**OCR A – A2 Biology Checklist**

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| **Module 5: Communication, Homeostasis and Energy** |
| 13 | Can you explain the need for communication systems in multicellular organisms? |  |
|  | Can you describe the communication between cells by cell signalling? |  |
|  | Can you describe the roles of mammalian sensory receptors in converting different types of stimuli into nerve impulses? |  |
|  | Can you explain the structure and functions of sensory, relay and motor neurones? |  |
|  | Can you describe the generation and transmission of nerve impulses in mammals? |  |
|  | Can you describe the structure and roles of synapses in neurotransmission? |  |
|  | Can you recall the organisation of the mammalian nervous system? |  |
|  | Can you recall the structure of the human brain and the functions of its parts? |  |
|  | Can you describe reflex actions? |  |
|  | Can you describe the structure of mammalian muscle and the mechanism of muscular contraction? |  |
|  | Can you examine stained sections or photomicrographs of skeletal muscle? |  |
| 14 | Can you describe endocrine communication by hormones? |  |
|  | Can you describe the structure and functions of the adrenal glands? |  |
|  | Can you describe the histology of the pancreas? |  |
|  | Can you examine and draw stained sections of the pancreas to show the histology of the endocrine tissues? |  |
|  | Can you explain how blood glucose concentration is regulated? |  |
|  | Can you describe the differences between Type 1 and Type 2 diabetes mellitus? |  |
|  | Can you describe the potential treatments for diabetes mellitus? |  |
|  | Can you describe the coordination of responses by the nervous and endocrine systems? |  |
|  | Can you describe the effects of hormones and nervous mechanisms on heart rate? |  |
| 15 | Can you describe the principles of homeostasis? |  |
|  | Can you describe the physiological and behavioural responses involved in temperature control in ectotherms and endotherms? |  |
|  | Can you use the term excretion and describe its importance in maintaining metabolism and homeostasis? |  |
|  | Can you describe the structure and functions of the mammalian liver? |  |
|  | Can you the examine and draw stained sections to show the histology of liver tissue? |  |
|  | Can you describe the structure, mechanisms of action and functions of the mammalian kidney? |  |
|  | Can you dissect, examine, and draw the external and internal structure of the kidney? |  |
|  | Can you examine and draw stained sections to show the histology of nephrons? |  |
|  | Can you describe the control of the water potential of the blood? |  |
|  | Can you describe the effects of kidney failure and its potential treatments? |  |
|  | Can you explain how excretory products can be used in medical diagnosis? |  |
| 16 | Can you recall the types of plant responses? |  |
|  | Can you take part in practical investigations into phototropism and geotropism? |  |
|  | Can you describe the roles of plant hormones? |  |
|  | Can you describe the experimental evidence for the role of auxins in the control of apical dominance? |  |
|  | Can you describe experimental evidence for the role of gibberellin in the control of stem elongation and seed germination? |  |
|  | Can you take part in practical investigations into the effect of plant hormones on growth? |  |
|  | Can you describe the commercial use of plant hormones? |  |
| 17 | Can you explain the interrelationship between the process of photosynthesis and respiration? |  |
|  | Can you recall the structure of a chloroplast and the sites of the two main stages of photosynthesis? |  |
|  | Can you explain the importance of photosynthetic pigments in photosynthesis? |  |
|  | Can you take part in practical investigations using thin layer chromatography (TLC) to separate photosynthetic pigments? |  |
|  | Can you recall the light-dependent stage of photosynthesis? |  |
|  | Can you describe the fixation of carbon dioxide and the light-independent stage of photosynthesis? |  |
|  | Can you recall the uses of triose phosphate (TP)? |  |
|  | Can you describe factors affecting photosynthesis? |  |
|  | Can you take part in practical investigations into factors affecting the rate of photosynthesis? |  |
|  | Can you explain the need for cellular respiration? |  |
|  | Can you explain chemiosmotic theory? |  |
| 18 | Can you describe the structure of the mitochondrion? |  |
|  | Can you describe the process and site of glycolysis? |  |
|  | Can you describe the link reaction and its site in the cell? |  |
|  | Can you describe the process and site of the Krebs cycle? |  |
|  | Can you explain the importance of coenzymes in cellular respiration? |  |
|  | Can you describe the process and site of oxidative phosphorylation? |  |
|  | Can you describe the process of anaerobic respiration in eukaryotes? |  |
|  | Can you complete practical investigations into respiration rates in yeast, under aerobic and anaerobic conditions? |  |
|  | Can you explain the difference in relative energy values of carbohydrates, lipids and proteins as respiratory substrates? |  |
|  | Can you use and interpret the respiratory quotient (RQ)? |  |
|  | Can you complete practical investigations into the effect of factors such as temperature, substrate concentration and different respiratory substrates on the rate of respiration? |  |
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| **Module 6: Genetics, Evolution and Ecosystems** |
| 19 | Can you describe types of gene mutations and their possible effects on protein production and function? |  |
|  | Can you describe the regulatory mechanisms that control gene expression at the transcriptional level, posttranscriptional level and post-translational level? |  |
|  | Can you describe the genetic control of the development of body plans in different organisms? |  |
|  | Can you describe the importance of mitosis and apoptosis as mechanisms controlling the development of body form? |  |
| 20 | Can you explain the contribution of both environmental and genetic factors to phenotypic variation? |  |
|  | Can you explain how sexual reproduction can lead to genetic variation within a species? |  |
|  | Can you draw genetic diagrams to show patterns of inheritance? |  |
|  | Can you use phenotypic ratios to identify linkage (autosomal and sex linkage) and epistasis? |  |
|  | Can you use the chi-squared (χ2) test to determine the significance of the difference between observed and expected results? |  |
|  | Can you explain the genetic basis of continuous and discontinuous variation? |  |
|  | Can you describe the factors that can affect the evolution of a species? |  |
|  | Can you use the Hardy–Weinberg principle to calculate allele frequencies in populations? |  |
|  | Can you explain the role of isolating mechanisms in the evolution of new species? |  |
|  | Can you describe the principles of artificial selection and its uses? |  |
|  | Can you explain the ethical considerations surrounding the use of artificial selection? |  |
| 21 | Can you explain the principles of DNA sequencing and the development of new DNA sequencing techniques? |  |
|  | Can you explain how gene sequencing has allowed for genome-wide comparisons between individuals and between species? |  |
|  | Can you explain how gene sequencing has allowed for the sequences of amino acids in polypeptides to be predicted? |  |
|  | Can you explain how gene sequencing has allowed for the development of synthetic biology? |  |
|  | Can you describe the principles of DNA profiling and its uses? |  |
|  | Can you explain the principles of the polymerase chain reaction (PCR) and its application in DNA analysis? |  |
|  | Can you describe the principles and uses of electrophoresis for separating nucleic acid fragments or proteins? |  |
|  | Can you describe the principles of genetic engineering? |  |
|  | Can you describe the techniques used in genetic engineering? |  |
|  | Can you consider the ethical issues (both positive and negative) relating to the genetic manipulation of animals (including humans), plants and microorganisms? |  |
|  | Can you describe the principles of, and potential for, gene therapy in medicine? |  |
| 22 | Can you describe natural clones in plants and the production of natural clones for use in horticulture? |  |
|  | Can you explain how to take plant cuttings as an example of a simple cloning technique? |  |
|  | Can you describe the production of artificial clones of plants by micropropagation and tissue culture? |  |
|  | Can you explain the arguments for and against artificial cloning in plants? |  |
|  | Can you describe natural clones in animal species? |  |
|  | Can you explain how artificial clones in animals can be produced by artificial embryo twinning or by enucleation and somatic cell nuclear transfer (SCNT)? |  |
|  | Can you describe the arguments for and against artificial cloning in animals? |  |
|  | Can you describe the use of microorganisms in biotechnological processes? |  |
|  | Can you describe the advantages and disadvantages of using microorganisms to make food for human consumption? |  |
|  | Can you explain how to culture microorganisms effectively, using aseptic techniques? |  |
|  | Can you explain the importance of manipulating the growing conditions in batch and continuous fermentation in order to maximise the yield of product required? |  |
|  | Can you describe the standard growth curve of a microorganism in a closed culture? |  |
|  | Can you complete practical investigations into the factors affecting the growth of microorganisms? |  |
|  | Can you describe the uses of immobilised enzymes in biotechnology and the different methods of immobilisation? |  |
| 23 | Can you describe ecosystems, which range in size, are dynamic and are influenced by both biotic and abiotic factors? |  |
|  | Can you explain biomass transfers through ecosystems? |  |
|  | Can you describe recycling within ecosystems? |  |
|  | Can you describe the process of primary succession in the development of an ecosystem? |  |
|  | Can you explain how the distribution and abundance of organisms in an ecosystem can be measured? |  |
|  | Can you use sampling and recording methods to determine the distribution and abundance of organisms in a variety of ecosystems? |  |
| 24 | Can you describe the factors that determine size of a population? |  |
|  | Can you describe interactions between populations? |  |
|  | Can you explain the reasons for, and differences between, conservation and preservation? |  |
|  | Can you explain how the management of an ecosystem can provide resources in a sustainable way? |  |
|  | Can you describe the management of environmental resources and the effects of human activities? |  |