

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Topic	Cell structure Conservation and transfer of energy	Atomic structure, mixtures and separation Energy resources Transport in Cells	Periodic table Active transport in cells Matter	Matter Organisation of the digestive system	Organising plants and animals Electric Circuits	Energy Changes Materials
Big questions	Cell structure How are our cells organised? How can we study cells? Conservation and transfer of energy How can we calculate the energy transferred when something happens?	Atomic structure, mixtures and separation How do we know what atoms are? How can we use our understanding of mixtures to separate them? Energy resources How do we generate the electricity we use to power our homes? How do different energy resources generate electricity, and what are their advantages and disadvantages? What is the most sustainable energy mix for the UK in the future, and why?	Periodic table How and why was the periodic table created? What are alkali metals, halogens and noble gases? Transport in cells How do substances get in and out of cells? Matter How does the particle model help us explain the properties and behaviour of solids, liquids and gases? What happens to particles when matter changes state, and how is energy involved in these changes?	Matter How can understanding matter help us explain pressure, density and other everyday physical phenomena? Organisation of the digestive system How do we digest and absorb food? How do enzymes help keep us alive?	Organising plants and animals How do our circulatory and respiratory systems work? How do plants absorb and transport materials? Electric Circuits How does electrical charge flow through a circuit and transfer energy to useful devices? What is the relationship between current, potential difference and resistance in an electric circuit? How can we design and analyse electrical circuits to make them safe, efficient and fit for purpose?	Energy Changes How does energy transfer cause changes in the state and temperature of matter? What is internal energy, and how do changes in internal energy affect particles? Why are energy transfers during heating and cooling important in both everyday life and industrial processes? Forces and Motion What rules do we use to describe and predict how objects move?
Domains of knowledge	Cells, energy	Particles, Energy Resources and transport in cells	Elements, Active transport in cells and Matter	Particles, organisation	Organisation, Electric Circuits	Energy changes, Materials,
Concepts	Prokaryotic and Eukaryotic Cells Animal and Plant Cells Comparing Cells Bacterial Cells Orders of Magnitude Microscopes Observing Cells Stem Cells Cell Cycle Cell Differentiation Specialised Cells in Animals Specialised Cells in Plants Changes in Energy Stores Conservation of Energy Energy , Work and Power GPE, Kinetic and Elastic energy Energy Dissipation Energy and Efficiency Electrical Appliances	Atoms Chemical Equations Elements, Compounds, and Mixtures Separating Mixtures Simple Distillation (Practical) Crystallisation (Practical) History of the Atom Ions, Atoms, and Isotopes Electronic Structures Energy Demands –Renewable Energy Resources and Non-Renewable Energy Energy and the Environment Big Energy Issues Diffusion Factors Affecting Diffusion Diffusion Agar Practical Osmosis	Development of the Periodic Table Atoms and the Periodic Table Electronic Structures Metals and Non-Metals Group 1 – The Alkali Metals Group 7 – The Halogens Group 0 – Noble Gases The Periodic Table Active Transport Active Transport in Plants Active Transport in Animals Density (Regular Objects) Density (Irregular Objects) Required Practical Density (regular and irregular Objects) States of matter & changes of states	States of Matter and Changes of State/heating curve of steric acid practical Internal Energy Specific Latent Heat Gas Pressure and Temperature Levels of Organisation Food Tests Food Tests 2 Digestive System Absorption Factors Affecting Enzymes pH and Enzymes 1 pH and Enzymes 2 The Lungs	Gas Exchange The Heart Blood and Blood Vessels Plant Tissues Plant Roots The Leaf Transport in Plants Investigating Transpiration Circuit Symbols/Introduction to Current Introduction to Potential Difference ($V=E/Q$) Potential Difference & Resistance ($V=IR$) Only Ohm's law theory Series & Parallel circuits: Practical Components Characteristics (sensors)	Exothermic and Endothermic Reactions Energy profile diagrams Required Practical: Exothermic and Endothermic Reaction Analysis of Required Exothermic and Endothermic Reaction Bond Energy Calculation Vectors and Scalars Forces Between Objects Resultant Forces Speed and distance time graph velocity and acceleration (Calculations only) Velocity-Time Graphs Forces and Acceleration Mass vs Weight Reaction time Stopping distance; Factors affecting thinking and breaking distance)

Practical skills	- Preparing and observing onion epidermis cells under a microscope - Preparing and observing cheek cells under a microscope - Using a microscope to measure cell size with an eyepiece graticule - Investigating Hooke's Law with springs or elastic bands - Calculating kinetic energy using toy cars on ramps	- Simple distillation of ink or salt solution - Crystallisation of a soluble salt from solution - Required practical – measuring specific heat capacity of a block - Investigating thermal conductivity of different materials (conduction practical) - Separating mixtures using filtration and evaporation	- Osmosis practical using potato cylinders in varying sugar solutions - Osmosis practical 2 (e.g. using visking tubing or alternative method) - Observing reactions of Group 1 metals with water (teacher demonstration) - Observing reactions of Group 7 halogens with metals or displacement reactions (teacher demonstration) - Active transport demonstration using visking tubing or model setups	- Density required practical – measuring mass and volume of regular and irregular objects - Food tests for sugars, starch, proteins, and lipids - Investigating the effect of pH on enzyme activity - Investigating the effect of temperature on enzyme activity - Observing changes of state by heating ice to steam and recording temperature changes	- Investigating transpiration using a potometer - Dissecting a heart to study internal structure - Measuring reaction time using ruler drop test (forces and acceleration link) - Investigating motion with a trolley, ramp, and light gates (speed, velocity, acceleration) - Investigating centre of mass using card cut-outs and plumb lines	- Chromatography required practical – separating inks or dyes - Flame tests for identifying metal ions - Gas tests for hydrogen, oxygen, carbon dioxide, and chlorine - Tests for carbonates, sulfates, and halides - Investigating current and potential difference in series and parallel circuits
Assessment	End of Unit assessment to assess impact	End of Unit assessment to assess impact	End of Unit assessment to assess impact	KS3 exam assessing all topics covered so far this year. Attainment in this exam will be used to determine combined/triple route for GCSE Science in Y10.	End of Unit assessment to assess impact	End of Unit assessment to assess impact
Tier 3 Vocabulary (literacy in science)	<i>prokaryote, eukaryote, nucleus, mitochondrion, chloroplast, cell membrane, plasmid, magnification, resolution, stem cell, mitosis, differentiation, specialised cell, order of magnitude, closed system, energy store, kinetic energy, gravitational potential energy, elastic potential energy, efficiency, specific heat capacity, power</i>	<i>proton, electron, element, compound, mixture, solvent, solute, filtration, evaporation, distillation, crystallisation, chromatography, ionic bond, isotope, atomic number, chemical equation, melting point, boiling point, specific heat capacity, thermal conductivity, renewable energy, non-renewable energy, fossil fuel, solar power, geothermal energy, joule, watt, energy transfer, conduction, environmental impact</i>	<i>proton, neutron, electron, atomic number, periodicity, valency, group 1, alkali metal, group 7, halogen, group 0, noble gas, period, atomic radius, ionisation energy, electronic configuration, periodic table trends, diffusion, concentration gradient, osmosis, partially permeable membrane, active transport, surface area to volume ratio, carrier protein, ATP, passive process, root hair cell, xylem</i>	<i>thermal energy, internal energy, density, mass, volume, regular solids, irregular solids, specific latent heat, change of state, melting point, boiling point, gas pressure, temperature, pressure law, organisation level, tissue, organ, digestive system, digestion, absorption, enzyme, amylase, protease, lipase, pH, factors affecting enzymes, lock and key mechanism, active site, optimum, denaturation</i>	<i>protection, pleural membrane, thoracic cavity, diaphragm, intercostal muscles, trachea, bronchi, bronchioles, alveoli, capillary, surface area to volume ratio, gas exchange, concentration gradient, diffusion, pulmonary artery, pulmonary vein, breathing rate, roots, xylem, phloem, transpiration, stomata, vector, scalar, displacement, velocity, acceleration, force, resultant force, centre of mass, weight, terminal velocity, braking force, Newton's laws</i>	<i>electric current, potential difference, voltage, alternating current, direct current, resistor, ammeter, voltmeter, power (W), energy transfer, cable insulation, live wire, neutral wire, earth wire, efficiency, chromatography, retention factor, flame test, ion test, carbonate test, sulfate test, halide test, metal hydroxide precipitation, identifying ions</i>
Supporting learning at home	Century.tech – short video nuggets and review tasks, satchelone.com – to check homework, thenational.academy – video lesson and work exam questions, Kerboodle.com – access to textbooks					
Careers	<i>molecular biologist, biomedical scientist, laboratory technician, clinical scientist, stem cell researcher, energy research consultant, sustainability consultant, physicist, medical physicist, research technician, forensics scientist, conservation scientist, environmental consultant</i>	<i>analytical chemist, chemical engineer, renewable energy engineer, environmental consultant, energy consultant, laboratory technician, research scientist, forensic scientist, chemistry teacher, sustainability consultant</i>	<i>analytical chemist, chemical engineer, chemistry teacher, laboratory technician, forensic scientist, materials scientist, research scientist (chemistry), biomedical scientist, environmental consultant, renewable energy engineer</i>	<i>analytical chemist, chemical engineer, laboratory technician, research scientist, food scientist, nutritionist, dietitian, process engineer, quality control analyst, environmental consultant</i>	<i>cardiac physiologist, clinical scientist (cardiac), healthcare science practitioner, clinical technologist, respiratory therapist, perfusionist, biomechanical engineer, gait analyst, vehicle technician, EV powertrain engineer, automotive mechanic, automotive design engineer, forensic biomechanics expert</i>	<i>analytical chemist, chromatography scientist, laboratory technician, forensic scientist, public analyst, pharmaceutical technician, chemical engineer, energy consultant, electrical engineer, sustainability consultant</i>
	Here are some excellent UK-focused sites where children can explore science and STEM careers: STEM Learning – Virtual Careers Fairs: Inspiring virtual fairs for 13–19 year-olds showcasing a variety of STEM roles and industries. https://www.stem.org.uk/secondary/careers/virtual-careers-fairs (learning.sciencemuseumgroup.org.uk, stem.org.uk) Youth Employment UK – STEM Careers Hub: Clear guides on STEM careers, qualifications, salaries, employers, and work-experience pathways. https://www.youthemployment.org.uk/careers-hub-sector/stem-careers/ (youthemployment.org.uk) Science Museum Group – STEM through Museums: Tips and resources for exploring STEM careers via authentic museum exhibits and interactions. https://learning.sciencemuseumgroup.org.uk/blog/stem-careers-through-museums (learning.sciencemuseumgroup.org.uk) Neon (The Big Bang Fair): Interactive activities, case studies, and robotics challenges introducing students to engineering and STEM. https://www.thebigbang.org.uk/get-your-students-excited-about-engineering-and-stem/ (thebigbang.org.uk) Imperial College London – Explore STEM Careers: Profiles and insights into careers like astronomer, forensic scientist, nuclear engineer, ecologist, and more. https://www.imperial.ac.uk/be-inspired/schools-outreach/secondary-schools/stem-in-action/careers/explore-stem-careers/ (imperial.ac.uk) STEM Learning – Primary STEM Careers Resources: Age-appropriate resources to introduce primary school children to STEM roles. https://www.stem.org.uk/primary/resources/stem-careers (stem.org.uk)					