4:00 pm)

The correct answer is option (d).

55. We need to consider 2 kinds of journeys for calculating the required number of ticket slips after inclusion of 5 new cities.

- (a) When there are 2 cities such that 1 is among the 10 original cities the other is among 5 new cities.

The number of tickets required is $2 \times 5 \times 10 = 100$

- (b) When both cities are among 5 new cities

The number of tickets required is $= 2 \times {}^5C_2 = 20$

So, total number of ticket slips required is $100 + 20 = 120$

The number of tickets slips which was required earlier was 90

The required difference is $= 120 - 90 = 30$

Correct option is (a).

56. We need to consider 2 kinds of journeys for calculating the required number of ticket slips after inclusion of 5 new cities.

- (a) When there are 2 cities such that 1 is among the 10 original cities the other is among 5 new cities.

The number of routes for this plan is $5 \times 10 = 50$. For each route we need minimum 4 buses. There are 4 trips for each route but 1 bus can be used for 2 trips only as the maximum time for which each bus can be used is 5 hours & time for each trip is 2 hours. Also, 2 buses are needed for each route simultaneously. So, the buses required are $4 \times 50 = 200$

- (b) When both cities are among 5 new cities.

The number of buses required is $= 2 \times {}^5C_2 = 20$

So, total number of buses required is $200 + 20 = 220$

Correct option is (c).

Solutions and Explanation for 57 to 60: We know there are five specializations and eleven students. We are given data for the number of calls each student got from IIM (A, B, L & K). The data for calls received by students from each specialization is also given for same 11 students. We have to arrange students in their respective specialization.

The data for students us given as:

Students	IIM A	IIM B	IIM L	IIM K
Akash	1	1	1	1
Bhawna	2	0	0	1
Chander	2	0	0	0
Dheeraj	0	1	3	0

Ekta	0	1	1	2
Feroz	0	1	2	2
Gopal	0	1	0	1
Harish	0	0	2	1
Inder	0	2	1	0
Jai	2	0	1	0
Kishen	1	1	1	0

The data for specializations is given as-

Specialization	IIM A	IIM B	IIM L	IIM K
ECE	3	2	4	1
Civil	2	1	3	2
CSE	1	3	2	1
Mechanical	2	1	1	2
IT	0	1	2	2

We must decide a logical way to start as just hit & trial won't give any fruitful result. Better to start with checking for each of eleven students that what are the possible specializations from which they belong. It means for each student we have to check that from which specialization he/she may belong (& from which specialization or specializations he/she cannot belong to) For example let's check for the student who got maximum calls from a single IIM. Dheeraj got three calls from IIM L and one from IIM B. He must be the student of specialization which got at least three calls from IIM L and at least one from IIM B. Only two specializations follow this and they are ECE & Civil. So, Dheeraj is either student of ECE or Civil.

Similarly, we can check for each of given 11 students that from which specialization (or specializations) they might belong to.

Akash can be a student of anyone of the 4 specializations other than IT.

Bhawna can be a student of anyone of the 3 specializations other than IT & CSE.

Chander can be a student of anyone of the 3 specializations other than IT & CSE.

Dheeraj is student of either ECE or Civil.

Ekta can be a student of anyone of the 3 specializations other than ECE & CSE.

Feroz is student of either IT or Civil.

Gopal can be the student of any of the 5 specializations.

Harish can be a student of anyone of the 4 specializations other than Mechanical.

Inder is student of either ECE or CSE.

Jai can be a student of anyone of the 3 specializations other than IT & CSE.

Kishen can be a student of anyone of the 4 specializations other than IT.

We should try to start with those students who have minimum number of possible specializations. Dheeraj, Feroz & Inder have only 2 possible specializations. So, we must begin from any 1 of these 3 students. But again the question is from which of these 3 students. We know that Dheeraj is either from ECE or Civil. Both these specializations are 1 of the 2 possible specializations from other 2 students. So, we must begin with Dheeraj. There are 2 possible scenarios for Dheeraj. We need to check both & see how many total feasible scenarios are obtained.

Case 1- Dheeraj is from ECE

Case 2- Dheeraj is from Civil

We need to check these 2 possibilities & all possible scenarios with these cases. We start with case 1

Case 1- Dheeraj is from ECE

So, Inder must be from CSE.

Now, the position of five specializations in terms of remaining nine students & their IIM calls is as-

Specialization	IIM A	IIM B	IIM L	IIM K
ECE	3	1	1	1
Civil	2	1	3	2
CSE	1	1	1	1
Mechanical	2	1	1	2
IT	0	1	2	2

We will again check for remaining 9 students beginning from Akash. We can't find unique possibility of specialization for Akash, Bhawna, Chander, Ekta, Feroz, Gopal, Harish, Jai & Kishen.

But we have least number of possibilities for Feroz. He is from either Civil or IT. So, we can make further 2 cases for Feroz from Case 1- Name those as Case 1A & Case 1B

Case 1A- Dheeraj is from ECE, Inder is from CSE & Feroz is from IT

Now, the position of 5 specializations in terms of remaining 8 students & their IIM calls is as:

Specialization	IIM A	IIM B	IIM L	IIM K
ECE	3	1	1	1
Civil	2	1	3	2
CSE	1	1	1	1
Mechanical	2	1	1	2
IT	0	0	0	0

We will again check for remaining 8 students beginning from Akash. We can't find unique possibility for specialization for Akash, Bhawna, Chander, Ekta & Gopal.

But, Harish can be from Civil only. Now, the position of 5 specializations in terms of remaining 7 students & their IIM calls is as

Specialization	IIM A	IIM B	IIM L	IIM K
ECE	3	1	1	1
Civil	2	1	1	1
CSE	1	1	1	1
Mechanical	2	1	1	2
IT	0	0	0	0

We will again check for remaining 7 students beginning from Akash. We can't find unique possibility for specialization for Akash, Bhawna & Chander.

But, Ekta must be from Mechanical only. We can't find unique possibility for specialization for Govind, Jai & Kishen. Now, the position of 5 specializations in terms of remaining 6 students & their IIM calls is as

Specialization	IIM A	IIM B	IIM L	IIM K
ECE	3	1	1	1
Civil	2	1	1	1
CSE	1	1	1	1
Mechanical	2	0	0	0
IT	0	0	0	0

We will again check for remaining 6 students beginning from Akash. We can't find unique possibility for specialization for any one of these six remaining students directly. If we observe Mechanical, then we can say that Chander is only possible student for Mechanical as Mechanical has 2 possibilities now, either 1 student who got 2 calls from IIM A & no call from any other IIM or it may have two students each getting exactly one call from IIM A & no call from any other IIM. So, from remaining students, only Chander can be the student of Mechanical. By observing Akash, we can observe that there are 3 possibilities for Akash which are ECE, Kareen launcher & CSE. If Akash is student of ECE, then 2 calls from IIM A will be left in ECE. So, Chander must also been student from ECE. But we already know Chander is student of CSE. So, Akash is not from ECE. If Akash is student of Civil, then only 1 call from IIM A is left for Civil. But there must also be another student who got call from IIM A only. But, there is no such student. So, Akash is not student of Civil. So, Akash must be the student of CSE. We can observe that Bhawna can be student of ECE or Civil. But, if she is student of Civil, then Civil has 1 call from IIM B and one call from IIM L. But, it cannot be arranged for any student. So, Bhawna must be from ECE. Kishan must also be the student of ECE, Both Jai & Gopal must be the students of Civil (as it the only possibility left for them)

Specialization	IIM A	IIM B	IIM L	IIM K
ECE	3	1	1	1
Civil	2	1	1	1
CSE	0	0	0	0
Mechanical	0	0	0	0
IT	0	0	0	0

So, we get the following feasible combination-
ECE- Dheeraj, Bhawna, Kishen
Civil- Harish, Jai, Gopal
CSE- Inder, Akash
MECHANICAL- Ekta, Chander
IT- Feroz

Case 1B- Dheeraj is from ECE, Inder is from CSE & Feroz is from Civil

Now, the position of 5 specializations in terms of remaining 8 students & their IIM calls is as:

Specialization	IIM A	IIM B	IIM L	IIM K
ECE	3	1	1	1
Civil	2	0	1	0
CSE	1	1	1	1
Mechanical	2	1	1	2
IT	0	1	2	2

We will again check for remaining 8 students beginning from Akash. We can't find unique possibility for specialization for Akash, Bhawna, Chander, Ekta & Gopal.

But, Harish must be from IT only. Now, the position of 5 specializations in terms of remaining 7 students & their IIM calls is as

Specialization	IIM A	IIM B	IIM L	IIM K
ECE	3	1	1	1
Civil	2	0	1	0
CSE	1	1	1	1
Mechanical	2	1	1	2
IT	0	1	0	1

We will again check for remaining 7 students beginning from Akash. We can't find unique possibility for specialization for Akash, Bhawna & Chander.

But, Ekta must be from Mechanical only. We can't find unique possibility for specialization for Govind, Jai & Kishen. Now, the position of 5 specializations in terms of remaining 6 students & their IIM calls is as

Specialization	IIM A	IIM B	IIM L	IIM K
ECE	3	1	1	1
Civil	2	0	1	0
CSE	1	1	1	1
Mechanical	2	0	0	0
IT	0	1	0	1

We will again check for remaining 6 students beginning from Akash. We can't find unique possibility for specialization for Akash. But, Bhawna, must be from ECE. Using this we can find that Akash must be from CSE, Gopal must be from IT, Chander must be from MECHANICAL, Jai must be from Civil & Kishen must be from ECE.

So, we get the following feasible combination:

ECE- Dheeraj, Bhawna, Kishen

Civil- Feroz, Jai

CSE- Inder, Akash

MECHANICAL- Ekta, Chander

IT- Harish, Gopal

So, we get 2 possible scenarios with Case 1. Now, we need to check case 2

Case 2- Dheeraj is from Civil

Then Feroz must be from IT.

Now, the position of 5 specializations in terms of remaining 9 students & their IIM calls is as-

Specialization	IIM A	IIM B	IIM L	IIM K
ECE	3	2	4	1
Civil	2	0	0	2
CSE	1	3	2	1
Mechanical	2	1	1	2
IT	0	0	0	0

We will again check for the remaining 9 students beginning from Akash. We can't find unique possibility for specialization for Akash, Bhawna & Chander.

But, Ekta must be from MECHANICAL. Jai must be from ECE

We can't find unique possibility for caching specialization for Gopal, Harish, & Kishen.

Now, the position of 5 specializations in terms of remaining 7 students & their IIM calls is as

Specialization	IIM A	IIM B	IIM L	IIM K
ECE	1	2	3	1
Civil	2	0	0	2
CSE	1	3	2	1
Mechanical	2	0	0	0
IT	0	0	0	0

We will again check for the remaining 7 students beginning from Akash. We can't find unique possibility for specialization for Akash. But, Bhawna must be from Civil. But, now Civil is left with 1 call from IIM K. But, there is no student who got call from IIM K. So, this case is not feasible

So, we can conclude that there are 2 possible combinations

Combination 1

ECE- Dheeraj, Bhawna, Kishen

Civil- Harish, jai, Gopal

CSE- Inder, Akash

MECHANICAL- Ekta, Chander

IT- Feroz,

Combination 2

ECE- Dheeraj, Bhawna, Kishen

Civil- Feroz, Jai

CSE- Inder, Akash

MECHANICAL- Ekta, Chander

IT- Harish, Gopal

57. Statement (a) & Statement (b) is correct in both possible combinations. Statement (c) is false in both the combinations. Statement (d) is false in combination 1 but true in combination 2. So, statement (d) is a may be correct, but not necessarily correct statement. Hence, option (d) is the answer
58. Gopal is either from Civil or from IT. So, it cannot be determined. Hence, option (d) is the answer
59. Bhawna, Dheeraj & Kishan are the three students from ECE who got calls from IIM. Hence, option (a) is the answer
60. Akash and Inder are the two students from CSE. Hence, option (a) is the answer

Solutions and Explanation for 61 to 64: It is a tabular arrangement problem. We need to make a table with 4 column & 6 rows as we have to arrange 6 people on basis of their names, organization, current location & programming language of their expertise.

Alok & Ajay are working in Wipro & Infosys respectively. None of them is currently posted in Moscow. Alok is an expert of Java. This can be filled in the table. Anish is working in Tech Mahindra. So, he cannot be expert of C or C++. Aman is expert of C language & currently posted in London. Also, he must be employee of TCS. Anmol is posted in Zurich. The table obtained is as:

Name	Organization	Current Location	Expertise
Alok	Wipro	x Moscow	Java
Ajay	Infosys	x Moscow	
Anish	Tech Mahindra		x C++
Aman	TCS	London	C
Anmol		Zurich	

Amit can be written in 1st column of last row. Anmol & Amit must be working in HCL & Capgemini but not necessarily in same order. As only these 2 organizations are left, both of them too are not expert of C++ as the employees of Tech Mahindra, HCL & Capgemini are neither expert of C nor C++. So, Ajay must be the expert of C++ & therefore he must be posted in Singapore. Now the employees posted in Paris & Moscow must be experts of Python & SQL respectively. These employees can be Anish & Amit but not necessarily in same order. Now, current location for Alok must be New York & Anmol must be an expert of PHP. So, the final arrangement obtained is as shown below

Name	Organization	Current Location	Expertise
Alok	Wipro	New York	Java
Ajay	Infosys	Singapore	C++
Anish	Tech Mahindra	Paris/Moscow	Python/ SQL
Aman	TCS	London	C

Anmol	HCL/Capgemini	Zurich	PHP
Amit	Capgemini/HCL	Moscow/Paris	SQL/ Python

61. Alok is expert of Java & he is currently posted in New York
Correct option is (b).
62. Amit is either working in Capgemini or HCL. So, this cannot be determined.
Correct option is (d).
63. Ajay is currently posted in Singapore & he is working in Infosys
Correct option is (a).
64. Anmol is expert of PHP
Correct option is (c).

Solutions and Explanation for 65 to 68: As they have chosen their minor courses such that each one of them is studying his minor with at least one other friend, so there must be at least 2 students for each minor & so the maximum students who can opt for any minor is 4.

65. Omkar & Umesh has chosen Investment Management as their minor course. Varun must have chosen the same minor as Omkar, so he has chosen Invest Management. Qadir will also choose same minor as Umesh in this case. So, he too has chosen Investment Management. As Qadir has not chosen Analytics, Parminder could not have chosen Analytics. As, there could be maximum 4 friends who can choose same minor & there are already 4 who have opted Investment Management, so Parminder must have chosen Risk Management. Rehman could not have chosen Analytics & so he must have chosen Risk Management. Now, Tilakraj & Stephan are only remaining friends & they could have chosen Analytics only.

The correct answer is option (c).

66. Omkar & Varun are the only ones who have chosen Risk Management. Rehman must have chosen Investment Management as he could not choose Analytics. The choice made by Umesh will give us different possibilities.

Case 1- If Umesh has chosen Investment Management: Qadir must have chosen the same minor. As we know that If Parminder chooses Analytics, then Qadir & Tilakraj also chooses Analytics. But, Qadir has not chosen Analytics. So, Parminder must not have chosen Analytics.

Sio, only possibility for Parminder is Investment Management. Now, the remaining 2 friends Tilakraj & Stephan must have opted for Analytics.

The final arrangement is

Analytics- Tilakraj & Stephan

Investment management- Rehman, Umesh, Qadir, Parminder

Risk management- Omkar & Varun

Case 2- If Umesh has chosen Analytics: The only option for Stephan is Investment management. Parminder must not have chosen Investment management as then there will be 5 friends with same minor. So, Parminder must have opted for Analytics. So, Qadir & Tilakraj too have chosen Analytics

The final arrangement is

Analytics- Umesh, Parminder, Qadir, Tilakraj

Investment management- Rehman, Stephan,

Risk management- Omkar & Varun

From these 2 possibilities we have 5 friends who might have chosen Analytics. They are-Tilakraj, Stephan, Umesh, Parminder & Qadir

The correct answer is option (d).

67. If 4 friends have chosen Risk Management, then there must be 2 friends each who have opted for Analytics & investment Management. Qadir & Stephan have chosen Risk management. Stephan & Umesh do not choose the same minor course. So, Umesh must have opted for either Analytics or Investment management. If Umesh chooses Investment Management, then Qadir also chooses Investment management as minor. But, Qadir has not chosen Investment management. So, the choice made by Umesh must be Analytics. Omkar & Varun must have made same choice. Either they have opted for Risk management or Investment Management. Parminder must not have chosen Analytics. Rehman cannot choose Analytics. The only person who has chosen Analytics with Umesh is Tilakraj.

The final arrangement is

Analytics- Umesh, Tilakraj

Investment management- (Parminder & Rehman)/ (Omkar & Varun)

Risk management- Rehman, Stephan, (Parminder & Rehman)/ (Omkar & Varun)

It is clear that Tilakraj has not chosen Risk Management

The correct answer is option (a).

68. Qadir & Varun have chosen Analytics. Omkar must have chosen Analytics. Had Umesh chosen Investment Management, Qadir should also have been chosen Investment Management. So, Umesh has either chosen Analytics or Risk Management. Parminder & Umesh have chosen the same minor course. But, it cannot be Analytics as then there would be 6 friends in Analytics. So, Parminder & Umesh have chosen Risk Management. Stephan's choice could be either Analytics or Investment Management. Rehman's choice could be either Investment Management or Risk Management. Tilakraj could have made any choice.

The final arrangement is

Analytics- Qadir, Varun, Omkar

Investment management-

Risk management- Parminder, Umesh

From given options A, B & C are not possible. A & C are clear to be rejected. B is not true as there could be 4 friends who have chosen Analytics

The correct answer is option (d).

Solutions and Explanation for 69 to 72: We can make a table for the schedule of actor RKK for the 5 days of week in which he will be doing these 4 tasks- Movie Shooting, Movie Promotion, Endorsement or Hosting of TV show. The 5 mornings are used as- 3 for Movie Promotion, 1 for Endorsement & 1 for Movie Shooting. The 5 evenings are used as- 3 for Movie shooting & 2 for Hosting of TV show.

For mornings: On Saturday, he will neither promote his movie nor will host the TV program. So he can either do endorsement or can shoot for pending movie on Saturday morning. If he promotes his upcoming movie on Monday, he will not do promotion on Tuesday & vice versa. So, either Monday or Tuesday morning will be used for the Movie Promotion while the other can be used for Endorsement or shooting. There must be promotion on Wednesday & Friday mornings.

For Evenings: On Saturday, he will neither promote his movie nor will host the TV program. He will host the TV program in evenings only & that must be done on exactly 2 consecutive calendar days. So, The Hosting will not be done on Friday & Saturday evenings. It must be done on Monday & Tuesday or Tuesday & Wednesday. For rest 3 days he must be shooting for the pending movie. For Tuesday evening he must be hosting. For Monday & Wednesday evenings he may either complete shooting or host the TV show

The information can be shown in tabular way as-

	Monday	Tuesday	Wednesday	Friday	Saturday
Morning	Promotion/ (Shooting/Endorsement)	Promotion/(Shooting/Endorsement)	Promotion	Promotion	Endorsement/ Shooting
Evening	Shooting/Hosting	Hosting	Hosting/Shooting	Shooting	Shooting

69. His schedule for Wednesday must have Promotion of upcoming movie in morning & Hosting of TV show or shooting of pending movie in the evening. Movie promotion in the morning & Hosting of Game show in the evening is a possible schedule for Wednesday

Correct option is (c).

70. If RKK promotes the upcoming movie on Tuesday, then the schedule can be shown in tabular way as

	Monday	Tuesday	Wednesday	Friday	Saturday
Morning	Shooting/Endorsement	Promotion	Promotion	Promotion	Endorsement/ Shooting
Evening	Shooting/Hosting	Hosting	Hosting/Shooting	Shooting	Shooting

As all the 4 options have Monday morning & evening, so the table which can be further modified as per the common term in all 4 options, i.e., shooting for Monday morning & evening as:

	Monday	Tuesday	Wednesday	Friday	Saturday
Morning	Shooting	Promotion	Promotion	Promotion	Endorsement
Evening	Shooting	Hosting	Hosting	Shooting	Shooting

Correct option is (d).

71. RKK will host the TV game show for 2 evenings. One of them must be Tuesday

Correct option is (b).

72. If Endorsement is done on Monday, the schedule will be as shown below:

	Monday	Tuesday	Wednesday	Friday	Saturday
Morning	Endorsement	Promotion	Promotion	Promotion	Shooting
Evening	Shooting/Hosting	Hosting	Hosting/Shooting	Shooting	Shooting

Correct option is (a).

Solutions and Explanation for 73 to 76: The total score by CSK is 172/5. So, there must be 7 players who batted in this inning. The runs scored by batsmen of opening partnership were 32 & 28 which gives total 60. The runs given as extra from opponent (KKR) team were 12. So, the total runs scored by 5 non-opening batsmen must be 100. Let the score of the other batsmen named Andrew, Bravo, Mahendra, Ravindra & Suresh

be denoted as A, B, M, R & S respectively for the convenience.

$$A:B = 3:4$$

So, let $A = 3k$ & $B = 4k$ where k = positive integer (less than 15 as $7k$ is total run by these 2. If $k = 15$, $7k = 105$ which is more than 100)

$$\text{So, we have } A + B + M + R + S = 100$$

$$7k + M + R + S = 100 \quad (1)$$

Mahindra scored the same number of runs as Ravindra & Suresh scored together. So, $M = R + S$

Let $M = R + S = x$ (initials are used to indicate the runs scored by individual)

Then we have (1) as

$$7k + 2x = 100$$

$$2x = 100 - 7k \quad (2)$$

As $2x$ must be an even number. We can check for the different possible values of k which gives even value for $100 - 7k$.

The possible values of k are 2, 4, 6, 8, 10, 12 & 14. For these values the corresponding values of $2x$ are 86, 72, 58, 44, 30, 16 & 2 respectively.

So, the possible values of x will be 43, 36, 29, 22, 15, 4, 1.

The number of runs scored by Mahindra was same as the square of an integer. So, value of x must be a perfect square. So, the possible values for x are 36, 4 & 1. The corresponding values of k are 4, 12 & 14 respectively.

The runs scored by Suresh were 3 more than the cube of an integer. The number of runs scored by Ravindra was same as either the square or cube of an integer.

So, $S = n^3 + 3$ (where n is a positive integer)

$R = p^2$ or q^3 (where p & q are positive integers)

As, $M = R + S$ (given)

$M = R + S = x = \text{a perfect square}$

$$n^3 + 3 + p^2/q^3 = x \quad (2)$$

Using (2) we can easily say that value of x cannot be 1 or 4.

So, $x = 36$ & so $k = 4$

So, runs scored by Mahendra, Andrew & Bravo must be 36, 12 & 16 respectively.

Now, we have $36 = n^3 + 3 + p^2/q^3$

So, $n^3 + p^2/q^3 = 33$.

Assuming $n = 1$, we cannot find any feasible value for p or q .

If $n = 2$, $p = 5$ (no feasible value for q)

If $n = 3$, we cannot find any feasible value for p or q .

So, $n = 2$ & $p = 5$

So, runs scored by Suresh & Ravindra are 11 & 25 respectively

So, the scores of 5 batsmen are as:

Andrew-12, Bravo-16, Mahendra-36, Ravindra-25 & Suresh-11

73. Only one player's number of runs is a prime number. This player is Suresh & he scored 11 runs
Correct option is (b).

74. Ravindra scored 25 runs
Correct option is (c).

75. Mahendra scored 36 runs
Correct option is (c).

76. Bravo & Suresh scored 16 & 11 respectively. So, the difference between the runs scored by them is 5 runs.
Correct option is (a).

Solutions and Explanation for 77 to 80:

The entire loan taken by these employees will be used for purchasing Washing Machine & TV. Transportation etc. costs are to be ignored. There are 5 employees & 5 brands. We also know no 2 have taken TV of same brand. Same is for washing machines too. It is given that exactly 2 people purchased both the items of the same brand. Exactly one of Fatima or Hanah purchased both items of different brands. It clearly means that exactly 1 of Fatima or Hanah purchased both items of same brand. It is also clearly given that the 2nd employee to purchase both items of same brand is Eshita

The amount of loan taken by Gayatri is twice the amount spent by Dipika. So, we need to look at the possibilities for loan amount (i.e., purchasing price of both items) for these 2 employees. The minimum possible expenditure may be ₹ 25,000 & the maximum possible expenditure may be ₹ 60,000. So, we can have 2 possibilities.

Case 1- The expenditure (i.e., loan amount) of Dipika & Gayatri are ₹ 25,000 & ₹ 50,000

The price of the Washing Machine and the TV purchased by Dipika was the same but this was not true for Gayatri. Dipika must have purchased Washing Machine & TV from Intex & Micromax brands respectively. (She cannot purchase TV of Intex brand as it would mean 3 employees purchased both items of same brand). Gayatri must have purchased Washing Machine & TV from Micromax & Samsung brands respectively (she cannot purchase both from LG to have total of ₹ 50,000). Eshita spent a lower amount in purchasing a TV of the same brand as Washing Machine, so she must have purchased both items of Philips brand. The total expenditure for Eshita is ₹ 37,500. The total expenditure of Hanah must be lower than this amount. So, Hanah has not purchased both items of LG brand. Hanah must have purchased Washing Machine & TV from Samsung & Intex brands respectively. Fatima must have purchased both items of LG brand.

The information can be shown as

Employee Name	Washing Machine (Brand & Price)	TV (Brand & Price)
Dipika	Intex (₹ 12,500)	Micromax (₹ 12,500)
Gayatri	Micromax (₹ 15,000)	Samsung (₹ 35,000)
Eshita	Philips (₹ 22,500)	Philips (₹ 15,000)
Hanah	Samsung (₹ 20,000)	Intex (₹ 12,500)
Fatima	LG (₹ 25,000)	LG (₹ 25,000)

2. The expenditure (i.e., loan amount) of Dipika & Gayatri is ₹ 30,000 & ₹ 60,000

The price of the Washing Machine and the TV purchased by Dipika was the same but this was not true for Gayatri. Dipika must have purchased Washing Machine & TV from Micromax & Philips brands respectively. Gayatri must have purchased Washing Machine & TV from LG & Samsung brands respectively. This gives infeasible situation as only Intex is left whose both the items are still not used while there must be 2 brands for which same person purchased both items. So, this cannot be possible here.

So, case 1 is only possible case.

77. Total amount of loan taken by Gayatri must be same as purchase price of both the items she purchased with the help of loan. This amount is equal to ₹ 50,000
Correct option is (c).
78. Hanah purchased washing machine of Samsung brand of cost ₹ 20,000
Correct option is (a).
79. Fatima purchased the TV of Intex company
Correct option is (b).
80. The loan amount (i.e., total expenditure) by both Fatima & Gayatri is ₹ 50,000. So, the difference between these amounts is 0
Correct option is (a).

Solutions and Explanation for 81 to 84:

81. Option A is not correct as neither R nor S can be used for bowling while at least 1 new batsman in 1st Match must be capable of bowling.

Option (b) is incorrect as there must be 3 new batsmen in 3rd Match.

Option (d) is incorrect as there must be 3 new batsmen in 3rd Match.

Option (c) fulfills all the conditions

Correct option is (c).

82. Option B is incorrect as there must be 3 new batsmen in 3rd Match.

Option (d) is incorrect as there must be 3 new batsmen in 3rd Match.

Option (c) is incorrect as the players N, P & R will be playing in 3rd match. But, R & P cannot play in same match

Correct option is (a).

83. The original plan was as- O & S in 1st Match; M, N & P were supposed to make debut in 3rd Match. So, Q & R were supposed to make their debut in 2nd Match.

After the necessary changes we observe that

1st Match- There should be 2 players & both must be good fielders. So, any 2 from N, O, R & S

3rd Match- There should be 2 players & both must be capable of bowling. So, any 2 from M, N, O, P & Q

2nd Match- There should be 3 players & 2 of them must be capable of bowling & also good fielders. So, 2 players must be N & O. Any other player may become the 3rd one to make debut.

So, we can say N & O are in 2nd match. So, 2 players making debut in 1st Match must be R & S. For, 3rd Match any 2 can be chosen from M, P & Q. For 2nd Match N & O are there & any other can be the 3rd player to make debut.

So, the new selection is as:

1st Match- R & S

2nd Match- N, O & M/P/Q

3rd Match- any 2 from M, P & Q

Option A & B are clearly incorrect. Now, neither (c) nor (d) seems to be incorrect. The fact is we have to choose the better option from 2 good options or the more correct option from 2 non-incorrect options. Option (d) is better choice as for 2nd Match N & O fulfills the condition for both players to be capable of bowling & must be good fielders too. While option (c) is about moving P to 2nd match, who may or may not be moved to 2nd match (as we could move M or Q too in place of P). So, the better choice is (d).

Correct option is (d).

84. Option (b) is incorrect as at least 1 player in 1st match must be capable of bowling while both R &

S are good fielders but none of them can be used for bowling.

Option (c) is incorrect as the only player left for 2nd match is Q who is not a good fielder while at least 1 player of 2nd Match must be good fielder.

Option (d) is clearly wrong as 2 options are already incorrect

Correct Option is (a)

Solutions and Explanation for 85 to 90:

Following is the arrangement:

Elephant	Worm	Fly	Toad
Dog	Eel	Fat	Puffin

Pheasant	Cod	Emu	Stoat
Wolf	Penguin	Shark	Pig

This is the only possible arrangement. Now all the questions can be answered.

85. B

86. B

87. A

88. B

89. A

90. A

Solutions and Explanation for 91 to 94:

91. Following table presents the situation clearly:

Year	03–04	02–03	01–02	00–01	99–00	98–99	97–98
Total Debt to Equity Ratio	4.15	8.59	7	4.57	4.87	3.41	2.35
Current Ratio less than 0.8	No	No	No	Yes	Yes	Yes	Yes
Gross profit margin more than 15%	Yes	Yes	No	No	No	No	No
Final Verdict	No	No	No	NO	No	No	NO

It can be inferred that none of the years satisfy all the three conditions. Hence, option (a) is the answer.

92. In 2002 – 03, total debt to equity ratio = 8.6 $\Rightarrow$ Total debt = $8.6 \times ₹ 9 \text{ million} = ₹ 77.4 \text{ million}$.

Total current liabilities = $₹ 9 \text{ million} \times 4 = ₹ 36 \text{ million}$

After servicing the current liability through total debt, there would be a surplus (since Total debt > Total current liabilities). Surplus = $₹ 77.4 \text{ million} - ₹ 36 \text{ million} = ₹ 41.4 \text{ million}$. Hence, option (B) is the answer.

93. Following are the years:

2000–2001, 2002–03, 2003–04, 2005–06. So there are four years when Gross profit margin as well as current ratio have either both decreased or both increased over the previous year. Kindly note that data presents years in a right to left format.

Hence, option (c) is the answer.

94. There is no relation given between sales value minus cost of goods sold and total current asset. So Gross profit margin calculated over total current asset cannot be calculated. Hence, option (d) is the answer.

Solutions and Explanation for 95 to 96:

95. Option (c) is the answer.

96. Option (d) is the answer.

Solutions and Explanation for 97 to 100:

97. Option (a) is the answer.

Following is the table corresponding to the conditions given:

Bill	5	AM
Jay	7	PM
Kate	8	PM
Jess	11	AM

98. Option (c) is the answer.

99. Option (b) is the answer.

100. Option (b) is the answer.

PART 6

TESTING YOUR METTLE

SECTION 2

MOCK TESTS

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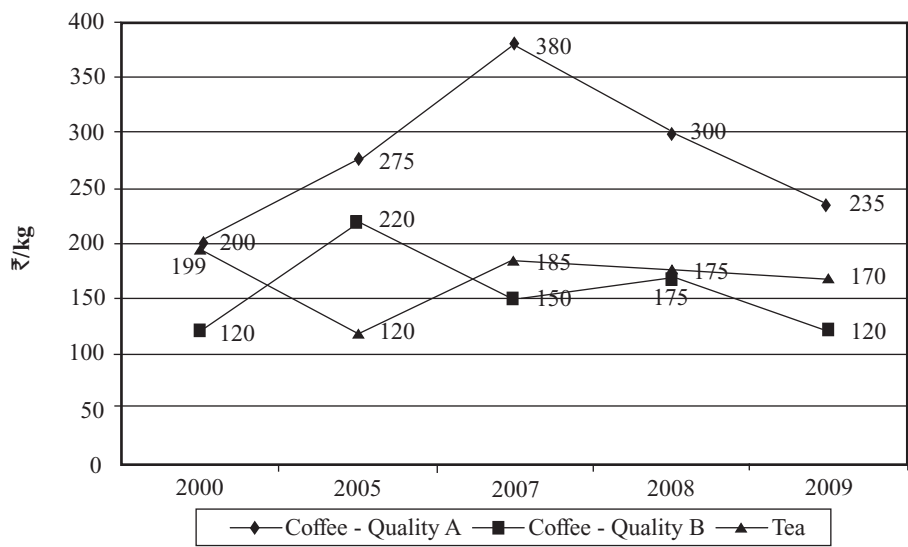
MOCK TEST 1

INSTRUCTIONS

- Directions for answering the questions are given before each group of questions. Read these directions carefully and answer the questions by darkening the appropriate circles Sheet. Each question has only one correct answer.
- All questions carry three marks each. Each wrong answer will attract a penalty of one mark.
- Do your rough work only on the Test Booklet and NOT on the Answer Sheet.

Directions for questions 1 to 4: *Go through the data set given below and solve the questions based on it.*

The line chart depicts the price trend of beverages (₹/kg) from 2000 to 2009.



Following table provides the price indices for agricultural commodities in the years 2000 to 2009. For the sake of calculation, base year is considered as the year 2000. In the year 2000, unit price of the items mentioned = 100.

Price indices for Agricultural Commodities:

Item	2000	2005	2007	2008	2009
1. Beverages	100	127	158	135	104
2. Food	100	98	107	101	85
3. Raw Materials	100	113	105	84	85

Assume that the index for beverage is based on the 3 beverages for which the price trend is shown in the line chart given at the top.

- In 2009, what is the quantity of tea that can be bought for ₹2,000?
(a) 10.8 kg (b) 5.88 kg
(c) 11.7 kg (d) 12.8 kg
- During which period was the change in the price (₹/kg/years) the lowest for coffee quality A?
(a) 00 – 05 (b) 05 – 07
(c) 07 – 08 (d) 08 – 09
- For which of the three beverages is the change in price between 00 and 09 not in conformity with the trend for beverage price index?

- Coffee – Quality A
- Coffee – Quality B
- Tea

- III only
- I and II
- I and III
- II and III

- Assuming that equal weightage is given to each of three beverages in calculating the index, which one contributes most to the rise in index from 2000 to 2009?

- Tea
- All contribute equally
- Coffee – Quality A
- Coffee – Quality B

Directions for questions 5 to 8: Go through the chart given below and solve the questions based on it.

Following grid presents the percentage composition of five verticals under different sectors viz. Government, Public, Private, Joint.

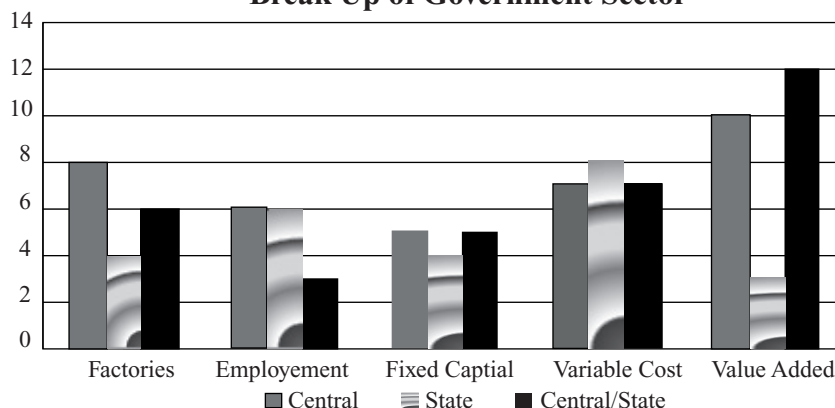
Sector	Factories	Employment	Fixed Capital	Variable Cost	Value Added
Government	18	15	14	22	25
Public	12	8	6	19	8
Private	55	65	72	54	62
Joint	15	12	8	5	5
Total	100	100	100	100	100

For example, of all the factories, 18% are owned by Government.

Further, Government Sector can be further broken

down into three Sub-sectors – Central, State, Central / State. Following bar chart gives a break – up of the Government Sector data (as given in Table above):

Break Up of Government Sector



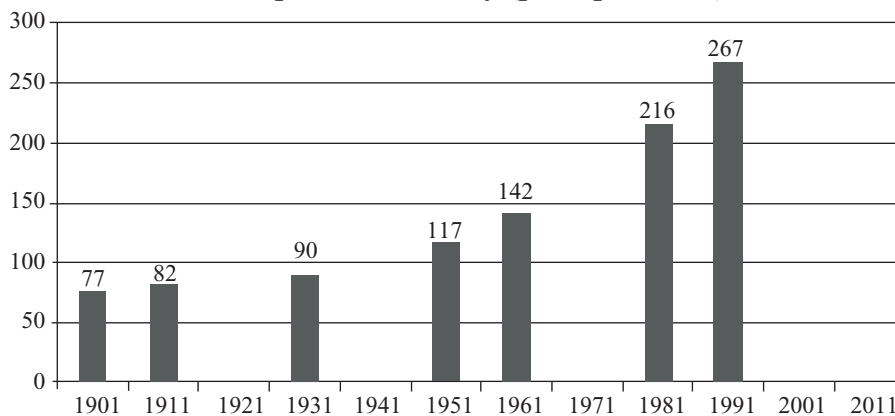
5. If the total work force was 76 million whereas the total value added was ₹225 million, then which of the following had the maximum value addition per worker?
 (a) Central (b) State
 (c) Central/State (d) Public
6. Which of the following sectors has the maximum fixed capital invested per factory?
 (a) Central (b) State
 (c) Central/State (d) Public
7. If the variable is proportional to the number of employees and the production per employee, then for which of the following is the production highest?
 (a) Government (b) Private
 (c) Joint (d) Public

8. If the government has a fixed capital of \$200 million in the Iron & Steel industry, which corresponds to 20.012% of its total investment as fixed capital, then how much did the government invest (in ₹million) in Maruti Udyog Ltd. which forms 25% of the investment in the joint sector? (1 US \$ = ₹45)
 (a) 7860 (b) 2500
 (c) 143 (d) 145

Directions for questions 9 to 12: Go through the data set given below and solve the questions based on it.

Following bar chart and table provides the Census Data for India during the given period.

Population Density (per square km)



As it can be seen that in the bar chart, population density data for few years namely 1921, 1941, 1971, 2001 and 2011 have been omitted due to some technical fault. Assume these values to be equal to A, B, C, D and E respectively. Following table provides the absolute increase in the density of the census year with respect to the previous census year.

Census year	Absolute increase from previous census
1901	NA
1911	5
1921	-1
1931	9
1941	13
1951	14
1961	25

1971	35
1981	39
1991	51
2001	58
2011	Not mentioned

9. Which of the following is the largest one?
 (a) B (b) C
 (c) D (d) Cannot be determined
10. Population density of census year 2011 increases by 17.5% over the population density of census year 2001. What is the value of E?
 (a) 372 (b) 382
 (c) 392 (d) 352
11. Which year shows the 2nd largest percentage increase in the population density over the previous census year?
 (a) 1931 (b) 1941
 (c) 1971 (d) 1991

12. Population density of which year is closest to the average of population density of all the census years from 1901 to 2001?

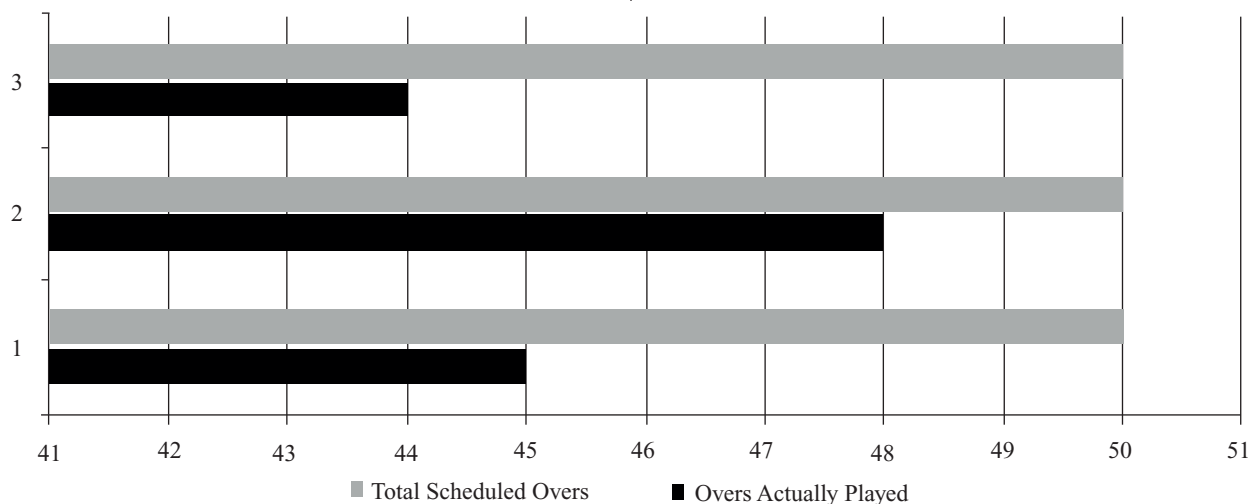
(a) 1931 (b) 1961
(c) 1981 (d) 1991

Directions for questions 13 to 16: Go through the chart given below and solve the questions based on it.

In the game of cricket, there are 11 batsmen who bat during the match of 50 Overs. 1st two batsmen come

to bat 1st and when any one of the two gets out, next batsman come to bat alongwith the one of the two batsmen left out. And so on the next batsman comes to bat – in a fixed sequence for all the three matches. Only one batsman can get out for one ball. One over comprises of 6 balls – to be thrown one by one. Though if all the batsmen get out before scheduled 50 Overs, match ends at that point (known as Overs Actually Played).

Following bar chart shows total scheduled Overs and Overs actually played for 1st match (denoted by 1), 2nd match (denoted by 2) and 3rd match (denoted by 3).



Following table shows the runs scored in three matches series. Total runs scored = Runs Scored by 1st Five players + Runs scored by Remaining Last six players + Extra Runs.

India Vs Pakistan ODI Series – Runs Scored

	1st Match	2nd Match	3rd Match
Runs Scored by 1st Five Players	18	75	80
Runs Scored by Remaining Last Six Players	187	72	70
Extra Runs	22	18	17

$$\text{Average Runs per over} = \frac{\text{Total Runs Scored}}{\text{Overs Actually Played}}$$

13. In which of the matches, Indian Team's average runs per over is maximum?

(a) 1st match (b) 2nd match
(c) 3rd match (d) Either 1st or 2nd match

14. What would have the total runs scored in the 3rd match if Indian team would have played 50 Overs

with the same average which it maintained till the Overs actually played?

(a) 180 (b) 190
(c) 200 (d) 170

15. Mr PhaniRam, the team selector, has made following observations to improve the performance of the team:

- Performance of 1st five players have improved, whereas performance of last six players have gone down.
- Had there been no extra runs, runs in 2nd match would have decreased by maximum percentage.
- If team would have played for full 50 Overs, it would have scored maximum in 1st match.

How many of these observations are true?

(a) Only i and ii but not iii
(b) Only ii and iii but not i
(c) Only i and iii but not ii
(d) All three

16. If extra runs are not considered, which match has the lowest average runs per over?

(a) 1st match (b) 2nd match
(c) 3rd match (d) Either 2nd or 2nd match

Directions for questions 17 to 20: Read the information given below and solve the questions based on it.

On an island there are exactly seven towns: T, U, V, W, X, Y, and Z. All existing and projected roads on the island are two way and run perfectly straight between one town and the next. All distances by road are distances from the centre of one town to the centre of another town. U is the same distance by road from T, V, and W as Y is from X and Z. The following are all of the currently existing roads and connections by road on the island.

Road 1 goes from T to V via U.

Road 2 goes from U directly to W.

The Triangle Road goes from X to Y, from Y on to Z, and from Z back to X.

Any centre reached by two roads is an interchange between them, and there are no other interchanges between roads.

17. It is possible that the distance by road from X to Y is unequal to the distance by road from
 - (a) T to U
 - (b) U to V
 - (c) U to W
 - (d) X to Z
18. Which of the following is a pair of towns connected by two routes by road that have no stretch of road in common?
 - (a) T and U
 - (b) U and V
 - (c) V and W
 - (d) X and Y
19. If a projected road from T to Y were built then the shortest distance by road from W to X would be the same as the shortest distance by road from Z to
 - (a) T
 - (b) U
 - (c) V
 - (d) X
20. If two projected roads were built, one from T directly to Y and one from V directly to Z, then each of the following would be a complete list of the towns lying along one of the routes that a traveler going by road from U to X could select EXCEPT
 - (a) T,Y
 - (b) T,Z
 - (c) V,Z
 - (d) T,Y,Z

Directions for questions 21 to 24: Read the information given below and solve the questions based on it.

Two circular dials of exactly the same size are mounted on a wall side by side in such a way that their perimeters touch at one point. Dial 1, which is on the left, spins clockwise around its centre, and dial 2, which is on the right, spins counter wise around its centre. (Assume that there is no friction at the point of contact between the dials.)

Each dial has marked on its perimeter three points that are at equal distances around the perimeter from each other. Going clockwise on each dial the points

marked on dial 1 are N,O, and P, and the points marked on dial 2 are X,Y and Z.

21. Which of the following lists the points on a dial on a dial in an order in which they could pass consecutively through the point of contact between the dials?
 - (a) O,N,P
 - (b) X,Z,Y
 - (c) Y,X,Z
 - (d) None of these
22. If points O and Z are just meeting at the point of contact between the dials, and if dial 1 spins at the same speed as dial 2, what is the smallest number of revolution of each dial that will bring O and Z together again?
 - (a) 4
 - (b) 2
 - (c) 3
 - (d) 1
23. If points N and Y are just meeting at the point of contact between the dials, and if dial 1 spins at the same speed as dial 2, which of the following pairs of points will also meet in the course of the next full revolution of the dials?
 - (a) N and Z
 - (b) O and X
 - (c) O and Z
 - (d) P and X
24. Which of the following is a possible sequence of pairs of points meeting consecutively at the point of contact between the dial if dial 1 spins at the same speed as dial 2?
 - (a) N and O followed by X and Z
 - (b) N and X followed by O and Z
 - (c) O and X followed by N and X
 - (d) O and Y followed by N and Z

Directions for questions 25 to 28: Go through the information given below and solve the questions based on it.

Five students – Aman, Gaurav, Chandra, Pooja and Mudit – take an exam in which there are eight questions numbered 1 to 8. Each question has four options – a, b, c and d. Only one of them is right. A student gets one mark for a right answer and loses one third mark for a wrong answer. The answers marked by the five students for each of the eight questions are given below:

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Aman	A	B	B	C	D	C	C	A
Gaurav	A	C	B	D	D	B	D	D
Chandra	B	B	B	D	D	C	C	d
Pooja	C	B	B	C	C	B	D	C
Mudit	A	C	D	B	D	C	C	D

Following observations are also made:

- (1) It is also known that if a student marked the same option (from any of the four options) for

- (2) Gaurav topped the exam with a total of 5.33 marks.
- (3) Pooja had the least total score with zero marks.
- (4) Had Mudrit marked one more answer correctly and Gaurav marked one more answer wrongly, their scores would have interchanged.
- (5) Three of the eight questions were answered correctly by Aman as well as Chandra and both of them scored equal marks.

- Directions for questions 29 to 32: Read the following information and answer the questions.**

- 1) U is sweeter than V and healthier than Z.
- 2) V is sweeter than Y and less healthy than Z.
- 3) W is less sweet than X and less healthy than U.
- 4) X is less sweet and healthier than Y.
- 5) Y is less sweet and healthier than U.
- 6) Z is sweeter than U and less healthy than W.

29. Which is the sweetest essence?
(a) U (b) W
(c) X (d) Z
30. Which of the following essences is/are both sweeter and healthier than V?
(a) U only (b) W only
(c) Z only (d) U & Z only
31. Which of the following essences is/are sweeter than Y and healthier than W?
(a) U only (b) V only
(c) Z only (d) U & V only
32. Which is the least healthy essence?
(a) U (b) V
(c) W (d) Y

1. (b)	2. (a)	3. (d)	4. (c)	5. (c)	6. (b)	7. (b)	8. (a)	9. (d)	10. (b)
11. (d)	12. (b)	13. (a)	14. (b)	15. (c)	16. (b)	17. (d)	18. (c)	19. (c)	20. (b)
21. (a)	22. (d)	23. (b)	24. (d)	25. (b)	26. (a)	27. (c)	28. (d)	29. (d)	30. (d)
31. (a)	32. (b)								

HINTS AND EXPLANATIONS

1 to 4

StoryLine:

Line charts are typically used for trend analysis for chronological data. A clear trend of price change can be seen through the line chart – with a word of caution because gap in number of years between two data point is not same. Table given below presents the index value for Beverages, based upon the data from line chart, and two other items. As stated in the 1st line, you may expect questions which ask to compare the trends of different items across the years.

Solution and Explanation:

1. This question needs a simple calculation. Price per kg of tea in 2009 = ₹170/kg.

$$\text{Hence quantity that can be bought for ₹1000} \\ = \frac{1000}{170} = ₹5.88/\text{kg}$$

Hence option (b) is the answer.

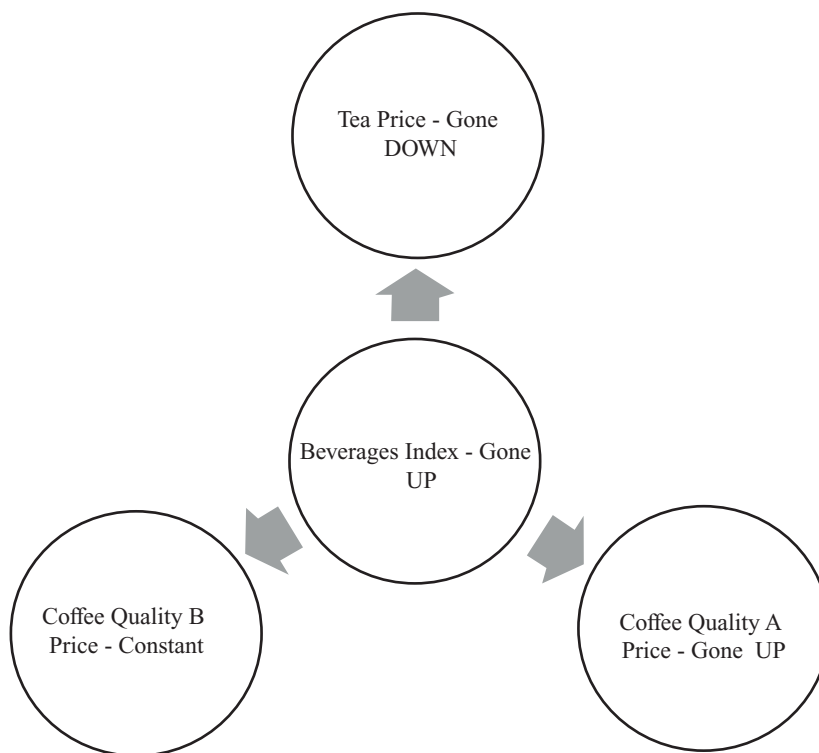
2. Question is asking for change, and not increase or decrease. So we are required to work upon with

magnitude only, and sign (positive or negative) is not important.

Year Span	Total Change	Total Years	Change / year
2000 - 2005	75	5	15
2005 - 2007	105	2	52.5
2007 - 2008	80	1	80
2008 - 2009	65	1	65

It is obvious that change / year is minimum in the year 2000 – 2005. Hence option (a) is the answer.

3. Index has the following pattern: Increase – Increase – Decrease – Decrease
Only Coffee Quality A shows this trend.
Hence option (d) is the answer.
4. Beverages Index in the year 2000 = 100
Beverages Index in the year 2009 = 104. So there is a rise in index.
It can be observed that Tea price has remained same and price of Coffee Quality A has gone down in 2009 over 2000.



Only the price of Coffee Quality A has gone up. So it can be concluded that Coffee quality A has

the maximum impact on the beverages index and hence contributes most.
Hence option (c) is the answer.

5 to 8

StoryLine:

Table provides percentage share (or composition) of Factories, Employment, Fixed Capital, Variable cost and Value added among four sectors viz. Government sector, Public sector, Private sector and Joint sector.

Key point here is to understand that Government sector is broken down into three sub sectors. For all the data given in Government sector, corresponding data for sub sectors is provided in the bar chart.

Solution and Explanation:

$$5. \text{ Value addition per worker} = \frac{\text{Value Added}}{\text{No. of Employees}}$$

Total Value added = ₹225 million and Total work force = 76 million.

We go by the options and calculate Value added per worker for all the given options:

$$\text{For Central} = \frac{10\% \text{ of } ₹225 \text{ million}}{6\% \text{ of } ₹76 \text{ million}}$$

$$\text{For State} = \frac{3\% \text{ of } ₹225 \text{ million}}{6\% \text{ of } ₹76 \text{ million}}$$

$$\text{For Central / State} = \frac{12\% \text{ of } ₹225 \text{ million}}{3\% \text{ of } ₹76 \text{ million}}$$

$$\text{For Public} = \frac{8\% \text{ of } ₹225 \text{ million}}{8\% \text{ of } ₹76 \text{ million}}$$

Calculation Short Cut:

Instead of calculating the real value in the above four options, what we can do is quick ratio

comparison. We can observe that $\frac{₹225 \text{ million}}{₹76 \text{ million}}$ is present in all the ratios. Let us assume $\frac{₹225 \text{ million}}{₹76 \text{ million}} = N$.

So the four ratios become like the following:

$$\text{For Central} = \frac{10\% \text{ of } ₹225 \text{ million}}{6\% \text{ of } ₹76 \text{ million}} = \frac{10\%}{6\%} N$$

$$\text{For State} = \frac{3\% \text{ of } ₹225 \text{ million}}{6\% \text{ of } ₹76 \text{ million}} = \frac{3\%}{6\%} N$$

$$\begin{aligned} \text{For Central / State} &= \frac{12\% \text{ of } ₹225 \text{ million}}{3\% \text{ of } ₹76 \text{ million}} \\ &= \frac{12\%}{3\%} N \end{aligned}$$

$$\text{For Public} = \frac{8\% \text{ of } ₹225 \text{ million}}{8\% \text{ of } ₹76 \text{ million}} = \frac{8\%}{8\%} N$$

It can be now clearly seen that the ratio is largest in case of Central / State. Hence option (c) is the answer.

In such questions, we can do the proceeding in a nutshell like the following:

Value added per worker for various sectors will be proportional to following ratios:

Central	10/6
State	3/6
Central/state	12/3
Public	8/8

6. Using the method given in A5:

Fixed capital per factory will be proportional to the following ratios:

Central	5/8
State	4/4
Central/state	5/6
Public	6/12

Hence option (b) is the answer.

7. If the variables are proportional to the number of employees and the production per employee, then we can say that the variable cost is directly proportional to the production. Since the variable cost is maximum for private sector, it will also have the maximum production.

Hence option (b) is the answer.

8. Since options are not so close, we can take 20.012% = 20%

If 20% of govt. fixed capital is equal to \$200 million $\Rightarrow$ Total govt. sector fixed capital = \$1000 m which is equivalent to 14% of the total fixed capital. Now, 25% of Govt. investment in joint sector, i.e. 25% of the 8% of the total = 2%

of total fixed capital will be given by: $\frac{1000 \times 2}{14}$
= \$143 million

Value in ₹ is given by: $143 \times 55 = ₹7865$ million

Hence option (a) is the answer.

9 to 12

StoryLine:

Bar chart provides the population density of the census years – though data for some of the years is missing. To find out the missing values in the bar chart, table provides the absolute increase in the census year with respect to the previous census year. For example, census year of 1941 = 13 more from the population density of 1931 = 90 + 13 = 103.

9. It can be seen that density has increased in all the census years over the previous year except (a) in 1921 (b) in 2011 – we do not have information. Hence population density for 2011 = E is not known to us.

So final answer is – cannot be determined.
Hence option (d) is the answer.

10. Given that Population density in 1991 = 267

So population density of 2001 = $267 + 58 = 325$.
To calculate the population density of 2011, we have been given the clue in terms of percentage increase over 2001 population density.

Population density of 2011 = Population density of 2001 + increase of 17.5% over this = $325 + 17.5\%$ of 325

$$17.5\% = 20\% - 2.5\% = \frac{1}{5} - \frac{1}{40}$$

$$\frac{1}{5} \text{ of } 325 = 65 \text{ and } \frac{1}{40} \text{ of } 325 = 8$$

(approximately)

So, $17.5\% = 65 - 8 = 57$

Hence population density of 2011 = $325 + 57 = 382$. Hence option (b) is the answer.

11. Following table gives the population density and percentage change:

Census year	Density (per sq.km)	% age Change
1901	77	
1911	82	6.5
1921	81	-1.2
1931	90	11.1
1941	103	14.4
1951	117	13.6
1961	142	21.4
1971	177	24.6
1981	216	22
1991	267	23.6
2001	325	21.7

2nd largest percentage increase occurs in 1991.
Hence option (d) is the answer.

12. **Method 1: Using approximation**

Since the population density is constantly on a rise, average would be accounted for by the years that lie midway – 1951 or 1961 or 1971. Census year 1951 can be easily ruled out as population

density in this year is too low. So either census year 1961 or 1971 will be the answer. Since 1971 is not in the options, hence 1961 is the answer.

Method 2: Using the actual calculation

Using the table drawn to solve Q3, average population density of all the census years from 1901 to 2001 = 152. This is closest to the population density of the census year 1961.

Hence option (b) is the answer.

13 to 16:

StoryLine:

Question provides two sets of data – Overs and Runs scored. While Total scheduled Overs is fixed at 50, Overs actually played vary for all the three matches. Runs scored have been given in three parts – Runs Scored by 1st Five Players, Runs Scored by remaining Last Six Players and Extra Runs. Summation of these three components gives total runs. Further, Average runs per over has been defined.

13. Clearly it can be seen that runs scored in the 1st match is much more than the total runs scored in either 2nd match or 3rd match. Though number of Overs actually played is almost similar in all the three matches – 45 Overs in 1st match, 48 Overs in 2nd match and 44 Overs in 3rd match.

Since numerator (Total runs scored) is maximum in case of 1st match whereas denominator is almost similar, Average runs per over will be maximum for 1st match.

Hence option (a) is the answer.

14. Total number of Overs Actually played in 3rd match = 44 Overs

Total number of Runs scored in 3rd match = $80 + 70 + 17 = 167$ runs

Method 1 – Through actual calculation method

Average Runs per Over in 3rd match = 3.8 runs per over

Total runs in 50 Overs = $50 \times 3.8 = 190$ runs

Method 2 – Through Approximation method

Percentage Increase

44 Overs $\xrightarrow{\text{of } 12\% - 13\%}$ 50 Overs

Hence runs scored will also increase by 12% - 13%. Now we will not go through the actual calculation. A quick look at the options shows that options are not close, so we can have a good approximation.

Instead of increasing 167 runs (scored in 44 Overs) by 12% - 13%, we increase it by ONLY 10% to find a quick range of our answer.

Percentage Increase of 10%
 $167 \xrightarrow{\text{Percentage Increase of 10\%}} 167 + 16.7 \equiv 184$. Our Actual answer will be a bit more than this.
 Option (b) is the closest one.

Hence option (b) is the answer.

15. Evaluating the observations one by one:

Observation I – Understand that you don't have to use your "Cricket" knowledge to answer this question. Taking the data on its face value, it can be clearly seen that Performance of 1st five players has improved whereas performance of last six players has gone down. Hence observation I is correct.

Observation II – This is a close call. So let us go through the actual calculation.

$$\text{Percentage decrease in case of Match 1} = \frac{22}{227} \times 100 = 9.69\%$$

$$\text{Percentage decrease in case of Match 2} = \frac{18}{165} \times 100 = 10.9\%$$

$$\text{Percentage decrease in case of Match 3} = \frac{17}{167} \times 100 = 10.17\%$$

So, maximum percentage decrease occurs in case of Match 3. Hence Observation II is wrong.

Observation III – Since the Average Runs per over is maximum in Match 1 (using answer

to Q13), hence runs scored in 50 Overs would have been maximum in match 1. So observation iii is true.

So, only observations I and III are correct.

Hence option (c) is the answer.

16. This is simple calculation – similar to Q13.

Option (a) can be easily eliminated as this has the maximum runs scored. Though to decide between match 2 and match 3, we are required to calculate the actual value.

Average Runs per Over for Match 2 = 3.06 runs per over and average runs per over for match 3 = 3.40 runs per over. Hence match 2 is the answer.

Hence option (b) is the answer.

25 to 28:

Using (1), we can say that answer to any two questions is option (a), answer to any two questions is option (b), answer to any two questions is option (c), answer to any two questions is option (d).

Using (2) we can say that Gaurav got 6 correct and 2 incorrect. Further it can also be seen that Gaurav has marked 1 a's, 2 b's, 1 c's and 4 d's. Using (1), we can say that out of 4 d's marked by Gaurav, two d's are incorrect and instead, it should have been one a and one c actually.

A table with the possible wrong answers can be seen below:

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Wrong Answer
Aman	A	B	B	C	D	C	C	A	1 c
Gaurav	A	C	B	D	D	B	D	D	2 d's
Chandra	B	B	B	D	D	C	C	D	1 b, 1 d
Pooja	C	B	B	C	C	B	D	C	2 c, 1 b
Mudit	A	C	D	B	D	C	C	D	1 c, 1 d

Using this, we can say that all the answers marked either a or b or c by Gaurav are correct:

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Wrong Answer
Gaurav	A	C	B	D	D	B	D	D	2 d's
	Correct	Correct	Correct	Not sure	Not sure	Correct	Not sure	Not sure	

So we have got the right answers of Q1, Q2, Q3 and Q6.

Using (4):

Had Gaurav marked one more answer wrongly
 $\Rightarrow$ Gaurav's actual = 6 correct, 2 incorrect. In

this new case, correct questions = 5, incorrect questions = 3
Had Mudit marked one more answer correctly

she would have interchanged her score with Gaurav $\Rightarrow$ Mudit attempted 5 questions right and 3 questions wrong.

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Wrong Answer
Mudit	A	C	D	B	D	C	C	D	1 c, 1 d
	Correct	Correct	Wrong	Not sure	Not sure	Wrong	Not sure	Not sure	

Mudit has got 5 correct and 3 incorrect. In the above table, we get only 2 correct and 2 wrong. Hence we can conclude that out of the remaining 4 questions, for which we are not sure, 3 are correct and 1 is wrong.

Using (5):
Three of the eight questions were answered correctly by Aman as well as Chandra.

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Wrong Answer
Aman	A	B	B	C	D	C	C	A	1 c
Chandra	B	B	B	D	D	C	C	D	1 b, 1 d
Right answer	A	C	B			B			

Since both of them have got 3 common questions right, it will be Q3, and it will not be Q1, Q2,

Q4, Q6, Q8. Hence common correct questions = Q3, Q5, Q7.
So the answer grid, as of now, looks like:

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Correct Answer	A	C	B		D	B	C	

Till now, list of answers that we have got = 1 a, 2 c, 2 b, 1 d. So one of Q4 and Q8 will have

answer as option a and other one as d.
Once again we recreate the situation for Gaurav:

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Wrong Answer
Gaurav	A	C	B	D	D	B	D	D	2 d's
	Correct	Correct	Correct	Not sure	Correct	Correct	Wrong	Not sure	

Gaurav got 2 d's wrong. One wrong d has already occurred in Q7.
Let us now recreate the final table:

Pooja has got zero mark $\Rightarrow$ 2 correct and 6 incorrect $\Rightarrow$ Q3 and Q6 are correct $\Rightarrow$ all the other 6 answers are incorrect.

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Wrong Answer
Pooja	C	B	B	C	C	B	D	C	2 c, 1 b
	Wrong	Wrong	Correct	Wrong	Wrong	Correct	Wrong	Wrong	

WE have so far got

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
A	C	B		D	B	C	

It should look like:

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
A	C	B	A/D	D	B	C	D/A

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Wrong Answer
Aman	A	B	B	C	D	C	C	A	1 c
	Correct	Wrong	Correct	Wrong	Correct	Wrong	Correct	Not sure	

Aman and Chandra got the same marks. We have concrete information for 7 questions of Aman – 4 correct and 3 wrong (no info for Q8). Now net score for Aman may be either 4 correct and

4 wrong (in that case Aman’s answer to Q8 is wrong $\Rightarrow$ answer to Q8 is option D $\Rightarrow$ answer to Q4 is option A) or 5 correct and 3 wrong.

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Wrong Answer
Chandra	B	B	B	D	D	C	C	D	1 b, 1 d
Right answer	Wrong	Wrong	Correct		Correct	Wrong	Correct		

Looking at Chandra score, one of the option D’s have to be wrong (since she has marked 3 option D as the answers), so she cannot get both Q4 and Q8 correct. So her best score = 4 correct and 4 wrong (she cannot have both D’s wrong as in that case her score will not match with Aman).

So answer to Q8 = Option D $\Rightarrow$ Answer to Q4 = option A. So the final answer grid is:

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
A	C	B	A	D	B	C	D

Now all the questions can be answered.

25. Aman got 4 questions right. Hence option (B) is correct.
26. Mudit got 5 correct – 3 wrong = 4 marks
Chandra got 4 correct – 4 wrong = 2.66 marks
Different = 1.33 marks $\Rightarrow$ hence option (A) is the answer.
27. Except Pooja, all of them got their scores above it. Hence option (C) is the answer.
28. It is possible to calculate the scores for all of them. Hence option (D) is the answer.

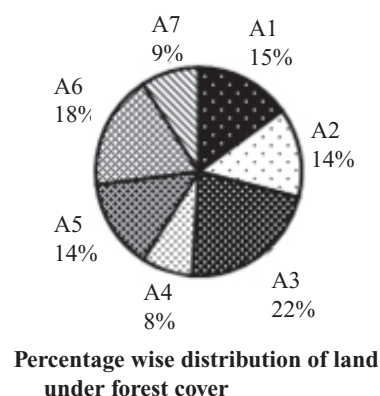
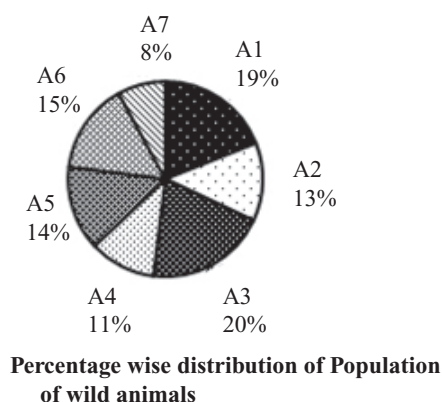
MOCK TEST 2

INSTRUCTIONS

- ☐ Time allotted = 60 minutes
 - ☐ Each question carries 3 marks. There is one third negative marking.
-

Directions for questions 1 to 4: *Go through the data set given below and solve the questions based on it.*

Below given pie charts show the percentage population of wild animals and the percentage of land use under forest cover in different regions of the world in the year 2007.



Following are the geographical regions:

A1 – Asia, China, India, **A2** – Australia, **A3** – Africa, **A4** – Europe, **A5** – Russia, **A6** – North & South America, **A7** – Antarctica. Population density is obtained by dividing population by land.

$$\text{Population density} = \frac{\text{Percentage Number of Animals}}{\text{Percentage Land Area Under Forest Cover}}$$

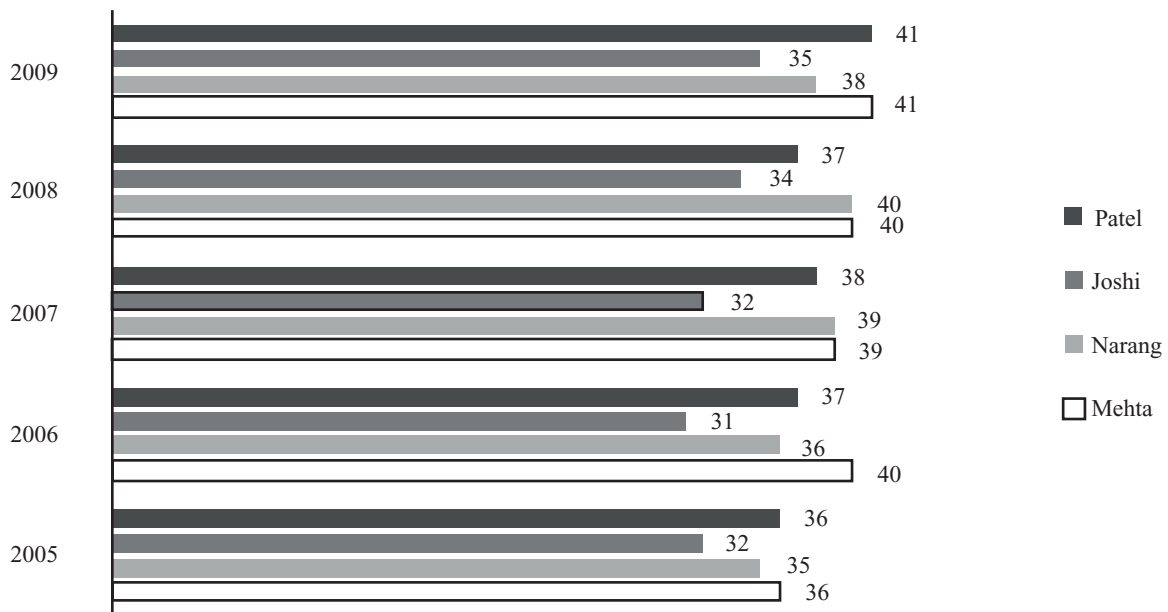
- If the population density of wild animals in Russia is 1, then what is the combined population density of (Africa and North & South America)?
 (a) 0.79 (b) 0.84
 (c) 0.88 (d) 0.94
- Which among the following has the fourth highest population density of wild animals?
 (a) A5 (b) A7
 (c) A3 (d) A2
- Population density of wild animals in Europe is how many times that of the population density of wild animals in Russia?
 (a) 1.375 (b) 1.49
 (c) 1.57 (d) 1.64
- If in the next 10 years, the population of wild animals in Antarctica will increase by 2.5% more than that in the rest of the world, what will be the percentage population of wild animals in Antarctica after 10 years?
 (a) 9.5% (b) 11.6%
 (c) 15.7% (d) Cannot be determined

Directions for questions 5 to 8: Read the following information given below and solve the questions based upon it.

There are four rich families in a locality : the Patels, the Joshis, the Narangs and the Mehtas. In the year 2005, these families have 7, 6, 6 and 5 members respectively. All four families are on excellent terms and during the year 2006 to 2009, in each year, on January 1st, exactly one marriage takes place (that is a girl from one of the four families marries a boy from another of the four families and goes to stay with that family). No other marriage, or births or deaths take place during the given time period. No member of any of the families had a birthday in December or January. None of those getting married is over 30 years at the time of marriage.

The table below gives the average age of each family during the given period (with each family member's age being calculated as completed years on the 31st of December of that year).

Average Age of Families across the Years



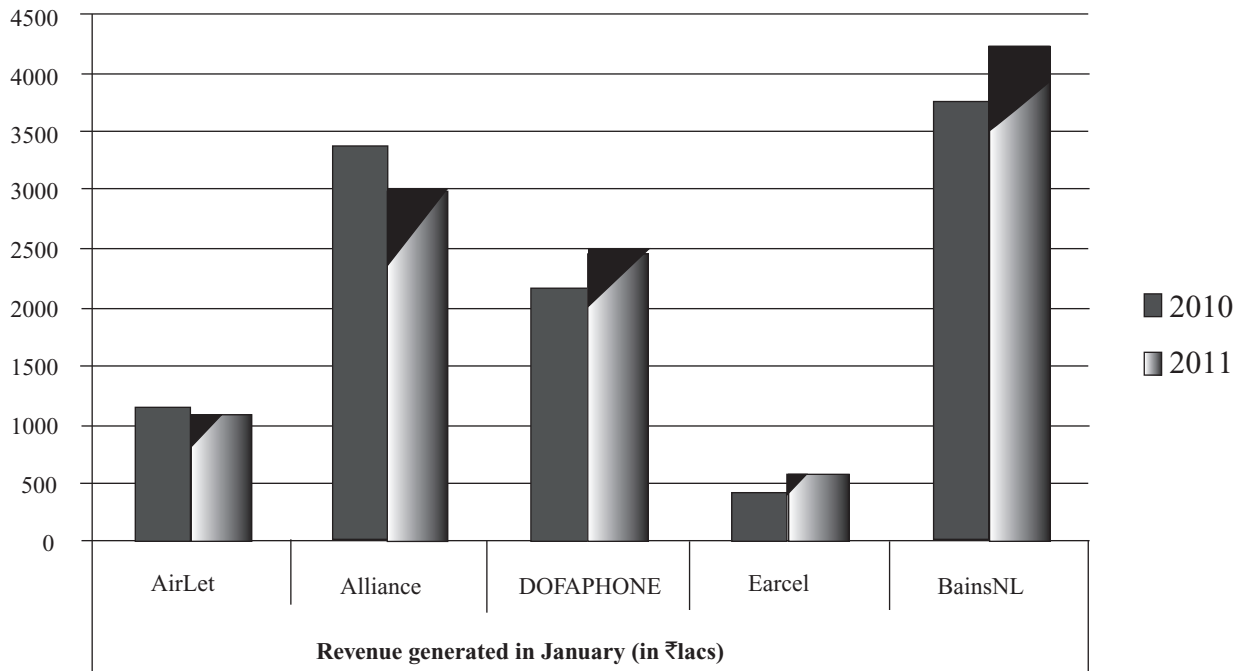
- In which year did a girl from the Mehta family get married?
 (a) 2006 (b) 2007
 (c) 2006 or 2007 (d) Cannot be determined
- In which year did a boy from the Mehta family get married?
 (a) 2006 (b) 2007
 (c) 2006 or 2007 (d) Cannot be determined
- On 31st Dec 2009, how old was the girl originally from the Joshi family who got married?
 (a) 20 (b) 26
 (c) 28 (d) Cannot be determined
- On 31st Dec 2005, how old was the boy originally from the Patel family who got married?
 (a) 20 (b) 26
 (c) 28 (d) Cannot be determined

Directions for questions 9 to 12: Go through the data set given below and solve the questions based on it.

Following chart gives the revenue of 5 telecom companies generated in Jan'2010 and Jan'2011.

All the values are in the multiples of 50.

Following table provides the number of users of these telecom companies for the same two years in the month of January (in lacs):



Number of Users (in lacs)					
	AirLet	Alliance	Dofaphone	Earcel	BainsNL
2010	242	324	286	42	422
2011	259	318	294	46	440

9. ARPU is defined as Average Revenue Per User. For which of the following companies ARPU in the month of January maximum for both the years combined?
- (a) Alliance (b) Dofaphone
(c) Earcel (d) BainsNL
10. ARPU is defined as Average Revenue Per User. For how many companies, ARPU has increased in January 2011 over January 2010?
- (a) 2 (b) 3
(c) 4 (d) 5
11. In January 2011, VAS (Value Added Services) was launched by all these five telecom companies for the 1st time. Following table gives the percentage of revenue generated through VAS by these companies in the month of January 2011 (out of total revenue generated in January 2011 as given in the bar chart):

AirLet	Alliance	Dofaphone	Earcel	BainsNL
18%	9%	12%	22%	6%

Which of the following is NOT correct for the VAS revenue generated by these companies for the year 2011?

- (a) VAS revenue of Alliance is more than the VAS revenue of BainsNL.
(b) VAS revenue of AirLet is more than the VAS revenue of Alliance.
(c) If we arrange VAS revenue of all these companies in ascending order, then VAS revenue of BainsNL will be the median.
(d) Cannot be determined
12. In January 2010, SMS Services was launched by all these five telecom companies for the 1st time. Following table gives the percentage of revenue generated through SMS services by these companies in the month of January 2010 (out of total revenue generated in January 2010 as given in the bar chart):

AirLet	Alliance	Dofaphone	Earcel	BainsNL
12%	16%	9%	6%	14%

What is the ratio of revenue generated through SMS services by Alliance Telecom to the revenue generated by Earcel through SMS in 2010?

- (a) 8:3 (b) 7:2
(c) 4:7 (d) Cannot be determined

Directions for questions 13 to 16: *Go through the data set given below and solve the questions based on it.*

A magazine is about to celebrate its 25th anniversary and they have launched a special offer price for its customers as per the following details:

McDi produces chicken nugget box (1,000 boxes at a time in a batch). McDi has to ensure that it does not supply undercooked nuggets (known as defective) to the customers. If a customer receives a defective nugget box, company has to pay a penalty of ₹150 per nugget box. To check the level of preparedness of nuggets, any of the two tests can be used:

No. of years	Standard Price	25 TH ANNIVERSARY Price	Number of issues + Free goodies
1 year	600	500	12 issues + a GK book worth ₹60
2 years	1200	950	24 issues + A book on Human anatomy worth ₹120
3 years	1800	1400	36 issues + a GK book worth ₹60 + A book on human anatomy worth ₹120
4 years	2400	1850	48 issues + a pen set worth ₹250
5 years	3000	2100	60 issues + a wrist watch worth ₹350 + three books on Yoga worth ₹850

NOTE:

- (1) Charges for postage to be borne by the reader.
 - (2) ₹25 extra to be included as postage charges (on yearly basis).
 - (3) The effective cost of subscription is (price) minus (the cost of gifts) plus (the postage charges).
13. The percentage decrease in the 25th Anniversary price per issue from one term to the next is maximum in
 - (a) 2 year term
 - (b) 3 year term
 - (c) 4 year term
 - (d) 5 year term
 14. What is the difference between the effective cost per issue, between a subscription of 1 year and 5 years (for 25th anniversary price)?
 - (a) ₹23.33
 - (b) ₹15.55
 - (c) ₹21.66
 - (d) ₹17.77

15. What is the effective cost per issue, for the 25th anniversary price of a 4 year term?
 - (a) ₹33.33
 - (b) ₹35.41
 - (c) ₹37.31
 - (d) ₹38.54
16. For which subscription, the fraction of (Standard Price) to (25th anniversary effective special offer price) the highest?
 - (a) 5 year term
 - (b) 4 year term
 - (c) 3 year term
 - (d) 2 year term

Directions for questions 17 to 20: *Go through the data set given below and solve the question based upon it.*

Following table gives the marks of six students A1, A2, A3, A4, A5, and A6 in five papers of an examination - P1, P2, P3, P4, and P5.

	P1	P2	P3	P4	P5	Total
A1	97	99	98		99	491
A2	92	95		94		
A3	86	89		90	93	443
A4	78		76		85	405
A5		69	64	75		349
A6	49	53	48	60	55	
Total	468		463	502	505	

17. What is the marks obtained by A2 in P5?
 - (a) 98
 - (b) 96
 - (c) 94
 - (d) 95

18. What is the marks scored by A4 in P4?
 - (a) 80
 - (b) 88
 - (c) 85
 - (d) 75

19. What is the average of the total marks scored by all six students?

- (a) 304 (b) 436
(c) 336 (d) 404

20. What is the sum of the marks scored by all the six students in P2?

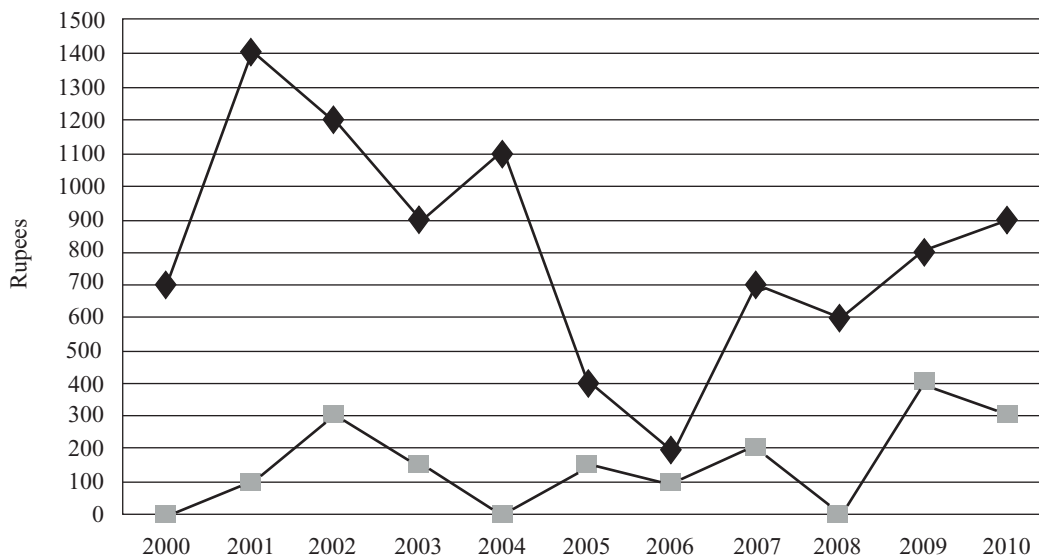
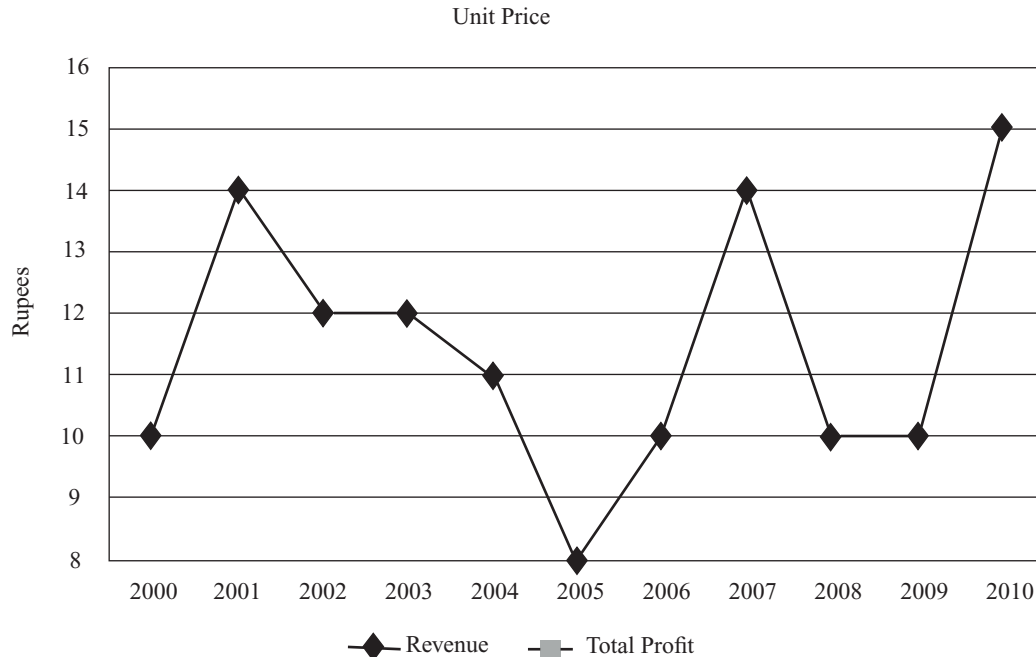
- (a) 576 (b) 486

(c) 586

(d) 476

Directions for questions 21 to 24: Go through the data set given below and solve the questions based on it.

Answer the questions based on the following two graphs, assuming that there is no fixed cost component and all the units produced are sold in the same year.



21. In which year per unit cost is HIGHEST?

- (a) 2002 (b) 2001
(c) 2005 (d) 2007

22. What is the approximate average quantity sold during the period 2000-2010?

- (a) 64 units (b) 70 units
(c) 77 units (d) 81 units

HINTS AND EXPLANATIONS

1 to 4:

StoryLine:

Pie charts given in the question present two different data for seven regions namely A1 to A7. Left hand piechart presents the population distribution of wild animals in seven regions whereas right hand piechart presents the land under forest cover distribution in seven regions.

$$\text{Population density} = \frac{\text{Percentage Number of Animals}}{\text{Percentage Land Area Under Forest Cover}}$$

Solution and Explanation:

1. This is a straight forward question. We need to add the percentage of animals and divide it by summation of percentage of land area under forest cover.

$$\text{Required population density} = \frac{20+15}{22+18} = 0.88.$$

Hence, option (c) is the answer.

2. If the question would have asked us 'maximum' or 'minimum', we could have solved it through process of elimination. Since question asks us to evaluate

"fourth highest population density", it is better that we calculate the density for each of the regions and identify the fourth highest.

The population densities of the areas are:

$$A1 = 1.266 \quad A2 = 0.928 \quad A3 = 0.909$$

$$A4 = 1.375 \quad A5 = 1 \quad A6 = 0.833 \quad A7 = 0.89$$

Alternatively, we can use some guesstimation skills to shorten the calculation process:

Three regions – namely A1, A4 and A5 are clearly greater than or equal to 1. So, fourth highest is a value closest AND lower than 1.

Hence, option (d) is the answer.

3. This is simple calculation.

Population density of Russia = 1 while population density of Europe = 1.375.

Hence, option (a) is the answer.

4. As the increase in the population of the rest of the world is not known, we cannot determine the increase in Antarctica's wild life population. Hence, option (d) is the answer.

9 to 12:

9. Following is the list of ARPU:

	AirLet	Alliance	Dofaphone	Earcel	BainsNL
ARPU Jan 10	4.7	10.49	7.5	10.7	9
ARPU Jan 11	4.2	9.4	8.67	13.04	9.6

It can be seen clearly that Earcel is maximum for both the years. Hence it will be maximum combined also. Hence option (c) is the answer.

Alternatively, it can be observed that all the bars

except Earcel gives less than 10 ARPU in the 1st year and in 2nd year, Earcel is maximum.

10. Following is the list of ARPU:

	AirLet	Alliance	Dofaphone	Earcel	BainsNL
ARPU Jan 10	4.7	10.49	7.5	10.7	9
ARPU Jan 11	4.2	9.4	8.67	13.04	9.6

Hence option (b) is the answer.

11.

VAS	AirLet	Alliance	Dofaphone	Earcel	BainsNL
2011	18%	9%	12%	22%	6%
Revenue	198	270	306	132	255

Statements (a) and (c) are true and (b) is false. Hence answer is option (d) cannot be determined.

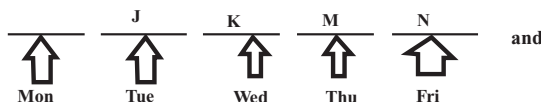
12. Data is given for January 2010, and question is asking for the whole year 2010. Hence cannot be determined. Hence option (d) is the answer.

13 to 16:

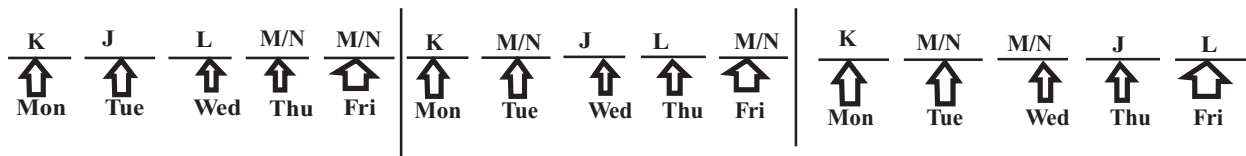
13. Price per issue for the 4 year term = $1850/48 = 38.88$.
 Price per issue for the 5 year Term = $2100/60 = 35$.
 Hence, percentage decrease = $(38.88 - 35)/38.88 \times 100 = 9.97\%$ is maximum in this case Ans (d).
14. Cost per issue for a 1 year term = $(500 - 60 + 25)/12 = ₹38.75$.
 Cost per issue for a 5 year term = $(2100 - 350 - 850 + 125)/60 = ₹17.08$.
 Hence, difference between the effective cost = $38.75 - 17.08 = ₹21.66$ Ans (c).
15. Effective price per issue for a 4 year subscription = $(1850 + 25 \times 4 - 250)/48 = 35.41$.
 Hence, Ans (b).
16. Effective offer price for the 5 year term = $(2100 + 5 \times 25 - 850 - 350) = 1025$.
 Normal Price = 3000 Hence, $3000/1025 = 2.92$ is the highest Ans (a).

25 to 28

25. N owned it before L owned it. Hence option (a) cannot be true, as J owned it before O owned it. Similarly, options (b) and (d) are not true, as it is not related to the conditions given. Hence the answer is option (c).

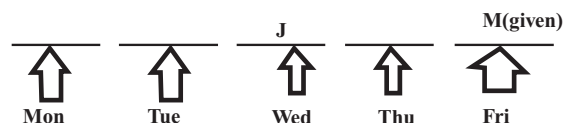


As per the conditions given, we can see that J can be unloaded on Monday or Tuesday. Since, it is given that – K must be unloaded on a day preceding the days M and N are unloaded and M must be the second ship unloaded after J is



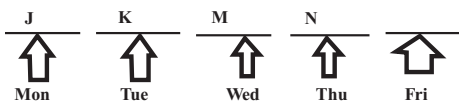
The correct answer choice is option (b), that is, K is unloaded on Monday. Option (a) cannot be true, as J can be unloaded on Tuesday, Wednesday or Thursday. Similarly, option (c), cannot be true, as L can be unloaded on Wednesday, Thursday

26. The answer is option (a), that is, J owned it before L owned it. Option (b) cannot be true as it is violating the conditions. Similarly, options, (c) and (d), are incorrect, as it is not related to the conditions. Hence the answer is option (a).
27. N sold it to J on New Year's Day, 1932, that is option (c). As it is given that, "L sold it to O, J owned it before O owned it, N owned it before L owned it". According to these conditions, option (c) is correct.
29. Following diagram can be drawn:



As it is given that – M must be the second ship unloaded after J is unloaded. Since, M is unloaded on Friday, J must be unloaded on Wednesday. Option (b) is not true as K can be unloaded on either on Tuesday or on Monday. Similarly, option (c) cannot be true as it is not fixed when to L is unloaded. Also, option (d) is not true. Hence the answer is option (a).

30. Following diagram can be drawn:



unloaded, therefore, the answer is option (a). Hence the answer is option (a).

31. Question is asking for "must be true".

Following diagrams can be drawn:

or Friday. Option (d), is also not true. Hence the answer is option (b).

32. If J is unloaded on Monday, then K is unloaded on Tuesday, which is option (c).

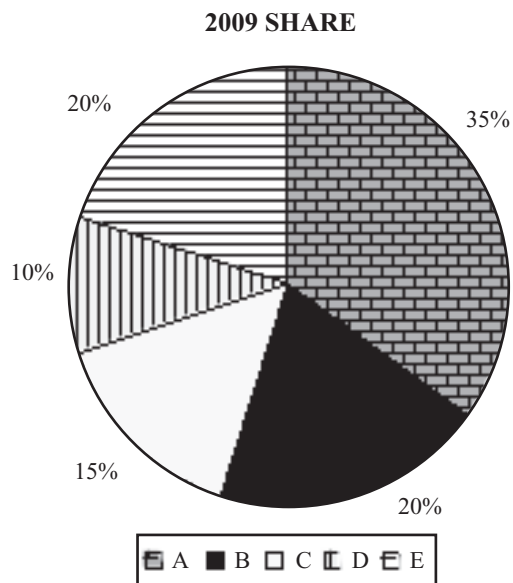
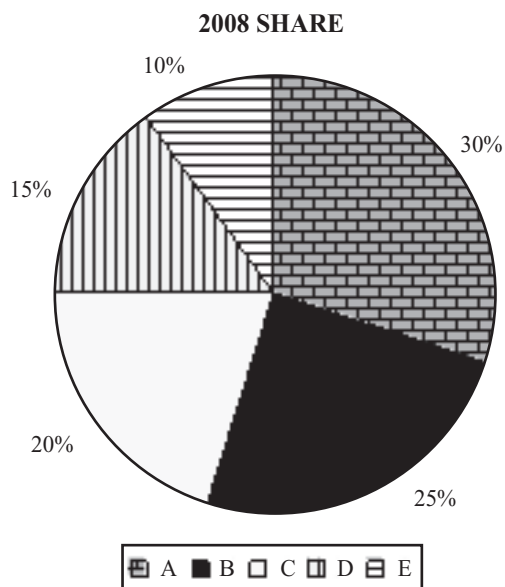
MOCK TEST 3

INSTRUCTIONS

- ☐ Time allotted = 60 minutes.
 - ☐ Each question carries 3 marks. There is one third negative marking.
-

Directions for questions 1 to 4: *Go through the data set given below and solve the questions based on it.*

The following pie charts represent the percentage share of each of the five car manufacturing companies – A, B, C, D and E – for the two consecutive years – 2008 and 2009.



A = 35% and then clockwise for B, C, D and E.

- For how many of the companies mentioned in the above pie charts, the sales volume has certainly increased in 2009 over 2008?
(a) 0 (b) 1
(c) 2 (d) Cannot be determined
- From 2008 to 2009, if the sales volume of none of the manufacturing companies decreased, then what is the minimum percentage increase in the total sales volume of cars in 2009 over 2008?
(a) 25% (b) 50%
(c) 75% (d) 20%
- From 2008 to 2009, if the total sales volume of cars increased, then which of the following companies had the highest absolute increase in the sales volume during this period?
(a) A (b) B
(c) C (d) Cannot be determined
- Sales volume of company B increased by 20% in 2009 over 2008. What is the percentage change in the total sales volume of 2009 over the total sales volume of 2008?
(a) 25% (b) 50%
(c) 75% (d) 20%
- The total population of State A is 3200 thousands, then what is the approximate no. of females above poverty line in state A (in thousands)?
(a) 1206 (b) 2112
(c) 1800 (d) 1950
- If the total population of C and D together is 18000, then what is the total no. of females below poverty line in these two states?
(a) 5000 (b) 5500
(c) 4800 (d) Cannot be determined
- If the population of males below poverty line in state B is 500 then what is the total population of B?
(a) 14400 (b) 6000
(c) 8000 (d) 7600
- If the population of males below poverty line in state A is 3000 and that in state E is 6000, then what is the ratio of the total population of state A and E?
(a) 3:4 (b) 4:5
(c) 21:25 (d) None of these
- What is the number of males below population line in state E?
(a) 3000 (b) 6000
(c) 8000 (d) 7600

Directions for questions 5 to 9: Study the following chart carefully and answer the questions based on it.

Following table shows the percentage population of six states below poverty line and the proportion of male and female. Everybody is either above the poverty line or below the poverty line.

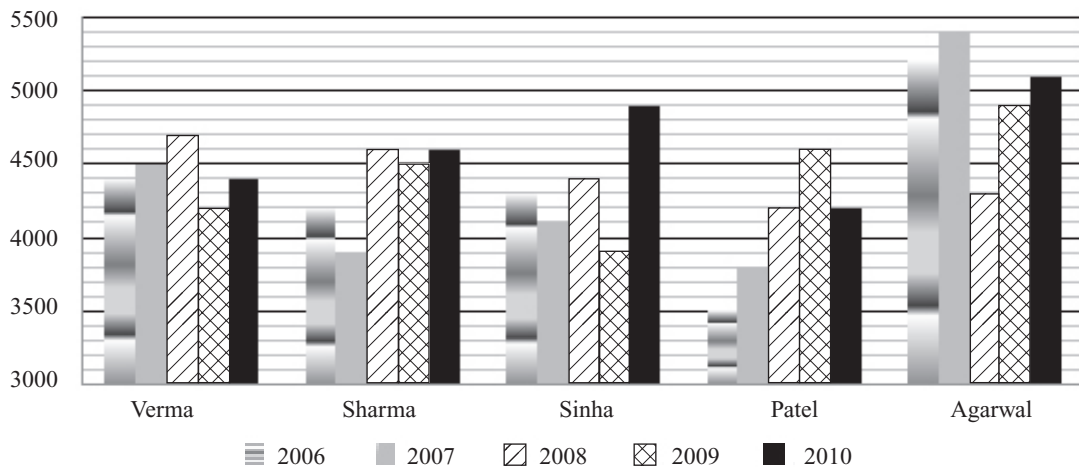
Answer to some of the questions may be fractional. For the sake of calculation convenience, take integral values in such cases.

Directions for questions 10 to 12: Go through the data set given below and solve the questions based on it.

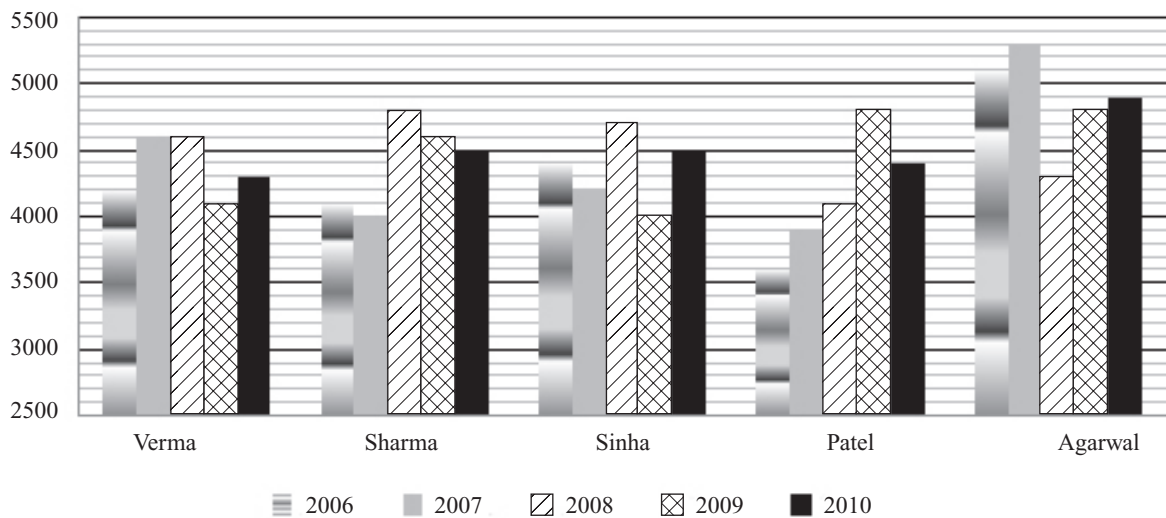
Following bar charts give the average income and average expense for five families in the five years from 2006 to 2010. Average Savings for the year = Average Income – Average Expenses.

State	Percentage Total Population Below Poverty Line	Proportion of Male and Female	
		Below Poverty Line Male : Female	Above Poverty Line Male : Female
A	12	3:2	4:3
B	15	5:7	3:4
C	25	4:5	2:3
D	26	1:2	5:6
E	10	6:5	3:2
F	32	2:3	4:5

Average Income



Average Expenses



All the values are in the multiples of 100.

10. For how many families, savings is non-negative for each of the years?

- (a) 0 (b) 1
(c) 2 (d) 3

11. Which of the following families' total savings is maximum over the given period?

- (a) Agarwal (b) Sharma
(c) Patel (d) Verma

12. For how many families, total savings is negative over the given period?

- (a) 2 (b) 3
(c) 4 (d) 5

Directions for questions 13 to 16: Read the information given below and solve the questions based on it.

The Financial Statements of Neo Corporation for the period 2004-2008 are summed up given in the table below.

Particulars	2004	2005	2006	2007	2008
Revenue	10,156.00	11,799.00	14,380.00	17,996.00	22,430.00
COGS	1,770.00	2,033.00	2,516.00	3,349.00	3,984.00
Gross Profit	8,386.00	9,766.00	11,864.00	14,647.00	18,446.00
Net Income	2,681.00	2,886.00	3,381.00	4,274.00	5,521.00
Total Assets	12,763.00	20,687.00	29,029.00	34,572.00	47,268.00
Total Current Liabilities	4,272.00	8,063.00	6,930.00	9,387.00	10,029.00
Total Liabilities	4,768.00	9,850.00	14,017.00	17,653.00	24,243.00
Total Equity	7,995.00	10,837.00	15,012.00	16,919.00	23,025.00
Total Liabilities and Equity	12,763.00	20,687.00	29,029.00	34,572.00	47,268.00

Evaluate the pairs of statements in each question on the basis of data given in the table and mark your answer as option:

- (a) if only statement I is correct.
 (b) if only Statement II is correct.
 (c) if both the statements are correct.
 (d) if none of the statements is correct.
13. Statement I: Percentage Revenue growth over the previous year has been the highest in the year 2007.
 Statement II: Percentage Revenue growth over the previous year has been the lowest in the year 2008.
14. Statement I: Lowest growth rate over the previous year in Total Assets was recorded in the year 2006.
 Statement II: Highest growth rate over the previous year in Total Equity was recorded in the year 2008.
15. Statement I: Gross Profit every year has recorded higher growth rate as compared to the previous year for the period under review.

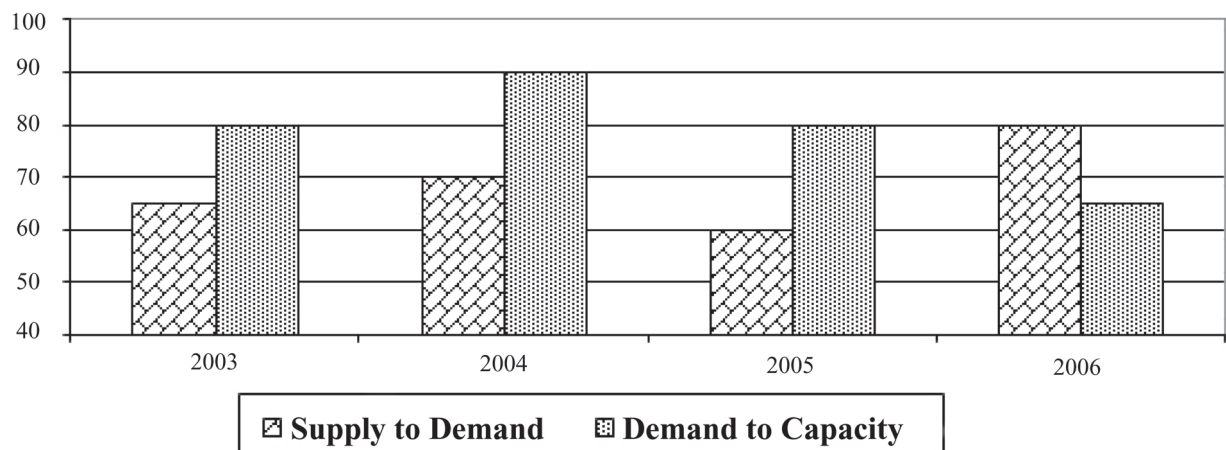
Statement II: Total Assets every year has not recorded higher growth rate as compared to the previous year for the period under review.

16. Statement I: The COGS to Revenue ratio is the lowest in the year 2006.
 Statement II: The COGS to Revenue ratio is the highest in the year 2007.

Directions for questions 17 to 20: Go through the chart given below and solve the questions based on it.

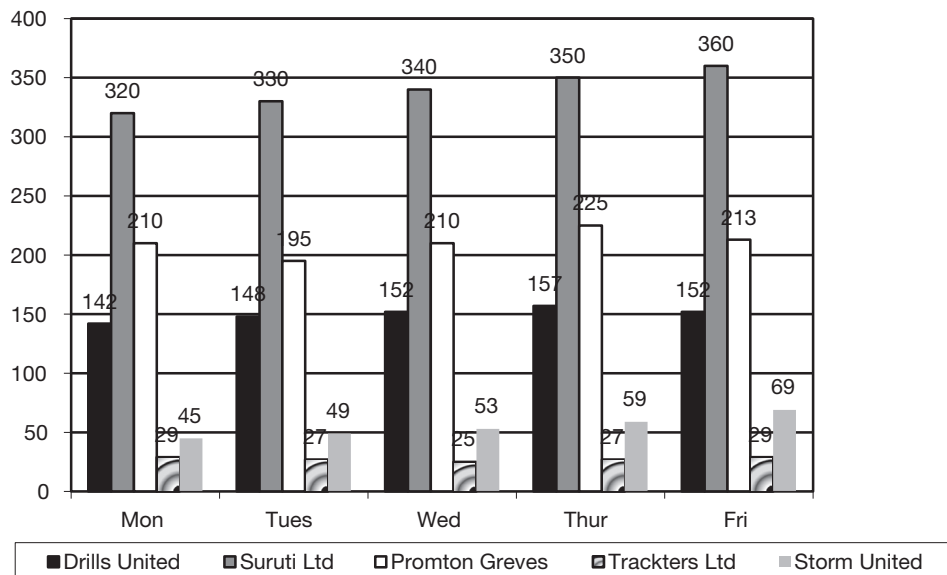
Following bar chart presents supply as a percentage of demand of a product and demand as a percentage of capacity of the industry to produce the same product. All the values are multiples of 5.

17. If product supply for the year 2005 is 6000 kgs, then the total capacity of the product is (in kg):
 (a) 12500 (b) 16500
 (c) 10000 (d) None of these



18. If capacity of the industry to produce the product remains constant at 10000 kgs, what is the approx. average supply (in kgs) for the given period?
 (a) 5100 (b) 5375
 (c) 4400 (d) 6200
19. If the product supply remains unchanged for the given period then what does the trend of industry capacity signify?
 (a) Industry capacity steadily increases over the given period.
 (b) Industry capacity steadily decreases over the given period
 (c) Industry capacity fluctuates over the given period.
 (d) None of these.
20. Which year shows the highest increase in the difference between the industry capacity and supply over the previous year, if demand for the product is 10,000 kgs for each of the given years?
 (a) 2003 (b) 2004
 (c) 2005 (d) 2006
22. Which investment strategy will result in a larger gain?
 I Buy 50 shares of Drills United on Monday and sell 25 shares each on Wednesday and Thursday.
 II Buy 25 shares each of Trackters Ltd and Suruti Ltd on Monday and then sell them on Friday.
 III Buy 100 shares of Drills united on Monday and sell them on Thursday.
 (a) i (b) ii
 (c) iii (d) Both i and ii give the same return
23. Which of the following is/are true (Volatility is defined as the percentage change in the value on Friday over Monday)?
 I Prompton Greves gives the least percentage return.
 II Prompton Greves is the most volatile
 III Trackters Ltd is the least volatile
 (a) Only (i) (b) Only(ii)
 (c) Only (iii) (d) All the three

Directions for questions 21 to 23: The following line chart shows the price of three different stocks over a period of five working days. The stocks are listed on the Bombay Stock Exchange (BSE).



Answer the following questions on the basis of the information given above.

21. Which stock has registered the maximum percentage increase over the given five days?
 (a) Drills United (b) Suruti Ltd.
 (c) Prompton Greves (d) Storm United

Directions for questions 24 to 27: Answer the questions on the basis of the information given below.

Prof. Singh has been tracking the number of visitors to his homepage. His service provider has provided him with the following data on the country of origin of the visitors and the university they belong to:

Number of visitors			
		DAY	
Country	1	2	3
Canada	2	0	0
Netherlands	1	1	0

India	1	2	0
UK	2	0	2
USA	1	0	1

Number of visitors

	DAY		
UNIVERSITY	1	2	3
University 1	1	0	0
University 2	2	0	0
University 3	0	1	0
University 4	0	0	2
University 5	1	0	0
University 6	1	0	1
University 7	2	0	0
University 8	0	2	0

24. To which country does university 5 belong?

- (a) India or Netherlands but not USA
(b) India or USA but not Netherlands

- (c) Netherlands or USA but not India
(d) India or USA but not UK.

25. University 1 can belong to

- (a) UK (b) Canada
(c) Netherlands (d) USA

26. Which among the listed countries can possibly host three of the eight listed universities?

- (a) None (b) Only UK
(c) Only India (d) Both India and UK

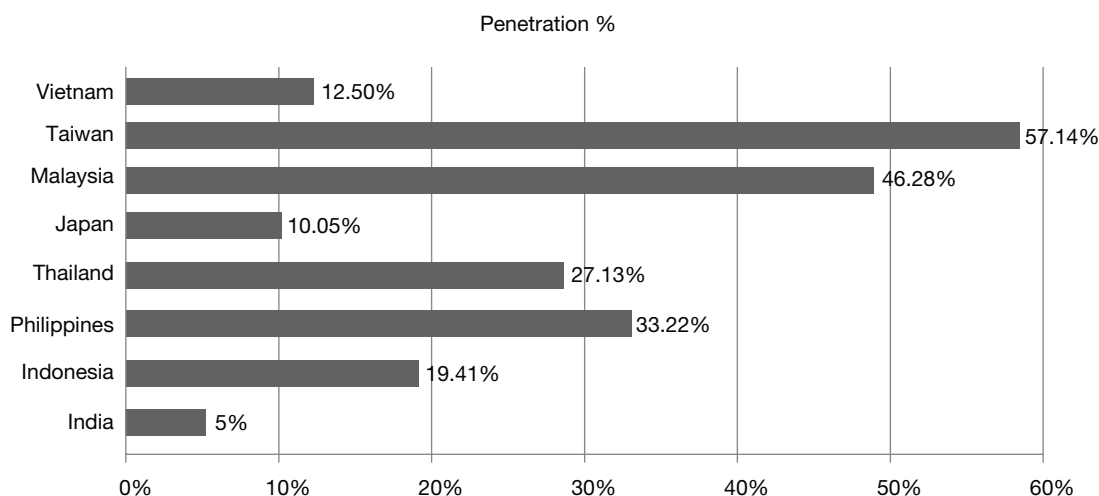
27. Visitors from how many universities from UK visited Prof. Singh's homepage in the three days?

- (a) 1 (b) 2
(c) 3 (d) 4

Direction for questions 28–32: Go through the data set given below and solve the questions based on it.

Following table gives the top eight countries in terms of users of Facebook as on 1st January 2013. Change in users is given with respect to the data as on 1st January 2012. Penetration is defined as the percentage of population using facebook. For example, in case of India, penetration is mentioned as 5.24%. It means that 5.24% population of India uses facebook.

Rank	Country	Users (in lacs)	Change in Users
1	India	614	1.46%
2	Indonesia	471	–5.77%
3	Philippines	301	0.72%
4	Thailand	182	3.62%
5	Japan	138	–18.06%
6	Malaysia	130	–2.26%
7	Taiwan	128	–0.06%
8	Vietnam	112	12.78%



Penetration percentage is approximate as a ratio calculated may have more digits beyond two digits of the decimal.

28. For how many countries, total population (in lacs) as on 1st January 2013 will be a natural number?
(a) 0 (b) 1
(c) 2 (d) More than 2
29. Which country had the largest number of facebook users as on 1st January 2012?
(a) India (b) Indonesia
(c) Philippines (d) None of these
30. Which country had the lowest number of facebook users as on 1st January 2012?
(a) Vietnam (b) Taiwan
(c) Japan (d) Malaysia
- (b) 748
(c) 1373
(d) Cannot be determined
32. Japan and Taiwan are merged as one country. What is going to be the facebook penetration of this merged entity?
(a) Between 12% – 14%
(b) between 15% – 17%
(c) between 20% – 22%
(d) Between 42% – 44%

ANSWER KEYS

1. (d)	2. (b)	3. (d)	4. (b)	5. (a)	6. (d)	7. (c)	8. (d)	9. (a)	10. (b)
11. (a)	12. (b)	13. (a)	14. (d)	15. (c)	16. (b)	17. (a)	18. (b)	19. (c)	20. (c)
21. (d)	22. (c)	23. (c)	24. (a)	25. (c)	26. (a)	27. (b)	28. (c)	29. (a)	30. (a)
31. (d)	32. (b)								

HINTS AND EXPLANATIONS

1 to 4

StoryLine:

Pie charts give the percentage composition of the car market – it tells the market share of the different companies. Since total number of cars sold is not given, we cannot calculate the number of cars sold by each of the companies for any of the years. You may expect questions which contain data for a particular year of a company to be connected with the data of the other company.

Solution and Explanations:

- Though in some cases, percentage market share has increased but unless we have the numbers of cars sold for a particular year, we cannot compare the sales data of any company of 2008 to the data of 2009. So the answer is – option (d) Cannot be determined.
- Understand this questions 1st – It can be seen that market share of some of these companies have gone down in 2009 over 2008. Despite this, sales volume of none of these companies has gone down. It is possible only if the total number of production has increased considerably so that even if market share is down in 2009, but because it is out of a 'larger pie', hence number of cars sold will be higher in 2009 than in 2008.

Market share of companies A and E have grown up.

Market share of companies B, C and D have gone down.

Maximum percentage decrease in market share occurs in the case of company D. Percentage decrease in the market share of D

$= \frac{15-10}{15} \times 100 = 33.33\%$. So we should be working out with D.

Assume that the total car sales in the year 2008 = 100 units. So number of cars sold by D = 15.

Since the number of cars sold does not go down for any of the companies, including that of D, we assume that the number of cars sold in 2009 by D = 15. Assume that the total number of cars sold in 2009 = x

Hence $10\% \text{ of } x = 15 \Rightarrow x = 150 = \text{Total number of cars sold in 2009.}$

Hence percentage increase in the total cars sold
 $= \frac{150 - 100}{100} \times 100 = 50\%$.

Had it been anything less than 50%, total cars sold by D in 2009 would have been less than the number of cars sold by D in 2008.

- Market share of only two companies increased during this period – A and E. So answer should be one of these. Consider the following cases:

			Assume 2008 = 100 and 2009 = 120	Assume 2008 = 100 and 2009 = 1000		
	A	E	A	E	A	E
2008	30%	10%	30	10	30	10
2009	35%	20%	42	24	350	200
	Sales					
	Volume		12	14	320	190
	Verdict		E > A		A > E	

Hence answer is option (d) cannot be determined.

- Assume that the total sales volume in 2008 = 100 units.

Market share of B in 2008 = 25%. Hence sales volume of B in 2008 = 25% of 100 = 25

Sales volume of B has increased by 20% in 2009 over 2008.

Hence sales volume of B in 2009 = $1.2 \times 25 = 30$

Assume that the total sales volume in 2009 = x.

So, $20\% \text{ of } x = 30 = \text{Sales volume of B in 2009.}$

So, $x = 150$.

Hence percentage increase in the total cars sold

$= \frac{150-100}{100} \times 100 = 50\%$.

Hence option (b) is the answer.

5 to 9

- Total population above poverty line = $100\% - 12\% = 88\%$

So, total population above poverty line = 88% of 3200 = 2816

Ratio of Male : Female in above poverty line = 4:3

Number of females above poverty line in state A

$= \frac{3}{7} \times 2816 = 1206$

Hence option (a) is the answer.

6. From the given information, we cannot find the population of states C and D individually; so we can't find the required value. Hence option (d) is the answer.

7. Population of State B below poverty line = 15%
Ratio of males to females below poverty line = 5:7 $\Rightarrow$ So males are $\frac{5}{12}$ of the total population below poverty line. 12

So, $\frac{5}{12}$ of 15% population of A = 500

So, total population of A = $500 \times \frac{12}{5} \times \frac{100}{15} = 8000$. Hence option (c) is the answer.

8. Population of State A below poverty line = 12%
Ratio of males to females below poverty line = 3:2 $\Rightarrow$ So males are $\frac{3}{5}$ of the total population below poverty line. 5

So, $\frac{3}{5}$ of 12% population of A = 3000

So, total population of A = $3000 \times \frac{5}{3} \times \frac{100}{12}$

[At this stage, we are not going to calculate the exact value of population of A. Because, we have to find out the ratio of population of A and E.]

Similarly, total population of E = $6000 \times \frac{11}{6} \times \frac{100}{10}$

Therefore, Required ratio =

$$\frac{3000 \times 5 \times 100 \times 6}{6000 \times 3 \times 12 \times 11 \times 10} = \frac{25}{66}$$

Hence option (d) is the answer.

9. Population of State E below poverty line = 10%.
Hence population of state E above poverty line = 90% of the total population.

Ratio of males to females above poverty line = 3:2 $\Rightarrow$ So females are $\frac{2}{5}$ of the total population above poverty line. 5

So, $\frac{2}{5}$ of 90% population of E = 19800

So, total population of E = $19800 \times \frac{5}{2} \times \frac{100}{90} = 55000$

So, number of males below poverty line = 10% of total = 10% of 55000 = 5500

Ratio of males : females below poverty line = 6:5.

Hence males are $\frac{6}{11}$ of the total population

below poverty line = $\frac{6}{11} \times 5500 = 3000$. Hence

option (a) is the answer.

10 to 12

This question set is purely based upon observation. That also, very careful observation. During online CAT, such kind of questions have been reported by the students where solving a question was more a job of 'eyes' than the job of 'brain'.

10. For Verma family, savings is negative in 2007, so we do not need to check for other years.

For Sharma family also, savings is negative in 2007.

For Sinha and Patel family, savings is negative in 1st year itself.

For Agrawal family, this is zero for 2008, and positive for all the years. Since question is asking for non negative value, Agrawal family's data satisfy this condition. Hence option (b) is the answer.

11. Only two families have positive savings – Verma and Agrawal. Agrawal's savings is more than Verma's savings. Hence option (a) is the answer.

12. Sharma, Sinha and Patel family have negative total savings. Hence option (b) is the answer.

Following is the detailed list of savings:

	2006	2007	2008	2009	2010	Summation
Verma	200	-100	100	100	100	400
Sharma	100	-100	-200	-100	100	-200
Sinha	-100	-100	-300	-100	400	-200
Patel	-100	-100	100	-200	-200	-500
Agrawal	100	100	0	100	200	500

13 to 16

13. Percentage Revenue growth is as follows:

$$2005 = \frac{11799 - 10156}{10156} \times 100 = 16.178\%$$

$$2006 = \frac{14380 - 11799}{11799} \times 100 = 21.875\%$$

$$2007 = \frac{17996 - 14380}{14380} \times 100 = 25.146\%$$

$$2008 = \frac{22430 - 17996}{17996} \times 100 = 24.639\%$$

Percentage Revenue growth over the previous year has been the highest in the year 2007.

$\Rightarrow$ Statement I is correct.

Percentage Revenue growth over the previous year has been the lowest in the year 2005.

$\Rightarrow$ Statement II is incorrect.

So, option (a) is the answer.

14. Total Assets growth rate is as follows:

$$2005 = \frac{20687 - 12763}{12763} \times 100 = 62.086\%$$

$$2006 = \frac{29029 - 20687}{20687} \times 100 = 40.325\%$$

$$2007 = \frac{34572 - 29029}{29029} \times 100 = 19.095\%$$

$$2008 = \frac{47268 - 34572}{34572} \times 100 = 36.723\%$$

Lowest growth rate over the previous year in Total Assets was recorded in the year 2007.

⇒ Statement I is incorrect.

Total Equity growth rate is as follows:

$$2005 = \frac{10837 - 7995}{7995} \times 100 = 35.547\%$$

$$2006 = \frac{15012 - 10837}{10837} \times 100 = 38.525\%$$

$$2007 = \frac{16919 - 15012}{15012} \times 100 = 12.703\%$$

$$2008 = \frac{23025 - 16919}{16919} \times 100 = 36.089\%$$

Highest growth rate over the previous year in Total Equity was recorded in the year 2006.

⇒ Statement II is incorrect.

So, option (d) is the answer.

15. Gross Profit growth rate is as follows:

$$2005 = \frac{9766 - 8386}{8386} \times 100 = 16.456\%$$

$$2006 = \frac{11864 - 9766}{9766} \times 100 = 21.483\%$$

$$2007 = \frac{14647 - 11864}{11864} \times 100 = 23.458\%$$

$$2008 = \frac{18446 - 14647}{14647} \times 100 = 25.937\%$$

Gross Profit every year has recorded higher growth rate as compared to the previous year for the period under review.

⇒ Statement I is correct.

From the solution to the previous question, we can conclude that:

Total Assets every year has not recorded higher growth rate as compared to the previous year for the period under review.

⇒ Statement II is correct.

So, option (c) is the answer.

16. COGS to Revenue ratio is as follows:

$$2004 = \frac{1770}{10156} = 0.1743$$

$$2005 = \frac{2033}{11799} = 0.1723$$

$$2006 = \frac{2516}{14380} = 0.1750$$

$$2007 = \frac{3349}{17996} = 0.1861$$

$$2008 = \frac{3984}{22430} = 0.1776$$

The COGS to Revenue ratio is the lowest in the year 2005.

⇒ Statement I is incorrect.

The COGS to Revenue ratio is the highest in the year 2007.

⇒ Statement II is correct.

So, option (b) is the answer.

17 to 20:

The StoryLine:

1st bar mentions the ratio Supply to demand, i.e. Supply : Demand. For example, as mentioned in the bar of 2003, 65% is the value for Supply to Demand. It means that supply is 65% of demand. In other words, it means that if demand is of 100 units, then supply is 65 units. Similarly, the second bar gives the value for Demand to capacity. For example, as mentioned in the bar of 2003, 80% is the value for Demand to capacity. It means that if capacity is of 100 units, then demand is 80 units.

It can also be observed that if we join the values in both the bars, then a relation between Supply and capacity can be established using ratio or percentage calculation.

Solution and Explanation:

17. In year 2005, percentage of supply to demand = 60%.
So supply is 60% of the demand.

So, 60% of demand = 6000 kg ⇒ 100% of demand = Total Demand = 10,000 kg.

In year 2005, percentage of demand to capacity = 80%. So demand is 80% of the capacity.

So, 80% of the capacity = 10,000 kg ⇒ 100% of the capacity = Total capacity = $10,000 \times \frac{100}{80} = 12500$ kg.

Alternatively, in year 2005, 80% of capacity = Demand, and 60% of demand = Supply.

Assume that capacity = p , then demand = 80% of $p = 0.8p$. Further, 60% of $0.8p = 0.48p$ = Supply
Using the information given in the question,
 $0.48p = 6000 \Rightarrow p = 6000 \times \frac{100}{48} = 12500$.

Hence option (a) is the answer.

18. In year 2003, Supply = 65% of demand. Further, Demand = 80% of capacity $\Rightarrow$ Supply = 65% of 80% of capacity = $(\frac{65}{100} \times 80)\%$ of capacity = 52% of capacity.

Similarly, in year 2004, Supply = 70% of 90% of Capacity = 63% of capacity.

In year 2005, Supply = 60% of 80% of Capacity = 48% of capacity.

In year 2006, Supply = 80% of 65% of Capacity = 52% of capacity.

Since capacity of the industry is constant every year, to find out the average supply per year, we can simply find out the average percentage supply and multiply it with 10,000.

$$\text{Average percentage supply per annum} = \frac{52\% + 63\% + 48\% + 52\%}{4} = \frac{215\%}{4} = 53.75\%$$

Hence Average Supply per annum = 53.75% of 10,000 = 5375. Hence option (b) is the answer.

19. Using data from previous question:
Supply as a percentage of Demand:

2003	2004	2005	2006
52%	63%	48%	52%

It is given that supply remains constant. Since there is no fixed pattern of supply as a percentage of demand (as given in above table), hence there is no fixed trend of capacity.

20. Following data can be obtained:

	2003	2004	2005	2006
Supply	6500	7000	6000	8000
Capacity	12500	11111.11	12500	15384.62
Difference	6000	4111.11	6500	7384.6

It can be easily seen that maximum increase occurs in 2005. Hence option (c) is the answer.

21 to 23:

21. Storm United has registered the maximum percentage increase = $\frac{24}{45} \times 100 = 53.33\%$.
Hence option (d) is the answer.

22. (iii) will result in larger gain. Purchase price of shares = 14200. Sale price of shares = 15700. Gain = ₹1500. Hence option (c) is the answer.
23. It can be clearly observed from the graph that only (iii) statement is true. Hence option (c) is the answer.

24 to 27:

When we compare table 1 and 2, university 4 corresponds to UK and university 6 corresponds to USA (after day 3 onwards values are concerned and university 8 corresponds to India and university 3 to Netherlands and now Indian or Netherlands can take university 1 or university 5. now university 2 and 7 belongs to either UK or Canada (Only one).

University	Day			Country
	1	2	3	
University 1	1	0	0	India/Netherlands
University 2	2	0	0	UK/Canada
University 3	0	1	0	Netherlands
University 4	0	0	2	UK
University 5	1	0	0	India/Netherlands
University 6	1	0	1	USA
University 7	2	0	0	UK/Canada
University 8	0	2	0	India

Now all the questions can be answered.

24. University 5 can belong to either India or Netherlands, but not USA. Hence option (a) is the answer.
25. University 1 can belong either to Netherlands or India. Hence option (c) is the answer.
26. None of the countries can host three universities. Hence option (a) is the answer.
27. University 4 and either University 2 or 7 belong to UK. Hence there are two universities that belong to UK. Hence option (b) is the answer.

28 to 32:

28. Total population (in lacs) will be a natural number only if the penetration percentage can be written as a ratio where numerator of this ratio will divide the number of users (in lacs). Only India and Vietnam satisfy this. Hence option (C) is the answer.
29. Number of users is maximum as on 1st January 2013, and this value is way ahead of the user value of other countries. Despite factoring in the percentage change, number of users in India as on 1st Jan 2012 will be

more than the number of users in other countries as on 1st Jan 2012. Hence option (a) is the answer.

30. Since option mentions four countries, and no 'None of These' option, hence we can go on checking these four options only.

Vietnam is at a user base of 112 after a growth of 12% $\Rightarrow$ Number of user base as on 1st January 2012 will be less than 112.

For remaining three countries, there is decline in 2013 over 2012. Hence user base of these respective countries will be less than that as on 1st January 2012. Hence option (A) is the answer.

This is what we obtain using actual calculation:

		Users as on 1st Jan 2013	Percentage Change	Users as on 1st Jan 2012
5	Japan	138	-18.06%	168
6	Malaysia	130	-2.26%	133
7	Taiwan	128	-0.06%	128
8	Vietnam	112	12.78%	99

31. We can calculate the number of users as on 1st January 2012, but we do not have the Penetration data in the year 2012. Hence we cannot calculate the population of Japan (or any other country) as on 1st January 2012. Hence option (d) is the answer.

32. Combined user base of Taiwan and Japan as on 1st January 2013 = 266 lacs

Combined population of Taiwan and Japan as on 1st January 2013 = 1597 lacs (1373 lacs + 224 lacs)

$$\text{Hence percentage penetration} = \frac{266}{1597} \times 100 = 16.6\%$$

Hence option (b) is the answer.