Science Curriculum Intent

'Science knows no country, because knowledge belongs to humanity, and is the torch which illuminates the world.' Louis Pasteur

Valuable members of society

Science students will become informed and inquisitive members of society, having an insightful understanding of the world around them. This will enable them to engage fully with developments that will help them to be part of local, national and global communities.

As critical thinkers, our students will be equipped to challenge bias and to value evidence as a basis of opinion, lending their understanding to the wealth of ideas generated by all aspects of society.

The Science curriculum will support the pathways necessary for students to flourish in a range of scientific and non-scientific careers, adding to the development of innovation.

Great communicators

Science students will be scientifically literate allowing them to critically evaluate and refine methodologies, and judge the validity of scientific conclusions that are presented to them in the media.

To build confidence in communication, opportunities to present conclusions and research to their peers are supported by the curriculum. These provide transferable skills to wider life experiences, now and in the future.

Students develop team and interpersonal skills reliant on effective communication when working together during investigations and group work to ensure safe and enjoyable learning experiences.

Knowledgeable

Students will become scientifically knowledgeable by a fostered spirit of independent inquiry, curiosity and using current, real world science in the classroom.

Students will learn underlying concepts that influence all of the key aspects the Science curriculum: Our own bodies – how to make healthy decisions; the world's resources – how to make sustainable decisions.

They will have an ability to use gained scientific knowledge and inquiry skills to identify questions and explain science phenomena, enriching not only their own understanding but that of those around them.

SCIENCE

Year	Key Features	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
7 KS3	All students 3 periods per week	<u>How Science Works</u> Students are introduced to Secondary School Science. They will understand the importance of laboratory safety and develop key investigative skills. <u>Crime Scene</u> Students step into the life of a forensic scientist, learning and applying techniques to analyse a variety of samples. Students learn about: Cells and organisation Microscopes Chromatography Flame tests pH testing Revealing fingerprints Discussing limitations and drawing conclusions	<u>Prosthetics</u> The differences between each of us should be not only accepted but also celebrated. Students learn about: The skeletal and muscular systems The particulate nature of matter Metals and non-metals Forces and motion	<u>Desert Island</u> In this unit, students' science skills are used to find effective ways to find food, shelter, energy and a water supply on a desert island. Students learn about: Separation techniques Plant reproduction Changes of state Electricity	<u>Life on Titan</u> What would life be like on Titan? Saturn's largest moon and the only known body in space, other than Earth, where clear evidence of stable bodies of surface liquid has been found. Students learn about: Weight, mass and gravity The solar system Days and seasons Plant growth	<u>Renewable Energy</u> With Climate Scientists agreeing that human activity is driving a climate crisis across the Earth, this unit considers various alternative methods to supply populations with electricity, without having the same damaging effects to our environment as burning fossil fuels. Students learn about: Renewable energy resources The structure of the Earth Rock formation	<u>Global Links in Science</u> Cross-curricular links with Global Learning lessons are explored. Students learn about: Human reproduction Puberty The menstrual cycle Foetal development IVF <u>Crest Award</u> The CREST Bronze Awards introduce students to project work empowering them to work like real scientists. Students choose their own topic and methodologies, giving them complete freedom over their work. Students work independently or in groups to plan and run a project addressing a real-world STEM problem. This process develops enquiry, problem- solving and communication skills.

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8 KS3	All students 3 periods per week	<u>The Periodic Table and Reactions</u> The periodic table is fundamental for providing information on elements and how they relate to one another. We can then use this information in chemical equations. Students learn about: Atoms, elements and compounds The periodic table Chemical reactions Materials	<u>Jurassic Life</u> Approximately 240 million years ago, dinosaurs ruled the Earth. The conditions of Jurassic times are explored. Students learn about: Photosynthesis Structure of a leaf. Role of stomata Pressure Theories of evolution and natural selection Inheritance Fossils.	<u>Sport</u> The details of Sport and Exercise Sciences are explored within this topic, with an emphasis on the benefits of regular exercise and a balanced diet. Students learn about: Diets of different athletes Food tests Nutrition and digestion Breathing The heart Response to exercise Respiration Work done	<u>Environment</u> Humans affect the environment in many ways. Students will learn about: Composition of the atmosphere Earth's resources Deforestation Pollution Climate change Carbon cycle and carbon Reducing, reusing and recycling	<u>Natural Disasters</u> This topic explores into the science behind natural disasters. Students wave about: Waves Earth's structure and resources Heating and cooling Forces and pressure	<u>Investigating Electricity</u> Students put their investigative skills to the test. Students will be given a hypothesis, which then needs to be tested. Possible methods will be thought of before a detailed plan is written. Students will decide which variables need to be controlled in order to investigate the hypothesis and ensure they consider associated hazards. Students then carry out their investigations to obtain their results and form conclusions.
9 KS3	All students 4 periods per week Skills development building on fundamental concepts from previous KS3 work	<u>Atoms and the Periodic table</u> Evaluation of atomic models and their development: separation techniques for mixtures; development of theories and ideas relating to the Periodic table	<u>Energy</u> Applying knowledge to real world situations for a range of electronics; application of mathematical skills to calculate energy changes; consider the sustainability of a range of alternative energy generation methods	<u>Cells</u> Using cell diagrams to relay information; using experimental measurements and calculations in magnification; evaluating ethical issues relating to stem cells; applying knowledge to unfamiliar cells and organs	<u>Forces</u> Forces that affect every aspect of our lives are explored and analysed. Hands on work shows how forces can be applied in a number of scenarios and applied to a range of systems.	<u>Chemical reactions</u> Fundamental chemical reactions are looked at and used as a basis for not only how and why reactions happen but how we can interpret the collected data and observations.	<u>Ecology</u> How organisms interact and survive in a wide range of ecosystems is investigated. Experiences of assessing ecosystems is a fundamental part of the unit.

<table>
<tr><th>Year</th><th>Key Features</th><th>Term 1</th><th>Term 2</th><th>Term 3</th><th>Term 4</th><th>Term 5</th><th>Term 6</th></tr>
<tr><td rowspan="3">10
GCSE</td><td rowspan="3">All students

6 periods per week

Most students follow the GCSE Combined Science (AQA 8464) course. This does not include the material in italics/brackets.

Some students opt to take “Triple Science”. They have an additional 3 periods per week and also study the material in italics/brackets

GCSE Biology (AQA 8461)

GCSE Chemistry (AQA 8462)

GCSE Physics (AQA 8463)</td><td colspan="2">B1: Cell Biology
Cell structure
Cell division
Transport in cells</td><td colspan="2">B2: Organisation
Principles of organisation Animal tissues, organs and organ systems
Plant tissues, organs and systems</td><td colspan="2">B2: Organisation
Principles of organisation Animal tissues, organs and organ systems
Plant tissues, organs and systems
B3: Infection and Response
Communicable diseases
(Monoclonal antibodies)
(Plant disease)</td><td>B4: Bioenergetics
Photosynthesis; Respiration
B7: Ecology
Adaptations, interdependence and competition
Organisation of an ecosystem
Biodiversity and the effect of human interaction
(Trophic levels in an ecosystem)
(Food production)</td></tr>
<tr><td>C1: Atomic structure and the periodic table
Symbols, mass, electronic charge and isotopes
The periodic table; Transition metals</td><td>C2: Bonding, structure and the properties of matter
Chemical bonds: ionic, covalent and metallic
How bonding and structure are related to properties; Nanoparticles</td><td>C3: Quantitative Chemistry
Conservation of mass
Quantitative interpretation of chemical equations
Concentration
(Moles), (Yield); (Atom economy)</td><td>C4: Chemical Changes
Reactivity of metals
Reactions of acids
(Titrations)
Electrolysis</td><td>C5: Energy Changes
Exothermic and endothermic reactions
(Chemical cells and fuel cells)</td><td colspan="2">C6: The rate and extent of chemical change
Rate of reaction Reversible reactions and dynamic equilibrium
(The Haber process and NPK fertilisers)</td></tr>
<tr><td colspan="2">P4: Atomic Structure
Atoms and isotopes
Atoms and nuclear radiation
(Hazards and uses of radioactive emissions and of background radiation)
(Nuclear fissions and fusion)</td><td colspan="2">P1: Energy
Energy changes in a system
Conservation and dissipation of energy
National and global energy resources
P3: Particle Model of Matter
Changes of state and the particle model and pressure
Internal energy and energy transfers</td><td colspan="2">P2: Electricity
Current, potential difference and resistance
Series and parallel circuits
Domestic use of electricity and safety
Energy transfers
Static electricity</td><td colspan="2">P5: Forces
Forces and their interactions
Work done and energy transfer
Forces and elasticity
(Moments, levers and gears)
(Pressure and pressure differences in fluids)
Forces and motion
(Momentum)</td></tr>
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11 GCSE	All students 6 periods per week Most students follow the GCSE Combined Science (AQA 8464) course. This does not include the material in italics/brackets. Some take "Triple Science". They also study the material in italics/brackets GCSE Biology (AQA 8461) GCSE Chemistry (AQA 8462) GCSE Physics (AQA 8463)	<u>B5: Homeostasis and Response</u> Homeostasis Human nervous system Hormonal coordination *(Plant hormones)*		<u>B6: Inheritance, variation and evolution</u> Reproduction Variation and evolution History of understanding of genetics and evolution Classification of living organisms	Review of content		
		<u>C7: Organic Chemistry</u> Carbon compounds as fuels and feedstock *(Reactions of alkenes and alcohols)* *(Synthetic and naturally occurring polymers)*	<u>C8: Chemical Analysis</u> Purity, formulations and chromatography Identification of common gases *(Identification of ions by chemical, spectroscopic means)*	<u>C9: Chemistry of the atmosphere</u> Composition and evolution of the Earth's atmosphere Greenhouse gases Atmospheric pollutants <u>C10: Using resources</u> Using the Earth's resources Obtaining potable water Life cycle assessment and recycling	Review of content		
		<u>P6: Waves</u> Waves in air, fluids and solids Electromagnetic waves *(Black body radiation)*	<u>P7: Magnetism, Electromagnetism</u> Permanent and induced magnetism, magnetic forces and fields The motor effect *(Induced potential, transformers and the National Grid)*	*<u>(P8: Space Physics)</u>* *(Solar system)* *(Orbits and satellites)* *(Red shift)* Review of content			