

A Level Module 5: Communication, homeostasis and energy

| 5.1.1 Communication and homeostasis | Done ✓ | R | A | G | Revised |
|---|-----------|---|---|---|---------|
| (a) The need for communication systems in multicellular organisms. | | | | | |
| (b) The communication between cells by cell signalling. | | | | | |
| (c) The principles of homeostasis. | | | | | |
| (d) The physiological and behavioural responses involved in temperature control in ectotherms and endotherms. | | | | | |

| 5.1.2 Excretion as an example of homeostatic control | Done ✓ | R | A | G | Revised |
|--|-----------|---|---|---|---------|
| (a) The term excretion and its importance in maintaining metabolism and homeostasis. | | | | | |
| (b) <ul style="list-style-type: none"> (i) The structure and functions of the mammalian liver. (ii) The examination and drawing of stained sections to show the histology of liver tissue. | | | | | |
| (c) <ul style="list-style-type: none"> (i) The structure, mechanisms of action and functions of the mammalian kidney. (ii) The dissection, examination and drawing of the external and internal structure of the kidney. (iii) The examination and drawing of stained sections to show the histology of nephrons. | | | | | |
| (d) The control of the water potential of the blood. | | | | | |
| (e) The effects of kidney failure and its potential treatments. | | | | | |
| (f) How excretory products can be used in medical diagnosis. | | | | | |

| 5.1.3 Neuronal communication | Done ✓ | R | A | G | Revised |
|--|------------------|----------|----------|----------|----------------|
| (a) The roles of mammalian sensory receptors in converting different types of stimuli into nerve impulses. | | | | | |
| (b) The structure and functions of sensory, relay and motor neurones. | | | | | |
| (c) The generation and transmission of nerve impulses in mammals. | | | | | |
| (d) The structure and roles of synapses in neurotransmission. | | | | | |

| 5.1.4 Hormonal communication | Done ✓ | R | A | G | Revised |
|---|------------------|----------|----------|----------|----------------|
| (a) Endocrine communication by hormones. | | | | | |
| (b) The structure and functions of the adrenal glands. | | | | | |
| (c) <ul style="list-style-type: none"> (i) The histology of the pancreas. (iii) The examination and drawing of stained sections of the pancreas to show the histology of the endocrine tissues. | | | | | |
| (d) How blood glucose concentration is regulated. | | | | | |
| (e) The differences between Type 1 and Type 2 diabetes mellitus. | | | | | |
| (f) The potential treatments for diabetes mellitus. | | | | | |

| 5.1.5 Plant and animal responses | Done ✓ | R | A | G | Revised |
|--|-----------|---|---|---|---------|
| (a) (i) The types of plant responses. (ii) Practical investigations into phototropism and geotropism. | | | | | |
| (b) The roles of plant hormones. | | | | | |
| (c) The experimental evidence for the role of auxins in the control of apical dominance. | | | | | |
| (d) The experimental evidence for the role of gibberellin in the control of stem elongation and seed germination. | | | | | |
| (e) Practical investigations into the effect of plant hormones on growth. | | | | | |
| (f) The commercial use of plant hormones. | | | | | |
| (g) The organisation of the mammalian nervous system. | | | | | |
| (h) The structure of the human brain and the functions of its parts. | | | | | |
| (i) Reflex actions. | | | | | |
| (j) The coordination of responses by the nervous and endocrine systems. | | | | | |
| (k) The effects of hormones and nervous mechanisms on heart rate. | | | | | |
| (l) (i) The structure of mammalian muscle and the mechanism of muscular contraction (ii) The examination of stained sections or photomicrographs of skeletal muscle. | | | | | |

| 5.2.1 Photosynthesis | Done ✓ | R | A | G | Revised |
|--|-----------|---|---|---|---------|
| (a) The interrelationship between the process of photosynthesis and respiration. | | | | | |
| (b) The structure of a chloroplast and the sites of the two main stages of photosynthesis. | | | | | |
| (c) <ul style="list-style-type: none"> (i) The importance of photosynthetic pigments in photosynthesis. (ii) Practical investigations using thin layer chromatography (TLC) to separate photosynthetic pigments. | | | | | |
| (d) The light-dependent stage of photosynthesis. | | | | | |
| (e) The fixation of carbon dioxide and the light independent stage of photosynthesis. | | | | | |
| (f) The uses of triose phosphate (TP). | | | | | |
| (g) <ul style="list-style-type: none"> (i) Factors affecting photosynthesis. (ii) Practical investigations into factors affecting the rate of photosynthesis. | | | | | |

| 5.2.2 Respiration | Done ✓ | R | A | G | Revised |
|--|-----------|---|---|---|---------|
| (a) The need for cellular respiration. | | | | | |
| (b) The structure of the mitochondrion. | | | | | |
| (c) The process and site of glycolysis. | | | | | |
| (d) The link reaction and its site in the cell. | | | | | |
| (e) The process and site of the Krebs cycle. | | | | | |
| (f) The importance of coenzymes in cellular respiration. | | | | | |
| (g) The process and site of oxidative phosphorylation. | | | | | |
| (h) The chemiosmotic theory. | | | | | |
| (i) (i) the process of anaerobic respiration in eukaryotes. (ii) practical investigations into respiration rates in yeast, under aerobic and anaerobic conditions. | | | | | |
| (j) The difference in relative energy values of carbohydrates, lipids and proteins as respiratory substrates. | | | | | |
| (k) The use and interpretation of the respiratory quotient (RQ). | | | | | |
| (l) Practical investigations into the effect of factors such as temperature, substrate concentration and different respiratory substrates on the rate of respiration. | | | | | |

A Level Module 6: Genetics, evolution and ecosystems

| 6.1.1 Cellular control | Done ✓ | R | A | G | Revised |
|---|-----------|---|---|---|---------|
| (a) Types of gene mutations and their possible effects on protein production and function. | | | | | |
| (b) The regulatory mechanisms that control gene expression at the transcriptional level, post transcriptional level and post-translational level. | | | | | |
| (c) The genetic control of the development of body plans in different organisms. | | | | | |
| (d) The importance of mitosis and apoptosis as mechanisms controlling the development of body form. | | | | | |

| 6.1.2 Patterns of inheritance | Done ✓ | R | A | G | Revised |
|---|-----------|---|---|---|---------|
| (a) (i) The contribution of both environmental and genetic factors to phenotypic variation (ii) How sexual reproduction can lead to genetic variation within a species. | | | | | |
| (b) (i) Genetic diagrams to show patterns of inheritance. (ii) The use of phenotypic ratios to identify linkage (autosomal and sex linkage) and epistasis. | | | | | |
| (c) Using the chi-squared (χ^2) test to determine the significance of the difference between observed and expected results. | | | | | |
| (d) The genetic basis of continuous and discontinuous variation | | | | | |
| (e) The factors that can affect the evolution of a species. | | | | | |
| (f) The use of the Hardy–Weinberg principle to calculate allele frequencies in populations. | | | | | |

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|--|--|--|--|--|--|
| (g) The role of isolating mechanisms in the evolution of new species. | | | | | |
| (h) <ul style="list-style-type: none"> (i) The principles of artificial selection and its uses. (ii) The ethical considerations surrounding the use of artificial selection. | | | | | |

| 6.1.3 Manipulating genomes | Done ✓ | R | A | G | Revised |
|---|-----------|---|---|---|---------|
| (a) The principles of DNA sequencing and new DNA sequencing techniques. | | | | | |
| (b) <ul style="list-style-type: none"> (i) How gene sequencing has allowed for genome-wide comparisons between individuals and between species. (ii) How gene sequencing has allowed for the sequences of amino acids in polypeptides to be predicted. (iii) How gene sequencing has allowed for the development of synthetic biology. | | | | | |
| (c) The principles of DNA profiling and its uses | | | | | |
| (d) The principles of the polymerase chain reaction (PCR) and its application in DNA analysis | | | | | |
| (e) The principles and uses of electrophoresis for separating nucleic acid fragments or proteins | | | | | |
| (f) <ul style="list-style-type: none"> (i) The principles of genetic engineering (ii) The techniques used in genetic engineering | | | | | |
| (g) The ethical issues (both positive and negative) relating to the genetic manipulation of animals (including humans), plants and microorganisms. | | | | | |
| (h) The principles of, and potential for, gene therapy in medicine. | | | | | |

| 6.2.1 Cloning and biotechnology | Done ✓ | R | A | G | Revised |
|--|-----------|---|---|---|---------|
| (a) (i) Natural clones in plants and the production of natural clones for use in horticulture. (ii) How to take plant cuttings as an example of a simple cloning technique. | | | | | |
| (b) (i) The production of artificial clones of plants by micropropagation and tissue culture. (ii) The arguments for and against artificial cloning in plants. | | | | | |
| (c) Natural clones in animal species. | | | | | |
| (d) (i) How artificial clones in animals can be produced by artificial embryo twinning or by enucleation and somatic cell nuclear transfer (SCNT). (ii) The arguments for and against artificial cloning in animals. | | | | | |
| (e) The use of microorganisms in biotechnological processes. | | | | | |
| (f) The advantages and disadvantages of using microorganisms to make food for human consumption. | | | | | |
| (g) (i) How to culture microorganisms effectively, using aseptic techniques. (ii) The importance of manipulating the growing conditions in batch and continuous fermentation in order to maximise the yield of product required. | | | | | |
| (h) (i) The standard growth curve of a microorganism in a closed culture. (ii) Practical investigations into the factors affecting the growth of microorganisms. | | | | | |
| (i) The uses of immobilised enzymes in biotechnology and the different methods of immobilisation. | | | | | |

| 6.3.1 Ecosystems | Done ✓ | R | A | G | Revised |
|--|-------------------|----------|----------|----------|----------------|
| (a) Ecosystems, which range in size, are dynamic and are influenced by both biotic and abiotic factors. | | | | | |
| (b) Biomass transfers through ecosystems. | | | | | |
| (c) Recycling within ecosystems. | | | | | |
| (d) The process of primary succession in the development of an ecosystem. | | | | | |
| (e) (i) How the distribution and abundance of organisms in an ecosystem can be measured. (ii) The use of sampling and recording methods to determine the distribution and abundance of organisms in a variety of ecosystems. | | | | | |

| 6.3.2 Populations and sustainability | Done ✓ | R | A | G | Revised |
|--|-------------------|----------|----------|----------|----------------|
| (a) The factors that determine size of a population. | | | | | |
| (b) Interactions between populations. | | | | | |
| (c) The reasons for, and differences between, conservation and preservation. | | | | | |
| (d) How the management of an ecosystem can provide resources in a sustainable way. | | | | | |
| (e) The management of environmental resources and the effects of human activities. | | | | | |