

Year Group: 12	Subject: Biology	Term: Autumn 2021
Topic	Key Learning points	Assessment
<p>Biological molecules</p>	<p><i>End Point: To understand the structure, roles and tests for water, proteins, lipids and carbohydrates and how they relate to life. To understand the process of chromatography and how it can be used to identify amino acids</i></p> <ul style="list-style-type: none"> • Relate the bonding and other properties of water to the roles of water for living organisms (eukaryotes and prokaryotes) Role include – water as a solvent, a transport medium, a coolant and a habitat • Recall the symbols and roles for common inorganic ions • Describe the structure, function and role of carbohydrates and polysaccharides • Understand the structure, properties and function of triglycerides and phospholipids and cholesterol • Draw the general structure of an amino acid and know that there are 20 amino acids • Define the terms primary, secondary, tertiary and quaternary structure • Understand the role of hydrogen, ionic and disulphide bonding in determining the 3D shape of a protein • Describe the general properties and functions of globular proteins and fibrous proteins • Understand the difference between a reducing and non-reducing sugar. • Understand, carry out and interpret results for chemical tests • Analyse data to determine the concentration of different chemical substances • Understand the principles and uses of principles and uses of paper and thin layer chromatography to separate biological molecules and compounds. • Understand the processes of paper and thin layer chromatography to separate and analyse biological solutions. 	<p>Students will be formatively assessed during each topic by past paper questions completed in lesson time.</p> <ul style="list-style-type: none"> • Students will complete homework assignments as ongoing assessment of understanding. • Teachers will provide students with targeted feedback, based on their test performance.
<p>Enzymes</p>	<p><i>End Point: To understand the structure and function of enzymes including how they work and the factors that affect them.</i></p> <ul style="list-style-type: none"> • Recall that enzymes are globular proteins and that enzymes are catalysts and reduce activation energy • Describe the lock and key and induced fit hypothesis of enzyme action • Explain how enzyme specificity depends on the tertiary structure. • Identify the factors effecting enzyme action • Describe how to calculate rate of enzyme catalysed reactions • Explain how to calculate the temperature coefficient ($Q_{10} = R_1 / R_2$) • Be able to investigate the effect of different factors on enzyme action • Describe effect of different inhibitors on the rate of enzyme-controlled reactions • Understand the role and need of cofactors, coenzymes and prosthetic groups in enzyme-controlled reactions 	
<p>Classification and evolution</p>	<p><i>End Point: To understand classification of organisms, the process of evolution and the impact humans have on this including how this can be evaluated using statistical tests.</i></p> <ul style="list-style-type: none"> • Describe how we classify and name organisms using the taxonomic hierarchy of kingdom, phylum, class, order, family, genus and species AND domain. • Describe the evidence that has led to new classification systems, such as the three domains of life. • Describe the classification of organisms into the kingdoms: Prokaryotae, Protocista, Fungi, Plantae, Animalia. • Define interspecific and intraspecific variation 	

	<ul style="list-style-type: none"> • Describe the differences between continuous and discontinuous variation • Describe both genetic and environmental causes of variation • Explain why organisms from different taxonomic groups may show similar anatomical features • Explain how natural selection results in an increased proportion of the population possessing the advantageous characteristic(s). • Recall how the theory of evolution was developed by Darwin and Wallace including the evidence they had available and describe the evidence for the theory of evolution by natural selection • Describe how evolution in some species has implications for human populations • Describe standard deviation as a measure of the spread of a set of data • Use student's t-test to compare means of data values of two populations • Use the Spearman's rank correlation coefficient to consider the relationship of the data 	
Biodiversity	<p><i>End Point: To understand biodiversity, how it can be evaluated using statistical tests, the impacts humans have on it and how it can be conserved.</i></p> <ul style="list-style-type: none"> • Describe how to measure species richness and species evenness in a habitat • Use Simpson's Index of Diversity (D) to calculate the biodiversity of a habitat • Describe how sampling is used in measuring the biodiversity of a habitat and the importance of sampling • Describe practical procedures for collecting random and non-random samples in the field • Describe factors affecting biodiversity • Evaluate the ecological, economic and aesthetic arguments for maintaining biodiversity • Describe in situ and ex situ methods of maintaining biodiversity • Describe the international and local conservation agreements made to protect species and habitats. • Describe how genetic biodiversity can change through mutation, gene flow, selective breeding, natural selection, genetic bottlenecks, founder effect and genetic drift. • Explain how genetic biodiversity may be assessed using: $\text{proportion of polymorphic gene loci} = \frac{\text{number of polymorphic gene loci}}{\text{total number of loci}}$ 	
Biological membranes	<p><i>End Point: To understand the roles and structure of biological membranes and the processes that allow movement of biological molecules over them.</i></p> <ul style="list-style-type: none"> • Describe the fluid mosaic model of membrane structure • Describe the role of membranes within cells and at the cell surface • Explain how and why different factors effect membrane permeability • Investigate factors effecting membrane permeability and structure • Describe the transport of molecules across membranes using ATP as an immediate source of energy • Describe how different factors affect the rate of diffusion into model cells • Describe the process of osmosis • Explain the effect of water potential gradients on osmosis • Explain the effect of solutions with different water potential have on plant and animal cells • Investigate the effect of solution with different water potential on plant and animal cells 	