

## iGCSE Scheme of Work: Year 9

### Biology 9B Nutrition

Lesson Guide	Approx number of lessons
9B1: Nutrients and balanced diet	1
9B2: Biological molecules	1
9B3: Food tests	3
9B4: Nutrient deficiencies & malnutrition	1
9B5: Introduction to digestion and the alimentary canal	2
9B6: Mechanical digestion & Teeth	1
9B7: Chemical digestion	1
9B8: Small intestine and absorption	2
9B9: Large intestine and intestinal disease	1
9B10: Enzyme Function	1
9B11: Enzymes and Temperature	2
9B12: Enzymes and pH	1

**Red text:** LOs apply to coordinated supplementary

**Highlighted text:** LOs apply to single BIOLOGY **only**

Please use your discretion and teacher-judgement when deciding whether they apply to your Yr 9 sets (i.e. No need to teach highlighted sections to sets 3-5)

QE2	No of lessons	Syllabus Points / Learning objectives	Suggested Resources/practicals etc	Requisition	Literacy Options	PL
9B1	1	<p><b>B6.1 Diet</b></p> <p>1 State what is meant by the term balanced diet for humans</p> <p>2 List the principal sources of, and describe the dietary importance of carbohydrates, fats, proteins, vitamins, limited to C and D, mineral salts, limited to calcium and iron, fibre (roughage), and water</p> <p>Explain how age, gender and activity affect the dietary needs of humans including during pregnancy and whilst breast-feeding</p>	<p>Boardworks PPT &amp; WS</p> <p>Healthy eating PPT</p> <p>Example meals PPT (good plenary)</p> <p>Vit C Prac - Good activity with practical/investigation questions</p> <p>Boardworks PPT and WS</p> <p>Diet and health WS</p>			
9B2	1	<p><b>B3 Biological molecules</b></p> <p>1 List the chemical elements that make up:</p> <ul style="list-style-type: none"> <li>– carbohydrates</li> <li>– fats</li> <li>– proteins</li> </ul> <p>2 State that large molecules are made from smaller molecules, limited to:</p> <ul style="list-style-type: none"> <li>– starch and glycogen from glucose</li> <li>– proteins from amino acids</li> <li>– fats and oils from fatty acids and glycerol</li> </ul> <p>4 State that water is important as a solvent</p> <p>Describe the roles of water as a solvent in organisms with respect to digestion, excretion and transport</p> <p>Explain that different sequences of amino acids give different shapes to protein molecules</p> <p>Relate the shape and structure of protein molecules to their function, limited to the active site of enzymes and the binding site of antibodies</p>	<p>Proteins PPT</p>			
9B3	3	<p>3 Describe the use of:</p> <ul style="list-style-type: none"> <li>– iodine solution to test for starch</li> <li>– Benedict's solution to test for reducing sugars</li> <li>– biuret test for proteins</li> <li>– ethanol emulsion test for fats and oils</li> <li>– DCPIP test for vitamin C</li> </ul>	<p>Food detectives WS &amp; PPT</p> <p>Yr 9 food tests PPT</p>	<p>1. Benedicts solution, Biuret solution, Iodine solution, Ethanol, DCPIP, Various food items(atleast 4), 3 different fruit juices (varying levels of vitamin C), kettle.</p> <p>2. Benedicts solution, Biuret solution, Iodine solution,</p>		

				kettle.		
9B4	1	<p><b>B6.1 Diet</b></p> <p>4 Describe the effects of malnutrition in relation to starvation, constipation, coronary heart disease, obesity and scurvy</p> <p>5 Explain the causes and effects of vitamin D and iron deficiencies</p> <p>6 Explain the causes and effects of protein energy malnutrition, e.g. kwashiorkor and marasmus</p>				
9B5	2	<p><b>B6.2 Alimentary canal</b></p> <p>1 Define ingestion as the taking of substances, e.g. food and drink, into the body through the mouth</p> <p>2 Define digestion as the breakdown of large, insoluble food molecules into small, water soluble molecules using mechanical and chemical processes</p> <p>3 Define mechanical digestion as the breakdown of food into smaller pieces without chemical change to the food molecules</p> <p>4 Define chemical digestion as the breakdown of large, insoluble molecules into small, soluble molecules</p> <p>5 Define absorption as movement of digested food molecules through the wall of the intestine into the blood</p> <p>6 Define assimilation as the movement of digested food molecules into the cells of the body where they are used, becoming part of the cells</p> <p>7 Define egestion as passing out of food that has not been digested, as faeces, through the anus</p> <p>8 Identify the main regions of the alimentary canal and associated organs, including mouth, salivary glands, oesophagus, stomach, small intestine, pancreas, liver, gall bladder, large intestine and anus</p> <p>9 Describe the functions of the regions of the alimentary canal listed above, in relation to ingestion, digestion, absorption, assimilation and egestion of food</p>	<p>Boardworks PPT &amp; WS</p> <p>Nutrition questions and answers (Word doc)</p> <p>National Geographic video - link on PPT - very yukky and good!</p> <p>digestive system to label word doc</p>	Body model		
9B6	1	<p><b>B6.3 Digestion Core</b></p> <p>1 Identify the types of human teeth (incisors, canines, premolars and molars)</p> <p>2 Describe the structure of human teeth, limited to enamel, dentine, pulp, nerves and cement, as well as the gums</p> <p>3 Describe the functions of the types of human teeth in mechanical digestion of food</p> <p>4 Describe the proper care of teeth in terms of diet and</p>		skulls (carnivore, herbivore, human)		

		regular brushing 5 State the causes of dental decay in terms of a coating of bacteria and food on teeth, the bacteria respiring sugars in the food, producing acid which dissolves the enamel and dentine				
9B7	1	6 State the significance of chemical digestion in the alimentary canal in producing small, soluble molecules that can be absorbed 7 State the functions of enzymes as follows: – amylase breaks down starch to simpler sugars – protease breaks down protein to amino acids – lipase breaks down fats to fatty acids and glycerol 8 State where, in the alimentary canal, amylase, protease and lipase are secreted Describe the digestion of starch in the alimentary canal: – amylase is secreted into the alimentary canal and breaks down starch to maltose – maltose is broken down by maltase to glucose on the membranes of the epithelium lining the small intestine Describe pepsin and trypsin as two protease enzymes that function in different parts of the alimentary canal: – pepsin in the stomach – trypsin in the small intestine 9 State the functions of the hydrochloric acid in gastric juice, limited to killing bacteria in food and giving an acid pH for enzymes 10 Explain the functions of the hydrochloric acid in gastric juice, limited to the low pH: – denaturing enzymes in harmful microorganisms in food – giving the optimum pH for protease activity	Boardworks PPT & WS Digestive enzymes worksheet Enzymes of the digestive system starter - spot the mistakes Protease, lipase, amylase worksheets	Demo/Prac: starch, amylase, visking tubing, Benedicts, iodine, water bath (hot!)		
9B8	2	11 Outline the role of bile in neutralising the acidic mixture of food and gastric juices entering the duodenum from the stomach, to provide a suitable pH for enzyme action 12 Outline the role of bile in emulsifying fats to increase the surface area for the chemical digestion of fat to fatty acids and glycerol by lipase 13 Explain the significance of villi in increasing the internal surface area of the small intestine 14 Describe the structure of a villus 15 Describe the roles of capillaries and lacteals in villi	Boardworks PPT & WS	Emulsification bottles  Visking tubing, amylase, starch solution, paperclips/elastic bands, iodine solution, Benedicts solution		

9B9	1	<p>State that water is absorbed in both the small intestine and the colon, but that most absorption of water happens in the small intestine Describe diarrhoea as the loss of watery faeces Outline the treatment of diarrhoea using oral rehydration therapy</p> <p>Describe cholera as a disease caused by a bacterium Explain that the cholera bacterium produces a toxin that causes secretion of chloride ions into the small intestine, causing osmotic movement of water into the gut, causing diarrhoea, dehydration and loss of salts from blood</p>	Boardworks PPT & WS		
9B10	1	<p><b>B4 Enzymes</b></p> <p>1 Define enzymes as proteins that function as biological catalysts</p> <p>2 Explain enzyme action with reference to the complementary shape of the active site of an enzyme and its substrate and the formation of a product</p>	<p>Boardworks PPT &amp; WS</p> <p>Enzymes keywords PPT</p> <p>Enzyme starter PPT</p> <p>Enzymes research - ipads - check URLs are up to date</p> <p>Enzyme lock and key SWF</p> <p>Enzyme and digestion test word doc - good as HW?</p> <p>lock and key worksheet - for lower ability</p> <p>Enzyme structure PPT</p> <p>Enzyme catchphrase</p>		
9B11	2	<p>3 Investigate and describe the effect of changes in temperature and pH on enzyme activity</p> <p>4 Explain the effect of changes in temperature on enzyme activity, in terms of kinetic energy, shape and fit, frequency of effective collisions and denaturation</p>		Prac: Starch, amylase, water baths, iodine, spotting tiles, colorimeters	
9B12	1	<p>5 Explain the effect of changes in pH on enzyme activity in terms of shape and fit and denaturation</p>	Investigating catalase PPT	Prac: Catalase, hydrogen peroxide, pH buffers (various), filter paper discs, forceps, petri dishes	