

## Shell Biology

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

Topics Covered	Key Points to Know	Page Ref	Revised? Y/N
<b>Characteristics of living organisms</b>	*Living things organisms share the eight basic characteristics (C MRS GREN)	1	
<b>Variety of living organisms</b>	*Biology classifies organisms on the basis of their structure and function *Describe common features shared by <b>plants, animals, fungi, bacteria, protoctists</b> and <b>viruses</b> *For each group describe examples and their features *Understand the term pathogen and know which groups contain them	16 16 – 21 16 - 21	
<b>Levels of Organisation</b>	*Describe the levels of organisation within organisms: organelles, cells, tissues, organs and systems	12 - 13	
<b>Cell Structure</b>	*Describe 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 * Compare the structures of plant and animal cells	1 – 3 2 – 3 3	
<b>Movement of Substances Into and Out of Cells</b>	*Understand 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 * <b>Understand the importance in plants of turgid cells as a means of support</b> *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 experiments to investigate diffusion and osmosis using living and non-living systems	9 – 10 9 – 10 123 – 124 10 10, 122 – 124	
<b>Biological Molecules</b>	*Identify 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 * <b>Understand how the functioning of enzymes can be affected by changes in active site caused by changes in pH</b>	37 – 40 37 – 40 42 – 43 3 – 4 4 - 5	

	<p>*Understand how the functioning of enzymes can be affected by changes in temperature, including changes due to change in active site</p> <p>* describe experiments to investigate how enzyme activity can be affected by changes in temperature.</p>	5 - 6	
<b>Nutrition &amp; Digestion</b>	<p><b>*Understand that a balanced diet should include appropriate proportions of carbohydrate, protein, lipid, vitamins, minerals, water and dietary fibre</b></p> <p>*Recall sources and describe functions of carbohydrate, protein, lipid (fats and oils), vitamins A, C and D, and the mineral ions calcium and iron</p> <p><b>*Understand that energy requirements vary with activity levels, age and pregnancy</b></p> <p>*Describe the structures of the human alimentary canal and describe in outline the functions of the mouth, oesophagus, stomach, small intestine, large intestine, and pancreas</p> <p>*Understand the processes of ingestion, digestion, absorption, assimilation and egestion</p> <p>*Explain how and why food is moved through the gut by peristalsis</p> <p>*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</p> <p>*Understand 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</p> <p>* Describe the structure of a villus and explain how this helps absorption of the products of digestion in the small intestine</p> <p><b>*Recall how to carry out a simple experiment to determine the energy content in a food sample</b></p>	<p>37</p> <p>37 – 42</p> <p>43 – 44</p> <p>46 – 50</p> <p>46 – 50</p> <p>46</p> <p>48</p> <p>48 – 49</p> <p>49 – 50</p> <p>45</p>	
<b>Respiration</b>	<p>*Understand that the process of respiration releases energy in living organisms</p> <p>*Describe the differences between aerobic and anaerobic respiration</p> <p>*Write the word equation and the balanced chemical symbol equation for aerobic respiration</p> <p>*Write the word equation for anaerobic respiration in plants and in animals</p> <p><b>*Describe experiments to demonstrate the evolution of carbon dioxide and heat from respiring seeds or other suitable living organisms</b></p>	<p>6 – 7</p> <p>7</p> <p>7</p> <p>7 – 8</p> <p>8 - 9</p>	
<b>Breathing</b>	<p>*describe the structure of the thorax, including the ribs, intercostal muscles, diaphragm, trachea, bronchi, bronchioles, alveoli and pleural membranes</p> <p>*understand the role of the intercostal muscles and the diaphragm in ventilation</p> <p>*explain how alveoli are adapted for gas exchange by diffusion between air in the</p>	<p>26 – 27</p> <p>26 – 28</p>	

	<p>lungs and blood in capillaries</p> <p>*understand the biological consequences of smoking in relation to the lungs and the circulatory system, including coronary heart disease</p> <p>*describe experiments to investigate the effect of exercise on breathing in humans.</p>	<p>29 – 30</p> <p>30 – 34</p> <p>30</p>	
<b>Photosynthesis</b>	<p>*Describe the process of photosynthesis and understand its importance in conversion of light energy to chemical energy</p> <p>*Write the word equation and the balanced chemical symbol equation for photosynthesis</p> <p>*Understand how varying carbon dioxide concentration, light intensity and temperature affect the rate of photosynthesis</p> <p>*Describe the structure of a leaf and explain how the structure of the leaf is adapted for photosynthesis</p> <p>*Understand that plants require mineral ions for growth and that magnesium ions are needed for chlorophyll and nitrate ions are needed for amino acids</p> <p>*Describe 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</p>	<p>112</p> <p>112</p> <p>116</p> <p>112 – 114</p> <p>118 – 119</p> <p>115 – 117, 109 – 111</p>	
<b>Plant Hormones &amp; Tropisms</b>	<p>*Understand that plants respond to stimuli</p> <p>*Describe the geotropic responses of roots and stems</p> <p>*Describe positive phototropism of stems</p> <p>*Understand that phototropic responses in stems are the result of differential growth caused by auxin</p> <p>*Recall controlled experiments to demonstrate phototropic and geotropic plant growth responses</p>	<p>135 – 136</p> <p>138 – 139</p> <p>136 – 138</p> <p>138 – 139</p> <p>139 – 141</p>	
<b>Ecology</b>	<p>*Understand the terms population, community, habitat and ecosystem</p> <p>*Describe the use of quadrats as a technique for sampling the distribution of organisms in their habitats</p> <p>*Explain how quadrats can be used to estimate the population size of an organism in two different areas.</p> <p>*Explain how quadrats can be used to sample the distribution of organisms in their habitats.</p> <p>*Explain the names given to different trophic levels to include producers, primary, secondary and tertiary consumers and decomposers</p> <p>*Understand the concepts of food chains, food webs, pyramids of number,</p>	<p>152 – 153</p> <p>153 – 154</p> <p>154</p> <p>153 -154</p> <p>155 – 156</p> <p>155 – 158</p>	

	<p>pyramids of biomass and pyramids of energy transfer</p> <p>*Understand the transfer of substances and of energy along a food chain</p> <p>*Explain why only about 10% of energy is transferred from one trophic level to the next</p> <p><b>*Describe the stages in the water cycle, including evaporation, transpiration, condensation and precipitation</b></p> <p>*Describe the stages in the carbon cycle, including respiration, photosynthesis, decomposition and combustion</p> <p><b>*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)</b></p>	<p>158</p> <p>158</p> <p>161</p> <p>159</p> <p>160</p>	
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