



## Science curriculum overview KS3

### **Curriculum intent:**

Science is everywhere in today's world. It is part of our daily lives, from cooking and gardening, to recycling and comprehending the daily weather report, to reading a map and using a computer. Advances in technology and science are transforming our world at an incredible pace, and our children's future will surely be filled with leaps in technology we can only imagine. Being "science literate" will no longer be just an advantage but an absolute necessity. We cannot underestimate the significance of science in our world.

We aim to promote a love of science and to equip pupils with the skills necessary to understand the impact of science on their lives and equip them with the skills and knowledge they need to be successful in the future.

### **IMPLEMENTATION**

Year 7 and 8 introduce key concepts for students which will allow them to understand the basic principles which govern all the scientific concepts in the world round them. Each primary topic of Biology, Chemistry and Physics contains knowledge which can be applied to the secondary topic and has skills of analysis and comparison interwoven.

Both years build upon each other and begin the task of allowing students to begin developing 'mastery' of key scientific skills, eg year 7 students covering 'particles', leading to year 8 students covering 'periodic table and materials'; both topics rely on similar principles which must be looked at multiple times.

Assessments will take place at the end of each term on all topics covered that term.

The year 9 scheme of learning introduces students to all the key areas needed to fully access the GCSE Combined Science qualification, focusing on the key concepts for Biology, Chemistry and Physics.

This year includes key skills areas and mini-tests which need to be focused on in order to ensure pupils are fully prepared to access the content of GCSE lessons.

Lesson guides are also written around beginning to stretch and challenge student abilities within science through identification of "Triple Science Only"

lessons. Staff are able to ensure all ability groups are supported; to 'push' students towards these triple topics where applicable or ensure they approach learning at a slower pace to encourage 'revisiting for mastery' for lower ability classes.  
Assessments will take place at the end of each topic

	Autumn Term	Spring Term	Summer term
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Year 7	<b><u>Topic: Particles</u></b>	<b><u>Topic: Types of reaction</u></b>	<b><u>Topic: Forces</u></b>	<b><u>Topic: Energy</u></b>	<b><u>Topic: Interdependence and cells</u></b>	<b><u>Topic: Reproduction and Variation</u></b>
	Scientific equipment	Physical and Chemical reactions	Identifying forces – contact vs non-contact	Different types of energy stores	Living things: MRS NERG	Male and female reproductive organs in humans and plants
	Writing a method (EXT)	Solubility	Balanced and unbalanced forces	Energy transfers	5 Kingdoms and classes	Gametes – humans and plants
	Classifying solids, liquids and gases	Rates of dissolving	Resultant force	Sankey diagrams (EXT)	Classification and keys	Fertilisation in humans
	Changes of state	Filtration	Newton's Laws (EXT)	Efficiency calculations	Food chains	Pregnancy and gestation (EXT)
	Melting and boiling points	Crystallisation (linking to evaporation)	Hooke's Law- practical and graph skills (EXT)	Conduction, convection and radiation	Food webs	Menstrual cycle (EXT)
	Expansion and contraction	Simple Distillation	Friction- advantages and disadvantage	Preventing heat loss- practical skills	Pyramids of numbers	Genetic and environmental variation
	Diffusion	Chromatography	Streamlining- everyday examples and linked to particles	Renewable and non-renewable	Pyramids of biomass (EXT)	Genetic cross diagrams (EXT)
	Osmosis	Acids and Alkalis	Moments (EXT)	Renewables- advantages and disadvantages	Environment and habitats	Genetic diseases and sexual determination (EXT)
	Mini Quiz	Indicators	Speed calculations	Nuclear energy	Competition	Adaptation
	Active transport	Neutralisation	Distance- time graph	Calculations: power and energy	Sampling techniques (EXT)	Natural Selection
	Atoms and elements		Velocity-time graph		Animal cells	Selective Breeding
	Compounds and mixtures		Gravity, weight and mass		Plant cells	Endangered species and extinction
	Symbols and formulae		Solar system		Prokaryotic vs eukaryotic	Biodiversity (EXT)
	Atomic structure		Day and night		Microscopes	Extremophiles (EXT)
			Seasons		Microscope calculations (EXT)	
		Galaxies and universe		Specialised cells		
		Light year		Stem cells		
				Cells, tissues, organs, systems		

Year 8	<b>Topic: Periodic table and materials</b> The periodic table – structure History of the periodic table (EXT) Metals and non-metals Alloys (EXT) Ceramics (EXT) Polymers (EXT) Composite (EXT) Atomic Structure Electron configuration Ar and Mr (EXT) Alkali metals (group 1) Halogens (Group 7) Noble Gases (Group 0) (EXT) Reactivity of group 1 and 7 (EXT) Naming compounds (EXT) Writing formulae (EXT) Exothermic and endothermic reactions Gas Tests	<b>Topic: Chemical Reactions and the environment</b> Metals and oxygen Metals and acid reactions Acids and hydroxides (EXT) Acids and carbonates (EXT) Combustion Word and symbol equations (taught throughout this topic) Balancing equations (taught throughout this topic) Conservation of mass The Reactivity series (EXT) Displacement reactions (EXT) Extracting metals (EXT) Rates of reaction (EXT) Catalysts (EXT) Fossil fuel formation Climate change Greenhouse effect (EXT) Carbon cycle Recycling	<b>Topic: Waves and Pressure</b> Producing sounds How sound travels Hearing sounds – The ear (EXT) Properties of sound waves Wave calculations Using sound: ultrasound and echo waves (EXT) Waves – EM waves Transverse and longitudinal (EXT) The eye and light Reflection Refraction Seeing colour (EXT) Pressure (over area) Pressure (in liquids) Pressure (in gases)	<b>Topic: Electricity and Magnetism</b> Static electricity (EXT) Conductors and Insulators Electrical circuits Current Potential difference Measuring potential difference Series and Parallel circuits Resistance in a circuit (EXT) Power in a circuit (EXT) Magnets Making Magnets Drawing magnetic fields Earth's magnetic field Electromagnets (EXT) Using Electromagnets (EXT)	<b>Topic: Energy from food</b> Food groups Balanced and unbalanced diets Energy in food Tissues and organs of the digestive system Digestion Absorption – diffusion, active transport, osmosis (EXT) Enzymes in the digestive system Photosynthesis Leaf adaptations – Gas exchange Rood adaptation - Absorption of water Transpiration/translocation (EXT) Testing for starch	<b>Topic: Keeping Healthy</b> Sub cellular structures (recap) Cells, tissues, organs and systems The lungs Breathing Gas exchange The heart and blood The circulatory system Aerobic respiration Anaerobic respiration Exercise and respiration Communicable vs non communicable diseases Microorganisms Pathogens Antibiotics Human defences Vaccination (EXT)
	Year 9	<b>Chemistry</b>		<b>Physics</b>		<b>Biology</b>

	<p><b><u>Topic: Chemistry Fundamentals – 20 lessons + 5 triple</u></b></p>	<p><b><u>Topic: Investigative Chemistry – 19 lessons + 16 triple</u></b></p>	<p><b><u>Topic: Physics - Energy and Waves – 19 lessons + 10 triple</u></b></p>	<p><b><u>Topic: Forces – 22 lessons + 9 triple</u></b></p>	<p><b><u>Topic: Cell Biology – 23 lessons + 4 triple</u></b></p>	<p><b><u>Topic: Communicable Diseases – 17 lessons + 5 triple</u></b></p>
	<p><b>Knowledge:</b> Changing states of matter</p> <p>Atoms and elements</p> <p>Compounds and formulae</p> <p>Pure substances and solutions</p> <p>Separation techniques</p> <p>RP: Chromatography</p> <p>Changing Atomic Theories</p> <p>Protons, Neutrons and Electrons</p> <p>Electron configuration</p> <p>Isotopes and relative atomic mass</p> <p>The periodic table</p> <p>The modern periodic table</p> <p><b>Mini Quiz</b></p> <p>Metals and non-metals</p>	<p><b>Knowledge:</b> Ionic bonding part 1</p> <p>Ionic bonding part 2</p> <p>Properties of ionic bonding</p> <p>Covalent bonding</p> <p>Properties of covalent structures</p> <p>Giant covalent structures</p> <p>Nanoparticles (T only)</p> <p>Metallic Bonding</p> <p>Comparing and contrasting types of bonding</p> <p>Word and symbol equations</p> <p>Balancing equations</p> <p>Conservation of mass</p>	<p><b>Knowledge:</b> Types of energy and energy transfers</p> <p>Open and closed systems</p> <p>Insulation</p> <p>RP: Investigating thermal insulators (T only)</p> <p>Non-renewable resources</p> <p>Renewable resources</p> <p>Comparison of energy resources</p> <p>Work done</p> <p>Power</p> <p>Efficiency calculations</p> <p>Gravitational potential energy</p> <p>Kinetic energy</p>	<p><b>Knowledge:</b> Scalar and vector quantities</p> <p>Types of forces</p> <p>Centre of mass</p> <p>Weight</p> <p>Resultant forces</p> <p>Vector diagrams</p> <p>Speed and velocity</p> <p>Circular motion</p> <p>Distance time graphs</p> <p>Acceleration and deceleration</p> <p>Velocity time graphs</p> <p>Terminal Velocity</p> <p>Newton's first law</p>	<p><b>Knowledge:</b> Types of cells</p> <p>Specialised cells</p> <p>Tissues, organs and systems</p> <p>Introducing microscopes</p> <p>RP: Using Microscopes</p> <p>Types of microscope</p> <p>Multiplying bacteria (T only)</p> <p>Culturing microorganisms</p> <p>RP: Investigating Antiseptics (part 1)</p> <p>RP: Investigating antiseptics (part 2)</p> <p>Analysing Antibiotics</p> <p><b>Mini Quiz</b></p>	<p><b>Knowledge:</b> Health</p> <p>Bacterial diseases</p> <p>Pathogens</p> <p>Viral Diseases</p> <p>Fungal and protists</p> <p>Our barriers to diseases</p> <p>The immune system</p> <p>Vaccinations</p> <p>Medicines</p> <p>Antibiotic resistance</p> <p>Developing new drugs</p> <p>Cancer</p> <p>Monoclonal antibodies (T</p>

<p>Uses of metals</p> <p>Corrosion (T only)</p> <p>Corrosion prevention (T only)</p> <p>Transition metals (T only)</p> <p>Typical properties (T only)</p> <p>Alloys</p> <p>Properties and uses of alloys (T only)</p> <p>Alkali metals</p> <p>Halogens</p> <p>Noble Gases</p> <p>Gas tests</p> <p><b>Skills:</b> Calculate the number of protons, neutrons and electrons for different elements Naming apparatus Selecting appropriate apparatus Explaining why certain apparatus is used Accuracy (comparison to true value) Select the best hypothesis based on results</p>	<p>Metals and oxygen</p> <p>Metals and acid</p> <p>Metals and water</p> <p>Redox reactions (T only)</p> <p>Acids and bases</p> <p>Acids - weak and strong (T only)</p> <p>Neutralisation</p> <p>RP: Soluble Salts</p> <p>RP: Titrations part 1 (T only)</p> <p>RP Titrations part 2 (T only)</p> <p>Testing for ions (T only)</p> <p>RP: Testing for ions part 1 (T only)</p> <p>RP: Testing for ions part 2 (T only)</p> <p>Atom economy (T only)</p> <p>Percentage yield (T only)</p> <p>Reacting masses (T only)</p> <p>Reactivity series and displacement reactions</p> <p>Ionic half equations for displacement (T only)</p> <p>Reactivity series and extraction methods</p> <p>Electrolysis of molten compounds (T only)</p>	<p>Elastic potential energy</p> <p>RP: Relationship between force and extension</p> <p><b>Mini Quiz</b></p> <p>Introduction to waves Waves equation</p> <p>Measuring speed of sound</p> <p>Measuring period of a wave</p> <p>RP: Measuring speed of a wave using a ripple tank</p> <p>EM Spectrum</p> <p>Radios (T only)</p> <p>RP: Investigating IR radiation (T only)</p> <p>Sound waves (T only)</p> <p>Uses of sound waves (T only)</p> <p>Reflection of light (T only)</p> <p>Refraction of light (T only)</p> <p>RP: Investigating reflection and refraction of light</p> <p>Lenses (T only)</p> <p>Magnification (T only)</p> <p>Colour (T only)</p> <p><b>Skills:</b> Independent, dependent and control variables</p>	<p>Newton's second law</p> <p>Inertia and inertial mass (T only)</p> <p>RP: Investigate Newton's Second Law of motion</p> <p>Newton's third law</p> <p>Stopping distances</p> <p>Energy transfers in stopping</p> <p>Momentum (T only)</p> <p>Momentum calculations (T only)</p> <p>Moments (T only)</p> <p>Lever and gears (T only)</p> <p>Static electricity (T only)</p> <p>Electric field patterns (T only)</p> <p>Sound waves (T only)</p> <p>Uses of sound waves for detection and exploration (T only)</p> <p>Magnets</p> <p>Magnetic fields</p> <p>Electromagnets</p> <p><b>Skills:</b> Using a manual or digital scale Rearranging and using equations Stating the resolution Explaining why certain</p>	<p>DNA</p> <p>The Human Genome (T only)</p> <p>Mitosis and the cell cycle</p> <p>Incredible stem cells</p> <p>Therapeutic cloning</p> <p>Cloning plants</p> <p>Cloning animals (T only)</p> <p>Asexual reproduction</p> <p>Sexual Reproduction and Meiosis</p> <p>Sexual vs asexual reproduction</p> <p>Examples of unusual reproduction</p> <p>Inheritance (genetic cross diagrams)</p> <p>Family trees</p> <p>Genetic diseases and sex determination</p> <p>Protein Synthesis (T only)</p> <p><b>Skills:</b> Writing instructions Calculate uncertainty Creating own hypothesis Making scientific drawings Evaluating stem cells Explaining why certain apparatus is used</p>	<p>only)</p> <p>Scatter Graphs and Health</p> <p>Frequency tables and histograms</p> <p>Analysis data</p> <p><b>Mini Quiz</b></p> <p>Plant diseases (T only)</p> <p>Parts of the brain (T only)</p> <p>Brain Surgery (T only)</p> <p>The Eye (T only)</p> <p>Myopia and hyperopia (T only)</p> <p><b>Skills:</b> Plot and interpret scatter graphs showing data about health and diseases Analyse data health from frequency tables and histograms Using a given result table</p>
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		<p>Electrolysis of aqueous compounds (T only)</p> <p>RP: Electrolysis part 1 (T only)</p> <p>RP: Electrolysis part 2 (T only)</p> <p><b>Skills:</b> Writing a method Reproducibility and repeatability Following a given method Following a given risk assessment Writing a risk assessment (hazards, risks, precautions) Explaining properties of types of bonding Reproducibility and repeatability</p>	<p>Explaining differences between waves Stating the resolution Using a manual or digital scale Explaining why certain apparatus is used Bar chart</p>	<p>apparatus is used Sketch graph Using a manual or digital scale Making predictions from data Range electrolyte Gradient Area under a graph</p>		
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