

SCIENCE YEAR 9 Curriculum Overview



BIG IDEAS CURRICULUM

In Year 9, students begin to build the deeper scientific understanding that prepares them for GCSE study. During the autumn term they explore the structure and function of cells, learn how living organisms grow and divide, and revisit the building blocks of matter through the periodic table and atomic structure. They also study how energy is transferred by heating and develop their use of mathematical skills in quantitative chemistry.

In spring, students learn how the human body breaks down and transports nutrients, investigate how substances bond to form compounds, and explore the chemistry of energy changes. These topics strengthen key ideas about systems, reactions and energy that run throughout the GCSE course.

The summer term focuses on applying science to real-world contexts — understanding electrical circuits, how living organisms release and store energy through respiration and photosynthesis, how matter behaves at the particle level, and how genetic information is passed from one generation to the next.

Throughout the year, students work scientifically by planning and carrying out experiments, interpreting data, and communicating findings using correct scientific vocabulary. This builds the curiosity, precision and analytical thinking needed for success in GCSE Science and beyond.

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TERM	THEMES/ TOPICS	KEY KNOWLEDGE & SKILLS	KEY ASSESSMENTS
<p><u>AUTUMN</u></p> <p>Term 1</p> <p>Topic 1</p>	<p><u>BIOLOGY</u></p> <p><u>BIG IDEA</u> Organisms</p> <p><u>TOPIC</u> B1 Cells and Cell Division</p>	<p style="text-align: center;"><u>Core Substantive Knowledge</u></p> <ul style="list-style-type: none"> • Structure and function of animal and plant cells <ul style="list-style-type: none"> • Specialised cells and adaptations • Microscopy and magnification calculations <ul style="list-style-type: none"> • Cell division (mitosis) and growth <p style="text-align: center;"><u>Disciplinary Focus (Skills & Working Scientifically)</u></p> <ul style="list-style-type: none"> • Using light microscopes and preparing slides <ul style="list-style-type: none"> • Calculating magnification and scale • Recording observations with accuracy • Linking cell structure to biological function 	<ul style="list-style-type: none"> • Microscope practical skills check • Low-stakes retrieval quiz <ul style="list-style-type: none"> • End-of-topic test (Deliberate Practice)

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<p><u>AUTUMN</u></p> <p>Term 1</p> <p>Topic 2</p>	<p><u>CHEMISTRY</u></p> <p><u>BIG IDEA</u> Reactions</p> <p><u>TOPIC</u> C1 The Periodic Table and the Atom</p>	<p style="text-align: center;"><u>Core Substantive Knowledge</u></p> <ul style="list-style-type: none"> • Development of the periodic table • Structure of the atom (protons, neutrons, electrons) <ul style="list-style-type: none"> • Group 1, 7 and 0 patterns and reactivity • Atomic number, mass number and isotopes <p style="text-align: center;"><u>Disciplinary Focus (Skills & Working Scientifically)</u></p> <ul style="list-style-type: none"> • Using the periodic table to identify elements <ul style="list-style-type: none"> • Modelling atomic structure • Recognising patterns and predicting reactivity <ul style="list-style-type: none"> • Applying numeracy in atomic calculations 	<ul style="list-style-type: none"> • Retrieval quiz • End-of-topic test (Deliberate Practice)

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<p><u>AUTUMN</u></p> <p>Term 2</p> <p>Topic 1</p>	<p>PHYSICS</p> <p><u>BIG IDEA</u></p> <p>Energy</p> <p><u>TOPIC</u></p> <p>P1</p> <p>Heating</p>	<p style="text-align: center;"><u>Core Substantive Knowledge</u></p> <ul style="list-style-type: none"> • Energy transfer by conduction, convection and radiation <ul style="list-style-type: none"> • Specific heat capacity and insulation • Efficiency and energy conservation <ul style="list-style-type: none"> • Thermal equilibrium <p style="text-align: center;"><u>Disciplinary Focus (Skills & Working Scientifically)</u></p> <ul style="list-style-type: none"> • Planning and carrying out heating investigations • Measuring temperature and calculating energy changes • Drawing and interpreting energy-transfer diagrams <ul style="list-style-type: none"> • Evaluating accuracy and reliability 	<ul style="list-style-type: none"> • Core practical – heating and insulation • Retrieval quiz • End-of-topic test (Deliberate Practice)

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<p><u>AUTUMN</u></p> <p>Term 2</p> <p>Topic 2</p>	<p><u>CHEMISTRY</u></p> <p><u>BIG IDEA</u> Reactions</p> <p><u>TOPIC</u> C3 Quantitative Chemistry</p>	<p style="text-align: center;"><u>Core Substantive Knowledge</u></p> <ul style="list-style-type: none"> • Conservation of mass in reactions • Relative formula mass (Mr) and mole concept • Using balanced equations to calculate mass <ul style="list-style-type: none"> • Concentration of solutions <p style="text-align: center;"><u>Disciplinary Focus (Skills & Working Scientifically)</u></p> <ul style="list-style-type: none"> • Carrying out mass and volume measurements • Using mathematical equations for moles and mass • Evaluating data accuracy and percentage error <ul style="list-style-type: none"> • Linking theory to experimental evidence 	<ul style="list-style-type: none"> • Quantitative calculations task • End-of-term cumulative test

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<p><u>Spring</u> Term 1 Topic 1</p>	<p><u>BIOLOGY</u></p> <p><u>BIG IDEA</u> Organisms</p> <p><u>TOPIC</u> B2 Organisation Systems (Digestion)</p>	<p style="text-align: center;"><u>Core Substantive Knowledge</u></p> <ul style="list-style-type: none"> • Organs of the digestive system and their functions • Role of enzymes and factors affecting enzyme activity <ul style="list-style-type: none"> • Lock-and-key model • Absorption and transport of nutrients <p style="text-align: center;"><u>Disciplinary Focus (Skills & Working Scientifically)</u></p> <ul style="list-style-type: none"> • Conducting enzyme temperature/pH practicals <ul style="list-style-type: none"> • Drawing labelled diagrams and models <ul style="list-style-type: none"> • Analysing data on reaction rates • Communicating findings clearly 	<ul style="list-style-type: none"> • Enzyme core practical • Retrieval quiz • End-of-topic test (Deliberate Practice)

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<p><u>Spring</u></p> <p>Term 1</p> <p>Topic 2</p>	<p><u>CHEMISTRY</u></p> <p><u>BIG IDEA</u> Matter</p> <p><u>TOPIC</u> C2 Bonding and Structure of the Atom</p>	<p style="text-align: center;"><u>Core Substantive Knowledge</u></p> <ul style="list-style-type: none"> • Ionic, covalent and metallic bonding • Properties linked to structure and bonding • Giant lattice and simple molecular substances <ul style="list-style-type: none"> • Limitations of particle models <p style="text-align: center;"><u>Disciplinary Focus (Skills & Working Scientifically)</u></p> <ul style="list-style-type: none"> • Drawing dot-and-cross diagrams • Using models to represent different bond types <ul style="list-style-type: none"> • Explaining physical properties from bonding • Linking microscopic and macroscopic concepts 	<ul style="list-style-type: none"> • Retrieval quiz • End-of-topic test (Deliberate Practice) • Retrieval quiz • End-of-topic test (Deliberate Practice)

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<p><u>Spring</u> Term 2 Topic 1</p>	<p><u>BIOLOGY</u></p> <p><u>BIG IDEA</u> ORGANISMS</p> <p><u>TOPIC</u> B2 Systems (Respiratory and Circulatory)</p>	<p style="text-align: center;"><u>Core Substantive Knowledge</u></p> <ul style="list-style-type: none"> • Structure and function of heart, blood and lungs <ul style="list-style-type: none"> • Double circulation and gas exchange • Components of blood and their roles • Effects of lifestyle on health and disease <p style="text-align: center;"><u>Disciplinary Focus (Skills & Working Scientifically)</u></p> <ul style="list-style-type: none"> • Using models and diagrams of body systems • Analysing data on heart rate and oxygen uptake <ul style="list-style-type: none"> • Applying numeracy in biological contexts • Drawing evidence-based conclusions 	<ul style="list-style-type: none"> • Circulation investigation • Retrieval quiz • End-of-topic test (Deliberate Practice)

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<p><u>Spring</u> Term 2 Topic 2</p>	<p><u>CHEMISTRY</u></p> <p><u>BIG IDEA</u> Reactions</p> <p><u>TOPIC</u> C5 Energy Changes</p>	<p style="text-align: center;"><u>Core Substantive Knowledge</u></p> <ul style="list-style-type: none"> • Exothermic and endothermic reactions • Energy profiles and bond energy calculations • Uses of energy changes in real-life contexts <p style="text-align: center;"><u>Disciplinary Focus (Skills & Working Scientifically)</u></p> <ul style="list-style-type: none"> • Measuring temperature change in reactions <ul style="list-style-type: none"> • Calculating energy changes • Evaluating reliability of experimental results <ul style="list-style-type: none"> • Applying data to practical applications 	<ul style="list-style-type: none"> • Core practical – temperature change in reactions • End-of-topic test (Deliberate Practice)

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<p><u>Summer</u></p> <p>Term 1</p> <p>Topic 1</p>	<p><u>PHYSICS</u></p> <p><u>BIG IDEA</u> Electricity & Magnetism</p> <p><u>TOPIC</u> P2 Electricity</p>	<p style="text-align: center;"><u>Core Substantive Knowledge</u></p> <ul style="list-style-type: none"> • Current, potential difference and resistance <ul style="list-style-type: none"> • Ohm's Law ($V = IR$) • Series and parallel circuits • Power and energy transfer <p style="text-align: center;"><u>Disciplinary Focus (Skills & Working Scientifically)</u></p> <ul style="list-style-type: none"> • Constructing and testing circuits • Measuring current and voltage • Calculating resistance and power • Evaluating sources of error in measurements 	<ul style="list-style-type: none"> • Practical – investigating resistance • Retrieval quiz • End-of-topic test (Deliberate Practice)

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<p><u>Summer</u></p> <p>Term 1</p> <p>Topic 2</p>	<p><u>BIOLOGY</u></p> <p><u>BIG IDEA</u> Organisms</p> <p><u>TOPIC</u> B4 Bioenergetics</p>	<p style="text-align: center;"><u>Core Substantive Knowledge</u></p> <ul style="list-style-type: none"> • Photosynthesis: word and symbol equations • Limiting factors and rate of photosynthesis <ul style="list-style-type: none"> • Aerobic and anaerobic respiration • Relationship between respiration and photosynthesis <p style="text-align: center;"><u>Disciplinary Focus (Skills & Working Scientifically)</u></p> <ul style="list-style-type: none"> • Planning investigations into photosynthesis rate • Measuring gas exchange and analysing results <ul style="list-style-type: none"> • Drawing and interpreting graphs • Evaluating experimental methods 	<ul style="list-style-type: none"> • Core practical - photosynthesis • End-of-topic test (Deliberate Practice)

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<p><u>Summer</u></p> <p>Term 2</p> <p>Topic 1</p>	<p><u>PHYSICS</u></p> <p><u>BIG IDEA</u> Heating and Cooling</p> <p><u>TOPIC</u> P3 Particle Model of Matter</p>	<p style="text-align: center;"><u>Core Substantive Knowledge</u></p> <ul style="list-style-type: none"> • Particle arrangement in solids, liquids, gases <ul style="list-style-type: none"> • Density and states of matter • Changes of state and internal energy • Specific latent heat and specific heat capacity <p style="text-align: center;"><u>Disciplinary Focus (Skills & Working Scientifically)</u></p> <ul style="list-style-type: none"> • Measuring mass, volume and density • Using mathematical relationships between variables • Modelling particle behaviour during heating and cooling • Evaluating data for consistency and precision 	<ul style="list-style-type: none"> • Density practical • Retrieval quiz • End-of-topic test (Deliberate Practice)

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<p><u>Summer</u></p> <p>Term 2</p> <p>Topic 2</p>	<p>BIOLOGY</p> <p><u>BIG IDEA</u> Genes</p> <p><u>TOPIC</u> B6 Inheritance</p>	<p style="text-align: center;"><u>Core Substantive Knowledge</u></p> <ul style="list-style-type: none"> • DNA, genes and chromosomes • Inheritance of characteristics • Genetic crosses and Punnett squares • Ethical considerations in genetics <p style="text-align: center;"><u>Disciplinary Focus (Skills & Working Scientifically)</u></p> <ul style="list-style-type: none"> • Constructing and analysing genetic diagrams <ul style="list-style-type: none"> • Interpreting probability and ratio data • Discussing applications of genetics in society <ul style="list-style-type: none"> • Using scientific language precisely 	<ul style="list-style-type: none"> • Retrieval quiz • End-of-topic test (Deliberate Practice) • End-of-year exam (cumulative)