*All page numbers refer to Longman’s Biology for IGCSE (the* ***green*** *textbook)*

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| **Topics Covered** | **Key Points to Know** | **Page Ref** | **Revised?**  **Y/N** |
| **Characteristics of living organisms** | \*Living things organisms share the eight basic characteristics (C MRS GREN) | 1 |  |
| **Variety of living organisms** | \*Biology classifies organisms on the basis of their structure and function  \*Describe common features shared by **plants, animals, fungi, bacteria, protoctists** and **viruses**  \*For each group describe examples and their features  Understand the term pathogen and know which groups contain them | 16  16 – 21  16 - 21 |  |
| **Levels of Organisation** | \*Describe the levels of organisation within organisms: organelles, cells, tissues, organs and systems | 12 - 13 |  |
| **Cell Structure** | \*Recognise cell structures, including the nucleus, cytoplasm, cell membrane, cell wall, chloroplast and vacuole  \*Describe the functions of the nucleus, cytoplasm, cell membrane, cell wall, chloroplast and vacuole  \*Describe the differences between plant and animal cells | 1 – 3  2 – 3  3 |  |
| **Movement of Substances Into and Out of Cells** | \*recall definitions of diffusion, osmosis and active transport  \*Understand that the movement of substances into and out of cells can be by diffusion, osmosis and active transport  \*Understand the importance in plants of turgid cells as a means of support  \*Understand the factors that affect the rate of movement of substances into and out of cells to include the effects of surface area to volume ratio, temperature and concentration gradient  \*Describe simple experiments on diffusion and osmosis using living and non-living systems | 9 – 10  9 – 10  123 – 124  10  10, 122 – 124 |  |
| **Respiration** | \*Recall that the process of respiration releases energy in living organisms  \*Describe the differences between aerobic and anaerobic respiration  \*Recall the word equation and the balanced chemical symbol equation for aerobic respiration  \*Recall the word equation for anaerobic respiration in plants and in animals  \*Describe simple controlled experiments to demonstrate the evolution of carbon dioxide and heat from respiring seeds or other suitable living organisms | 6 – 7  7  7  7 – 8  8 - 9 |  |
| **Uses of Microbes** | \*Understand the role of yeast in the production of beer  \*Describe a simple experiment to investigate carbon dioxide production by yeast, in different conditions  \*Understand the role of bacteria (Lactobacillus) in the production of yoghurt  \*Interpret and label a diagram of an industrial fermenter and explain the need to provide suitable conditions in the fermenter, including aseptic precautions, nutrients, optimum temperature and pH, oxygenation and agitation, for the growth of microorganisms | 231 – 232  232  233  229 – 230 |  |
| **Biological Molecules** | \*Recall the chemical elements present in carbohydrates, proteins and lipids (fats and oils)  \*Describe the structure of carbohydrates, proteins and lipids as large molecules made up from smaller basic units: starch and glycogen from simple sugars; protein from amino acids; lipids from fatty acids and glycerol  \*Describe the tests for glucose and starch  \*Understand the role of enzymes as biological catalysts in metabolic reactions  \*Understand how the functioning of enzymes can be affected by changes in pH  \*Describe how to carry out simple controlled experiments to illustrate how enzyme activity can be affected by changes in temperature | 37 – 40  37 – 40  42 – 43  3 – 4  4 - 5  5 - 6 |  |
| **Photosynthesis** | \*Describe the process of photosynthesis and understand its importance in conversion of light energy to chemical energy  \*Recall the word equation and the balanced chemical symbol equation for photosynthesis  \*Understand how carbon dioxide concentration, light intensity and temperature affect the rate of photosynthesis  \*Explain how the structure of the leaf is adapted for photosynthesis  \*Recall that plants require mineral ions for growth and that magnesium ions are needed for chlorophyll and nitrate ions are needed for amino acids  \*Describe simple controlled experiments to investigate photosynthesis, showing the evolution of oxygen from a water plant, the production of starch and the requirements of light, carbon dioxide and chlorophyll | 112  112  116  112 – 114  118 – 119  115 – 117, 109 – 111 |  |
| **Transpiration** | \*Understand why simple, unicellular organisms can rely on diffusion for movement of substances in and out of the cell  \*understand the need for a transport system in multicellular organisms  \*Explain how the structure of the leaf is adapted for gas exchange  \*Describe the role of stomata in gas exchange  \*Describe the position of phloem and xylem in a stem  \*Describe the role of phloem in transporting sucrose and amino acids between the leaves and other parts of the plant  \*Describe the role of the xylem in transporting water and mineral salts from the roots to other parts of the plant  \*Explain how water is absorbed by root hair cells  \*Recall that transpiration is the evaporation of water from the surface of a plant  \*Explain how the rate of transpiration is affected by changes in humidity, wind speed, temperature and light intensity  \*Describe experiments that investigate the role of environmental factors in determining the rate of transpiration from a leafy shoot | 53 – 54  53 – 54  128  129 – 130  129  130  130  128 – 129  129 – 130  132 – 133  133 |  |
| **Plant Hormones & Tropisms** | \*Understand that plants respond to stimuli  \*Describe the geotropic responses of roots and stems  \*Describe positive phototropism of stems  \*Understand that phototropic responses in stems are the result of differential growth caused by auxin  \*Recall controlled experiments to demonstrate phototropic and geotropic plant growth responses | 137 – 138  140 – 141  138 – 140  141 – 142  141 – 142 |  |

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| **Plant Reproduction** | \*Describe the difference between sexual and asexual reproduction  \*Understand that fertilisation involves the fusion of a male and female gamete to produce a zygote  \*Describe the structures of an insect-pollinated and a wind-pollinated flower and explain how each is adapted for pollination  \*Describe pollination and the growth of the pollen tube  \*Understand how germinating seeds utilise food reserves until the seedling can carry out photosynthesis  \*Understand that plants can reproduce asexually by natural methods (illustrated by runners), and by artificial methods (illustrated by cuttings) | 143  144  144  144 – 145  147  143 |  |
| **Ecology** | \*Understand the terms population, community, habitat and ecosystem  \*Describe the use of quadrats as a technique for sampling the distribution of organisms in their habitats  \*Recall the use of quadrats to estimate the population size of an organism in two different areas.  \*Recall the names given to different trophic levels to include producers, primary, secondary and tertiary consumers and decomposers  \*Understand the concepts of food chains, food webs, pyramids of number, pyramids of biomass and pyramids of energy transfer  \*Understand the transfer of substances and of energy along a food chain  \*Explain why only about 10% of energy is transferred from one trophic level to the next  \*Describe the stages in the water cycle, including evaporation, transpiration, condensation and precipitation  \*Describe the stages in the carbon cycle, including respiration, photosynthesis, decomposition and combustion  \*Describe the stages in the nitrogen cycle, including the roles of nitrogen fixing bacteria, decomposers, nitrifying bacteria and denitrifying bacteria (specific names of bacteria are not required)  \*Understand the biological consequences of pollution of air by sulphur dioxide and by carbon monoxide  \*Recall that water vapour, carbon dioxide, nitrous oxide, methane and CFCs are greenhouse gases  \*Understand how human activities contribute to greenhouse gases  \*Understand how an increase in greenhouse gases results in an enhanced greenhouse effect and that this may lead to global warming and its consequences  \*Understand the biological consequences of pollution of water by sewage including increases in the number of microorganisms causing depletion of oxygen  \*Understand that eutrophication can result from leached minerals from fertiliser  \*Understand the effects of deforestation, including leaching, soil erosion, disturbance of the water cycle and of the balance in atmospheric oxygen and carbon dioxide  \*Explain the biological consequences of overfishing and overgrazing. | 152 – 153  153 – 154  154  155 – 156  155 – 158  158  158  161  159  160  171 – 173  170 – 171  170 – 171  170 – 171  173 – 175  173 – 175  170- 171 |  |
| **Food Production** | \*Describe how glasshouses and polythene tunnels can be used to increase the yield of certain crops  \*Understand the effects on crop yield of increased carbon dioxide and increased temperature in glasshouses  \*Understand the use of fertiliser to increase crop yield  \*Understand the reasons for pest control and the advantages and disadvantages of using pesticides and biological control with crop plants  \*Explain the methods which are used to farm large numbers of fish to provide  a source of protein, including maintenance of water quality, control of intraspecific and interspecific predation, control of disease, removal of waste products, quality and frequency of feeding and the use of selective breeding | 165 – 166  166  167  168 – 169  169 – 170 |  |
| **Breathing & Circulation** | \*Recall the structure of the thorax, including the ribs, intercostal muscles, diaphragm, trachea, bronchi, bronchioles, alveoli and pleural membranes  \*Understand the role of the intercostal muscles and the diaphragm, in ventilation  \*Explain how alveoli are adapted for gas exchange by diffusion between air in the lungs and blood in capillaries  \*Understand the biological consequences of smoking in relation to the lungs and the circulatory system  \*Describe a simple experiment to investigate the effect of exercise on breathing in humans  \*Recall the composition of the blood: red blood cells, white blood cells, platelets and plasma  \*Understand the role of plasma in the transport of carbon dioxide, digested food, urea, hormones and heat energy  \*Describe the adaptations of red blood cells for the transport of oxygen, including shape, structure and the presence of haemoglobin  \*Describe the role of white blood cells in preventing disease by ingestion of microorganisms and the production of antibodies to destroy microorganisms  \*Recall that platelets are involved in blood clotting, which prevents blood loss and the entry of microorganisms  \*Describe the structure of the heart and how it functions  \*Understand that the heart rate changes during exercise and under the influence of adrenaline  \*Describe the structure of arteries, veins and capillaries and understand their roles  \*Recall the general plan of the circulation system to include the blood vessels to and from the heart, the lungs, the liver and the kidneys. | 26 – 27  26 – 28  29 – 30  30 – 34  30  60  60  60 – 61  61 – 62  62  56 – 58  57  58 – 59  54 – 55 |  |
| **Nutrition & Digestion** | \*Understand that a balanced diet should include carbohydrate, protein, lipid,  vitamins, minerals, water and dietary fibre  \*Recall sources and describe functions of carbohydrate, protein, lipid (fats and oils), vitamins A, C and D, and the mineral ions calcium and iron  \*Understand that energy requirements vary with activity levels, age and pregnancy  \*Recognise the structures of the human alimentary canal and describe in outline the functions of the mouth, oesophagus, stomach, small intestine, large intestine, and pancreas  \*Understand the processes of ingestion, digestion, absorption, assimilation and egestion  \*Explain how and why food is moved through the gut by peristalsis  \*Understand the role of digestive enzymes to include the digestion of starch to glucose by amylase and maltase, the digestion of proteins to amino acids by proteases and the digestion of lipids to fatty acids and glycerol by lipases  \*Recall that bile is produced by the liver and stored in the gall bladder, and understand the role of bile in neutralising stomach acid and emulsifying lipids  \*Explain how the structure of a villus helps absorption of the products of digestion in the small intestine  \*Recall how to carry out a simple experiment to determine the energy content in a food sample | 37  37 – 42  43 – 44  46 – 50  46 – 50  46  48  48 – 49  49 – 50  45 |  |
| **Nervous System** | \*Describe how responses can be controlled by nervous or by hormonal communication and understand the differences between the two systems  \*Recall that the central nervous system consists of the brain and spinal cord and is linked to sense organs by nerves  \*Understand that stimulation of receptors in the sense organs sends electrical impulses along nerves into and out of the central nervous system, resulting in rapid responses  \*Describe the structure and functioning of a simple reflex arc illustrated by the withdrawal of a finger from a hot object  \*Describe the structure and function of the eye as a receptor  \*Understand the function of the eye in focusing near and distant objects, and in responding to changes in light intensity | 78  66  65  72 – 73  68 – 71  71 |  |