

Science Curriculum Intent

Biology GCSE



At New Line Learning Academy, the Year 11 curriculum is designed to develop curious, analytical and scientifically literate students who understand the living world and their place within it. Through the study of Biology, Chemistry and Physics, students explore the complexity of life from microscopic cells to global ecosystems, developing an appreciation of how living organisms function, interact and evolve. The curriculum encourages students to ask questions, think critically and evaluate evidence, enabling them to make informed decisions about health, the environment and the scientific issues that shape modern society.

The curriculum begins with the fundamental building blocks of life, exploring cell structure, transport processes and biological organisation before progressing to the systems that enable organisms to survive and reproduce. Students investigate disease, immunity and medical advances before developing an understanding of photosynthesis, respiration and the transfer of energy through living systems. They then study homeostasis, genetics, evolution and ecology, recognising the interconnected nature of biological processes and the impact humans have on the natural world.

Throughout the curriculum, substantive knowledge is carefully sequenced alongside disciplinary knowledge. Students develop practical laboratory skills, learn to plan and evaluate investigations, interpret data, identify patterns, analyse graphs and apply mathematical techniques to biological contexts. They learn to think and communicate like scientists by constructing evidence-based explanations, evaluating the reliability of scientific evidence and applying their knowledge to unfamiliar situations.

The Biology curriculum places significant emphasis on the relevance of science beyond the classroom. Students explore contemporary issues including genetic engineering, stem cell research, vaccination, antibiotic resistance, conservation, biodiversity and climate change. These authentic connections encourage students to consider the ethical, social and environmental implications of scientific developments while recognising the important role Biology plays in improving lives and protecting our planet.

Learning is enriched through required practical investigations, retrieval practice, explicit vocabulary instruction, teacher modelling and opportunities for collaborative enquiry. Students are encouraged to become increasingly independent learners who can confidently explain complex biological concepts, interpret scientific evidence and solve problems using logical and critical thinking.

This means that all students leave the Biology curriculum able to:

- explain how living organisms are structured, function and interact at every level of organisation,
- apply biological knowledge confidently to unfamiliar scientific and real-world contexts,
- plan, carry out and evaluate practical investigations using appropriate scientific methods,
- analyse, interpret and evaluate biological evidence, data and graphical information,
- communicate scientific ideas accurately using precise biological vocabulary,
- understand the importance of Biology in medicine, healthcare, biotechnology and environmental conservation,
- appreciate the ethical, social and environmental implications of modern biological research, and

- develop the curiosity, resilience and critical thinking skills required for further study and future careers in science.

Topic 1

Topic



P5 – Forces



Big Picture

What are the main ideas and big questions in this topic?

Forces govern every movement in the universe, from the motion of planets and galaxies to the simple act of throwing a ball. Understanding how forces interact allows scientists and engineers to predict motion, design safer structures and vehicles, and develop technologies that improve everyday life. Whether constructing bridges, designing prosthetic limbs or launching spacecraft, the principles of forces underpin countless scientific and engineering achievements.

This enquiry introduces students to the fundamental concepts of forces, motion and interactions. Students investigate how forces can change the movement, shape or direction of objects, applying mathematical models and practical investigations to explain the world around them. By understanding how forces act and interact, students establish a foundation for later study of mechanics, engineering and advanced physics.



Zoom In

What knowledge, skills and key vocabulary will we learn step by step?

The enquiry begins by distinguishing between scalar and vector quantities, introducing students to the idea that some physical quantities have both magnitude and direction. Students develop the substantive knowledge needed to classify forces as contact or non-contact and explore how these forces influence the motion of objects in everyday situations.

Teacher modelling explicitly demonstrates how to represent forces using vector diagrams, free-body diagrams and force arrows. Students develop disciplinary knowledge by interpreting diagrams, making accurate measurements using force meters and analysing evidence collected during practical investigations.

Attention then turns to resultant forces, weight and gravity. Students investigate how balanced and unbalanced forces affect motion and apply mathematical relationships to calculate weight using gravitational field strength. Through practical activities, students analyse how friction, air resistance and normal contact forces influence movement, recognising how engineers minimise or exploit these forces in different contexts.

As the enquiry progresses, students explore motion, stopping distance and vehicle safety, interpreting distance-time and velocity-time graphs to explain changing motion. They investigate the factors affecting braking distance and reaction time, applying scientific understanding to evaluate road safety and real-world engineering challenges. Students also investigate momentum, recognising how conservation principles help explain collisions and inform the design of safer vehicles.

Throughout the enquiry, specialist vocabulary including force, vector, scalar, resultant, friction, air resistance, weight, mass, inertia, momentum, velocity and acceleration is explicitly taught and revisited through retrieval practice, practical investigation, mathematical application and extended scientific writing.

The enquiry concludes by challenging students to apply force calculations and graphical analysis to unfamiliar situations, combining mathematical reasoning with scientific evidence to explain motion confidently and accurately.

	Pre-Requisite Knowledge <i>What have we already learned that will help us with this topic?</i>		Pitch Up <i>How will we challenge ourselves?</i>
	Students build upon their Key Stage 3 understanding that forces can change the speed, direction and shape of objects. They also draw upon prior learning from the Energy enquiry, recognising that moving objects possess kinetic energy and that forces often transfer energy between different stores.		Students are challenged to move beyond describing movement by explaining <i>why</i> objects behave as they do using mathematical models and scientific reasoning. They interpret increasingly complex motion graphs, apply formulae confidently and evaluate engineering solutions designed to improve safety and performance. Stretch is embedded through multi-step calculations, graphical interpretation, momentum analysis and the application of force principles to unfamiliar real-world situations. Students are encouraged to think critically about how evidence, mathematics and experimentation combine to explain physical phenomena.
	Wider Framework <i>How does this learning connect to future topics and bigger goals?</i>		Curriculum Hinterland <i>What wider knowledge will deepen our understanding of this topic?</i>
	This enquiry forms part of the AQA GCSE Physics specification and provides the foundation for understanding mechanics, engineering and many applications of physics within the modern world. Students develop: • Substantive knowledge of forces, vectors, motion, gravity, momentum and stopping distances. • Disciplinary knowledge through practical investigation, mathematical modelling, graphical interpretation, data analysis and scientific evaluation. Students also strengthen mathematical fluency through equation manipulation and graph analysis whilst developing scientific literacy through evidence-based explanations.		Students explore the pioneering work of Sir Isaac Newton, whose Laws of Motion transformed our understanding of movement, alongside the contributions of Galileo Galilei, whose observations challenged long-held beliefs about motion and gravity. Students also investigate how force analysis underpins modern developments including Formula One engineering, aerospace technology, sports science, prosthetic limb design, robotics and earthquake-resistant buildings, recognising that physics continues to shape innovation across the world.
	Authentic connections <i>How does this topic connect to real life, careers, other subjects and important values?</i>		

The study of Forces enables students to understand the physical laws that govern every movement in the universe, from everyday actions to the motion of planets. Students develop spiritual understanding by recognising the remarkable consistency of the laws of physics and appreciating how a small number of scientific principles explain an extraordinary range of natural phenomena.

Social and cultural understanding develops through exploring how advances in force analysis have improved transport, sport, healthcare and infrastructure across the world. Moral understanding is strengthened as students evaluate how engineers use scientific knowledge to improve public safety through safer vehicles, buildings and protective equipment, considering the responsibility that accompanies scientific and engineering design.

This enquiry explicitly develops the following Skills Builder Universal Framework competencies:

- Teamwork – Students collaborate during practical investigations, sharing responsibilities and ensuring measurements are collected accurately and safely.
- Problem Solving – Students analyse forces acting on objects, interpret motion graphs and apply mathematical reasoning to explain unfamiliar situations.
- Leadership – Students organise investigations, support others during practical work and evaluate the reliability of experimental evidence.



This enquiry provides authentic insight into careers including:

- Mechanical Engineer – Designing machines, vehicles and mechanical systems that rely upon force analysis.
- Civil Engineer – Applying force calculations to design safe bridges, buildings and transport infrastructure.
- Sports Engineer – Improving sporting equipment and athlete performance through an understanding of motion and forces.

Students recognise that the mathematical reasoning, analytical thinking, collaboration and decision-making skills developed throughout this enquiry are highly transferable across engineering, technology, architecture and many wider professional sectors.

	Resources <i>What books, websites, videos and materials will support our learning?</i>		Assessment <i>How will we show what we know, remember and can apply?</i>
	Teaching and learning throughout this enquiry are supported through a range of practical, digital and contextual resources that develop scientific understanding through investigation and application. • Teacher modelling, live demonstrations and visualisers to explicitly teach vector diagrams, force calculations and graph interpretation. • Practical investigations using force meters, trolleys, ramps and motion equipment. • Data logging equipment and motion sensors to analyse speed, acceleration and force.		Students complete retrieval activities assessing prior understanding of simple forces, gravity and motion from Key Stage 3, identifying misconceptions that will be addressed throughout the enquiry. Students complete a practical investigation measuring forces or analysing motion, demonstrating their ability to collect reliable data, interpret graphs and evaluate the quality of evidence.

- Retrieval activities, dual-coded diagrams and subject-specific vocabulary displays.
- Simulations exploring balanced and unbalanced forces, momentum and vehicle safety.
- AQA GCSE Physics specification guidance and required practical resources.
- Digital resources including:
 - Oak National Academy Physics
 - BBC Bitesize GCSE Physics
 - Institute of Physics
 - National STEM Learning Centre
 - AQA GCSE Physics

Students complete a cumulative assessment requiring them to calculate forces, interpret motion graphs, explain momentum and evaluate real-world engineering scenarios using scientific reasoning.

XX% Substantive Knowledge

Students demonstrate knowledge and understanding of:

- Scalar and vector quantities.
- Contact and non-contact forces.
- Resultant forces and equilibrium.
- Weight, mass and gravitational field strength.
- Motion, stopping distances and momentum.
- Applications of force analysis in engineering and transport.

XX% Disciplinary Knowledge

Students demonstrate their ability to:

- Construct and interpret force diagrams.
- Plan, conduct and evaluate practical investigations.
- Analyse motion using distance-time and velocity-time graphs.
- Apply mathematical equations to solve problems involving forces and motion.
- Evaluate evidence and communicate scientific explanations using accurate terminology.
- Apply their understanding to unfamiliar contexts and justify conclusions using scientific reasoning.

Topic 2

Enquiry



C7 – Organic Chemistry



Big Picture

What are the main ideas and big questions in this topic?

Organic chemistry is the study of carbon-based compounds and underpins many aspects of modern life. From the fuels that power transport and the medicines that improve health to the plastics, cosmetics and textiles used every day, carbon chemistry has transformed society. This enquiry enables students to understand how the unique properties of carbon allow it to form an extraordinary variety of compounds and how chemists continue to develop new organic materials to meet the needs of an evolving world.

Students investigate hydrocarbons, crude oil, alkanes, alkenes, polymers and alcohols, developing an appreciation of how organic chemistry influences industry, medicine and sustainable development. Through scientific modelling, practical investigation and evidence-based reasoning, students explore both the benefits and challenges associated with the products of organic chemistry.

	Zoom In <i>What knowledge, skills and key vocabulary will we learn step by step?</i>
The enquiry begins by introducing carbon compounds, exploring why carbon is capable of forming such a vast range of substances. Students develop the substantive knowledge required to understand hydrocarbons, molecular formulae and structural representations, recognising how the arrangement of atoms determines the properties of organic compounds. Teacher modelling explicitly demonstrates how displayed formulae and structural diagrams help chemists visualise molecules that cannot be observed directly. Students develop disciplinary knowledge by interpreting molecular models, analysing chemical structures and explaining how evidence supports the classification of different organic compounds. Practical modelling and investigative activities encourage students to identify patterns, compare structures and justify conclusions using scientific evidence. Attention then turns to crude oil and fractional distillation, where students investigate how crude oil is separated into useful fractions based on boiling point. They explore the properties and uses of hydrocarbons, comparing alkanes and alkenes and explaining how molecular structure influences reactivity. As the enquiry progresses, students investigate cracking, polymers and alcohols, evaluating how chemists convert less useful hydrocarbons into more valuable products. They explore the development of plastics, synthetic materials and alternative fuels, considering both the advantages these materials provide and the environmental challenges associated with their production and disposal. Throughout the enquiry, specialist vocabulary including hydrocarbon, alkane, alkene, crude oil, fractional distillation, cracking, polymer, monomer, saturated, unsaturated and alcohol is explicitly taught and revisited through retrieval practice, molecular modelling, practical investigation and extended scientific writing. The enquiry concludes by challenging students to explain how the structure of carbon compounds determines their properties and how organic chemistry continues to shape modern technology, healthcare and sustainable innovation.	
	Pre-Requisite Knowledge <i>What have we already learned that will help us with this topic?</i>
Students build upon their understanding of atomic structure, chemical bonding and energy changes developed throughout C1–C6. They apply their knowledge of covalent bonding and molecular structure to explain the behaviour of carbon compounds and their applications within everyday life and industry.	
	Pitch Up <i>How will we challenge ourselves?</i>
Students are challenged to move beyond identifying different organic compounds by explaining how molecular structure influences physical properties, chemical behaviour and practical applications. They evaluate the advantages and disadvantages of different fuels, polymers and synthetic materials, applying scientific reasoning to environmental and industrial contexts.	

		Stretch is embedded through interpreting structural formulae, comparing reaction pathways, explaining polymerisation and evaluating the role of organic chemistry in addressing sustainability challenges. Students are encouraged to appreciate the balance between technological progress and environmental responsibility.	
	Wider Framework <i>How does this learning connect to future topics and bigger goals?</i>		Curriculum Hinterland <i>What wider knowledge will deepen our understanding of this topic?</i>
This enquiry forms an important component of the AQA GCSE Chemistry specification and develops students' understanding of the chemistry that underpins modern manufacturing, medicine and environmental science. Students develop: • Substantive knowledge of hydrocarbons, crude oil, alkanes, alkenes, polymers, alcohols and organic reactions. • Disciplinary knowledge through scientific modelling, practical investigation, evidence evaluation, structural interpretation and analytical reasoning. Students strengthen scientific literacy by interpreting molecular diagrams, evaluating environmental evidence and communicating complex scientific ideas using accurate terminology.		Students explore the pioneering work of Friedrich Wöhler, whose synthesis of urea challenged existing ideas about organic compounds, alongside Leo Baekeland, whose invention of Bakelite revolutionised the development of synthetic plastics. The enquiry also investigates contemporary developments including biodegradable plastics, sustainable aviation fuels, biofuels, recyclable polymers, pharmaceutical chemistry and green chemistry, demonstrating how organic chemistry continues to drive innovation whilst responding to global environmental challenges.	
	Authentic connections <i>How does this topic connect to real life, careers, other subjects and important values?</i>		
The study of Organic Chemistry enables students to appreciate how carbon compounds have transformed almost every aspect of modern life. Students develop spiritual understanding by recognising the remarkable versatility of carbon and reflecting on how a single element can form the immense variety of substances that support life and modern civilisation. Social and cultural understanding develops through exploring how organic chemistry has improved healthcare, food production, transport and manufacturing across the world. Moral understanding is strengthened as students evaluate the environmental impact of fossil fuels, plastics and waste, considering how chemists are developing more sustainable materials and cleaner technologies for future generations. This enquiry has strong links with Geography, where students explore fossil fuels, finite resources and the environmental consequences of resource extraction. It supports Design and Technology through the study of polymers, materials and product design, whilst reinforcing Citizenship through consideration of environmental responsibility, sustainability and ethical consumer choices. Students also develop English skills by evaluating evidence and constructing balanced scientific arguments.			

This enquiry explicitly develops the following Skills Builder Universal Framework competencies:

- Creativity – Students apply their understanding of molecular structure to evaluate new materials and propose sustainable alternatives.
- Speaking – Students communicate scientific explanations and debate the benefits and challenges associated with organic products and fuels.
- Teamwork – Students collaborate during molecular modelling, practical investigations and problem-solving activities to refine scientific understanding.

This enquiry provides authentic insight into careers including:

- Petrochemical Engineer – Developing fuels, lubricants and industrial chemicals.
- Polymer Chemist – Designing plastics, biodegradable materials and advanced composites.
- Pharmaceutical Chemist – Developing medicines through the synthesis and modification of organic compounds.



Students recognise that the analytical thinking, scientific communication and problem-solving developed throughout this enquiry are highly transferable across chemistry, medicine, engineering, manufacturing and environmental science.

 Resources <i>What books, websites, videos and materials will support our learning?</i>	 Assessment <i>How will we show what we know, remember and can apply?</i>
Teaching and learning throughout this enquiry are supported through a range of practical, digital and contextual resources that develop scientific understanding through modelling, investigation and application. • Teacher modelling, live demonstrations and visualisers to explicitly teach molecular structures and organic reactions. • Molecular model kits, hydrocarbon modelling and polymer demonstrations. • Practical investigations exploring combustion, cracking and the properties of hydrocarbons. • Retrieval activities, dual-coded diagrams and subject-specific vocabulary displays. • Case studies exploring sustainable plastics, biofuels and pharmaceutical development. • AQA GCSE Chemistry specification guidance. • Digital resources including: ○ Cognito ○ Kerboodle	Students complete retrieval activities assessing prior understanding of covalent bonding, molecular structure and energy changes. Diagnostic questioning identifies misconceptions about carbon compounds before new learning begins. Students interpret structural formulae, compare hydrocarbons and explain the separation of crude oil through fractional distillation. They analyse evidence and justify conclusions using molecular models and scientific reasoning. Students complete a cumulative assessment requiring them to explain the structure, properties and uses of organic compounds, evaluate environmental impacts and apply their understanding to unfamiliar industrial and sustainability contexts. XX% Substantive Knowledge Students demonstrate knowledge and understanding of: • Hydrocarbons and carbon compounds. • Crude oil and fractional distillation. • Alkanes and alkenes. • Cracking and its industrial importance. • Polymerisation and polymers. • Alcohols and their properties.

- BBC Bitesize GCSE Chemistry
- Oak National Academy
- Royal Society of Chemistry

- The environmental impact of organic products and fuels.
- XX% Disciplinary Knowledge**
Students demonstrate their ability to:
- Interpret structural and displayed formulae.
 - Explain how molecular structure influences physical and chemical properties.
 - Analyse scientific evidence relating to organic chemistry and sustainability.
 - Evaluate the advantages and disadvantages of fuels, polymers and synthetic materials.
 - Apply scientific understanding to unfamiliar organic chemistry contexts.
 - Communicate scientific explanations using accurate subject-specific vocabulary and justified scientific reasoning.

Topic 3

Topic



B5 Homeostasis and Response



Big Picture

What are the main ideas and big questions in this topic?

Cells can only survive within narrow physical and chemical limits. Throughout this topic, students investigate how the body maintains these stable internal conditions through homeostasis, using complex control systems that continually monitor and respond to changes within the internal environment.

Students explore the structure and function of the nervous and endocrine systems, investigating how they coordinate rapid and long-term responses. They examine the regulation of body temperature, blood glucose concentration and water balance before exploring the hormonal control of reproduction and plant responses. Through these investigations, students appreciate how homeostasis enables organisms to survive, reproduce and respond successfully to changing environments.



Zoom In

What knowledge, skills and key vocabulary will we learn step by step?

Students begin by investigating homeostasis, exploring why stable internal conditions are essential for life and how receptors, coordination centres and effectors work together as control systems. They compare the roles of the nervous and endocrine systems before investigating the structure and function of neurones, synapses and reflex actions.

Students then investigate the brain and the eye, exploring how different regions of the brain coordinate behaviour and how the eye detects and focuses light. Practical investigations develop students' understanding of reaction time, reflexes and body temperature regulation through the application of scientific enquiry and data analysis.

The topic continues with hormonal coordination, where students investigate the regulation of blood glucose concentration, diabetes, kidney function and water balance through negative feedback mechanisms. They explore the role of insulin, glucagon and ADH before evaluating modern treatments including dialysis, kidney transplantation and advances in diabetes management.

Students conclude by investigating human reproduction and plant hormones, exploring the menstrual cycle, fertility treatments, contraception and the hormonal control of plant growth. Required practical investigations allow students to evaluate plant responses to environmental stimuli and interpret biological evidence.

Core Knowledge (Substantive)

Students develop secure knowledge and understanding of:

- homeostasis and control systems
- the nervous system and reflex actions
- synapses and reaction time
- the structure and function of the brain
- the structure and function of the eye
- thermoregulation
- blood glucose regulation and diabetes
- kidney function and osmoregulation
- hormonal control of reproduction
- contraception and fertility treatments
- plant hormones and tropisms.

Working Scientifically (Disciplinary)

Students develop their ability to:

- investigate human reaction time
- carry out required practical investigations safely
- interpret graphs and physiological data
- analyse quantitative biological evidence
- evaluate medical treatments and scientific research
- apply biological knowledge to unfamiliar contexts
- communicate scientific explanations using accurate biological terminology.

Key Vocabulary: homeostasis, receptor, coordinator, effector, neurone, synapse, reflex, stimulus, response, cerebrum, cerebellum, medulla, accommodation, endocrine system, hormone, insulin, glucagon, ADH, osmoregulation, negative feedback, diabetes, dialysis, kidney, menstruation, fertility, contraception, auxin, gibberellin, ethene, tropism

	Pre-Requisite Knowledge <i>What have we already learned that will help us with this topic?</i>		Pitch Up <i>How will we challenge ourselves?</i>
	Students should already understand biological organisation, respiration and metabolism, together with the structure of major organ systems studied in B2 and B4. They should understand that enzymes control metabolic reactions and that cells require stable conditions to function effectively. Students should also have experience of practical investigations, analysing graphs and interpreting scientific evidence. This prior learning provides the foundation for understanding how homeostasis maintains stable internal conditions.		Pupils are expected to attend science lessons on time, well equipped, ready to take risks and be active learners. To stretch pupils' knowledge of homeostasis and response, teachers elevate learning by connecting biological mechanisms to real-world scenarios, encouraging critical thinking, and promoting systems-level understanding. Using with layered questioning; such as "How does the body respond to extreme temperature changes?" or "Why is negative feedback essential for survival?", which helps pupils to move beyond memorization and into reasoning. Teachers can utilise case studies like diabetes management or reflex actions in emergencies to show how homeostasis operates in daily life.
	Wider Framework <i>How does this learning connect to future topics and bigger goals?</i>		Curriculum Hinterland <i>What wider knowledge will deepen our understanding of this topic?</i>
	Understanding homeostasis and response provides the foundation for further study of genetics, inheritance, evolution and ecology, whilst reinforcing many concepts introduced in earlier GCSE Biology topics. Students build upon their understanding of biological organisation, respiration and metabolism to explain how organisms maintain stable internal conditions and respond to changes in their environment. Throughout the topic, students continue to develop the analytical, mathematical and practical skills required for GCSE examinations and further scientific study. The practical investigations undertaken throughout this topic strengthen students' ability to interpret scientific evidence, analyse physiological data, evaluate experimental methods and communicate scientific conclusions using accurate biological terminology.		Historical breakthroughs: ○ The discovery of insulin and its impact on diabetes treatment. ○ The story of Phineas Gage and how brain injury revealed functions of the cerebral cortex. ○ Early experiments on reflexes and the nervous system. Scientific intrigue: ○ The ethical debates around IVF and fertility treatments. ○ How adrenaline prepares the body for "fight or flight" and its role in extreme sports. ○ The use of brain imaging (MRI, EEG) to study neurological disorders. Real-world relevance: ○ Case studies of diabetes management and lifestyle interventions. ○ How reaction time is affected by drugs, fatigue, and distractions linked to driving safety. ○ The role of hormones in puberty, mood, and behaviour. Cross-curricular links: ○ Psychology: brain function and behaviour. ○ PE: effects of exercise on heart rate and thermoregulation.

	○ RWV - Ethics: debates around fertility, contraception, & hormone treatments.
	Authentic connections <i>How does this topic connect to real life, careers, other subjects and important values?</i>
Understanding homeostasis and response enables students to explain how living organisms maintain stable internal conditions, coordinate responses to environmental change and regulate essential life processes. Knowledge of the nervous system, hormones and homeostatic control underpins modern medicine, neuroscience, endocrinology and agriculture, helping students appreciate how biological research continues to improve healthcare, wellbeing and food production. SMSC is developed through curiosity, responsibility and ethical awareness as students evaluate evidence relating to diabetes treatment, fertility technologies, organ transplantation and reproductive health. Students consider how scientific advances improve quality of life whilst raising important moral, social and economic questions. Cross-curricular links include Chemistry through hormones and biochemical regulation, Mathematics through analysing physiological data, reaction times and graphical information, Physical Education through exercise physiology and thermoregulation, PSHE through health, relationships and reproduction, and Geography through crop production and sustainable agriculture. Students explore careers including: ○ Endocrinologist – diagnosing and treating disorders involving hormones and the endocrine system. ○ Clinical Neuroscientist – investigating how the brain and nervous system control behaviour and body functions. ○ Embryologist – supporting fertility treatments and reproductive medicine through laboratory research and clinical practice. The topic supports the Skills Builder Universal Framework, particularly: • Listening through evaluating scientific evidence and considering ethical viewpoints. • Planning through organising practical investigations and interpreting physiological evidence. • Problem Solving through applying biological knowledge to unfamiliar medical, environmental and agricultural contexts.	
	 Resources <i>What books, websites, videos and materials will support our learning?</i>
At New Line Learning Academy, we are committed to equipping our pupils with high-quality resources that extend learning beyond the classroom and empower them to take ownership of their scientific journey. To enrich and consolidate understanding, pupils have access to a range of carefully selected digital platforms and learning tools: • Cognito (https://cognitoedu.org/home) – Offers engaging video tutorials, concise notes, and practice questions tailored to support mastery of	Assessment <i>How will we show what we know, remember and can apply?</i> Assessment takes place throughout the enquiry through retrieval practice, required practical investigations, questioning, examination-style questions and independent application tasks. Students demonstrate their understanding by explaining how homeostasis maintains stable internal conditions, interpreting physiological data, analysing hormonal and nervous responses, evaluating treatments and communicating scientific ideas using accurate biological terminology.



scientific concepts across Key Stage 3 and beyond.

- BBC Bitesize (<https://www.bbc.co.uk/bitesize/levels/z4kw2hv>) – Provides accessible explanations, interactive activities, and revision materials, helping pupils consolidate learning and revisit key topics independently.
 - Sparx Science – www.sparx-learning.com – the platform used for science homework which will be set each week and provide topics from two weeks previously. The expectation is that pupils will have 100% completion and 100% success
 - Kerboodle (<https://www.kerboodle.com/users/login>) – Supports the curriculum with digital textbooks, assessments, and interactive resources aligned to national specifications, offering pupils and teachers a wealth of high-quality materials.
- These resources not only reinforce classroom learning but also foster curiosity, independence, and confidence, ensuring every pupil can thrive and deepen their scientific understanding at their own pace.

XX% Substantive Knowledge

Students demonstrate secure understanding of homeostasis, the nervous system, reflexes, hormones, the endocrine system, blood glucose regulation, the kidneys, the brain and human reproduction.

XX% Disciplinary Knowledge

Students apply practical and investigative skills by interpreting experimental and physiological data, analysing patterns, evaluating scientific evidence, applying biological knowledge to unfamiliar contexts and constructing evidence-based scientific explanations.

Topic 4

Enquiry



P6 – Waves



Big Picture

What are the main ideas and big questions in this topic?

Waves allow us to experience, observe and communicate with the world around us. From hearing conversations and enjoying music to seeing colour, diagnosing illness with ultrasound and communicating through fibre optic cables, waves are fundamental to modern life. Understanding how waves transfer energy without transferring matter enables scientists to explain natural phenomena and develop technologies that have transformed medicine, communication, astronomy and engineering.

This enquiry introduces students to the behaviour of mechanical and electromagnetic waves, exploring how they are produced, how they interact with matter and how they can be used to solve real-world problems. Through practical investigation and mathematical analysis, students develop an understanding of wave behaviour that underpins future study of optics, telecommunications and modern physics.



Zoom In

What knowledge, skills and key vocabulary will we learn step by step?

The enquiry begins by introducing waves as a means of transferring energy. Students develop the substantive knowledge needed to distinguish between transverse and longitudinal waves, recognising how energy travels whilst particles oscillate in different ways. They explore the key properties of waves, including amplitude, wavelength, frequency and wave speed, applying these concepts to familiar contexts such as sound, water and light.

Teacher modelling explicitly demonstrates how wave diagrams, graphs and mathematical relationships are used to represent wave behaviour accurately. Students develop disciplinary knowledge by measuring wave properties, interpreting graphical data and applying equations to calculate wave speed. Practical investigations encourage students to identify variables, record reliable observations and evaluate the quality of experimental evidence.

Attention then turns to the behaviour of waves as they undergo reflection, refraction and absorption. Students investigate how waves interact with different materials and explain these interactions using scientific models. They explore sound waves and hearing, considering how loudness and pitch are determined and investigating the limitations of human hearing alongside the wider applications of ultrasound.

As the enquiry progresses, students investigate the electromagnetic spectrum, comparing the properties, uses and potential risks of each region. They evaluate how different electromagnetic waves are applied within medicine, communication, astronomy and security, recognising that scientific understanding has enabled remarkable technological developments. Mathematical analysis and interpretation of data enable students to compare wavelengths, frequencies and energies across the spectrum.

Throughout the enquiry, specialist vocabulary including wave, amplitude, wavelength, frequency, transverse, longitudinal, reflection, refraction, diffraction, electromagnetic spectrum, ultrasound and radiation is explicitly taught and revisited through retrieval practice, practical investigation, discussion and extended scientific writing.

The enquiry concludes by challenging students to explain unfamiliar wave phenomena using mathematical reasoning and scientific evidence, recognising how a single scientific model explains an enormous range of natural and technological processes.



Pre-Requisite Knowledge

What have we already learned that will help us with this topic?

Students build upon their understanding of energy transfer developed in the Energy enquiry and their knowledge of particle behaviour from the Particle Model of Matter. They have previously encountered simple ideas about sound and light at Key Stage 3 and are now ready to explain these phenomena using more sophisticated scientific models and mathematical relationships.



Pitch Up

How will we challenge ourselves?

Students are challenged to move beyond identifying different types of waves by explaining how and why they behave using scientific models, mathematical calculations and experimental evidence. They interpret unfamiliar wave diagrams, compare different regions of the electromagnetic spectrum and justify the suitability of waves for specific technological applications.

Stretch is embedded through wave speed calculations, graphical interpretation and the evaluation of competing technologies that utilise electromagnetic radiation. Students are encouraged to think critically about how scientific understanding of waves continues to drive innovation across medicine, communication and space exploration.

	Wider Framework <i>How does this learning connect to future topics and bigger goals?</i>		Curriculum Hinterland <i>What wider knowledge will deepen our understanding of this topic?</i>
	This enquiry forms part of the AQA GCSE Physics specification and provides the foundation for further study of optics, electromagnetism and modern communication technologies. Students develop: • Substantive knowledge of wave properties, sound, light and the electromagnetic spectrum. • Disciplinary knowledge through practical investigation, mathematical analysis, graphical interpretation, modelling and evidence-based scientific reasoning. Students also strengthen mathematical fluency through calculations involving wave speed, frequency and wavelength whilst developing scientific literacy through explanation, evaluation and communication.		Students explore the work of scientists including Christiaan Huygens, James Clerk Maxwell and Heinrich Hertz, whose discoveries transformed our understanding of wave behaviour and electromagnetic radiation. The enquiry also explores contemporary applications including fibre optic communications, MRI scanners, ultrasound imaging, satellite technology, Wi-Fi, mobile networks and space telescopes, demonstrating how wave physics continues to shape the modern world.
	Authentic connections <i>How does this topic connect to real life, careers, other subjects and important values?</i>		
	The study of Waves encourages students to appreciate how invisible processes allow us to communicate, observe distant galaxies and diagnose disease. Students develop spiritual understanding by recognising the extraordinary ways in which energy travels across vast distances, allowing humanity to explore the universe and understand phenomena that cannot be experienced directly. Social and cultural understanding develops through exploring how communication technologies have transformed education, healthcare and global connectivity. Moral understanding is strengthened by evaluating the responsible use of electromagnetic radiation, balancing the enormous benefits of technologies such as medical imaging with the importance of minimising unnecessary exposure to harmful radiation. This enquiry explicitly develops the following Skills Builder Universal Framework competencies: • Creativity – Students apply scientific ideas to explain unfamiliar wave phenomena and evaluate innovative technological applications. • Listening – Students interpret demonstrations, practical observations and scientific explanations to refine their understanding of complex wave behaviour. • Speaking – Students communicate scientific explanations, justify the most appropriate uses of different electromagnetic waves and evaluate evidence using accurate scientific vocabulary. This enquiry provides authentic insight into careers including: ○ Acoustic Engineer – Designing environments and technologies that control and improve sound. ○ Medical Imaging Specialist – Using ultrasound, MRI and other wave-based technologies to diagnose and monitor disease.		



- Telecommunications Engineer – Developing fibre optic networks, satellite communications and wireless technologies that connect people across the globe.

Students recognise that the analytical thinking, scientific communication and mathematical reasoning developed throughout this enquiry are highly transferable across science, engineering, healthcare and technology.

 Resources <i>What books, websites, videos and materials will support our learning?</i>	 Assessment <i>How will we show what we know, remember and can apply?</i>
Teaching and learning throughout this enquiry are supported through a range of practical, digital and contextual resources that develop scientific understanding through investigation, modelling and application. • Teacher modelling, live demonstrations and visualisers to explicitly teach wave behaviour, graphical interpretation and mathematical calculations. • Practical investigations using ripple tanks, slinkies, tuning forks, ray boxes, lenses and wave simulation software. • Oscilloscopes, sound meters and optical equipment to investigate sound and light. • Retrieval activities, dual-coded diagrams and subject-specific vocabulary displays. • Case studies exploring medical imaging, telecommunications and astronomy. • AQA GCSE Physics specification guidance and required practical resources. • Digital resources including: ○ Oak National Academy Physics ○ BBC Bitesize GCSE Physics ○ Institute of Physics ○ National STEM Learning Centre ○ AQA GCSE Physics	Students complete retrieval activities assessing prior understanding of sound, light and energy transfer, identifying misconceptions about wave movement and wave properties before new learning begins. Students complete a practical investigation measuring wave speed or investigating reflection and refraction. They collect and analyse data, identify variables and explain their findings using scientific models and mathematical calculations. Students complete a cumulative assessment requiring them to explain wave behaviour, calculate wave speed, interpret graphical data and evaluate the uses and limitations of different regions of the electromagnetic spectrum. XX% Substantive Knowledge Students demonstrate knowledge and understanding of: • Transverse and longitudinal waves. • Wave properties, including wavelength, frequency, amplitude and wave speed. • Reflection, refraction and diffraction. • Sound waves and hearing. • The electromagnetic spectrum and its applications. • Risks and benefits associated with different forms of electromagnetic radiation. XX% Disciplinary Knowledge Students demonstrate their ability to: • Interpret wave diagrams, graphs and scientific models. • Plan, conduct and evaluate practical investigations involving waves.

- Apply mathematical equations to calculate wave speed, frequency and wavelength.
- Analyse experimental data and identify patterns.
- Evaluate the suitability of different wave technologies using scientific evidence.
- Communicate scientific explanations using precise subject-specific vocabulary.

Topic 5

Enquiry



C8 – Chemical Analysis



Big Picture

What are the main ideas and big questions in this topic?

Chemists must be able to identify substances accurately to ensure medicines are safe, drinking water is clean, food meets quality standards and industrial products perform as expected. Chemical analysis provides the techniques needed to identify unknown substances, monitor pollution and investigate the composition of materials. This enquiry enables students to understand how scientists use both traditional laboratory techniques and modern analytical methods to investigate the chemical world with accuracy and confidence.

Students investigate methods of identifying pure substances, analysing mixtures and testing for ions and gases. Through practical investigation, careful observation and scientific reasoning, students develop the knowledge and skills required to evaluate evidence and draw reliable conclusions from chemical testing.



Zoom In

What knowledge, skills and key vocabulary will we learn step by step?

The enquiry begins by exploring the concept of chemical analysis, investigating why chemists need reliable methods to identify substances. Students develop the substantive knowledge required to distinguish between pure substances and mixtures, understanding how melting point and boiling point data can be used to assess purity. Teacher modelling explicitly demonstrates how scientific observations must be interpreted carefully to produce valid conclusions.

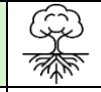
Students develop disciplinary knowledge through practical investigations using laboratory techniques to identify unknown substances. They learn to observe carefully, record evidence systematically and evaluate the reliability of experimental results. Practical work reinforces the importance of accuracy, precision and safe laboratory practice.

Attention then turns to chromatography and chemical testing, where students investigate how mixtures can be separated and analysed. They explore paper chromatography, calculate R_f values and interpret chromatograms to identify substances. Students also investigate flame tests, gas tests and tests for positive and negative ions, applying structured investigative techniques to solve chemical problems.

As the enquiry progresses, students evaluate the strengths and limitations of different analytical methods, recognising that chemists often combine several techniques to improve reliability and accuracy. They consider how analytical chemistry supports medicine, forensic science, environmental monitoring and industrial quality control.

Throughout the enquiry, specialist vocabulary including chromatography, chromatogram, Rf value, pure substance, mixture, precipitate, flame test, ion, qualitative analysis and analytical technique is explicitly taught and revisited through retrieval practice, practical investigation, teacher modelling and extended scientific writing.

The enquiry concludes by challenging students to explain how chemists identify unknown substances using evidence from a range of analytical techniques and justify why reliable scientific testing is essential in modern society.

	Pre-Requisite Knowledge <i>What have we already learned that will help us with this topic?</i>		Pitch Up <i>How will we challenge ourselves?</i>
	Students build upon their understanding of atomic structure, chemical reactions, ions and organic chemistry developed throughout C1–C7. They apply this knowledge when identifying substances, interpreting chemical tests and evaluating experimental evidence.		Students are challenged to move beyond following laboratory instructions by evaluating the reliability of different analytical techniques and selecting the most appropriate methods to solve unfamiliar investigative problems. They interpret chromatograms, identify unknown ions and justify conclusions using multiple sources of scientific evidence. Stretch is embedded through analysing complex chromatographic data, comparing analytical techniques and evaluating the limitations of practical investigations. Students are encouraged to appreciate that scientific conclusions depend upon the quality of evidence collected.
	Wider Framework <i>How does this learning connect to future topics and bigger goals?</i>		Curriculum Hinterland <i>What wider knowledge will deepen our understanding of this topic?</i>
	This enquiry forms an essential component of the AQA GCSE Chemistry specification and introduces students to many of the techniques used in professional analytical laboratories. Students develop: • Substantive knowledge of purity, chromatography, flame tests, gas tests and ion testing. • Disciplinary knowledge through practical investigation, observation, evidence evaluation, scientific reasoning and analytical problem solving.		Students explore the development of analytical chemistry through the work of scientists such as Mikhail Tsvet, who pioneered chromatography, alongside the evolution of modern laboratory techniques including spectroscopy and mass spectrometry. The enquiry also investigates contemporary applications including forensic investigations, drug testing, environmental monitoring, food safety and medical diagnostics, demonstrating how chemical analysis supports public health, criminal justice and scientific research.

Students strengthen scientific literacy by interpreting data, evaluating evidence and communicating conclusions using accurate chemical terminology.



Authentic connections

How does this topic connect to real life, careers, other subjects and important values?

The study of Chemical Analysis enables students to appreciate how evidence-based investigation underpins scientific discovery and protects society. Students develop spiritual understanding by recognising the precision and reliability of scientific investigation, appreciating how unseen substances can be identified through careful observation and systematic enquiry.

Social and cultural understanding develops through exploring how analytical chemistry safeguards food supplies, medicines and drinking water whilst supporting forensic science and environmental protection. Moral understanding is strengthened by considering the responsibility scientists have to produce accurate evidence that informs decisions affecting health, justice and the environment.

This enquiry has strong links with Biology, where students use investigative techniques, observation and evidence to identify substances and interpret results. It reinforces Mathematics through data analysis, calculation of R_f values and interpretation of graphical information. Links with Citizenship are developed through the role of analytical chemistry in public health, forensic science and environmental protection, whilst English supports scientific reporting and evidence-based reasoning.

This enquiry explicitly develops the following Skills Builder Universal Framework competencies:

- Listening – Students interpret practical instructions, teacher modelling and scientific explanations to carry out investigations accurately.
- Problem Solving – Students analyse evidence from multiple analytical techniques to identify unknown substances and justify conclusions.
- Leadership – Students organise practical investigations, allocate responsibilities and ensure scientific procedures are followed safely and accurately.



This enquiry provides authentic insight into careers including:

- Analytical Chemist – Identifying and testing substances within research and industry.
- Forensic Scientist – Using chemical analysis to investigate criminal evidence.
- Environmental Scientist – Monitoring pollution and analysing samples to protect ecosystems and public health.

Students recognise that the precision, critical thinking and evidence-based decision making developed throughout this enquiry are highly transferable across science, medicine, law enforcement and environmental management.



Resources

What books, websites, videos and materials will support our learning?



Assessment

How will we show what we know, remember and can apply?

Teaching and learning throughout this enquiry are supported through a range of practical, digital and contextual resources that develop scientific understanding through investigation, analysis and application.

- Teacher modelling, live demonstrations and visualisers to explicitly teach analytical techniques and interpretation of results.
- Practical investigations involving chromatography, flame tests, gas tests and ion testing.
- Retrieval activities, dual-coded diagrams and subject-specific vocabulary displays.
- Unknown substance investigations and forensic case studies.
- Laboratory equipment for qualitative analysis and chemical testing.
- AQA GCSE Chemistry specification guidance.
- Digital resources including:
 - Cognito
 - Kerboodle
 - BBC Bitesize GCSE Chemistry
 - Oak National Academy
 - Royal Society of Chemistry

Students complete retrieval activities assessing prior understanding of ions, chemical reactions and laboratory techniques. Diagnostic questioning identifies misconceptions about purity, mixtures and chemical testing before new learning begins.

Students complete practical investigations using chromatography and qualitative chemical tests to identify unknown substances. They analyse evidence, interpret results and justify conclusions using scientific reasoning.

Students complete a cumulative assessment requiring them to identify unknown substances, interpret chromatograms, explain analytical techniques and evaluate the reliability of scientific evidence across unfamiliar investigative contexts.

XX% Substantive Knowledge

Students demonstrate knowledge and understanding of:

- Pure substances and mixtures.
- Melting point and boiling point as tests of purity.
- Paper chromatography and R_f values.
- Flame tests for metal ions.
- Tests for positive and negative ions.
- Gas tests.
- The purpose and applications of chemical analysis.

XX% Disciplinary Knowledge

Students demonstrate their ability to:

- Carry out qualitative chemical tests safely and accurately.
- Interpret chromatograms and calculate R_f values.
- Analyse experimental evidence to identify unknown substances.
- Evaluate the reliability and limitations of analytical techniques.
- Apply scientific reasoning to unfamiliar investigative scenarios.
- Communicate scientific conclusions using accurate subject-specific vocabulary and justified evidence.

Topic 6 Topic	 B6 - Inheritance, Variation & Evolution
	Big Picture <i>What are the main ideas and big questions in this topic?</i>
Throughout this topic, students discover how the number of chromosomes is halved during meiosis before being combined with genetic information from another parent during sexual reproduction to produce genetically unique offspring. They investigate how mutations generate genetic variation and explore how natural selection enables populations to evolve over time, leading to the formation of new species. Students examine how scientific understanding of inheritance has enabled selective breeding, cloning and genetic engineering to produce organisms with desirable characteristics. They also consider the enormous potential of modern biotechnology alongside the ethical, environmental and social questions raised by genetic modification.	
	Zoom In <i>What knowledge, skills and key vocabulary will we learn step by step?</i>
Students begin by investigating sexual and asexual reproduction, comparing the advantages and disadvantages of each before exploring how meiosis produces genetically unique gametes. They investigate the structure of DNA, chromosomes and genes before developing an understanding of inheritance through the use of Punnett squares to predict the probability of inherited characteristics. Students then investigate genetic disorders, exploring the inheritance of polydactyly and cystic fibrosis before considering how mutations generate variation within populations. They examine how natural selection leads to evolution and investigate the evidence supporting evolutionary theory through fossils, extinction and the development of classification systems. The topic concludes with modern applications of genetics, including selective breeding, cloning and genetic engineering, before evaluating the benefits, risks and ethical implications of genetic modification. Students also investigate how antibiotic-resistant bacteria, such as MRSA, provide evidence of evolution occurring in real time. Core Knowledge (Substantive) Students develop secure knowledge and understanding of: • sexual and asexual reproduction • meiosis and gamete formation • DNA, genes, chromosomes and the genome • inheritance and Punnett squares • dominant and recessive alleles • genetic disorders including polydactyly and cystic fibrosis • mutations and genetic variation	

- natural selection and evolution
- evidence for evolution including fossils
- extinction
- selective breeding
- cloning
- genetic engineering
- classification using the Linnaean system.
- Working Scientifically

Students develop their ability to (Disciplinary):

- interpret genetic information and inheritance diagrams
- calculate genetic probabilities using Punnett squares
- analyse evidence supporting evolutionary theory
- interpret fossil evidence and classification data
- evaluate scientific developments in genetics and biotechnology
- apply biological knowledge to unfamiliar contexts
- communicate scientific explanations using accurate biological terminology.

Key Vocabulary: DNA, chromosome, gene, genome, allele, dominant, recessive, genotype, phenotype, meiosis, gamete, fertilisation, mutation, variation, evolution, natural selection, adaptation, selective breeding, cloning, genetic engineering, extinction, fossil, classification, binomial naming, MRSA



Pre-Requisite Knowledge

What have we already learned that will help us with this topic?

Students should already understand that sexual reproduction involves sperm and egg cells, that offspring inherit characteristics from both parents and that cells contain chromosomes within their nuclei.

They should also have a basic understanding of variation between individuals from earlier learning. This prior knowledge provides the foundation for investigating inheritance, genetics and evolution in greater depth.



Pitch Up

How will we challenge ourselves?

Pupils are expected to attend science lessons on time, well equipped, ready to take risks and be active learners.

To stretch pupils' knowledge of inheritance and evolution, teachers deepen understanding by connecting scientific principles to real-world contexts, encouraging critical thinking, and promoting inquiry-based learning. Starting with layered questioning; such as "Why do offspring vary from their parents?" or "How might environmental changes drive evolution?", which helps students move beyond surface-level facts and into reasoning about biological processes.

Teachers introduce case studies like selective breeding in dogs or antibiotic resistance in bacteria to show how inheritance and evolution operate in everyday

	life. Some tasks include designing a new species adapted to a specific environment or practical activities involving fossil evidence to trace evolutionary change. Newspaper articles linked to the rise of antibiotic resistance and modern evidence of evolution affords pupils with opportunities to critically analyse sources of the news which is published. Raising questions about the reliability of sources.
 Wider Framework <i>How does this learning connect to future topics and bigger goals?</i>	 Curriculum Hinterland <i>What wider knowledge will deepen our understanding of this topic?</i>
Understanding inheritance, variation and evolution provides the foundation for further study of ecology, biodiversity and the relationships between organisms. Students build upon their understanding of cells, reproduction and DNA to explain how characteristics are inherited, how populations evolve over time and how modern genetics influences medicine, agriculture and biotechnology. Throughout the topic, students continue to develop the analytical, mathematical and evaluative skills required for GCSE examinations and further scientific study. The investigations and case studies undertaken throughout this topic strengthen students' ability to interpret evidence, evaluate scientific theories, apply probability to biological contexts and communicate scientific explanations using accurate biological terminology.	Historical narratives: • The voyage of the HMS Beagle and Darwin's observations of finches. • Mary Anning's fossil discoveries and her overlooked contributions to paleontology. • Alfred Russel Wallace's independent theory of evolution. Scientific intrigue: • How DNA underpins inheritance—even though it's not taught in detail at KS2. • The story of the peppered moth and industrial melanism. • The concept of "survival of the fittest" and its misinterpretations. Real-world relevance: • Selective breeding in agriculture and pets. • Genetic disorders and family traits. • Evolution of antibiotic resistance in bacteria.
 Authentic connections <i>How does this topic connect to real life, careers, other subjects and important values?</i>	

Understanding inheritance, variation and evolution enables students to explain how characteristics are passed between generations, how species change over time and how scientific discoveries continue to transform medicine, agriculture and conservation. Knowledge of genetics, evolution and biotechnology underpins modern healthcare, forensic science, agriculture and environmental management, helping students appreciate how biology contributes to solving global challenges.

SMSC is developed through curiosity, respect and ethical awareness as students consider the implications of genetic engineering, cloning and selective breeding, evaluate evidence supporting evolutionary theory and appreciate the diversity of life on Earth. Students also explore how scientific discoveries have shaped society's understanding of heredity, biodiversity and human responsibility for protecting the natural world.

Cross-curricular links include Geography through biodiversity, extinction and conservation, Mathematics through probability, ratios and Punnett square calculations, History through the development of scientific theories and the work of Darwin, Wallace and Mary Anning, and PSHE through genetic conditions, family health and informed ethical decision-making.

Students explore careers including:

- Geneticist – investigating inheritance and genetic variation to improve healthcare and scientific understanding.
- Genetic Counsellor – supporting individuals and families to understand inherited conditions and make informed healthcare decisions.
- Palaeontologist – studying fossils to investigate the history of life and evolutionary change.
- Plant Geneticist – developing crops with desirable characteristics through selective breeding and genetic analysis.
- Forensic DNA Analyst – applying genetic variation to identify individuals and support criminal investigations.

The topic supports the Skills Builder Universal Framework, particularly:

- Listening through evaluating scientific evidence and considering different viewpoints.
- Creativity through applying scientific ideas to unfamiliar biological and ethical contexts.
- Problem Solving through interpreting genetic data, analysing evolutionary evidence and evaluating modern applications of biotechnology.



 Resources <i>What books, websites, videos and materials will support our learning?</i>	 Assessment <i>How will we show what we know, remember and can apply?</i>
At New Line Learning Academy, we are committed to equipping our pupils with high-quality resources that extend learning beyond the classroom and empower them to take ownership of their scientific journey. To enrich and consolidate understanding, pupils have access to a range of carefully selected digital platforms and learning tools: • Cognito (https://cognitoedu.org/home) – Offers engaging video tutorials, concise notes, and practice questions tailored to support mastery of scientific concepts across Key Stage 3 and beyond. • BBC Bitesize (https://www.bbc.co.uk/bitesize/levels/z4kw2hv) – Provides	Assessment takes place throughout the enquiry through retrieval practice, questioning, examination-style questions and independent application tasks. Students demonstrate their understanding by explaining patterns of inheritance, interpreting genetic information, analysing evolutionary evidence, evaluating scientific theories and communicating biological ideas using accurate scientific terminology. XX% Substantive Knowledge: Students demonstrate secure understanding of DNA, genes, chromosomes, genetic inheritance, variation, evolution, natural selection, selective breeding, genetic engineering and biodiversity.

accessible explanations, interactive activities, and revision materials, helping pupils consolidate learning and revisit key topics independently.

- Sparx Science – www.sparx-learning.com – the platform used for science homework which will be set each week and provide topics from two weeks previously. The expectation is that pupils will have 100% completion and 100% success
- Kerboodle (<https://www.kerboodle.com/users/login>) – Supports the curriculum with digital textbooks, assessments, and interactive resources aligned to national specifications, offering pupils and teachers a wealth of high-quality materials.

These resources not only reinforce classroom learning but also foster curiosity, independence, and confidence, ensuring every pupil can thrive and deepen their scientific understanding at their own pace.

XX% Disciplinary Knowledge: Students apply practical and investigative skills by interpreting genetic data, analysing evidence, evaluating scientific claims, applying probability and constructing evidence-based scientific explanations.

Topic 7

Enquiry



C9 – Chemistry of the Atmosphere



Big Picture

What are the main ideas and big questions in this topic?

The Earth's atmosphere has changed dramatically over billions of years and continues to evolve through both natural processes and human activity. Understanding the chemistry of the atmosphere allows scientists to investigate climate change, air pollution and the sustainability of Earth's resources. This enquiry enables students to explore how the atmosphere developed, how human actions have altered its composition and how chemistry can contribute to addressing some of the world's greatest environmental challenges.

Students investigate the evolution of the atmosphere, greenhouse gases, global climate change and atmospheric pollutants. Through scientific modelling, data analysis and evidence-based reasoning, students develop an appreciation of the role chemistry plays in understanding and protecting our planet.



Zoom In

What knowledge, skills and key vocabulary will we learn step by step?

The enquiry begins by exploring the early atmosphere of the Earth, investigating how volcanic activity, oceans and photosynthetic organisms gradually transformed the planet into one capable of supporting complex life. Students develop the substantive knowledge required to understand the changing composition of the atmosphere and the evidence scientists use to reconstruct events that occurred billions of years ago. Teacher modelling explicitly demonstrates how scientific theories evolve as new evidence becomes available.

Students develop disciplinary knowledge by analysing geological, biological and atmospheric evidence, interpreting graphs and evaluating competing scientific explanations. They learn to distinguish between observation, inference and scientific theory whilst recognising the importance of evidence in constructing explanations about the past.

Attention then turns to greenhouse gases and global climate change, where students investigate the enhanced greenhouse effect and examine the role of carbon dioxide, methane and water vapour in regulating Earth's temperature. They analyse climate data, evaluate scientific evidence and consider both natural and human influences on atmospheric change.

As the enquiry progresses, students investigate air pollution and sustainability, exploring the causes and effects of pollutants including particulates, sulfur dioxide and nitrogen oxides. They evaluate strategies designed to reduce emissions and improve air quality whilst considering the challenges of balancing economic development with environmental responsibility.

Throughout the enquiry, specialist vocabulary including atmosphere, greenhouse effect, climate change, carbon dioxide, methane, fossil fuels, pollutant, particulate, photosynthesis and sustainability is explicitly taught and revisited through retrieval practice, data interpretation, scientific modelling and extended evaluative writing.

The enquiry concludes by challenging students to explain how scientific evidence informs our understanding of atmospheric change and evaluate how chemistry contributes to developing sustainable solutions for the future.

	Pre-Requisite Knowledge <i>What have we already learned that will help us with this topic?</i>		Pitch Up <i>How will we challenge ourselves?</i>
	Students build upon their understanding of chemical reactions, energy changes, combustion and organic chemistry developed throughout C1–C8. They apply this knowledge to explain atmospheric processes, pollution and the chemistry underlying global environmental change.		Students are challenged to move beyond describing atmospheric processes by evaluating scientific evidence, interpreting climate data and considering the uncertainties involved in predicting future environmental change. They justify conclusions using evidence from multiple sources and critically evaluate strategies designed to reduce atmospheric pollution. Stretch is embedded through analysing long-term climate datasets, evaluating scientific models and considering the complex interactions between chemistry, biology and human activity. Students are encouraged to appreciate that environmental decision-making often requires balancing scientific evidence with social, economic and political considerations.
	Wider Framework <i>How does this learning connect to future topics and bigger goals?</i>		Curriculum Hinterland <i>What wider knowledge will deepen our understanding of this topic?</i>

This enquiry forms the final component of the AQA GCSE Chemistry specification and provides an opportunity for students to apply knowledge developed throughout the course to one of the most significant scientific issues facing society.

Students develop:

- Substantive knowledge of atmospheric evolution, greenhouse gases, climate change, pollutants and sustainability.
- Disciplinary knowledge through data interpretation, scientific modelling, evidence evaluation, critical thinking and extended scientific argument.

Students strengthen their ability to evaluate evidence, interpret scientific models and communicate balanced conclusions supported by reliable scientific data.

Students explore the work of scientists including James Lovelock, whose research advanced understanding of Earth's atmosphere and environmental systems, alongside Charles David Keeling, whose continuous measurements of atmospheric carbon dioxide transformed climate science through the famous *Keeling Curve*.

The enquiry also investigates contemporary developments including carbon capture and storage, renewable energy technologies, international climate agreements, air quality monitoring and green chemistry, demonstrating how chemistry continues to play a central role in addressing global environmental challenges.



Authentic connections

How does this topic connect to real life, careers, other subjects and important values?

The study of Chemistry of the Atmosphere enables students to appreciate how scientific understanding supports informed decisions about the future of our planet. Students develop spiritual understanding by reflecting on the delicate balance of Earth's atmosphere and recognising humanity's responsibility to protect the natural systems that sustain life.

Social and cultural understanding develops through exploring how climate change and air pollution affect communities differently across the world, highlighting issues of environmental justice and global cooperation. Moral understanding is strengthened as students evaluate the ethical responsibilities of governments, industries and individuals in reducing pollution, conserving resources and protecting future generations.

This enquiry has particularly strong links with Geography, where students investigate climate change, sustainability, ecosystems and human impacts on the environment. It reinforces learning in Biology through photosynthesis, ecosystems and the carbon cycle, whilst supporting Citizenship by encouraging informed discussion about global responsibility, environmental policy and sustainable development. Students apply Mathematics when interpreting climate data and trends, and develop English through balanced scientific evaluation and extended written arguments.

This enquiry explicitly develops the following Skills Builder Universal Framework competencies:

- Problem Solving – Students analyse complex environmental evidence and evaluate strategies for reducing
- Speaking – Students communicate balanced scientific arguments, justify conclusions and participate in discussions about environmental issues.
- Creativity – Students consider innovative technologies and sustainable solutions that may help address future environmental challenges.



atmospheric pollution.
evidence-based

This enquiry provides authentic insight into careers including:

- Atmospheric Scientist – Investigating climate systems and environmental change.
- Environmental Chemist – Monitoring pollutants and developing strategies to improve air quality.
- Climate Policy Adviser – Using scientific evidence to inform environmental policy and sustainable development.

Students recognise that the analytical thinking, data interpretation, critical evaluation and evidence-based decision making developed throughout this enquiry are highly transferable across environmental science, engineering, research, public policy and many other professional fields.

 Resources <i>What books, websites, videos and materials will support our learning?</i>	 Assessment <i>How will we show what we know, remember and can apply?</i>
Teaching and learning throughout this enquiry are supported through a range of practical, digital and contextual resources that develop scientific understanding through investigation, analysis and application. • Teacher modelling, live demonstrations and visualisers to explicitly teach atmospheric processes and climate science. • Practical investigations exploring combustion, greenhouse gases and air pollution. • Retrieval activities, dual-coded diagrams and subject-specific vocabulary displays. • Climate datasets, historical evidence and environmental case studies. • Satellite imagery, atmospheric modelling and contemporary scientific reports. • AQA GCSE Chemistry specification guidance. • Digital resources including: ○ Cognito ○ Kerboodle ○ BBC Bitesize GCSE Chemistry ○ Oak National Academy ○ Royal Society of Chemistry	Students complete retrieval activities assessing prior understanding of combustion, greenhouse gases, energy changes and chemical reactions. Diagnostic questioning identifies misconceptions about climate change and atmospheric composition before new learning begins. Students interpret climate data, analyse evidence relating to atmospheric change and evaluate the causes and effects of greenhouse gases and air pollutants. They justify conclusions using scientific evidence from multiple sources. Students complete a cumulative assessment requiring them to explain the evolution of Earth's atmosphere, evaluate evidence relating to climate change, analyse environmental data and propose scientifically justified solutions to contemporary environmental challenges. XX% Substantive Knowledge Students demonstrate knowledge and understanding of: • The development of Earth's atmosphere. • The role of photosynthesis in atmospheric change. • Greenhouse gases and the greenhouse effect. • Global climate change. • Atmospheric pollutants and their sources. • The effects of air pollution. • Sustainable approaches to reducing environmental impact. XX% Disciplinary Knowledge Students demonstrate their ability to:

- Interpret scientific data relating to atmospheric and climate change.
- Analyse evidence from historical and contemporary scientific studies.
- Evaluate competing explanations using reliable scientific evidence.
- Apply chemical knowledge to unfamiliar environmental scenarios.
- Construct balanced, evidence-based scientific arguments.
- Communicate scientific explanations using accurate subject-specific vocabulary and justified conclusions.

Topic 8

Enquiry



P7 - Magnetism and Electromagnetism



Big Picture

What are the main ideas and big questions in this topic?

Magnetism is one of the most fascinating invisible forces in nature. From the Earth's magnetic field guiding navigation to the electric motors that power washing machines, trains and electric vehicles, magnetism plays a vital role in modern life. The discovery that electricity and magnetism are intrinsically linked revolutionised science, leading to technologies that transformed industry, communication and transportation.

This enquiry introduces students to magnetic fields, permanent and induced magnets, electromagnets and electromagnetic induction. Students investigate how magnetic forces can be generated, controlled and applied to solve engineering challenges, developing the scientific understanding required to explain many of the technologies that underpin modern society. Through practical investigation and scientific reasoning, students appreciate how invisible forces can be harnessed to produce movement, generate electricity and improve everyday life.



Zoom In

What knowledge, skills and key vocabulary will we learn step by step?

The enquiry begins by exploring the properties of permanent magnets, magnetic materials and magnetic fields. Students develop the substantive knowledge required to explain attraction and repulsion, identify magnetic field patterns and distinguish between permanent and induced magnetism. Teacher modelling explicitly demonstrates how magnetic fields are represented using field lines and how these models help scientists visualise invisible forces.

Students develop disciplinary knowledge through practical investigations using magnets, compasses and iron filings, observing magnetic interactions and interpreting field patterns. They learn to identify variables, collect reliable observations and evaluate the quality of experimental evidence.

Attention then turns to electromagnets, investigating how electric current flowing through a wire produces a magnetic field and how this effect can be strengthened using coils and iron cores. Students explore how electromagnets can be controlled far more effectively than permanent magnets, applying this understanding to devices including scrapyard cranes, relays, electric bells and loudspeakers.

As the enquiry progresses, students investigate electromagnetic induction and the generation of electricity. They explore how moving conductors within magnetic fields induces a potential difference and evaluate how this principle underpins generators, transformers and the National Grid. Practical demonstrations and mathematical analysis enable students to interpret scientific evidence and apply their understanding to unfamiliar engineering contexts.

Throughout the enquiry, specialist vocabulary including magnetic field, magnetic flux, electromagnet, induced magnetism, solenoid, motor effect, electromagnetic induction, generator, transformer and National Grid is explicitly taught and revisited through retrieval practice, modelling, practical investigation and extended scientific writing.

The enquiry concludes by challenging students to explain how electricity and magnetism interact to produce movement and generate electrical energy. By combining practical investigation with scientific reasoning, students develop an understanding of one of the most significant discoveries in modern physics.

	Pre-Requisite Knowledge <i>What have we already learned that will help us with this topic?</i>		Pitch Up <i>How will we challenge ourselves?</i>
	Students build upon their understanding of electricity developed in P2 and their knowledge of energy transfers from P1. They also draw upon prior Key Stage 3 learning about simple magnets, magnetic materials and electrical circuits, providing the foundation for studying electromagnetism and induction in greater depth.		Students are challenged to move beyond simply identifying magnetic phenomena by explaining the relationship between electricity and magnetism using scientific models and experimental evidence. They interpret magnetic field diagrams, evaluate engineering solutions and apply scientific principles to explain unfamiliar technologies. Stretch is embedded through interpreting transformer calculations, analysing electromagnetic induction and evaluating the advantages and limitations of different electrical transmission systems. Students are encouraged to appreciate that understanding invisible forces has driven some of the greatest technological advances in human history.
	Wider Framework <i>How does this learning connect to future topics and bigger goals?</i>		Curriculum Hinterland <i>What wider knowledge will deepen our understanding of this topic?</i>
	This enquiry forms part of the AQA GCSE Physics specification and brings together ideas developed throughout the course, including energy, electricity and forces. Students develop: Substantive knowledge of magnetic fields, electromagnets, electromagnetic induction, generators, transformers and electricity transmission.		Students explore the pioneering work of Michael Faraday, James Clerk Maxwell and Nikola Tesla, whose discoveries transformed our understanding of electricity and magnetism and laid the foundations for the modern electrical world. The enquiry also investigates contemporary applications including MRI scanners, maglev trains, renewable electricity generation, electric vehicle motors, wind turbines and the National Grid, demonstrating how electromagnetism continues to shape modern engineering and technological innovation.

- Disciplinary knowledge through practical investigation, scientific modelling, mathematical application, evidence evaluation and problem solving.

Students also strengthen mathematical fluency through transformer calculations, scientific literacy through extended explanations and oracy through collaborative investigation and discussion.



Authentic connections

How does this topic connect to real life, careers, other subjects and important values?

The study of Magnetism and Electromagnetism enables students to appreciate how invisible forces can be harnessed to transform society. Students develop spiritual understanding by recognising the remarkable relationships between electricity and magnetism and reflecting on how scientific discoveries have revealed hidden patterns that govern the natural world.

Social and cultural understanding develops through exploring how electromagnetism has revolutionised transport, healthcare, manufacturing and communication across the globe. Moral understanding is strengthened as students evaluate how advances in electrical technology can contribute to more sustainable societies through renewable energy generation, efficient transport and reduced carbon emissions, whilst recognising the responsibility to use technological innovation wisely.

This enquiry explicitly develops the following Skills Builder Universal Framework competencies:

- Leadership – Students organise collaborative practical investigations, allocate responsibilities and support others in collecting reliable scientific evidence.
- Teamwork – Students work effectively together to build, test and refine electromagnets, sharing observations and evaluating results.
- Creativity – Students apply their understanding of electromagnetism to explain and evaluate innovative engineering solutions and emerging technologies.



This enquiry provides authentic insight into careers including:

- Electrical Design Engineer – Developing electric motors, generators and electrical infrastructure.
- Renewable Energy Engineer – Designing wind turbines, hydroelectric generators and sustainable power systems.
- Rail Systems Engineer – Applying electromagnetism to signalling systems, electric railways and emerging maglev technologies.

Students recognise that the practical investigation, collaboration, innovation and analytical thinking developed throughout this enquiry are highly transferable across engineering, manufacturing, renewable energy and many wider professional industries.



Resources

What books, websites, videos and materials will support our learning?



Assessment

How will we show what we know, remember and can apply?

Teaching and learning throughout this enquiry are supported through a range of practical, digital and contextual resources that develop scientific understanding through investigation, modelling and application.

- Teacher modelling, live demonstrations and visualisers to explicitly teach magnetic fields, electromagnets and electromagnetic induction.
- Practical investigations using permanent magnets, iron filings, compasses, solenoids, iron cores, motors and generators.
- Demonstrations exploring the motor effect, electromagnetic induction and transformer principles.
- Retrieval activities, dual-coded diagrams and subject-specific vocabulary displays.
- Case studies exploring renewable energy generation, electric transport and modern electrical engineering.
- AQA GCSE Physics specification guidance and required practical resources.
- Digital resources including:
 - Oak National Academy Physics
 - BBC Bitesize GCSE Physics
 - Institute of Physics
 - National STEM Learning Centre
 - AQA GCSE Physics

Students complete retrieval activities assessing prior understanding of electricity, magnetic materials and energy transfers. Diagnostic questioning identifies misconceptions about magnetic fields and electrical circuits before new learning begins.

Students complete a practical investigation exploring how the strength of an electromagnet changes by varying factors such as the current, number of coil turns or iron core. Students collect reliable data, identify patterns and evaluate the quality of their investigation using scientific evidence.

Students complete a cumulative assessment requiring them to explain magnetic fields, electromagnetism and electromagnetic induction, apply transformer calculations and evaluate real-world engineering applications using scientific reasoning.

XX% Substantive Knowledge

Students demonstrate knowledge and understanding of:

- Permanent and induced magnets.
- Magnetic fields and field patterns.
- Electromagnets and factors affecting their strength.
- The motor effect.
- Electromagnetic induction.
- Generators, transformers and the National Grid.

XX% Disciplinary Knowledge

Students demonstrate their ability to:

- Interpret magnetic field diagrams and scientific models.
- Plan, conduct and evaluate practical investigations involving magnets and electromagnets.
- Analyse experimental data and identify relationships.
- Apply mathematical calculations involving transformers and electrical transmission.
- Explain the operation of electrical technologies using accurate scientific vocabulary.
- Apply scientific understanding to unfamiliar contexts and justify conclusions using evidence.

Topic 9 Enquiry	 C10 – Using Resources
	Big Picture <i>What are the main ideas and big questions in this topic?</i>
Earth's natural resources are finite, and the choices society makes about how they are extracted, used and recycled have significant environmental, economic and social consequences. Chemistry plays a vital role in developing sustainable technologies, reducing waste and ensuring that valuable resources are used efficiently. This enquiry enables students to explore how chemists contribute to creating a more sustainable future through recycling, life cycle assessment, water treatment and the responsible use of Earth's resources. Students investigate the sustainable use of metals, ceramics, polymers, fertilisers, potable water and wastewater treatment. Through scientific investigation, data analysis and evidence-based evaluation, students develop an appreciation of how chemistry helps balance human needs with environmental responsibility.	
	Zoom In <i>What knowledge, skills and key vocabulary will we learn step by step?</i>
The enquiry begins by exploring the concept of finite and renewable resources, investigating why the responsible management of raw materials is essential for future generations. Students develop the substantive knowledge required to understand the advantages and disadvantages of different resource management strategies, recognising that scientific solutions often involve balancing environmental, economic and social factors. Teacher modelling explicitly demonstrates how life cycle assessments are used to evaluate the environmental impact of products from manufacture to disposal. Students develop disciplinary knowledge by interpreting environmental data, evaluating scientific evidence and comparing the sustainability of different materials and manufacturing processes. They learn to consider multiple perspectives, justify conclusions and appreciate that scientific decisions are rarely based upon a single factor. Attention then turns to water resources, wastewater treatment and recycling, where students investigate how chemistry provides clean drinking water and enables valuable materials to be recovered and reused. They evaluate the processes involved in purification, desalination and sewage treatment, considering how scientific innovation helps meet the growing demands of an increasing global population. As the enquiry progresses, students investigate life cycle assessments, corrosion prevention and sustainable agriculture, evaluating how chemists minimise waste, improve efficiency and develop environmentally responsible technologies. They consider the role of fertilisers, resource conservation and green chemistry in supporting sustainable development.	

Throughout the enquiry, specialist vocabulary including sustainability, renewable resource, finite resource, potable water, wastewater, desalination, recycling, corrosion, life cycle assessment and fertiliser is explicitly taught and revisited through retrieval practice, data interpretation, case studies and extended evaluative writing.

The enquiry concludes by challenging students to explain how chemistry enables society to use resources more sustainably whilst evaluating the scientific, environmental and ethical considerations involved in managing Earth's limited resources.

	Pre-Requisite Knowledge <i>What have we already learned that will help us with this topic?</i>		Pitch Up <i>How will we challenge ourselves?</i>
Students build upon their understanding of chemical reactions, energy changes, industrial chemistry, atmospheric chemistry and chemical analysis developed throughout C1–C9. They apply this knowledge to evaluate sustainable technologies, resource management and environmental protection.		Students are challenged to move beyond describing sustainable practices by evaluating the advantages, limitations and long-term consequences of different approaches to resource management. They interpret life cycle assessment data, justify environmental decisions using scientific evidence and critically evaluate competing sustainability strategies. Stretch is embedded through analysing complex environmental data, comparing industrial processes and evaluating how scientific innovation contributes to sustainable development. Students are encouraged to recognise that chemistry often provides solutions to environmental challenges whilst also creating new scientific questions.	
	Wider Framework <i>How does this learning connect to future topics and bigger goals?</i>		Curriculum Hinterland <i>What wider knowledge will deepen our understanding of this topic?</i>
This enquiry concludes the AQA GCSE Chemistry specification by bringing together knowledge developed throughout the course and applying it to the sustainable use of Earth's resources. Students develop: • Substantive knowledge of sustainable development, resource management, water treatment, recycling, corrosion prevention and life cycle assessment. • Disciplinary knowledge through evidence evaluation, data interpretation, scientific reasoning, critical analysis and informed decision making.		Students explore how modern chemistry contributes to the United Nations Sustainable Development Goals, including clean water, responsible consumption, affordable clean energy and climate action. They investigate developments in biodegradable materials, circular economies, green chemistry, advanced recycling technologies and sustainable agriculture. The enquiry also explores the work of environmental chemists and engineers who develop innovative solutions to reduce waste, improve water quality and conserve natural resources for future generations.	

Students strengthen their ability to interpret scientific evidence, evaluate environmental claims and communicate balanced conclusions supported by reliable data.



Authentic connections

How does this topic connect to real life, careers, other subjects and important values?

The study of Using Resources enables students to appreciate how chemistry contributes to building a more sustainable future. Students develop spiritual understanding by reflecting on humanity's relationship with the natural world and recognising the importance of responsible stewardship of Earth's finite resources.

Social and cultural understanding develops through exploring how access to clean water, raw materials and sustainable technologies differs across the world, highlighting issues of global inequality and shared responsibility. Moral understanding is strengthened as students evaluate the ethical implications of resource extraction, pollution, recycling and consumption, considering how scientific innovation can improve quality of life whilst protecting the environment.

This enquiry has strong explicit links with Geography, where students explore sustainability, resource management, climate change and the environmental impacts of human activity. It reinforces geographical understanding of global inequalities, water security and sustainable development. Students apply Mathematics when interpreting life cycle assessment data, analysing graphs and evaluating environmental trends. Links to Design and Technology are developed through the study of materials, recycling technologies and sustainable product design, whilst Citizenship encourages students to consider ethical consumerism, environmental responsibility and the role of individuals, businesses and governments in protecting natural resources. English is further developed through evaluating evidence, constructing balanced arguments and communicating scientific conclusions using precise technical vocabulary.

This enquiry explicitly develops the following Skills Builder Universal Framework competencies:

- Leadership – Students evaluate sustainability strategies, justify decisions and lead discussions considering scientific, environmental and economic evidence.
- Problem Solving – Students analyse complex environmental issues and propose evidence-based solutions to resource management challenges.
- Teamwork – Students collaborate to evaluate case studies, compare solutions and develop balanced recommendations for sustainable development.



This enquiry provides authentic insight into careers including:

- Environmental Engineer – Designing sustainable systems for water treatment, recycling and resource management.
- Sustainability Consultant – Advising organisations on reducing environmental impact and improving resource efficiency.
- Water Quality Scientist – Monitoring drinking water supplies and developing purification technologies to protect public health.

Students recognise that the critical thinking, scientific reasoning, evidence evaluation and decision-making developed throughout this enquiry are highly transferable across environmental science, engineering, policy making, business and many other professional fields.

 Resources <i>What books, websites, videos and materials will support our learning?</i>	 Assessment <i>How will we show what we know, remember and can apply?</i>
Teaching and learning throughout this enquiry are supported through a range of practical, digital and contextual resources that develop scientific understanding through investigation, analysis and application. • Teacher modelling, live demonstrations and visualisers to explicitly teach sustainability concepts and resource management. • Practical investigations exploring water purification, corrosion and material properties. • Retrieval activities, dual-coded diagrams and subject-specific vocabulary displays. • Life cycle assessment case studies and sustainability decision-making activities. • Data analysis using environmental reports, recycling statistics and water quality investigations. • AQA GCSE Chemistry specification guidance. • Digital resources including: ○ Cognito ○ Kerboodle ○ BBC Bitesize GCSE Chemistry ○ Oak National Academy ○ Royal Society of Chemistry	Students complete retrieval activities assessing prior understanding of chemical reactions, atmospheric chemistry, industrial processes and sustainability. Diagnostic questioning identifies misconceptions about resource management and environmental impact before new learning begins. Students analyse life cycle assessment data, evaluate sustainable resource management strategies and interpret evidence relating to water treatment, recycling and corrosion prevention. They justify conclusions using scientific evidence from multiple sources. Students complete a cumulative assessment requiring them to evaluate sustainable technologies, explain the scientific principles underpinning resource management and apply their understanding to unfamiliar environmental and industrial contexts. XX% Substantive Knowledge Students demonstrate knowledge and understanding of: • Finite and renewable resources. • Potable water and wastewater treatment. • Desalination. • Life cycle assessments. • Recycling and sustainable resource management. • Corrosion and corrosion prevention. • Sustainable agriculture and the use of fertilisers. • The principles of green chemistry and resource conservation. XX% Disciplinary Knowledge Students demonstrate their ability to: • Interpret scientific and environmental data relating to resource use. • Evaluate the sustainability of products and industrial processes using life cycle assessments. • Analyse evidence to compare different resource management strategies. • Apply chemical knowledge to unfamiliar environmental and industrial scenarios.

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| | <ul style="list-style-type: none">• Construct balanced, evidence-based evaluations considering scientific, economic and environmental factors.• Communicate scientific explanations and justified conclusions using accurate subject-specific vocabulary. |
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