Longcroft School Curriculum Overview
SCIENCE

Longcroft School Mission Statement

Longcroft strives to be a positive, warm and welcoming school where pupils aim to do their very best and, with great heart, thought and vision, take pride in their achievements and those of our community. By constantly challenging our pupils to excel, we nurture aspiration and strive to cultivate a lifelong love of learning in our young people. We provide a creative, safe, inclusive and caring environment where every child is known and cared for as an individual. In this climate, every young person has the opportunity to thrive as they develop in personality, character and intellect and become a highly successful learner and individual.

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Introduction

This document outlines the curriculum and key considerations including:

- Aims and purpose
- Alignment with the whole school provision and curriculum intent
- A summary programme of study which includes sequencing of taught content

We use the National Curriculum as our statutory foundation and broadly share its principles and aims including:

- 'To provide pupils with an introduction to the essential knowledge that they need to be educated citizens. To introduce pupils to the best that has been thought and said; and help engender an appreciation of human creativity and achievement'.
- To prepare students to be confident in themselves, to have a fulfilled and successful life beyond our school – one where they contribute positively to society.
- Our statutory curriculum is just one element in the education of every child. There is time and space in the school day and in each week, term and year to range beyond statutory specifications.
- Provision of a framework of core knowledge around which teachers can develop exciting and stimulating lessons to promote the development of pupils' knowledge, understanding and skills as part of the wider school curriculum.
- The wider school curriculum includes an extensive range of opportunities and activities that are routinely available to students, are inclusive and reflect our diverse community.

Inclusion

In accordance with our school curriculum statement, teachers will set high expectations for every pupil. They should plan stretching work for all pupils, including whose attainment is significantly above the expected standard. There is an even greater obligation to plan lessons for pupils who have low levels of prior attainment or come from disadvantaged backgrounds. Evidence based approaches must be taken to respond to specific needs including students with special educational needs and those for whom English is not their first language; and be regularly reviewed. Teacher's must at all times take account of their duties under equal opportunities legislation and act consistently with our vision and values.

Numeracy and literacy

Teachers should take opportunities to develop pupils' mathematical fluency, spoken language, reading, writing and vocabulary within their specific discipline and in line with the expectations laid out in our school curriculum statement.

Purpose of study

'A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.' *Adapted from National Curriculum, DfE, 2014.*

Aims

The Longcroft School and Sixth Form curriculum for science aims to ensure that all pupils:

- develop **scientific knowledge and conceptual understanding** through the specific disciplines of biology, chemistry and physics
- develop understanding of the **nature, processes and methods of science** through different types of science enquiries that help them to answer scientific questions about the world around them

- are equipped with the scientific knowledge required to understand the **uses and implications** of science, today and for the future.
- are prepared to **effectively articulate their knowledge and skills** in the way that best represents these in statutory assessments such that they have the requisite outcomes to enable the widest access of opportunity.

Subject Curriculum Vision

To equip students with the skills, knowledge and experience to be curious in exploring the world around them.

Our curriculum reflects our core school values of Great Heart, Great Thought and Great Vision:

Great Heart

To promote a safe, nurturing classroom environment where students can learn about the world around them. Students will learn about their own bodies, the ecosystems, climate change and how energy systems operate. We promote intrigue and curiosity, giving the students' knowledge about the world around them and the world in the future.

Great Thought

The Science curriculum is challenging for all, providing opportunities for students to ask questions and always ask 'why?'

Great Vision

We give students the tools to think about future developments in Science and Engineering. We inform them about how the world is changing each day, and how to best equip themselves to prepare for the future.

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Key subject skills

WS 1.1	WS 1.2	WS 1.3	WS 1.4	WS 1.5	WS 1.6
Understand how scientific methods and theories develop over time.	Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts.	Appreciate the power and limitations of science and consider any ethical issues which may arise.	Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments.	Evaluate risks both in practical science and the wider societal context, including perception of risk in relation to data and consequences.	Recognise the importance of peer review of results and of communicating results to a range of audiences.

WS 2.1	WS 2.2	WS 2.3	WS 2.4	WS 2.5	WS 2.6	WS 2.7
Use scientific theories and explanations to develop hypotheses.	Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena.	Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment.	Carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations.	Recognise when to apply a knowledge of sampling techniques to ensure any samples collected are representative.	Make and record observations and measurements using a range of apparatus and methods.	Evaluate methods and suggest possible improvements and further investigations.

WS 3.1	WS 3.2	WS 3.3	WS 3.4	WS 3.5	WS 3.6	WS 3.7	WS 3.8
Presenting observations and other data using appropriate methods.	Translating data from one form to another.	Carrying out and represent mathematical and statistical analysis.	Representing distributions of results and make estimations of uncertainty.	Interpreting observations and other data (presented in verbal, diagrammatic, graphical, symbolic or numerical form), including identifying patterns and trends, making inferences and drawing conclusions.	Presenting reasoned explanations including relating data to hypotheses.	Being objective, evaluating data in terms of accuracy, precision, repeatability and reproducibility and identifying potential sources of random and systematic error.	Communicating the scientific rationale for investigations, methods used, findings and reasoned conclusions through paper-based and electronic reports and presentations using verbal, diagrammatic, graphical, numerical and symbolic forms.

WS 4.1	WS 4.2	WS 4.3	WS 4.4	WS 4.5	WS 4.6
Use scientific vocabulary, terminology and definitions.	Recognise the importance of scientific quantities and understand how they are determined.	Use SI units (e.g. kg, g, mg; km, m, mm; kJ, J) and IUPAC chemical nomenclature unless inappropriate.	Use prefixes and powers of ten for orders of magnitude (eg tera, giga, mega, kilo, centi, milli, micro and nano).	Interconvert units.	Use an appropriate number of significant figures in calculation.

Building on prior learning

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What can students do by the end of KS2?

Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary

- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- using test results to make predictions to set up further comparative and fair tests
- reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
- identifying scientific evidence that has been used to support or refute ideas or arguments.

Year 5			
Animals, including humans	**Properties and changes of materials**	**Earth and space**	**Forces**
Pupils should be taught to: ▫ describe the changes as humans develop to old age.	Pupils should be taught to: ▫ compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets ▫ know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution ▫ use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating ▫ give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic ▫ demonstrate that dissolving, mixing and changes of state are reversible changes ▫ explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.	Pupils should be taught to: ▫ describe the movement of the Earth, and other planets, relative to the Sun in the solar system ▫ describe the movement of the Moon relative to the Earth ▫ describe the Sun, Earth and Moon as approximately spherical bodies ▫ use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.	Pupils should be taught to: ▫ explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object ▫ identify the effects of air resistance, water resistance and friction, that act between moving surfaces ▫ recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.

Year 6				
Living things and their habitats	**Animals including humans**	**Evolution and inheritance**	**Light**	**Electricity**
Pupils should be taught to: ▫ describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals ▫ give reasons for classifying plants and animals based on specific characteristics.	Pupils should be taught to: ▫ identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood ▫ recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function ▫ describe the ways in which nutrients and water are transported within animals, including humans.	Pupils should be taught to: ▫ recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago ▫ recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents ▫ identify how animals and plants are adapted to suit their environment in different ways and	Pupils should be taught to: ▫ recognise that light appears to travel in straight lines ▫ use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye ▫ explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes ▫ use the idea that light travels in straight lines to explain why	Pupils should be taught to: ▫ associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit ▫ compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches ▫ use recognised symbols when representing a simple circuit in a diagram.

		that adaptation may lead to evolution.	shadows have the same shape as the objects that cast them.	

What are the skills gaps?

In terms of the skills, we work very closely with our primary schools in order to make sure the gaps are as small as possible. Our KS3 scheme is planned with their subject knowledge acquired from KS1 and KS2 in mind. In Year 7, there is a gradual focus on developing KS3 and KS4 mathematical skills. We work in collaboration with our Mathematics department to use a common language across the Science and Maths based subjects. Students learn how to apply a line of best fit to a scatter graph, use standard form in the context of Science and rearrange algebraic equations to make different values the subject. We also focus on the key skills related to Scientific Language, word equations and concepts related to shape.

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Curriculum Overview - Biology

Strand	Year 7		Strand	Year 8		Strand	Year 9		Strand	Year 10		Strand	Year 11	
Biology - Cells		Microscopes	Biology - Respiration		Breathing and exercise	Biology - Cells		Eukaryotes and prokaryotes	Biology - Bioenergetics		Photosynthetic reaction	Biology - Inheritance, Variation and Evolution		Sexual and asexual reproduction
		Cells			Aerobic and Anaerobic respiration			Cell specialisation			Rate of photosynthesis			Meiosis
		Make a microscope slide			Breathing (ventilation)			Microscopy			Use of glucose			DNA and the genome
		Organisation in plants			Smoking (lung diseases)			Culturing Microorganisms			Aerobic and Anaerobic Respiration			DNA Structure
		Organisation in animals			Circulatory system			Chromosomes			Response to exercise			Genetic inheritance
		Organ systems			Blood			Mitosis and the cell cycle			Metabolism			Inherited disorders
		Specialised cells			Yeast Respiration			Stem Cells						Sex determination
								Diffusion						Variation
								Osmosis						Evolution
								Active Transport						Selective breeding
														Genetic engineering
														Cloning

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Strand	Year 7		Strand	Year 8		Strand	Year 9		Strand	Year 10		Strand	Year 11	
Biology - Reproduction		Internal and external fertilisation	Biology - Genetics and Variation		Reproduction and Fertilisation	Biology - Organisation		Organisational Hierachy	Biology - Homeostasis and Response		Homeostasis	Biology - Inheritance, Variation and Evolution		Theory of evolution
		Asexual/ sexual reproduction			Characteristics			Enzymes			The brain			Speciation
		Reproductive organs in humans			Variation and Varieties			Human Digestive Enzymes			The eye			The understanding of genetics
		Puberty & periods			Mendel and DNA			Food tests			Control of body temperature			Evidence for evolution
		Pregnancy & foetus health			Genetic Diseases			The heart and blood vessels			Endocrine system			Fossils
		Reproductive organs in plants			DNA Model Development			Structure and function of arteries, veins and capillaries			Blood glucose concentration			Extinction
		Seed Dispersion			Class Variation			Coronary heart disease			Water and nitrogen balance			Resistant bacteria
Biology - Fit and Healthy		Fitness	Biology - Evolution		Classification			Blood						Classification of living organisms
		Healthy eating			Tree of Life			Health issues				Biology - Homeostasis and Response		Communities
		Muscles and moving			Theory of Evolution			Cancer						Abiotic factors
		Heart diseases			Extinction and Fossils			Plant tissues						Biotic factors
		Drugs			Natural Selection			Plant transport systems						Adaptations

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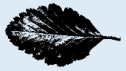
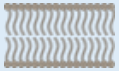
Strand	Year 7		Strand	Year 8		Strand	Year 9		Strand	Year 10		Strand	Year 11	
Biology - Ecosystems		Habitats	Biology - Evolution		Selective Breeding	Biology - Infection and Response		Communicable diseases	Biology - Homeostasis and Response		Hormones in reproduction	Biology - Homeostasis and Response		Levels of organisation
		Adaptations of animals			Cloning			Diseases			Contraception			How matrials are cycled
		Adaptations of plants			GM Crops			Protist Diseases			Hormone infertility treatment			Decomposition
		Changes in environment	Biology - Photosynthesis		Discovering Photo-synthesis			Human Defence Systems			Negative feedback			Biodiversity
		Food chains			Respiration and Photo-synthesis			Vaccination			Control and coordination			Waste management.
		Quadrats - estimation			Adaptations for Photo-synthesis			Antibiotics and Painkillers			Plant hormones			Land use
		Quadrats - transect			Measuring Photo-synthesis			Discovery and Development of Drugs						Deforestation
					Uses of Glucose			Producing Monoclonal Antibodies						Global warming
					Substance Transportation			Uses of monoclonal antibodies						Maintaining biodiversity
					Testing for Starch			Plant diseases						Pyramids of biomass
								Plant defence responses						Transfer of biomass
														Farming techniques

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Curriculum Overview - Chemistry

Strand	Year 7		Strand	Year 8		Strand	Year 9		Strand	Year 10		Strand	Year 11	
Chemistry - Rocks		Structure of the Earth			Pure and impure substances	Chemistry - Chemistry of the Atmosphere		Earth's Early Atmosphere	Quantitative Chemistry		Conservation of Mass	Chemistry - Energy Change		Exothermic and Endothermic
		Breaking down rocks	Chemistry - Separating Mixtures		Dissolving			Greenhouse gases			Relative Formula Mass			Reaction Profiles
		Sedimentary rocks			Diffusion			Human effects			Mass Changes of Gas			Energy Changes
		Fossils			Filtration			Global climate change			Chemical Measurements			Temperature Changes
		Igneous Rocks			Rock salt separation			Atmospheric Pollutants from Fuels			Moles			Cells and Batteries and Fuel Cells
		Metamorphic rocks	Chemistry - Using Resources		Distillation			Earth's Resources			Amounts of Substances in Equations			
		The rock cycle			Chromatography			Potable Water			Using Moles to Balance Equations			
Chemistry - Particles		Solids, Liquid & Gases			RF Values			Waste Water Treatment			Limiting Reactants			
		Particle Model			The Periodic Table			Reducing use of resources			Concentration			
											Atom Economy			
											Concentration of Solutions			
											Volumes of Gases			

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Strand	Year 7	Strand	Year 8	Strand	Year 9	Strand	Year 10	Strand	Year 11
Chemistry - Particles	Change of State	Chemistry - The Periodic Table	Development of the PT	Chemistry - Using Resources	Corrosion	Chemistry - Chemical Changes	Metal Oxides	Chemistry	Pure Substances
	Gas pressure		Metals and non-metals		Alloys as useful materials		Reactivity Series		Formulations
	Diffusion		Properties Metals Non-metals		Ceramics, Polymers and Composites		Metal Extraction		Chromatography
Chemistry - Atoms, Elements, and Compounds	Atoms, Elements & Compounds		Reactivity series		Haber Process		Reactions of Acids with Metals		Gas Tests
	Chemical Symbols and Formulae		Extracting metals		NPK Fertilisers		Neutralisation and Salt Production		Flame Tests
	Chemical Reactions		Ceramics and composites	Chemistry - Atomic Structure and Periodic Table	Atoms, Elements and Compounds		Soluble Salts		Metal Hydroxides, Carbonates, Halides
	Conservation of mass		Polymers		Mixtures		pH Scale and Neutralisation		Sulfates
Chemistry - Acids and Alkalis	Indicators and the pH scale		Group Chemistry		Development of Model of the Atom		Strong and Weak Acids		Identifying Ions
	Red cabbage indicator		Metal Oxides		Relative Electrical Charge		Electrolysis		Instrumental Methods and Flame Emission Spectroscopy
	Neutralisation		Reversible and Irreversible		Electronic Structure		Using electrolysis to extract metals		
	Metals and Acids		Particle Diagrams		Development of the Periodic Table		Electrolysis of aqueous solutions		
							Half equations and electrons		

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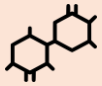
Strand	Year 7		Strand	Year 8		Strand	Year 9			Year 10			Year 11
Chemistry - Acids and Alkalis		Acids and metal carbonates	Chemistry - Chemical Reactions		Combustion	Chemistry - Bonding		Chemical Bonds	Chemistry - Rate and Extent of Chemical Change		Rate of Reactions		
		Making a salt			Thermal Decomposition			States of Matter			Factors affecting rates		
					Oxidation			Metallic Bonding			Catalysts		
					Displacement			Ionic Bonding			Reversible Reaction		
					The Atmosphere			Ionic Compounds			Equilibrium		
					Decomposing			Covalent Bonding			Temperature changes		
			Chemistry - Chemical Reactions		The Carbon Cycle			Properties of Small Molecules	Organic Chamistry		Crude oil, hydrocarbons and alkanes		
					Global Warming			Giant Covalent Structures			Cracking and Alkenes		
					Acid Rain			Sizes of Particles			Alcohols		
					Earth's Resources			Nanoparticles			Carboxylic Acids		
					Recycling						Amino Acids		
											DNA		

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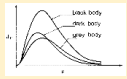
Curriculum Overview - Physics

Strand	Year 7		Strand	Year 8		Strand	Year 9			Year 10			Year 11	
Physics - Space		The Solar System	Physics - Physics in Sports		Speed	Physics - Energy		Energy stores and systems	Physics - Particle Model		Density of Materials	Physics - Waves		Transverse and Longitudinal Waves
		The History of the Solar System			Distance-Time Graphs			Changes in energy			Changes of Stage			Properties of waves
		The Universe			Velocity			Energy changes in systems			Internal Energy			Properties of waves
		The Planet Earth			Newton's First Law			Power			Specific Heat Capacity			Sound waves
		Gravitational Pull			Newton's Second & Third Law			Energy Transfers in a system			Specific Latent Heat			Ultrasound and Seismic waves
		The Moon	Physics - Thermodynamics		Particles and Forces			Efficiency			Particle Motion in Gases			EM waves
		Extra-Terrestrials			Kinetic Theory			National and Global Energy Resources			Pressure in Gases			Properties of EM waves
									Physics - Forces		Scalars and Vectors			Uses of EM waves
											Contact and Non-Contact			Lenses
											Gravity			Visible light
											Resultant Forces			Black body radiation
											Work Done			

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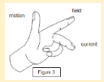
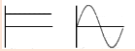
Strand	Year 7		Strand	Year 8		Strand	Year 9			Year 10			Year 11	
Physics - Exploring Space		Light as Waves	Physics - Thermodynamics		Gas Behaviour	Physics - Electricity		Circuit Diagram Symbols	Physics - Forces		Forces and Elasticity	Physics - Magnetism and Electromagnetism		Poles of a magnet
		Reflecting Telescopes			Ice Water Transition			Electrical Charge			Moments, Levers and Gears			Magnetic fields
		Refracting Telescopes			Thermal Equilibrium			The current in a series circuit			Distance and Displacement			Electromagnetism
		Colour			Conduction and Convection			Potential difference, current and resistance			Speed			Fleming's Left Hand Rule
		Force Diagrams			Insulation			Resistors			Velocity			Electric motors
		Friction	Physics - Engineering		Pressure in Solids			Series and Parallel Circuits			Acceleration			Loudspeakers
		Drag			Density			Direct and Alternating PD			Stopping Distance			Generator effect
		Newton's Laws			Pressure in Liquids			Mains Electricity			Reaction Time			Generators
											Factors Affecting Braking Distance			Microphones
														Transformers

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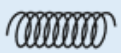
Strand	Year 7		Strand	Year 8		Strand	Year 9			Year 10			Year 11	
Physics - Electricity		Electrostatic	Physics - Engineering		Pressure in Gases	Physics - Electricity		Power and Resistance Heating	Physics - Atomic Structure		The structure of an atom	Physics - Space		Our Solar System
		Circuits			Moments of Force			Energy Transfers			Mass Number, Atomic Number, Isotopes			Life cycle of a star
		Current			Balanced Forces			The National Grid			Development of Model of the Atom			Satellites
		Potential Difference	Physics - The Music Industry		Transverse Waves			Static Charge			Radioactive Decay			Orbits
		Series Circuits			The Speed of Sound			Electric Fields			Nuclear Equations			Red Shift
		Parallel Circuits			Musical Sounds	Physics - Particle Model		Density of Materials			Half-Lives and Radioactive Decay			
Physics - The Energy Industry		Energy as Food			The Ear and Detection			Changes of State			Radioactive Contamination			
		Non-Renewable and Renewable			Magnetism			Internal Energy			Background Radiation			
		Resources			Using Compasses			Specific Heat Capacity			Half Lives of Radioisotopes			
		Power Ratings			Electromagnets			Specific Latent Heat			Uses of Nuclear Radiation			
		Energy Stores			Applications of Magnets			Particle Motion in Gases			Nuclear Fission			
		Conservation of Energy						Pressure in Gases			Nuclear Fusion			
		Springs												

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Biology

Topic	Skills tested				Links
7.2 Cells	1.1	2.1	3.1	4.1	**Links to prior learning** Year 6 ✓ Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals
	1.2	2.2	3.2	4.2	
	1.3	2.3		4.3	**How does this prepare students for future learning?** KS4 Topics: ✓ B1 Cells and transport ✓ B2 Human biology
		2.4		4.4	
			3.5	4.5	
		2.6		4.6	
		2.7	3.7		
7.6 Reproduction	1.1		3.1	4.1	**Links to prior learning** Year 6 ✓ Give reasons for classifying plants and animals based on specific characteristics ✓ Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.
	1.2	2.2	3.2		
		2.3	3.3	4.3	
		2.4	3.4		**How does this prepare students for future learning?** KS4 Topics: ✓ B1 Cells and transport ✓ B4 Plant Biology ✓ B7 Environmental science
	1.1	2.1	3.1	4.1	**Links to prior learning**

Chemistry

Topic	Skills tested				Links
7.1 Rocks	1.1		3.1	4.1	**Links to prior learning** Year 5 ✓ Properties and changes of materials ✓ Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.
	1.2	2.2		4.2	
	1.3	2.3	3.3	4.3	
	1.4	2.4	3.4		**How does this prepare students for future learning?** Links to 9C1 9C2: ✓ Chemical reactions and using word equations and balanced symbol equations. KS4 Topics: ✓ C4 Chemical Changes. ✓ Topic C8 Chemical Analysis. ✓ Topic 10 Using Resources, polymers composites and ceramics.
	1.5				
		2.6			
		2.7			
			3.8		
7.4 Particles		2.1	3.1	4.1	**Links to prior learning** Year 5 ✓ Properties and changes of materials. ✓ Demonstrate that dissolving, mixing and changes of state are reversible changes. ✓ use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating
				4.2	
		2.3		4.3	
		2.4			**How does this prepare students for future learning?** ✓ Changes in State and Separation Techniques are revisited in KS4 Topic C1. ✓ Atomic Structure and The Periodic Table
	1.1	2.1	3.1	4.1	**Links to prior learning**

Physics

Topic	Skills tested				Links
7.3 Space	1.1			4.1	**Links to prior learning** Year 5 ✓ Earth and Space
				4.2	
		2.3	3.3	4.3	
			3.4	4.4	**How does this prepare students for future learning?** Ideas such as Pressure, pressure in liquids, air pressure, moments, gravity and weight, sun stars and galaxies all to be built in Key stage 4
		2.6			
		2.7			
			3.8		
7.5 Exploring Space		2.1	3.1	4.1	**Links to prior learning** Year 6 ✓ Light
	1.2	2.2		4.2	
		2.3		4.3	
		2.4		4.4	**How does this prepare students for future learning?** Ideas such as properties of waves, reflection, refraction, measuring speed and ultrasound to be built on Key stage 4
	1.1	2.1	3.1	4.1	**Links to prior learning**

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7.8 Fit and Healthy	1.2	2.2	3.2		Year 6 ✓ ▫recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function ✓ ▫describe the ways in which nutrients and water are transported within animals, including humans.	7.7 Atoms, Elements and Compounds Atoms, Elements and Compounds	1.2	2.2		4.2	Year 5 ✓ Properties and changes of materials ✓ Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets	7.9 Electricity	1.2	2.2		4.2	Year 6 ✓ Electricity			
	1.3	2.3		4.3			1.3	2.3	3.3	4.3			1.3	2.3		4.3				
	1.4	2.4			**How does this prepare students for future learning?** KS4 Topics: ✓ B2 Human biology ✓ B3 Infectious diseases ✓ B5 Co-ordination and control			2.4			**How does this prepare students for future learning?** KS4 topics: ✓ Topic C1. Atomic Structure and The Periodic Table. ✓ Topic C2 Structure and Bonding. ✓ Topic C7 Organic Chemistry. ✓ Topic C8 Chemical Analysis		1.4	2.4			**How does this prepare students for future learning?** Ideas such as current, voltage in circuits, static electricity, resistance, electromagnetism, electrical energy to be built on Key stage 4.			
							1.1	2.1	3.1	4.1										
							1.2	2.2		4.2										
							1.3	2.3	3.3	4.3										
								2.4												
7.10 Ecosystems	1.1	2.1	3.1		**Links to prior learning** **Year 5** ✓ **describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird** ✓ **describe the life process of reproduction in some plants and animals.**	7.11 Acids and Alkalis		2.1	3.1	4.1	**Links to prior learning** Year 5 ✓ Properties and Changes of Materials. ✓ Know that some materials will dissolve in liquid to form a solution.	7.12 The Energy Industry		2.1		4.1	**Links to prior learning** N/A.			
	1.2	2.2					1.2	2.2		4.2				2.2						
	1.3	2.3	3.3	4.3				2.3						2.3		4.3				
	1.1				**How does this prepare students for future learning?** ✓ B7 Ecology ✓ B6 Inheritance and Evolution			2.1			**How does this prepare students for future learning?** KS4 Topics: ✓ C4 Chemical Changes Neutralisation and Salts. ✓ C9 Chemistry of the atmosphere, Global warming and Climate Change		1.4	2.4			**How does this prepare students for future learning?** Ideas such as Stretching materials, air resistance and friction, thermal radiation, magnetism, generating electricity to be built on in Key stage 4			
	1.2	2.2		4.2			1.2	2.2	3.2	4.2										
	1.3	2.3		4.3			1.3	2.3	3.3	4.3										
	1.4		3.4				1.4	2.4	3.4	4.4										
8.2 Respiration	1.1	2.1	3.1	4.1	**Links to prior learning** Year 6 ✓ identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood	8.3 Separating Mixtures	1.1	2.1		4.1	**Links to prior learning** Year 5 ✓ use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating	8.1 Physics in Sport	1.1	2.1	3.1	4.1	**Links to prior learning** Year 5 ✓ explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object ▫ identify the effects of air resistance, water resistance and friction, that act between moving surfaces			
	1.2	2.2	3.2				1.2	2.2	3.2	4.2			1.2	2.2	3.2	4.2				
	1.3	2.3	3.3	4.3			1.3	2.3	3.3	4.3			1.3	2.3		4.3				

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	1.4	2.4		4.4	**How does this prepare students for future learning?** KS4 Topics: ✓ B2 Human biology			2.4			**How does this prepare students for future learning?** KS4 Topics: ✓ C4 Chemical Changes Neutralisation and Salts.			2.4		4.4	**How does this prepare students for future learning?** KS4 Topics: ✓ P5 Forces
		2.5	3.5			1.1	2.1	3.1	4.1					3.5	4.5	
			3.6	4.6		1.2	2.2		4.2				2.6		4.6	
		2.7	3.7			1.3	2.3	3.3	4.3				2.7	3.7		
							2.4									
8.6 Genetics and Variation	1.1		3.1	4.1	✓ **Links to prior learning** Year 6: ✓ recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents	8.5 Trends in the Periodic Table		2.1	3.1	4.1	Links to prior learning Year 8 Chemical Reactions	8.4 Thermodynamics		2.1	3.1	4.1	**Links to prior learning** Year 5 ✓ Properties and changes of materials
		2.2						2.2	3.2	4.2			1.2	2.2		4.2	
	1.3			4.3				2.3	3.3	4.3				2.3		4.3	
	1.1		3.1	4.1	**How does this prepare students for future learning?** KS4 Topics: ✓ B2 Human Biology ✓ B5 Co-ordination and control ✓ B6 Inheritance and evolution ✓			2.4	3.4		**How does this prepare students for future learning?** KS4 Topics: ✓ C1 Atomic Structure and the Periodic Table. C4 Chemical Changes. Reactions of acids and Extraction of metals.			2.4		4.4	**How does this prepare students for future learning?** Ideas such as particles, kinetic theory, density, diffusion to be built on in Key stage 4.
	1.5	2.5	3.5				1.5		3.5						3.5	4.5	
	1.6						1.6	2.6	3.6	4.6				2.6		4.6	
		2.7	3.7					2.7	3.7					2.7			
									3.8								
8.9 Evolution	1.1	2.1	3.1	4.1	**Links to prior learning** Year 6 ✓ identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.	8.7 Types of Chemical Reaction	1.1	2.1	3.1	4.1	**Links to prior learning** Topic ✓ Chemical Reactions. Chemical and Physical Changes. Combustion. Ideas about conservation of mass.	8.8 Engineering	1.1	2.1	3.1	4.1	**Links to prior learning** Year 5 ✓ recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.
	1.2	2.2	3.2	4.2			1.2	2.2	3.2	4.2							
	1.3	2.3		4.3			1.3	2.3	3.3				1.3	2.3		4.3	
		2.4		4.4	**How does this prepare students for future learning?** KS4 Topics: ✓ B7 Ecology		1.4	2.4	3.4		**How does this prepare students for future learning?** KS4 Topics:		1.1		3.1	4.1	**How does this prepare students for future learning?** KS4 Topics: ✓ P5 Forces
		2.5	3.5	4.5			1.5	2.5					1.2	2.2	3.2		
				4.6			1.6	2.6	3.6	4.6			1.3				
		2.7	3.7					2.7	3.7					2.4	3.4		

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					✓ B6 Inheritance and Evolution				3.8		✓ C3 Quantitative Chemistry and using balanced symbol equations to calculate reacting masses. ✓ C4 Chemical Changes. Extraction of metals. ✓ C5 Energy Changes. Exothermic and Endothermic Reactions. ✓ C6 Rates and extent of Chemical Change. ✓ Topic 10 Using Resources, extraction of metals. ✓						
8.10 Photosynthesis					**Links to prior learning** N/A.	8.11 **Climate**	1.1	2.1		4.1	**Links to prior learning** KS2 ✓ Physical geography, including: climate zones, biomes and vegetation belts, rivers, mountains, volcanoes and earthquakes, and the water cycle	8.12 The Music Industry	1.1	2.1		4.1	**Links to prior learning** Year 6 ✓ explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes ✓ use recognised symbols when representing a simple circuit in a diagram.
							1.2		3.2	4.2			1.2	2.2		4.2	
							1.3		3.3	4.3			1.3			4.3	
	1.4	2.4			**How does this prepare students for future learning?** KS4 Topics: ✓ B1 Cells and Transport ✓ B4 Plant Biology		1.4		3.4	4.4	**How does this prepare students for future learning?** KS4 Topics: ✓ C9 Chemistry of the Atmosphere		1.4			4.4	**How does this prepare students for future learning?** KS4 Topics: ✓ P6 Waves ✓ P7 Magnetism
		2.5	3.5	4.5			1.5		3.5	4.5						4.5	
		2.6	3.6	4.6			1.6		3.6	4.6						4.6	
		2.7	3.7						3.7								
			3.8						3.8								
B1 Cells and Transport		2.1	3.1	4.1	**Links to prior learning** KS3 Learning Points: ✓ Cells and animal reproduction ✓ Plant reproduction and ecology ✓ Photosynthesis and respiration	C1 Atomic Structure and the Periodic Table	1.1		3.1	4.1	**Links to prior learning** KS3 Learning Points: ✓ States of matter and Separation techniques, The Periodic Table, Atoms and Elements, Properties of Metals and Non metals. ✓ Trends in the Periodic Table.	P1 Energy				3.1		**Links to prior learning** Year 8 Energy topic such as Stretching materials, air resistance and friction, thermal radiation, magnetism, generating electricity to be built on Key stage 3.
1.2		2.2	3.2				1.2			4.2			1.2	2.2			
		2.3	3.3	4.3			1.3			4.3			1.3		3.3		
		2.4		4.4	**How does this prepare students for future learning?**		1.4		3.4	4.4	**How does this prepare students for future learning?**		1.4		3.4	4.4	**How does this prepare students for future learning?**
			3.5	4.5			1.5								3.5		
1.6		2.6	3.6	4.6			1.6										

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		2.7	3.7		KS5 Learning Points: ✓ Cell structures ✓ Transport across membranes ✓ Cell recognition and the immune system ✓ Exchange ✓ Mass transport				3.7		Atomic Structure is further developed in KS 5 to include electronic configurations and Ionisation Energies. Periodicity is expanded to include Period 3 elements, Group 2 and Transition metal reactions.				3.7		Stretching materials, air resistance and friction, magnetism, generating electricity to be built on in Key stage 5 Physics
			3.8						3.8								
B2 Organisation	1.1	2.1	3.1	4.1	**Links to prior learning** KS3 Learning Points: ✓ Cells and animal reproduction ✓ Diet digestion and drugs ✓ Muscles, bones and the respiratory system ✓ Genetics and biodiversity	C2 Bonding, Structure, and the Properties of Matter	1.1			4.1	**Links to prior learning** ✓ KS3 Learning Points ✓ The Periodic Table. Properties of Metals and non-metals.	P2 Electricity			3.1		**Links to prior learning** Current, voltage in circuits, static electricity, resistance, electromagnetism, electrical energy to be built on Key stage 3.
							1.2			4.2			1.2			4.2	
	1.3	2.3	3.3	4.3			1.3			4.3					3.3	4.3	
	1.4	2.4		4.4	**How does this prepare students for future learning?** KS5 Learning Points: ✓ Cell recognition and the immune system6 Exchange ✓ Mass transport ✓ DNA, genes and protein synthesis ✓ Response to stimuli ✓ Nervous co-ordination and muscles ✓ Homeostasis		1.4			4.4	**How does this prepare students for future learning?** Bonding and Structure is developed in KS5 to include Intermolecular forces.		1.4		3.4		**How does this prepare students for future learning?** Current, voltage in circuits, static electricity, resistance, electromagnetism, electrical energy, I-V graphs, Electrical power energy to be built on Key stage 5 Physics
	1.5		3.5	4.5			1.5		3.5	4.5			1.5		3.5		
	1.6	2.6	3.6	4.6			1.6		3.6								
		2.7	3.7						3.7						3.7		
			3.8						3.8								
B3 Infectious Diseases	1.1	2.1	3.1	4.1	**Links to prior learning** KS3 Learning Points 8B2 Muscles bones and the respiratory system	C3 Quantitative chemistry			3.1	4.1	**Links to prior learning** ✓ KS3 Learning Points ✓ Types of Chemical Reaction and the idea of Conservation of mass. Using balanced symbol equations.	P3 Particle model of matter				4.1	**Links to prior learning** Ideas such as particles, kinetic theory, density, diffusion are built from The Particle Model
		2.2	3.2					2.2	3.2	4.2							
	1.3	2.3	3.3	4.3			1.3	2.3	3.3	4.3			1.3				
	1.4	2.4		4.4	**How does this prepare students for future learning?** KS5 Topics: ✓ 5 Cell recognition and the immune system			2.4	3.4	4.4	**How does this prepare students for future learning?** Amount of Substance in KS5 includes mole calculations for solids, liquids and gases.					4.4	**How does this prepare students for future learning?** Ideas such as particles, kinetic theory, density, diffusion are built from in Key stage 5 Physics
	1.5		3.5	4.5			1.5	2.5	3.5	4.5						4.5	
	1.6	2.6	3.6	4.6			1.6	2.6	3.6	4.6						4.6	
		2.7	3.7					2.7	3.7								
			3.8						3.8								
B4 Plant Biology	1.1	2.1	3.1	4.1	**Links to prior learning**	C4 Chemical changes & Salts	1.1	2.1	3.1	4.1	**Links to prior learning** KS3 Learning Points ✓ Neutralisation and Salts	P4 Atomic structure	1.1	2.1	3.1	4.1	**Links to prior learning**
		2.2					1.2	2.2	3.2	4.2			1.2		3.2		
		2.3		4.3			1.3	2.3	3.3	4.3					3.3		

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					✓ KS3 Learning Points 2 Plant reproduction and ecology ✓ Photosynthesis and respiration ✓ Investigating the effect of light intensity						✓ The Periodic Table and Types of Chemical Reactions ✓ Extraction of Metals and the Reactivity Series.							✓ Ideas such as atomic structure, chemical symbols to be built on from atoms, elements and comp ✓ Periodic Table
	1.4	2.4	3.4	4.4	**How does this prepare students for future learning?** KS5 Topics: ✓ 3 Cell structure ✓ 4 Transport across cell membranes ✓ 11 Photosynthesis		1.4	2.4	3.4	4.4	How does this prepare students for future learning? Chemical Reactions and Redox equations are expanded in KS5.		1.4		3.4		How does this prepare students for future learning? Ideas such as radioactive decay, half-life, nuclear equations, fission, fusion to be built on Key Stage 5 Physics.
	1.5	2.5	3.5	4.5			1.5	2.5	3.5	4.5			1.5		3.5		
	1.6	2.6	3.6	4.6			1.6	2.6	3.6	4.6			1.6		3.6		
		2.7	3.7					2.7	3.7						3.7		
			3.8						3.8						3.8		
						C5 Energy changes	1.1	2.1	3.1	4.1	**Links to prior learning** ✓ KS3 Learning Points Types of Chemical Reactions. ✓ Exothermic and Endothermic reactions.						
							1.2	2.2	3.2	4.2							
							1.3	2.3	3.3	4.3							
							1.4	2.4	3.4	4.4	**How does this prepare students for future learning?** Energetics and Bond Enthalpies are expanded in KS5. Thermodynamics is introduced.						
							1.5	2.5	3.5	4.5							
							1.6	2.6	3.6	4.6							
								2.7	3.7								
									3.8								
B5 Co-ordination and Control	1.1	2.1	3.1	4.1	**Links to prior learning** KS3 Learning Points 7B1 Cells and animal reproduction ✓ 7B2 Plant reproduction and ecology ✓ 8B1 Diet, digestion and drugs	C6. The rate and extent of chemical change	1.1	2.1	3.1	4.1	**Links to prior learning** ✓ KS3 Learning Points ✓ Types of Chemical Reactions. Measuring Chemical Changes.	P5 Forces					
		2.2	3.2	4.2			1.2	2.2	3.2	4.2			1.2	2.2		4.2	
	1.3	2.3	3.3	4.3			1.3	2.3	3.3	4.3				2.3		4.3	
	1.4	2.4	3.4	4.4	**How does this prepare students for future learning?** KS5 Topics: ✓ 14 Responding to stimuli ✓ 15 Nervous co-ordination and muscles ✓ 16 Homeostasis		1.4	2.4	3.4	4.4	**How does this prepare students for future learning?** Rates of Reaction and Kinetics are expanded in KS5, with rate equations and calculations of activation energy.			2.4		4.4	**How does this prepare students for future learning?** Mass and weight, scalar and vector quantities, moments, centre of mass, motion graphs Newton's Laws of Motion to be built on in KS5 Physics.
	1.5	2.5	3.5	4.5			1.5	2.5	3.5	4.5			1.5		3.5	4.5	
	1.6	2.6	3.6	4.6			1.6	2.6	3.6	4.6				2.6		4.6	
		2.7	3.7					2.7	3.7					2.7			
			3.8						3.8								
B6 Inheritance and Evolution	1.1	2.1	3.1	4.1	**Links to prior learning** KS3 Learning Points Genetics and Biodiversity	C7 Organic chemistry	1.1		3.1	4.1	**Links to prior learning** KS3 Learning Points ✓ The periodic Table, atoms Elements and Compounds.	P6 Waves	1.1			4.1	**Links to prior learning** Properties of waves, reflection, refraction, measuring speed and ultrasound to be built
	1.2	2.2	3.2	4.2			1.2	2.2	3.2	4.2				2.2	3.2	4.2	
	1.3		3.3	4.3			1.3	2.3	3.3	4.3						4.3	

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																on from Light and Sound
	1.4	2.4	3.4	4.4	**How does this prepare students for future learning?**		1.4	2.4	3.4	4.4	**How does this prepare students for future learning?**		1.4			4.4	**How does this prepare students for future learning?**
	1.5	2.5	3.5	4.5			1.5	2.5	3.5	4.5			1.5			4.5	
	1.6	2.6	3.6	4.6			1.6	2.6	3.6	4.6						4.6	
		2.7	3.7		KS5 Topics:			2.7	3.7		Organic Chemistry is expanded in KS5 to include many more functional groups and reaction mechanisms.			2.7			Properties of waves, wave speed, the wave equation, refraction and total internal reflection to be built on KS5
			3.8		✓ 8 DNA, genes and protein synthesis ✓ 9 Genetic diversity ✓ 10 Biodiversity ✓ 20 Gene expression ✓ 21 Recombinant DNA technology				3.8								
B7 Ecology	1.1	2.1	3.1	4.1	**Links to prior learning**	C8 Chemical analysis	1.1	2.1	3.1	4.1	**Links to prior learning**	P7 Magnetism and electromagnetism		2.1		4.1	**Links to prior learning**
	1.2	2.2	3.2	4.2			1.2	2.2		4.2				2.2		4.2	
	1.3	2.3	3.3	4.3	KS3 Learning Points Cells and animal reproduction ✓ Plant reproduction and ecology ✓ enetics and Biodiversity		1.3	2.3			KS3 Learning Points The periodic table ✓ Atoms ✓ Elements and Compounds ✓ Chemical Reactions ✓ Gas tests.					4.3	Magnetism, generating electricity to be built from Energy Electromagnetism, electrical energy to be built on from Electricity.
	1.4	2.4	3.4	4.4	**How does this prepare students for future learning?**		1.4	2.4			**How does this prepare students for future learning?**		1.4			4.4	**How does this prepare students for future learning?**
	1.5	2.5	3.5	4.5			1.5	2.5	3.5							4.5	
	1.6	2.6	3.6	4.6			1.6	2.6	3.6							4.6	
		2.7	3.7		KS5 Topics:			2.7	3.7		Chemical analysis is expanded in KS5 to include Instrumental techniques such as Mass Spectrometry, Infra-red, Chromatography and NMR.						Alternating current, transformers, electromagnetism and electromagnetic induction to be built on Key stage 5 Physics.
			3.8		✓ 9 Genetic diversity ✓ 10 Biodiversity ✓ 13 Energy and ecosystems ✓ 18 Populations and evolution ✓ 19 Populations in ecosystems				3.8								
						C9 Chemistry of the atmosphere	1.1	2.1		4.1	**Links to prior learning**	P8 Space physics (physics only)	1.1				**Links to prior learning**
							1.2		3.2	4.2							
							1.3		3.3	4.3	KS3 Learning Points: ✓ Earth and the Atmosphere. ✓ The carbon cycle.		1.3				Gravity and weight, sun stars and galaxies all to be built on from the Earth, Space and Forces
							1.4		3.4	4.4	**How does this prepare students for future learning?**						**How does this prepare students for future learning?**
							1.5		3.5	4.5							
							1.6		3.6	4.6							
									3.7								
									3.8		Atmospheric effects of Combustion reactions of Alkanes are expanded in KS5.						Redshift, circular motion, satellites to be built on KS5

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Enrichment Opportunities

Key stage	
KS3	Stellarium British Science Week Career curriculum links Eden Project Residential Women in Science day Climate change unit
KS4	GCSE Science live London Science Trip (2019) Period 6 intervention for year 11 students Tutor time intervention Career curriculum links Proposed: Manchester Science Museum Women in Science day
KS5	Proposed: Med6 Women in Science day Previously/Proposed - Cranedale CREST