

Year 9 Science	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 Heat transfer and energy resources	Periodic table Transport in cells	Matter Organisation of the digestive system	Organising plants and animals Forces and Motion	Chemical analysis Electricity in the Home
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? Heat transfer and energy resources What factors affect how heat is lost by objects and buildings? How do we generate the electricity we use to power our homes?	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 can we calculate and measure density and pressure, and why would we need to? 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? Forces and Motion What rules do we use to describe and predict how objects move?	Chemical analysis How can we use chemistry to identify unknown substances? Electricity in the Home What's the difference between AC and DC? How does the wiring in our homes work?
Domains of knowledge	Cells, energy	Particles, energy	Elements, cells	Particles, organisation	Organisation, forces	Materials, energy
Concepts	- Prokaryotic and Eukaryotic Cells - Animal Cells - Plant Cells - Comparing Cells - Bacterial Cells - Orders of Magnitude - Microscopes - Observing Cells Under a Microscope - Stem Cells - Cell Cycle - Cell Differentiation - Specialised Cells in Animals - Specialised Cells in Plants - Changes in Energy Stores - Conservation of Energy - Energy and Work - Gravitational Potential Energy - Kinetic Energy - Elastic Energy - Energy Dissipation - Energy and Efficiency - Electrical Appliances - Energy and Power	- 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 Transfer by Conduction - Specific Heat Capacity - Specific Heat Capacity (Required Practical) - Heating and Insulating Buildings - Energy Demands – Non-Renewable Energy - Power from the Sun and the Earth - Energy and the Environment - Big Energy Issues	- Development of the Periodic Table - Atoms and the Periodic Table - Electronic Structures and the Periodic Table - Metals and Non-Metals - Group 1 – The Alkali Metals - Group 7 – The Halogens - Group 0 – Noble Gases - The Periodic Table - Diffusion - Factors Affecting Diffusion - Diffusion Agar Practical - Osmosis - Osmosis Practical - Osmosis Practical 2 - Active Transport - Active Transport in Plants - Active Transport in Animals	- Density (Regular Objects) - Density (Irregular Objects) - Density (Required Practical) - States of Matter and Changes of State - Internal Energy - Specific Latent Heat - Gas Pressure and Temperature - Levels of Organisation - Food Tests - Food Tests 2 - Digestive System - Digestion - 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 - Vectors and Scalars - Forces Between Objects - Resultant Forces - Centre of Mass - Speed and Distance-Time Graphs - Velocity and Acceleration - Velocity-Time Graphs - Forces and Acceleration - Weight and Terminal Velocity - Forces and Braking	- Introduction to Current - Introduction to Potential Difference - Alternating Current - Cables and Plugs - Electrical Power and Potential Difference - Electrical Currents and Energy Transfer - Appliances and Efficiency - Mixtures and Formulations - Chromatography - Chromatography (Required Practical) - Analysing Chromatography - Gas Tests (Practical) - Ions Revision - Flame Tests (Practical) - Tests for Carbonates and Sulfates (Practical) - Tests for Halides (Practical) - Metal Hydroxides (Practical) - Identifying Unknowns (Practical)

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)	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	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	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	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	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	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
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	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	analytical chemist, chemical engineer, renewable energy engineer, environmental consultant, energy consultant, laboratory technician, research scientist, forensic scientist, chemistry teacher, sustainability consultant	analytical chemist, chemical engineer, chemistry teacher, laboratory technician, forensic scientist, materials scientist, research scientist (chemistry), biomedical scientist, environmental consultant, renewable energy engineer	analytical chemist, chemical engineer, laboratory technician, research scientist, food scientist, nutritionist, dietitian, process engineer, quality control analyst, environmental consultant	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	analytical chemist, chromatography scientist, laboratory technician, forensic scientist, public analyst, pharmaceutical technician, chemical engineer, energy consultant, electrical engineer, sustainability consultant
	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)					