Year 10 IGCSE Biology Revision Checklist

Use this booklet to help you with your revision in preparation for your year 10 Biology examinations.

This is the work that you will have covered by the end of year 10 from the iGCSE Syllabus Examination 2016 -2018. Extended paper statements are highlighted in bold.

How can you use this document to help you revise?

By looking at this document you can see the extent of the work that you need to fully cover and revise before you sit your IGCSE examinations. This will then help you to track your progress through the year and also plan your revision for end of year examinations. Careful study and use of this document will ensure that you have sufficient time to cover all the work well before the exam. Remember to look back at the work you have done in year 9 as you will be expected to build upon this foundation. Exam questions may include some information from these topics.



BIOLOGY

5. Enzymes	\bigcirc	\bigcirc	\bigcirc
Define the term <i>catalyst</i> as a substance that increases the rate of a chemical reaction and is not changed by the reaction Define <i>enzymes</i> as proteins that function as biological catalysts • Describe why enzymes are important in all living organisms in terms of			
reaction speed necessary to sustain life on enzyme activity. Explain enzyme action with reference to the active site, enzyme-			
substrate complex, substrate and product			
• Describe and explain the specificity of enzymes in terms of the			
• Describe and explain the effect of changes in temperature on enzyme			
activity in terms of kinetic energy, shape and fit, frequency of effective			
collisions and denaturation			
• Describe and explain the effect of changes in pH on enzyme activity			
In terms of shape and fit and denaturation			
6. Plant Nutrition			
Photosynthesis			
Define <i>photosynthesis</i> as the process by which plants manufacture carbohydrates from raw materials using energy from light • State the word equation for photosynthesis:			
carbon dioxide + water \rightarrow glucose + oxygen, in the presence of light and chlorophyll			
Investigate the necessity for chlorophyll, light and carbon dioxide for			
• Investigate and describe the effects of varying light intensity, carbon			
dioxide concentration and temperature on the rate of photosynthesis, e.g. in submerged aquatic plants			
State the balanced chemical equation for photosynthesis			
• Explain that chlorophyll transfers light energy into chemical energy			
In molecules, for the synthesis of carbonydrates			
 Investigate the necessity for chlorophyll, light and carbon dioxide for photosynthesis, using appropriate controls 			
• Define the term <i>limiting factor</i> as something present in the			
 environment in such short supply that it restricts life processes Identify and explain the limiting factors of photosynthesis in different environmental conditions 			
• Describe the use of carbon dioxide enrichment, optimum light and			
optimum temperatures in glasshouses in temperate and tropical countries			
 Use hydrogencarbonate indicator solution to investigate the effect of 			
gas exchange of an aquatic plant kept in the light and in the dark			
Leaf structure			
• Identify chloroplasts, cuticle, guard cells and stomata, upper and lower epidermis, palisade mesophyll, spongy mesophyll, vascular bundles, xylem and phloem in leaves of a dicotyledonous plant			
• Explain how leaf internal structure is adapted for photosynthesis			
Mineral requirements			
 Describe the importance of: nitrate ions for making amino acids and magnesium ions for making chlorophyll 			

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 Explain the effects of nitrate ion and magnesium ion deficiency on 		U	6
plant growth			
8. Transport in Plants			
State the functions of xylem and phloem			
 Identify the position of xylem and phloem as seen in sections of roots, 			
Stems and leaves, limited to non-woody dicotyledonous plants			
Water uptake			
functions			
 State the pathway taken by water through root, stem and leaf as root hair 			
cell, root cortex cells, xylem and mesophyll cells			
• Investigate, using a suitable stain, the pathway of water through the above			
ground parts of a plant			
• Explain that the large surface area of root hairs increases the rate of			
the absorption of water by osmosis and ions by active transport			
Transpiration			
• State water is transported from the roots to leaves in xylem vessels			
Define transpiration as loss of water vapour from plant leaves by			
diffusion of water vanour through the stomata			
 Investigate and describe the effects of variation of temperature and 			
humidity on transpiration rate			
 Explain how water vapour loss is related to the large surface area of 			
cell surfaces, interconnecting air spaces and stomata			
• Explain the mechanism by which water moves upwards in the xylem			
in terms of a transpiration pull that draws up a column of water molecules, held together by cohesion			
• Explain how and why wilting occurs			
• Explain the effects of variation of temperature and humidity on			
transpiration rate			
Translocation			
• Define translocation in terms of the movement of sucrose and amino			
acids in phloem: from regions of production (source) to regions of			
storage OR to where they are used in respiration or growth (sink)			
different times during the life of a plant			
9 Transport in animals			
5. Hallsport III allitials			
and values to ensure one-way flow of blood			
Describe the single circulation of a fish			
 Describe the double circulation of a mammal and its advantages 			
Heart			
 Name and identify the structures of the mammalian heart, 			
• State that blood is pumped away from the heart into arteries and returns to			
the neart in veins • Explain the relative thickness:			
-of the muscle wall of the left and right ventricles			
– of the muscle wall of the atria compared to that of the ventricles			
 importance of the septum in separating oxygenated and 			
deoxygenated blood			

 Describe the functioning of the heart in terms of the contraction of muscles of the atria and ventricles and the action of the valves State that the activity of the heart may be monitored by ECG, pulse rate and listening to sounds of valves closing Investigate and state the effect of physical activity on pulse rate Describe coronary heart disease in terms of the blockage of coronary arteries and state the possible risk factors as diet, stress, smoking, genetic predisposition, age and gender Explain the effect of physical activity on the heart rate Discuss the roles of diet and exercise in the prevention of coronary heart disease Describe coronary heart disease treatments, by drugs with aspirin and surgery (stents, angioplasty and by-pass) 		
 Blood and lymphatic vessels Name the main blood vessels to and from the heart, lungs, kidney. Explain how the structures of arteries, veins and capillaries are adapted for their functions State the function of arterioles, venules and shunt vessels Outline the lymphatic system, lymphatic vessels and nodes Describe the function of the lymphatic system in the circulation of body fluids and the protection of the body from infection 		
 Blood Identify red and white blood cells, as seen under the light microscope, on prepared slides and in diagrams and photomicrographs State the functions of red blood cells, white blood cells, platelets and plasma Identify lymphocyte and phagocyte white blood cells, as seen under the light microscope, on slides, diagrams and photomicrographs State the functions of lymphocytes – antibody production and phagocytes – phagocytosis Describe the role of fibrinogen in clotting and how this prevents blood loss and the entry of pathogens Describe the transfer of materials between capillaries and tissue fluid 		
10. Disease and Immunity		
 Define <i>pathogen</i> as a disease-causing organism Define <i>transmissible disease</i> as a disease in which the pathogen can be passed from one host to another State how pathogens can be transmitted State that the body has mechanical, chemical and immune system defences: State that antibodies lock on to antigens leading to direct destruction of pathogens, or marking of pathogens for destruction by phagocytes Explain how each pathogen has its own antigens, which have specific shapes, so specific antibodies which fit the specific shapes of the antigens are needed Define <i>active immunity</i> as defence against a pathogen by antibody production in the body Explain that active immunity is gained after an infection by a pathogen, or by vaccination Explain the process of vaccination: 		

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 Explain the importance of hygienic food preparation, good personal hygiene, waste disposal and sewage treatment in controlling the spread of disease 			
 Explain the role of vaccination in controlling the spread of diseases Explain <i>passive immunity</i> is short-term defence against a pathogen by antibodies acquired from another, e.g. mother to infant and 			
 memory cells are not produced. Explain the importance of passive immunity for breast-fed infants State that some diseases are caused by the immune system targeting and destroying body cells, limited to Type 1 diabetes 			
12. Respiration			
State the uses of energy in the body of humans: muscle contraction, protein synthesis, cell division, active transport, growth, the passage of nerve impulses and the maintenance of a constant body temperature • State that respiration involves the action of enzymes in cells			
Aerobic respiration			
Define aerobic respiration as the chemical reactions in cells that use oxygen			
to break down nutrient molecules to release energy			
• State the word equation for aerobic respiration as $ducose \pm oxygen \rightarrow carbon dioxide \pm water$			
Investigate the uptake of oxygen by respiring organisms, such as			
arthropods and germinating seeds			
 State the balanced chemical equation for aerobic respiration as 			
$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$			
 Investigate the effect of temperature on the rate of respiration of germinating seeds 			
Anaerobic respiration			
Define anaerobic respiration as the chemical reactions in cells that break			
down nutrient molecules to release energy without using oxygen			
State the word equations for anaerobic respiration in muscles during			
vigorous exercise (glucose \rightarrow lactic acid)			
State that an archic respiration releases much less energy per ducose			
molecule than aerobic respiration			
• State the balanced chemical equation for anaerobic respiration in the			
microorganism yeast as $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$			
 State that lactic acid builds up in muscles and blood during vigorous exercise causing an oxygen debt 			
 Outline how the oxygen debt is removed during recovery, limited to: aerobic respiration of lactic acid in the liver 			
 continuation, after exercise, of fast heart rate to transport lactic acid in blood from muscles to the liver 			
-continuation, after exercise, of deeper breathing supplying oxygen for aerobic respiration of lactic acid			
11. Gas exchange			
Adaptations of lungs in humans, limited to large surface area, thin surface, good blood supply and good ventilation with air			

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 Name and identify the lungs, diaphragm, ribs, intercostal muscles, larynx, trachea, bronchi, bronchioles, alveoli and associated capillaries Name and identify the internal and external intercostal muscles State the functions of the cartilage in the trachea Identify and explain the role of the ribs, internal and external intercostal muscles and the diaphragm in producing volume and pressure changes in the thorax leading to ventilation of the lungs State and explain differences in composition between inspired and expired air, of oxygen, carbon dioxide and water vapour Use limewater as a test for carbon dioxide to investigate the differences in composition between inspired air Investigate and describe the effects of physical activity on rate and depth of breathing Explain the link between physical activity and rate and depth of breathing in terms of the increased carbon dioxide concentration in the blood, detected by the brain, causing an increased rate of breathing Explain the role of goblet cells, mucus and ciliated cells in protecting the gas exchange system from pathogens and particles 			
13. Excretion in humans			
State that urea is formed in the liver from excess amino acids • State that carbon dioxide is excreted through the lungs • State that the kidneys excrete urea and excess water and salts • Explain that the volume and concentration of urine produced is affected by water intake, temperature and exercise • Identify on, diagrams and images, the ureters, bladder and urethra • Describe the role of the liver in the assimilation of amino acids by converting them to proteins, including plasma proteins, e.g. fibrinogen • Define <i>deamination</i> as the removal of the nitrogen-containing part of amino acids to form urea • Explain the need for excretion, due to toxicity of urea and CO ₂ • Outline the structure of the kidney, identify cortex, medulla and ureter • Outline structure and functioning of a kidney tubule, including: – the role of the glomerulus and tubule • Explain dialysis in terms of salt balance, the maintenance of glucose concentration and the removal of urea • Describe the use of dialysis in kidney machines • Discuss the advantages and disadvantages of kidney transplants, compared with dialysis			
14. Coordination and response	1		
 Nervous control in humans Describe a nerve impulse as an electrical signal that passes along nerve cells called neurones Describe the human nervous system in terms of:the central nervous system consisting of brain and spinal cord, the peripheral nervous system and their role in coordination and regulation. Identify motor relay and sensory neurones from diagrams Describe a simple reflex arc in terms of receptor, sensory neurone, relay neurone, motor neurones and effector 			

 Describe a reflex action as a means of automatically and rapidly integrating and coordinating stimuli with the responses of effectors Distinguish between voluntary and involuntary actions Define a synapse as a junction between two neurones Describe the structure of a synapse, including the presence of neurotransmitter containing vesicles, the synaptic cleft and neurotransmitter receptor molecules Describe how an impulse triggers the release of neurotransmitter from vesicles into the synaptic gap and how the neurotransmitter diffuses across to bind with receptor molecules, in the membrane of the neurone after the synaptic gap, passing on the impulse State that in a reflex arc the synapses ensure that impulses travel in one direction only State that many drugs, e.g. beroin act upon synapses 		
Sense Organs		
 Define sense organs as groups of receptor cell responding to specific stimuli: light, sound, touch, temperature and chemicals Identify the structures of the eye, limited to cornea, iris, pupil, lens, retina, optic nerve and blind spot Describe the function of each of these part of the eye. Explain the pupil reflex in terms of light intensity and antagonistic action of circular and radial muscles in the iris Explain accommodation to view near and distant objects in terms of the contraction and relaxation of the lens and refraction of light State the distribution of rods and cones in the retina of a human Outline the function of rods and cones, limited to greater sensitivity of rods for night vision and three different kinds of cones absorbing light of different colours for colour vision Identify the position of the fovea 		
Hormones		
 Define a <i>hormone</i> as a chemical substance, produced by a gland and carried by the blood, which alters the activity of target organ(s) Identify specific endocrine glands and their secretions, limited to adrenal glands and adrenaline, pancreas and insulin, testes and testosterone and ovaries and oestrogen Describe the effects of adrenaline, and give examples where its secretion is increases as the hormone in 'fight or flight' situations State the functions of insulin, oestrogen and testosterone Discuss the role of the hormone adrenaline in the chemical control of metabolic activity, including increasing the blood glucose concentration and pulse rate Compare nervous and hormonal control systems in terms of speed and longevity of action 		
 Tropic responses Define <i>gravitropism</i> as a response in which parts of a plant grow towards or away from gravity Define <i>phototropism</i> as a response in which parts of a plant grow towards or away from the direction from which light is coming Investigate gravitropism and phototropism in shoots and roots 		

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 Explain phototropism and gravitropism of a shoot as examples of the chemical control of plant growth Explain the role of auxin in controlling shoot growth, Describe the use in weedkillers of the synthetic plant hormone 			
Homeostasis			
Define <i>homeostasis</i> as the maintenance of a constant internal			
 Name and identify on a diagram of the skin: hairs, hair erector muscles, sweat glands, receptors, sensory neurones, blood vessels and fatty tissue Describe the maintenance of a constant internal body temperature in humans in terms of insulation, sweating, shivering and the role of the brain (limited to blood temperature receptors and coordination) Explain that homeostasis is the control of internal conditions within set limite 			
• Explain the concept of control by negative feedback			
 Describe the control of the glucose concentration of the blood by the liver and the roles of insulin and glucagon from the pancreas Outline the symptoms and treatment of Type 1 diabetes Describe the maintenance of a constant internal body temperature in humans in terms of vasodilation and vasoconstriction of arterioles 			
supplying skin surface capillaries			
 15. Drugs Define a <i>drug</i> as any substance taken into the body that modifies or affects chemical reactions in the body Medicinal drugs Describe the use of antibiotics for the treatment of bacterial infection State that some bacteria are resistant to antibiotics which reduces the effectiveness of antibiotics and explain how development of resistant bacteria such as MRSA can be minimised State and explain why antibiotics kill bacteria, but do not affect viruses 			
Misused Drugs			
 Describe the effects of excessive alcohol and abuse of heroin, State that injecting heroin can cause infections such as HIV State that excessive alcohol consumption can cause liver damage State that tobacco smoking can cause chronic obstructive pulmonary disease (COPD), lung cancer and coronary heart disease Describe the effects on the gas exchange system of tobacco smoke and its major toxic components, 'carbon monoxide, nicotine and tar State that the liver is the site of break down of alcohol and other toxins Explain how heroin affects the nervous system, limited to its effect on the function of synapses 			
• Discuss the evidence linking smoking and lung cancer • Discuss the use of hormones to improve sporting performance			
limited to testosterone and anabolic steroids			