

	Year 12 Biology					
	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
BIG Q Content (max 5) Please log into Seneca to support your child to understand this learning	<u>How does the structure and organisation of cells enable them to function, exchange materials and reproduce?</u> Describe what cell fractionation is and how ultracentrifugation works. Explain the differences between a transmission electron microscope and a scanning electron microscope- understanding the limitations of both. Describe the structure of eukaryotic and prokaryotic cells and how to distinguish between them. Describe the stages of the cell cycle and how mitosis is controlled. Explain the processes of diffusion, osmosis, active transport and co-transport. <u>What are the roles of carbohydrates and lipids in living organisms?</u> Explain bonding and the formation of molecules. Describe condensation and hydrolysis reactions. Describe the structure and function of carbohydrates. Describe the structure and function of lipids. Describe how to test a sample for the presence of different types of carbohydrates and lipids.	<u>How does the immune system recognise, respond to and remember pathogens to protect the body from disease?</u> Describe the main defence mechanisms of the body. Explain the process of phagocytosis and the role of lysosomes. Describe the two main types of lymphocytes: the role of T cells in cell-mediated immunity and B cells in humoral immunity. Describe the structure of monoclonal antibodies, how they are produced and what they are used to target. Describe the nature of vaccines. <u>What are the roles of proteins in living organisms?</u> Explain how amino acids are linked to form polypeptides. Explain the arrangement of bonds in each level of protein structure. Explain how enzymes speed up chemical reactions. Explain how temperature and pH affect the rate of enzyme controlled reactions. Describe how to test a sample for the presence of proteins.	<u>How does the need for efficient exchange of substances influence the structure and function of organisms?</u> Explain how the size of an organism relates to its surface area to volume ratio. Describe how single celled organisms exchange gases. Describe the structure of fish gills and how water is passed along fish gills. Describe how plants exchange gases and the adaptations to prevent excessive water loss. Describe the structure of the human gas-exchange system. <u>What are the roles of other molecules in living organisms?</u> Describe the structure of nucleotides, RNA and DNA. Explain how ATP can be used as an energy store. Describe the structure of a water molecule and explain the properties of water. Explain the importance of water molecules to living organisms. Describe the roles of inorganic ions.	<u>How are specialised biological systems adapted to maximise the uptake and absorption of substances required for metabolism?</u> Describe the mechanism of breathing and how pulmonary ventilation can be calculated. Describe the essential features of exchange surfaces linking to alveoli and risk factors for lung disease. Explain the role of enzymes in digestion of carbohydrates, lipids and proteins. Describe the structure of the ileum and how it is adapted for absorbing amino acids and triglycerides. <u>How does DNA provide instructions to code for proteins?</u> Describe what the genetic code is and its main features. Explain how pre-mRNA is produced from DNA in transcription. Describe how pre-mRNA is modified to mRNA. Explain how a polypeptide is synthesised during translation.	<u>How do specialised transport systems ensure that oxygen and other essential substances are delivered efficiently to meet the metabolic demands of different organisms?</u> Explain the difference between haemoglobins in different organisms and the reasons for these differences. Describe the nature of oxygen dissociation curves and the effect of carbon dioxide on this curve. Describe the features of transport systems of large organisms: including the circulatory system in mammals. Describe the stages of the cardiac cycle, linking to pressure changes and taking place in the heart during contraction. Describe the structures of arteries, arterioles and veins and explain they link to their function. <u>How does mutated DNA lead to natural selection?</u> Explain how deletion and substitution mutations result in altered primary structures of polypeptides. Explain why some mutations do not result in altered primary structures of polypeptides. Describe the process of meiosis and explain how	<u>How do plants transport materials throughout the organism, and what evidence supports our understanding of these transport mechanisms?</u> Define transpiration, using it to explain how water moves through a leaf including the cohesion-tension theory. Describe the mass flow mechanism for the transport of organic substances in the phloem and summarise the evidence against the mass flow mechanism. Describe the use of ringing and tracer experiments to investigate transport in plants. Recognising common themes between topics learnt, understanding the base knowledge and applying to explaining importance to essay questions. <u>How do similarities in characteristics between species provide evidence for evolution?</u> Explain the concept and difficulties of defining a species. Explain the principles of classification. Explain how developments in technology allow comparison of species. Describe the impact of agriculture on species diversity.

