Biology OCR Year 13 - Personal Learning Checklist

OCR Y13 A Level Biology A

Remember to test yourself by doing an exam question!

Module 5: Communication, homeostasis and energy		R	A	G
B5.1.1 Communication and homeostasis	Explain the need for communication systems in multicellular organisms			
	Describe the need for animals and plants to respond to changes in the internal and external environment to coordinate the activities of different organs			
	Explain the communication between cells by cell signalling, including signalling between adjacent cells and signalling between distant cells			
	Describe the principles of homeostasis and the differences between negative feedback and positive feedback.			
	Recall physiological and behavioural responses involved in temperature control in ectotherms			
	Recall physiological and behavioural responses involved in temperature control in endotherms			
B5.1.2 Excretion as an example of homeostatic control	Explain the term excretion and its importance in maintaining metabolism and homeostasis, with reference to the importance of removing metabolic wastes			
	Describe the structure and functions of the mammalian liver, include the gross structure and histology of the liver			
	Examine and draw stained sections to show the histology of liver tissue, including the roles of the liver in storage of glycogen, detoxification and formation of urea			
	Describe the structure, mechanisms of action and functions of the mammalian kidney, including detailed structure of a nephron and its associated blood vessels			
	Dissect, examine and draw of the external and internal structure of the kidney			
	Describe the processes of ultrafiltration, selective reabsorption and the production of urine			
	Examine and draw stained sections to show the histology of nephrons			
	Explain the control of the water potential of the blood, including the role of osmoreceptors in the hypothalamus, the posterior pituitary gland, ADH and its effect on the walls of the collecting ducts			
	Describe the effects of kidney failure and its potential treatments			
	Explain the problems that arise from kidney failure including the effect on glomerular filtration rate (GFR), electrolyte balance, use of renal dialysis and transplants for the treatment of kidney failure			
	Explain how excretory products can be used in medical diagnosis			
	Describe the use of urine samples in diagnostic tests; the use of monoclonal antibodies in pregnancy testing and testing for anabolic steroids and drugs			
B5.1.3 Neuronal communication	Recall the roles of mammalian sensory receptors in converting different types of stimuli into nerve impulses			
	Recall and outline of the roles of sensory receptors in responding to specific types of stimuli and their roles as transducers			
	Explain the structure and functions of sensory, relay and motor neurones and the differences between the structure and function of myelinated and non-myelinated neurones			
	Describe the generation and transmission of nerve impulses in mammals, how the resting potential is established and maintained, how an action potential is generated and transmitted in a myelinated neurone			
	Explain the significance of the frequency of impulse transmission			
	Describe the structure and role of synapses in neurotransmission (cholinergic synapse), the action of neurotransmitters at the synapse and the importance of synapses in summation and control			
B5.1.4 Hormonal communication	Describe endocrine communication by hormones, secretion of hormones into the blood, transport by the blood and detection by target cells or tissues.			
	Describe the structure and functions of the adrenal glands as an example of endocrine glands, to include the hormones secreted by the cortex and medulla and their functions			
	Explain the histology of the pancreas , including the endocrine tissues			
	Examine and draw stained sections of the pancreas to show the histology of the endocrine tissues			
	Explain how blood glucose concentration is regulated, including the action of insulin and glucagon as an example of negative feedback, and the role of the liver			
	Describe, the differences between Type 1 and Type 2 diabetes mellitus, the causes of Type 1 and Type 2 diabetes and the treatments used for each			
	Recall the potential treatments for diabetes mellitus			
	Explain the use of insulin produced by genetically modified bacteria and the potential use of stem cells to treat diabetes mellitus			

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B5.1.5 Plant and animal responses	Recall the types of plant responses, include the response to abiotic stress and herbivory, e.g. chemical defences or folding in response to touch			
	Describe practical investigations into phototropism and geotropism, including the range of tropisms in plants			
	Describe the roles of plant hormones, including leaf loss in deciduous plants, seed germination and stomatal closure			
	Recall the experimental evidence for the role of auxins in the control of apical dominance			
	Recall the experimental evidence for the role of gibberellin in the control of stem elongation and seed germination			
	Explain practical investigations into the effect of plant hormones on growth, as an opportunity for serial dilution and for the use of standard deviation to measure the spread of a set of data			
	Describe the commercial use of plant hormones, include the use of hormones to control ripening, the use of rooting powders and hormonal weed killers			
	Explain the organisation of the mammalian nervous system, including the structural organisation into the central and peripheral systems and the functional organisation into the somatic and autonomic nervous systems			
	Describe the structure of the human brain and the functions of its parts, including its gross structure			
	Describe the functions of the cerebrum, cerebellum, medulla oblongata, hypothalamus and pituitary gland			
	Explain reflex actions, including knee jerk reflex and blinking reflex, with reference to the survival value of reflex actions			
	Explain the coordination of responses by the nervous and endocrine systems, include the 'fight or flight' response to environmental stimuli in mammals			
	Describe the action of hormones in cell signalling with reference to adrenaline , activation of adenylyl cyclase, and cyclic AMP			
	Describe the effects of hormones and nervous mechanisms on heart rate, as an opportunity to monitor physiological functions and use standard deviation			
	Describe the structure of mammalian muscle and the mechanism of muscular contraction, include structural and functional differences			
	Examine stained sections or photomicrographs of skeletal muscle			
	Describe the sliding filament model of muscular contraction and the role of ATP, and how ATP is maintained in muscles by creatine phosphate			

B5.2 Energy for biological processes		R	A	G
B5.2.1 Photosynthesis	Explain the interrelationship between the process of photosynthesis and respiration, include the relationship between the raw materials and products of the two processes			
	Describe the structure of a chloroplast and the sites of the two main stages of photosynthesis, including outer membrane, lamellae, grana, thylakoid, stroma and DNA			
	Explain the importance of photosynthetic pigments in photosynthesis, with reference to light harvesting systems and photosystems			
	Recall how to conduct practical investigations using thin layer chromatography (TLC) to separate photosynthetic pigments			
	Explain the light-dependent stage of photosynthesis, how energy from light is harvested and used to drive the production of chemicals, reference electron carriers and cyclic and non-cyclic photophosphorylation			
	Describe the fixation of carbon dioxide and the light-independent stage of photosynthesis			
	Describe the uses of triose phosphate (TP), include the use as a starting material for the synthesis of carbohydrates, lipids and amino acids			
	Explain factors affecting photosynthesis, reference to carbon dioxide concentration, light-intensity and temperature, and the implications of water stress			
	Conduct practical investigations into factors affecting the rate of photosynthesis			

B5.2.2 Respiration	Explain the need for cellular respiration, examples of why plants, animals and microorganisms need to respire			
	Describe the structure of the mitochondrion, including inner and outer mitochondrial membranes, cristae, matrix and mitochondrial DNA			
	Describe the process and site of glycolysis			
	Explain the link reaction and its site in the cell, including formation of Acetyl CoA by the decarboxylation of pyruvate and the reduction of NAD to NADH			
	Describe the process and site of the Krebs cycle, reference formation of citrate and importance of decarboxylation, dehydrogenation			
	Explain the importance of coenzymes in cellular respiration, reference NAD, FAD and coenzyme A			
	Explain the process and site of oxidative phosphorylation, include the roles of electron carriers, oxygen and the mitochondrial cristae			
	Describe the chemiosmotic theory, reference the electron transport chain, proton gradients and ATP synthase in oxidative phosphorylation and photophosphorylation			
	Explain the process of anaerobic respiration in eukaryote, reference anaerobic respiration in mammals and yeast and the benefits of being able to respire anaerobically			
	Conduct practical investigations into respiration rates in yeast, under aerobic and anaerobic conditions and why anaerobic respiration produces a much lower yield of ATP than aerobic respiration			
	Recall the difference in relative energy values of carbohydrates, lipids and proteins as respiratory substrates			
	Recall the use and interpretation of the respiratory quotient (RQ) **RQ =CO_2 produced/O_2 consumed**			
	Conduct practical investigations into the effect of factors such as temperature, substrate concentration and different respiratory substrates on the rate of respiration			

Module 6: Genetics, evolution and ecosystems		R	A	G
B6.1.1 Cellular control	Recall types of gene mutations and their possible effects on protein production and function, include substitution, insertion or deletion of one or more nucleotides			
	Recall the regulatory mechanisms that control gene expression at the transcriptional level, posttranscriptional level and post-translational level			
	Describe the genetic control of the development of body plans in different organisms			
	Explain the importance of mitosis and apoptosis as mechanisms controlling the development of body form, include genes that regulate the cell cycle and apoptosis are able to respond to internal and external cell stimuli			
B6.1.2 Patterns of inheritance	Describe the contribution of both environmental and genetic factors to phenotypic variation, include examples of both genetic and environmental contributions			
	Explain how sexual reproduction can lead to genetic variation within a species, include meiosis and the random fusion of gametes at fertilisation			
	Draw genetic diagrams to show patterns of inheritance, include monogenic inheritance, dihybrid inheritance, multiple alleles, sex linkage and codominance			
	Explain the use of phenotypic ratios to identify linkage (autosomal and sex linkage) and epistasis, include explanations of linkage and epistasis			
	Recall the use of the chi-squared (χ^2) test to determine the significance of the difference between observed and expected results			
	Describe the genetic basis of continuous and discontinuous variation, refer to the number of genes that influence each type of variation			
	Explain the factors that can affect the evolution of a species, include stabilising selection and directional selection, genetic drift, genetic bottleneck and founder effect			
	Recall the use of the Hardy–Weinberg principle to calculate allele frequencies in populations			
	Describe the role of isolating mechanisms in the evolution of new species, include geographical and reproductive mechanisms			
	Explain the principles of artificial selection and its use, include examples of selective breeding in plants and animals			
	Explain the importance of maintaining a resource of genetic material for use in selective breeding including wild types			
	Recall the ethical considerations surrounding the use of artificial selection			
B6.1.3 Manipulating genomes	Explain the principles of DNA sequencing and the development of new DNA sequencing techniques, include the rapid advancements of the techniques used in sequencing			
	Explain how gene sequencing has allowed for genome-wide comparisons between individuals and between species			
	Explain how gene sequencing has allowed for the sequences of amino acids in polypeptides to be predicted			
	Explain how gene sequencing has allowed for the development of synthetic biology			
	Recall the principles of DNA profiling and its uses, including forensics and analysis of disease risk			
	Recall the principles of the polymerase chain reaction (PCR) and its application in DNA analysis			
	Recall the principles and uses of electrophoresis for separating nucleic acid fragments or proteins			
	Recall the principles of genetic engineering, include the isolation of genes from one organism and the placing of these genes into another organism using suitable vectors			
	Describe the techniques used in genetic engineering, include the use of restriction enzymes, plasmids and DNA ligase to form recombinant DNA with the desired gene and electroporation			
	Explain the ethical issues (both positive and negative) relating to the genetic manipulation of animals (including humans), plants and microorganisms			
	Recall the principles of, and potential for, gene therapy in medicine, include differences between somatic cell gene therapy and germ line cell gene therapy			
B6.2.1 Cloning and biotechnology	Explain natural clones in plants and the production of natural clones for use in horticulture, include examples of natural cloning and the methods used to produce clones			
	Recall how to take plant cuttings as an example of a simple cloning technique, including dissection of a selection of plant material to produce cuttings			
	Explain the production of artificial clones of plants by micropropagation and tissue culture, include an evaluation of the uses of plant cloning in horticulture and agriculture			
	Recall the arguments for and against artificial cloning in plants			
	Explain natural clones in animal species, include examples of natural clones			
	Explain how artificial clones in animals can be produced by artificial embryo twinning or by enucleation and somatic cell nuclear transfer (SCNT), include an evaluation of the uses of animal cloning			
	Explain the arguments for and against artificial cloning in animals			
	Explain the use of microorganisms in biotechnological processes, include uses in brewing, baking, cheese making, yoghurt production, penicillin production, insulin production and bioremediation			
	Describe the advantages and disadvantages of using microorganisms to make food for human consumption, include bacterial and fungal sources			
	Recall how to culture microorganisms effectively, using aseptic techniques			
	Explain the importance of manipulating the growing conditions in batch and continuous fermentation in order to maximise the yield of product required			
	Describe the standard growth curve of a microorganism in a closed culture			
	Conduct practical investigations into the factors affecting the growth of microorganisms			
	Explain the uses of immobilised enzymes in biotechnology and the different methods of immobilisation, include methods of enzyme immobilisation and an evaluation			

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B6.3.1 Ecosystems	Recall how ecosystems, are dynamic and are influenced by both biotic and abiotic factors, include reference to a variety of ecosystems of different size and examples of biotic and abiotic factors			
	Explain biomass transfers through ecosystems, include how biomass transfers between trophic levels can be measured and the efficiency of biomass transfers, as well as the effect of human activities			
	Explain recycling within ecosystems, include the role of decomposers and the roles of microorganisms in recycling nitrogen within ecosystems			
	Explain the importance of the carbon cycle to include the role of organisms and physical and chemical effects in the cycling of carbon within ecosystems			
	Explain the process of primary succession in the development of an ecosystem, include succession from pioneer species to a climax community and deflected succession			
	Describe how the distribution and abundance of organisms in an ecosystem can be measured			
	Describe the use of sampling and recording methods to determine the distribution and abundance of organisms in a variety of ecosystems			
B6.3.2 Populations and sustainability	Explain the factors that determine size of a population, including the significance of limiting factors in determining the carrying capacity of a given environment and the impact of these factors on final population size			
	Describe interactions between populations To include predator–prey relationships considering the effects on both predator and prey populations and interspecific and intraspecific competition			
	Recall the reasons for, and differences between, conservation and preservation, include the economic, social and ethical reasons for conservation of biological resources			
	Explain how the management of an ecosystem can provide resources in a sustainable way, include examples such as timber production and fishing			
	Explain the management of environmental resources and the effects of human activities, include how ecosystems can be managed to balance the conflict between conservation/ preservation and human needs			
	Describe the effects of human activities on the animal and plant populations and how these are controlled in environmentally sensitive ecosystems			