

Department	Biology
Key Stage	Key Stage 4
Course Level	GCSE
Exam Board	AQA

Unit	Title	Weighting	Examination Method
1-4	Paper 1	50%	External written exam
5-7	Paper 2	50%	External written exam

Unit Title	End Points	Substantive Knowledge What will they learn about in this topic?	Disciplinary Knowledge What subject concepts will be developed through this topic?	Assessment Method
Cell biology	Students will have developed a strong understanding of the components of cells and how they work together to create organs and organ systems.	<p>Cell structure: To be able to compare eukaryotic and prokaryotic cells. To explore the structure and functions of specialised cells To be able to culture microorganisms using aseptic techniques (required practical) To be able to apply knowledge of a microscope and calculate image size. To evaluate embryonic and adult stem cells.</p> <p>Cell division To be able to define mitosis. To be able to explain the different stages of the cell cycle.</p> <p>Transport in cells To be able to define and compare osmosis, diffusion and active transport.</p>	<p>Using scientific equipment to product results that are accurate and reliable. Calculating means and presenting data in a graph.</p> <p>Rearrange formulas and covert units.</p> <p>Drawing biological diagrams.</p>	End of unit test
Organisation	Students will develop a better understanding of how different organ systems work together to allow our body to function in a healthy manner. Students will also develop an idea of the different structures that help create a organ system within plants that are essential for plant growth and survival.	<p>Animal tissues, organs, organ systems To be able to define cells tissues organs and organ systems. To be able to explain how amylase, protease and lipase are involved in the digestive system. To explain how the structure of different organs allow them to do their role in the digestive system. To be able to describe how enzymes act as biological catalysts to speed up a reaction and the factors that affect rate of enzyme activity. To apply practical skills to investigate food groups and the effect of pH on the rate of reaction of amylase enzyme.</p>	<p>Continue to draw biological drawings. Develop AO1/AO2/AO3 exam technique. To use qualitative reagents. Use a continuous sampling technique to determine time taken to completely digest a starch solution at a range of pH values.</p>	End of unit test

		<p><u>Heart, blood, coronary heart disease</u> To describe the different components of blood and compare the different blood vessels. To identify the different parts of the heart and explain how deoxygenated blood becomes oxygenated. To explore lifestyle and medical risk factors that increase the risk of coronary heart disease and health issues.</p> <p><u>Plant tissues</u> To compare the structure and function of the xylem and phloem. To understand the role of different structures within the leaf.</p>		
Infection and response	Students will extend their knowledge of cells and discover the effect pathogens have within the body. Students will begin to explore how pathogens cause infectious diseases which can be treatment using various medicine and prevented using vaccinations. Students will understand that there is a race against 'super-bacteria to create a new set of effective antibiotics.	<p><u>Communicable disease</u> To define communicable and non-communicable diseases. To research viral, bacterial, fungal and protists diseases. To describe how these pathogens cause disease, how spread can be reduced and treated. To explain the defence systems of the human body against pathogens and if a pathogen enters the body the immune system tries to destroy the pathogen through white blood cells.</p> <p><u>Development of drugs and monoclonal antibodies</u> To explain the steps of vaccination and compare primary and secondary vaccination. To describe the discovery and development of drugs and the production of monoclonal antibodies.</p> <p><u>Plant diseases</u> To explore the different pathogens that cause plant diseases, how they spread, how they can be prevented and treated.</p>	Wider reading into current medical research. Understand the importance of peer reviewing research articles before they are published. Analysing graphs and describing trends. Developing a stronger understanding of command words through exam questions.	End of unit test
Bioenergetics	Students will begin to explore how the energy released by the sun allows the survival of plants and humans. Students will further develop this concept in year 10 when looking into the early atmosphere.	<p><u>Photosynthesis</u> To write the formula of photosynthesis, explore factors effecting the rate of photosynthesis and drawing graphs to explain limiting reactants.</p> <p><u>Respiration</u> To compare aerobic and anaerobic respiration. To explain the effect of exercise on the body. To describe metabolism.</p>	Solve simple algebraic equations. Use qualitative reagents to generate results to support ideas. Balancing equations.	End of unit test

<p>Extending and embedding units 1-4. Scientific investigation skills</p>		<p><u>Scientific investigation skills:</u> Students will be able to understand how scientific methods and theories develop over time. Students will be able to devise hypothesises, write plans, identify variables and record accurate observations and measurements. Students will be able to collect, analyse and present data.</p>	<p>Explain, with examples, why new data from experiments led to changes in models or theories. Recognise, draw and interpret diagrams. Making predictions or calculating quantities based on the model or show its limitations. Outlining simple ethical arguments about the rights and wrongs of a new technology.</p>	<p>End of year assessment</p>
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Homeostasis	Students will expand on their previous knowledge of specialised cells to understand how our body responds to change to protect us from danger and respond to different stimuli. They will engage in the concept of hormones that help control our body regulations. They will have greater in-depth knowledge on different medical procedures available to help them build that interest in various medical careers.	<p>Human nervous system</p> <p>To be able to define negative feedback. To describe how neurones are specialised for their function. To explain the reflect arc. To describe the role of synapses and neurotransmitters. To explain how the body responds to stimuli. Explore the reaction time required practical.</p> <p>Hormonal coordination in humans</p> <p>Students should be able to explain the control of blood glucose concentration, body temperature and water levels in the human body and the role hormones play in this. Describe the role of various glands involved in the endocrine system. Students should be able to compare the nervous response to the hormonal response. Students should be able to describe the action of thyroxine and adrenaline. Identify different parts of the brain and eye, and describe their functions. Describe the roles of hormones in human reproduction, including the menstrual cycle. Evaluate the effect of plant hormones.</p> <p>Plant hormones</p>	<p>Extract and interpret data from graphs, charts and tables. Translate information about reaction times between numerical and graphical forms. Develop practical skills and identifying control, dependent and independent variables. Developing AO3 skills.</p>	End of unit test

		<p>To investigate the effect of plant hormones and explore the usage of plant hormones in the wider world. Discuss both advantages and disadvantages of using plant hormones.</p>		
<p>Inheritance, variation and evolution</p>	<p>After being introduced to mitosis in year 9, students will now expand their interest in DNA by exploring how all living organisms on Earth are so unique even though they are composed of the same 4 base pairs. What is it that causes so much variation between us all? They will be able to develop an understanding on how scientists are currently using their understanding of DNA to genetically engineer products that can be of many uses.</p>	<p><u>Reproduction</u> Compare the similarities and differences between mitosis and meiosis. Describe the structure of DNA and define the genome. Understand how genetic information is passed to offspring. Students will recognise that random mutations can cause variation. Students will use punnett squares to predict the probability of gender. Students should be able to define keywords involved in genetic inheritance and create punnett squares to determine the presence of certain characteristics and genetic inheritance. They should also be able to predict the probability of a child inheriting an inherited disorder.</p> <p><u>Variation and evolution</u> Understand that variation can be caused by both environmental and genetic causes. Describe evolution as a change in the inherited characteristics of a population over time through a process of natural selection which may result in the formation of a new species. Explain the impact of selective breeding of food plants and domesticated animals. Describe genetic engineering and evaluate the potential risks and benefits of this procedure in agriculture and in medicine. Explain the different cloning processes.</p> <p><u>Genetics and evolution</u> Explore the research and findings of Charles Darwin. Discuss the theory of evolution by natural selection. Evaluate other theories presented by other scientists. Explore fossils and extinction. Explore Linnaeus's classification system and evolutionary trees.</p>	<p>Apply knowledge to punnett square diagrams. Create models to support learning. Convert between percentages and fractions. Understand and use direct proportion and simple ratios in genetic crosses. Apply knowledge to 6-mark exam questions and developing English written communication skills.</p>	<p>End of unit test</p>

<p>Ecology</p>	<p>Explore the idea that all species live in ecosystems composed of complex communities of animals and plants dependent on each other. Students will explore actions required to ensure our future health, prosperity and well-being.</p>	<p><u>Adaptations, interdependence and competition</u> Describe the different levels of organisation in an ecosystem and the importance of interdependence and competition in a community. Compare different abiotic and biotic factors. Discuss adaptations organisms have that allow them to live in their natural environments and survive in extreme conditions.</p> <p><u>Ecosystem</u> Use quadrats and transects to measure population size of a common species in a habitat – required practical. Describe food chains and food webs. Explain the important of the carbon and water cycles to living organisms. Explain how temperature, water and availability of oxygen affect the rate of decay of biological materials. Investigate the effect of temperature on the rate of decay of fresh milk by measuring pH changes – required practical.</p> <p><u>Biodiversity and trophic levels</u> Explain how waste, deforestation and global warming have an impact on biodiversity. Evaluate waste management and land use. Evaluate the environmental implications of deforestation. Describe some of the biological consequences of global warming. Describe the differences between the trophic levels of organisms within an ecosystem. Construct accurate pyramids of biomass from appropriate data. Calculate the efficiency of biomass transfers between trophic levels by percentages or fractions of mass. Gaining knowledge on farming techniques, sustainable fisheries and role of biotechnology.</p>	<p>Extract and interpret information from charts, graphs and tables. Understand the terms mean, mode and median. Calculating arithmetic means. Plotting and drawing appropriate graphs, whilst selecting appropriate scales for the axes. Interpret graphs used to model cycles. Calculating rate. Developing practical skills. Calculating efficiency of biomass transfer between trophic levels – percentages and fractions.</p>	
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