Biology A Level	Key Stage 5 Curriculum Plan	Year 12

Exam Board:	*AQA*
Qualification:	*GCE Biology 7402*
Assessment Information:	*Paper 1 (topics 1-4), Paper 2 (topics 5-8) and Paper 3 (synoptic paper + essay). Each exam is 120 minutes in length*
Link to official specification	

Department Information:

Physics, Biology and Chemistry are popular and successful subjects at Furze Platt. The Department aims to provide a supportive, stimulating, dynamic and academically challenging experience for all students. Over recent years, the Department has gone from strength to strength, and standards and students' results are high.

In Year 12, those students studying the Biology A-level course will receive 9 hours of Biology teaching per fortnight.

ACHIEVE in the curriculum:

The curriculum has been designed with the ACHIEVE values at its core. Lessons have been written to encourage ***ambition*** *and have also been written with the intent of being enjoyable and giving opportunities for students to celebrate their own successes.* ***Collaboration*** *is a key aspect of the scientific method and students will develop this and their* ***versatility*** *through required practical activities, as well as through paired and group classwork. Students will develop* ***integrity*** *through their completion of independent learning and through self-marking and peer-marking their work. Students will develop* ***endurance*** *through the completion of consolidatory activities such as past exam papers.*

Curriculum Aims and Intent:

The AQA A-level Biology course aims to develop students' knowledge and understanding of biological principles, as well as their practical and analytical skills. The curriculum is designed to prepare students for higher education or careers in scientific fields while fostering a passion for biology.

- ***Develop comprehensive biological knowledge*** *by providing a broad understanding of core biological concepts, including cell biology, biochemistry, genetics, ecology, physiology, and evolution.*
- ***Encourage application of knowledge*** *by equipping students with the ability to apply biological knowledge to new and unfamiliar contexts, including problem-solving and decision-making.*
- ***Enhance practical skills*** *by promoting proficiency in practical and experimental skills through hands-on lab work, encouraging students to develop scientific inquiry, observation, and measurement skills.*
- ***Develop analytical and critical thinking*** *by fostering by interpreting data, analysing trends, and evaluating the reliability of information from experiments or secondary sources.*
- ***Prepare for higher education and careers*** *by laying the foundation for further study in biology, biomedical sciences, or related fields, and prepare students for scientific and non-scientific careers by developing transferable skills such as data analysis and critical thinking.*

- ***Encourage scientific literacy and awareness*** *by enabling students to become scientifically literate and informed citizens, aware of the role of biology in addressing global issues such as health, sustainability, and conservation.*
- ***Instil a passion for Biology*** *by cultivating a deeper interest in the living world and an appreciation for the complexity and diversity of life.*

Resources: • *Summer transition work: HeadStart to A-level Biology (CGP Guide) ISBN-13:* ***978-1782942795*** • *Oxford University Press A-Level Biology textbook (available on Kerboodle and Amazon) ISBN-13:* ***978-0198351771*** • *Kerboodle https://kerboodle.com* • *PMT (for past paper questions) https://www.physicsandmathstutor.com/biology-revision/gcse-aqa/* • *Ms Estruch Biology: https://www.youtube.com/@MissEstruchBiology*
How we keep parents informed: *Year 12 - Progress reports are published 4 times per year, in October, January, March and July, with a face-to-face parents' evening in November.*
How parents can help their child: *Assist with filing and folder organisation* *Ensue that students are consolidating their learning after every lesson. Students should be spending at least 9 hours per fortnight consolidating their learning* *Ensuring that students are actively engaged with their learning through the regular use of mind maps, flash cards, blurting etc.* *Encourage the completion and marking of past paper questions* *Encourage students to explore beyond the specification (documentaries, podcasts, reading of scientific journals, keeping abreast of scientific developments in the news)* *Liaise with teachers and attend Parents' evening*

What we study and when:					
Term	**Unit, Topic or Summary of Work Covered**	**Knowledge, Understanding & Skills Developed**	**ACHIEVE / Personal Development Focus**	**How The Work Is Assessed**	**Careers Links**
1	**Maths Skills**	**Knowledge:** Students will learn key mathematical concepts relevant to biology, including handling data, interpreting graphs, statistical tests, and calculating magnitudes such as standard deviation, percentages, and rates. **Understanding:** Students will understand how mathematical principles apply to biological data, enabling them to analyse experimental results, make predictions, and assess the reliability and significance of findings using statistical tests like the chi-square or t-test. **Skills Developed:** • Interpreting and plotting graphs • Performing unit conversions • Using statistical tools for data analysis • Calculating ratios, percentages, and rates of reaction • Applying standard form and logarithmic scales in biological contexts	**Versatility** Maths skills are versatile tools that enable students to analyse biological data and make informed decisions. Mastering these skills empowers students to apply mathematical concepts across various biological contexts, enhancing their problem-solving capabilities.	End-of unit test	Data Analyst Data analysts use mathematical and statistical skills to interpret biological data, making informed decisions that can drive research and development in various fields, including healthcare and environmental science.
	Biological molecules	**Knowledge:** Students will learn about the structure, properties, and roles of key biological molecules, including carbohydrates, lipids, proteins, nucleic acids, and water. **Understanding:** Students will understand how the structure of these molecules relates to their function in biological processes such as energy storage, cell structure, and catalysis (enzymes). They will also explore the importance of molecular interactions in metabolism and cellular function. **Skills Developed:** • Identifying molecular structures • Explaining enzyme function and specificity • Investigating how different conditions affect enzyme activity • Performing biochemical tests for sugars, proteins, and lipids	As above but in a biological context: **Integrity** Understanding biological molecules reflects integrity as it emphasizes the essential role these molecules play in maintaining life. Students learn that accurate knowledge of molecular structures and functions is crucial for comprehending biochemical processes and	End-of unit test	Biochemist Biochemists study biological molecules and their interactions, contributing to drug development, genetic engineering, and understanding metabolic pathways that are crucial for health and disease management.

			their implications for health.		
	Nucleic acids	**Knowledge:** Students will learn about the structure and function of DNA and RNA, including nucleotide composition, base pairing, and the double helix structure. **Understanding:** Students will understand the role of nucleic acids in storing and transmitting genetic information, as well as their importance in protein synthesis (transcription and translation). They will explore DNA replication, mutations, and the regulation of gene expression. **Skills Developed:** • Analysing the structure of DNA and RNA • Explaining the processes of DNA replication, transcription, and translation • Investigating the effects of mutations on protein function • Extracting and analysing DNA	As above but in a biological context: **Ambitious** The study of nucleic acids represents an ambitious endeavour as students explore the complexities of genetic information storage and transfer. Grasping these concepts encourages a deeper appreciation of molecular biology and its impact on genetics and biotechnology.	End-of unit test	Geneticist Geneticists use knowledge of nucleic acids to help individuals understand genetic disorders and the implications of genetic testing, guiding them through informed health decisions.
2	**Cell structure**	**Knowledge:** Students will learn about the structure and function of eukaryotic and prokaryotic cells, including key organelles such as the nucleus, mitochondria, ribosomes, and chloroplasts, as well as the cell membrane. **Understanding:** Students will understand how the structure of cellular components relates to their roles in processes like protein synthesis, energy production, and transport. They will explore differences between plant, animal, and bacterial cells and the importance of cell specialization. **Skills Developed:** • Using microscopes to observe cell structures • Identifying organelles and their functions • Comparing eukaryotic and prokaryotic cells • Explaining cell specialization and differentiation	As above but in a biological context: **Collaborative** Cell structure illustrates collaboration, as various organelles work together to sustain cellular functions. Students learn how teamwork at the cellular level is crucial for the overall health and efficiency of an organism, emphasizing the interconnectedness of biological systems.	End-of unit test	Cell Biologist Cell biologists investigate cell structure and function, playing a critical role in research related to disease mechanisms, drug development, and regenerative medicine.

	Transport across membranes	**Knowledge:** Students will learn the mechanisms of transport across cell membranes, including diffusion, osmosis, facilitated diffusion, active transport, endocytosis, and exocytosis. **Understanding:** Students will understand how membrane structure (phospholipid bilayer, proteins) relates to the movement of substances. They will explore concentration gradients, water potential, and how energy is required for active transport, as well as the importance of selective permeability in maintaining homeostasis. **Skills Developed:** • Investigating factors affecting diffusion and osmosis • Analysing the role of carrier and channel proteins • Explaining active transport in maintaining ion balance • Performing experiments to measure membrane permeability	As above but in a biological context: **Endurance** Transport across membranes embodies endurance, highlighting the ongoing processes that maintain cellular homeostasis. Students discover how cells continuously regulate substance movement, illustrating the resilience and adaptability of life at the cellular level.	End-of unit test	Pharmacologist Pharmacologists study how substances cross cell membranes to design and improve drug delivery systems, enhancing the efficacy of treatments and understanding drug interactions.
3	**Organisms exchanging substances with their environment**	**Knowledge:** Students will learn how organisms exchange gases, nutrients, and waste with their surroundings through processes like diffusion, osmosis, and active transport. They will study adaptations in organisms for efficient exchange, such as surface area to volume ratio. **Understanding:** Students will understand the mechanisms of gas exchange in plants, humans, and aquatic organisms. They will explore transport systems like the circulatory system in animals and xylem and phloem in plants, as well as factors affecting the efficiency of exchange. **Skills Developed:** • Comparing gas exchange adaptations • Investigating factors affecting diffusion and osmosis • Analysing circulatory and respiratory systems • Applying knowledge to ecological and physiological contexts	As above but in a biological context: **Integrity** Understanding how organisms exchange substances with their environment emphasizes the importance of maintaining safe and healthy ecosystems. This knowledge fosters a sense of responsibility for environmental stewardship.	End-of unit test	Environmental Scientist Environmental scientists assess how organisms exchange substances with their environment to understand ecosystem health and the impact of pollutants, informing conservation efforts.
	Cell recognition and the immune system	**Knowledge:** Students will learn about the immune response, including the roles of antigens, antibodies, phagocytes, lymphocytes, and the distinctions between non-specific and specific immune defences.	As above but in a biological context: **Integrity**	End-of unit test	Immunologist Immunologists study the immune system, contributing to the development of vaccines,

		Understanding: Students will understand how the body recognizes self and non-self cells, the stages of the immune response (phagocytosis, antigen presentation, clonal selection), and how vaccines provide immunity. They will explore autoimmune diseases, pathogen evasion, and allergic reactions. **Skills Developed:** • Explaining the immune response stages • Analysing antigen-antibody interactions • Investigating the effectiveness of vaccines • Applying knowledge to immune disorders and pathogen defence strategies	Cell recognition and the immune system demonstrate integrity by showcasing the body's ability to distinguish between self and non-self. Understanding these processes reinforces the importance of a well-functioning immune system in maintaining health and preventing disease.		therapies for autoimmune diseases, and understanding infectious diseases.
4	**Mass transport**	**Knowledge:** Students will learn about mass transport systems in multicellular organisms, including the circulatory system in animals and the transport of water and nutrients in plants (xylem and phloem). **Understanding:** Students will understand how substances like oxygen, carbon dioxide, glucose, and water are transported over long distances efficiently. Topics include the structure and function of the heart, blood vessels, haemoglobin, and the mechanisms of transpiration and translocation in plants. **Skills Developed:** • Investigating factors affecting transpiration • Analysing heart structure and the cardiac cycle • Explaining the oxygen dissociation curve of haemoglobin • Conducting experiments on plant transport and circulatory systems	As above but in a biological context: **Collaborative** Mass transport systems exemplify collaboration, as they involve multiple organs and processes working together to distribute essential substances throughout an organism. Students learn how teamwork among different systems ensures efficient nutrient and gas transport.	End-of unit test	Biomedical Engineer Biomedical engineers design medical devices and technologies that improve mass transport systems in the body, such as artificial hearts or drug delivery systems
	Genes and protein synthesis	**Knowledge:** Students will learn about the structure and function of genes, including the genetic code, transcription, translation, and the roles of mRNA, tRNA, and ribosomes in protein synthesis. **Understanding:** Students will understand how the sequence of nucleotides in DNA determines the structure of proteins and the process of gene expression. They will explore the impact of	As above but in a biological context: **Ambition** The study of genes and protein synthesis reflects ambition, as it encompasses complex	End-of unit test	Molecular Biologist Molecular biologists study gene expression and protein synthesis, contributing to research in genetics, biotechnology, and pharmaceuticals.

		mutations on protein function and the regulation of gene expression. **Skills Developed:** • Analysing the steps of transcription and translation • Interpreting genetic code and predicting amino acid sequences • Investigating the effects of mutations on protein synthesis • Conducting experiments related to gene expression regulation	processes critical to understanding life at the molecular level. Students are encouraged to explore the intricacies of genetic expression and its implications for biotechnology and medicine		
5 + 6	**Genetic diversity**	**Knowledge:** Students will learn about the concept of genetic diversity within populations, including the sources of variation (mutation, sexual reproduction, gene flow) and its significance for evolution and adaptation. **Understanding:** Students will understand how genetic diversity contributes to the resilience of populations, the importance of conservation genetics, and the role of genetic drift and natural selection in shaping allele frequencies over time. **Skills Developed:** • Analysing population genetics data (e.g., Hardy-Weinberg principle) • Investigating the impact of environmental changes on genetic variation • Conducting experiments to study inheritance patterns • Evaluating the importance of biodiversity in ecosystems and conservation efforts	As above	End-of unit test	Conservation Biologist Conservation biologists work to preserve genetic diversity in populations, helping to protect endangered species and maintain ecosystem stability.
	Biodiversity	**Knowledge:** Students will learn about the different levels of biodiversity, including genetic, species, and ecosystem diversity. They will explore the importance of biodiversity for ecosystem stability, resilience, and services. **Understanding:** Students will understand the threats to biodiversity, such as habitat destruction, climate change, pollution, and invasive species. They will examine conservation strategies and the role of biodiversity in maintaining ecological balance and human well-being. **Skills Developed:** • Assessing biodiversity using sampling techniques (e.g., quadrats, transects) • Analysing data on species richness and abundance	As above but in a biological context: **Versatility** Biodiversity exemplifies versatility, as it encompasses a wide range of species and ecosystems that adapt to varying environmental conditions. Students appreciate how diverse biological systems	End- unit test	Ecologist Ecologists study biodiversity and its impact on ecosystems, providing insights that inform conservation strategies and sustainable resource management. of

		• Evaluating conservation efforts and their effectiveness • Understanding ecological interactions and their impact on biodiversity	contribute to ecosystem stability and resilience.		
	Energy and ecosystems	**Knowledge:** Students will learn about the flow of energy through ecosystems, including primary production, trophic levels, and energy transfer between organisms. They will study concepts such as biomass, food chains, and food webs. **Understanding:** Students will understand how energy is lost at each trophic level (e.g., through respiration, heat) and the implications for ecosystem structure and function. They will explore the significance of energy efficiency and the impact of human activities on energy flow in ecosystems. **Skills Developed:** • Constructing and interpreting food chains and food webs • Calculating energy transfer and efficiency between trophic levels • Investigating the effects of changes in energy availability on ecosystems • Analysing ecological pyramids (pyramid of numbers, biomass, energy)	As above but in a biological context: **Endurance** Energy flow through ecosystems highlights endurance, as it sustains life processes and ecological balance. Students learn how energy dynamics impact population growth and ecosystem stability, emphasizing the long-term resilience of ecological systems.	End-of unit test	Renewable Energy Scientist Renewable energy scientists explore energy flow in ecosystems, contributing to the development of sustainable energy solutions and understanding the ecological impacts of energy production.