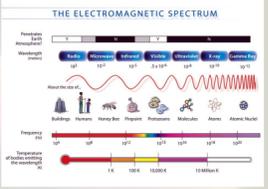
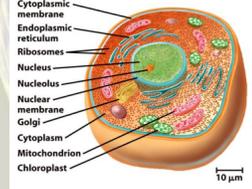


← Key Stage 2	7	8	9	Key Stage 4 →					
	Biology	Chemistry	Physics	Biology	Chemistry	Physics	Biology	Chemistry	Physics
The teaching of Science aims to develop scientific knowledge and conceptual understanding through the specific disciplines of Biology, Chemistry and Physics, to develop understanding 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, and to equip students with the scientific knowledge required to understand the uses and implications of science, today and for the future.	7.1a The Living Body 7.2b Habitats & Organisation 7.3ci Skeletons & Muscles	7.1b Elements, Compounds, Mixtures & Separating Techniques 7.3a Common Chemical Reactions	7.2a Speed & Forces 7.3b Electricity 7.3cii Space	8.1a How the Body Works 8.2b Evolution & Inheritance	8.1b Physical & Chemical Change 8.3a Chemistry on Earth 8.3ci Earth & Rocks	8.2a Energy 8.3b Magnetism & Waves 8.3cii Pressure	9.1a Cells 9.2a Organ systems 9.3a Photosynthesis & Respiration	9.1b Atomic Structure & the Periodic Table 9.2b Testing for Chemicals 9.2c Maths in Chemistry 9.3b Bonding in chemicals	9.1c Energy & Energy Resources 9.2d Changes of State & Gas Pressure 9.3c Radioactivity 9.3d Electricity in the Home
Core Knowledge	<p>7.1a Cells & cell structure, human body: circulatory, digestive and respiratory systems, healthy living, food groups, nutrients.</p> <p>7.2b: Interdependence of organisms, food chains and webs, food security, role of pollinators, impact of humans on habitat; positive and negative, the carbon cycle, adaptation of organisms to the effect of competition and changes in habitat.</p> <p>7.3ci: Structure of the human skeleton, muscles, interaction of skeleton & muscles, biomechanics.</p> 	<p>7.1b: Atoms, elements & compounds, purity of chemicals, naming chemicals, physical properties of substances, chemical properties of substances, organisation of the periodic table, separating mixtures.</p> <p>7.3a: Chemical reactions involve rearrangements of atoms, such changes can be represented by chemical equations, acids, alkalis and pH, types of chemical reaction, energy changes in chemical reactions.</p> 	<p>7.2a: Measuring speed, describing motion using graphs, stopping distances of vehicles, contact and non-contact forces such as gravity, friction, air resistance, the concept of work done, Newton's laws of motion.</p> <p>7.3b Potential difference, current & resistance, conductors & insulators.</p> <p>7.3cii: Gravity, stars & galaxies, seasons on Earth.</p> 	<p>8.1a: How the body responds to infection, the nervous system, hormonal systems, word & symbol equations.</p> <p>8.2b: Inheritance, genes, chromosomes & DNA, differences within species, variation, natural selection & evolution, extinction, biodiversity.</p> 	<p>8.1b: States of matter; solid, liquid, gas, physical changes of substances, density of matter, displacement reactions, extracting metals from the Earth.</p> <p>8.3a: The Earth's early atmosphere, how the atmosphere has changed, causes of these changes, fossil fuels, impact of burning fossil fuels on the atmosphere and the environment.</p> <p>8.3ci: Structure of the Earth, forms of rocks, the rock cycle.</p> 	<p>8.2a: Energy stores, pathways of transferring energy between stores, calculating energy in energy stores, energy dissipation, generating electricity, energy resources; renewable & non-renewable, power.</p> <p>8.3b: How magnets work, magnetic fields, electromagnets, types of wave, reflection & refraction, uses of waves.</p> <p>8.3cii: Pressure in fluids particle model of gases.</p> 	<p>9.1a: Eukaryotic & prokaryotic cells, specialised cells, transport in cells, diffusion, cell growth, mitosis, metabolism, cell division.</p> <p>9.2a: Digestive system, digestive enzymes, rate of digestion, the heart, lungs plant tissues, transpiration & translocation.</p> <p>9.3a: Photosynthesis, factors affecting the rate of photosynthesis, aerobic respiration, anaerobic respiration.</p> 	<p>9.1b: History of the model of the atom, subatomic particles, isotopes, ions, development of the periodic table, metals & nonmetals, groups 1,7 and 0, trends in properties.</p> <p>9.2b: Pure substances, testing for purity, formulations, testing gases, explaining chromatography.</p> <p>9.2c: Relative atomic/molecular mass, the mole, balancing equations, reacting masses, limiting reactants, conservation of mass.</p> <p>9.3b: Types of bonding in substances; ionic, covalent, metallic, properties of substances; macromolecular substances; diamond, graphite.</p>	<p>9.1c: Energy conservation, energy stores, work done, energy efficiency, heat transfer, thermal conductivity, specific heat capacity, insulation, fossil fuels, non-renewable & renewable energy resources.</p> <p>9.2d: The particle model, energy transfer in the particle model, particle model and pressure.</p> <p>9.3c: Radioactivity, half-life, dangers of radiation, uses of radiation.</p> <p>9.3d: The National Grid, wiring a plug, electrical safety, electrical power.</p> 
Concepts	The human cell. Interdependence of organisms and their adaptations.	All matter is made up of very small particles. Chemical formulae.	The link between forces & their effect on motion. Electricity as a way of transferring energy. The Universe.	Body's response to pathogens. Genes & DNA.	Representing chemical reactions as equations. Processes over time change the Earth.	Energy stores and transfers. Conservation of energy. Forces can act at a distance.	Specialisation of cells. Importance of enzymes. Cells need energy to survive.	Everything is made up of atoms. The mole in chemistry. The link between bonding and the properties of substances. The role of scientific models in explaining observations.	The particle nature of matter. Heating increases the kinetic energy of particles.
Opportunities & Adaptations	KS3 science club. Science competitions. PDBE Art project. Floating garden challenge.	Science competitions. KS3 science club. BP Ultimate STEM challenge.	Science competitions. KS3 science club. STEM IET Faraday challenge. Moon base Beta project. How big/How far/Measuring the Sun.	Science competitions. KS3 science club. PDBE Art project. IET Nature Reinvented.	Science competitions. KS3 science club. STEM Plastics Challenge. Solving the energy crisis.	Science competitions. KS3 science club. RCF Wind turbines experiment. Tech We Can: Tech for Communication. IOP Machines.	Science competitions. KS3 science club. PDBE art project. Biofuels.	Science competitions. KS3 science club. Growing organs. Forensic Chemistry.	Science competitions. KS3 science club RSC Challenging plants. Tech We Can.
Vocabulary	nucleus, magnification, specialised, respiratory, circulatory, digestive, carbohydrate, protein, element, biomechanics, antagonistic	compound, filtration, evaporation, condensation distillation, chromatography, reactant, product, neutralisation, indicator, alkali, exothermic, endothermic, collision, concentration, catalysts	velocity, acceleration, force, vector, scalar, momentum, friction, drag, air resistance, tension, resultant, electrostatic, magnetic conductor, insulator, alternating, potential difference, current, resistance, astronomical, hemisphere	infectious, pathogen, virus, bacteria, antibiotic, vaccination, reflex, menstrual, fertility, contraceptive, variation, inherited, environmental. population, evolution, reproduction, sexual, asexual, chromosome, genetic, mitosis, clone	reactivity, displacement, ore, malleable, ductile, polymer, biodegradable, atmosphere, photosynthesis, greenhouse gas, carbon footprint, sedimentary, metamorphic, mantle, cycle, erosion	kinetic, gravitational, fundamental, efficiency, conductivity, conservation, sankey, resource, hydroelectric, geothermal, attraction, repulsion, field, solenoid, electromagnet, relay, transverse, longitudinal, wavelength, frequency igneous, atmospheric, fluid, upthrust	eukaryotic, prokaryotic, diffusion, permeable, osmosis, mitosis, metabolism, molecule, compound, isotope, conservation, crystallisation, filtration, chromatography, group, period, scattering, dissipation, efficiency, dissipation, decommission	substrate, enzyme, denature, metabolism, bile, protein, carbohydrate, lipid, artery, valve, vein, haemoglobin, ventricle, epidermal, pulmonary, stomach, transpiration, mole, formula, limiting, relative, random, specific, latent, fusion, vaporisation	photosynthesis, chloroplast, chlorophyll, glucose, amino acid, cellulose, aerobic, anaerobic, respiration, glycogen, fermentation, lactic, metabolism, ionising, penetrating, irradiated, contamination, alternating, efficiency, potential, frequency
Assessment	End of unit tests Knowledge organiser tests End of year exams	End of unit tests Knowledge organiser tests End of year exams	End of unit tests Knowledge organiser tests End of year exams	End of unit tests Knowledge organiser tests End of year exams	End of unit tests Knowledge organiser tests End of year exams	End of unit tests Knowledge organiser tests End of year exams	End of unit tests Knowledge organiser tests End of year exams	End of unit tests Knowledge organiser tests End of year exams	End of unit tests Knowledge organiser tests End of year exams

The teaching of Science aims to develop scientific knowledge and conceptual understanding through the specific disciplines of Biology, Chemistry and Physics, to 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 and to equip students with the scientific knowledge required to understand the uses and implications of science, today and for the future.

Core Knowledge

B3: Communicable diseases, pathogens, how diseases spreads, viral, bacterial and fungal diseases in humans, human defence systems, vaccination, antibiotics, painkillers, discovery & development of drugs.

B5: Homeostasis, control systems, nervous system, reflexes, the brain, endocrine system, hormones, blood sugar, diabetes, hormones in reproduction, treating infertility, adrenaline & negative feedback.



C4: Reactivity of metals, oxidation, reduction, metal extraction, reactions of acids, metal salts, the pH scale, strong & weak acids, electrolysis of molten compounds, aluminium extraction, electrolysis of solutions.

C5: Exothermic reactions, endothermic reactions, reaction profiles, activation energy.

C6: Measuring reaction rates, factors affecting the rate of reactions, catalysts, reversible reactions, dynamic equilibrium, Le Chatelier's principle.

C7: Crude oil, alkanes, fractional distillation, fuels, combustion, cracking, alkenes.



P2a: Circuit symbols, drawing electric circuits, current, potential difference, resistance, determining resistance, IV graphs of electrical components, series & parallel circuits.

P5a: Contact & non-contact forces, weight, resultant force, centre of mass, work done & energy transfer, forces & elasticity.

P5b: Distance vs displacement, distance vs time graphs, speed vs velocity, velocity vs time graphs, acceleration, Newton's laws of motion, falling under gravity, thinking, braking & stopping distances, momentum.



B6: Sexual & asexual reproduction, meiosis, gametes, sex determination, DNA, human genome, genetic inheritance, inherited disorders, genetic engineering, variation, selective breeding, evolution, fossils.

B7: Classification, communities, biotic & abiotic factors, adaptation, food chains, ecosystems, cycling of carbon & water, decay cycle, biodiversity, effect of waste materials, land use, deforestation, global warming.

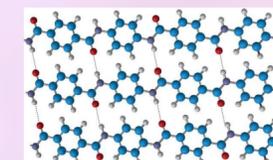
Triple Science: Extra Material
Culturing microorganisms, monoclonal antibodies, plant diseases, the brain
The eye, controlling body temperature, maintaining water and nitrogen levels in the body, plant hormones, DNA, cloning, theory of evolution, speciation.



C9: The composition and evolution of the Earth's atmosphere, the role of greenhouse gases in maintaining temperature for life on Earth, atmospheric pollutants from combustion of fuels, carbon footprint

C10: Earth's resources used by humans, water and its treatment to prevent disease, wastewater treatment, extraction of copper, life cycle assessment, recycling & reuse of materials

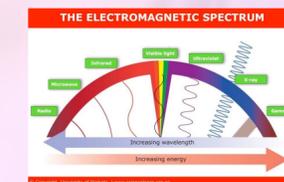
Triple Science: Extra Material
Reactions of alkenes, alcohols & carboxylic acids, synthetic polymers, addition polymers, condensation polymers, natural polymers, amino acids, DNA, flame tests to identify positive ions, identifying non-metal ions, instrumental methods of analysis.



P6: Transverse & longitudinal waves, wave speed, electromagnetic spectrum, reflection, refraction, radio waves, microwaves, infrared, ultraviolet, x-rays, gamma rays, waves & communication.

P7: Permanent magnets, induced magnets, magnetic materials, magnetic fields, electromagnets, electric motors, the motor effect.

Triple Science: Extra Material
Static electricity, pressure in gases, hazards & uses of radioactive substances, nuclear fission, nuclear fusion, moments, gears, levers, changes in momentum, solar system, life cycle of stars, orbital motion, natural and artificial satellites, red shift, big bang theory.



Concepts

Pathogens cause infectious diseases in animals and plants.
The body uses control systems that constantly monitor its functions.

Chemical change and our ability to use it to predict chemical reactions.
The extraction of important resources from the Earth.
Energy release from fuels.
Electricity from chemical reactions.
Changing the rate of reactions.

Electric charge as a fundamental property of matter.
The increasing role of electrical power in our lives.
How analysing forces helps in the design of machines and instruments.
The link between forces and motion.

The understanding of the role of genes.
Gene mutations can lead to genetic disorders or death.
Evolution.
Classification of all organisms.
Materials are continually recycled by the living world.
All species live in ecosystems.
Biodiversity.

The Earth's atmosphere is dynamic and forever changing.
The causes of these changes are sometimes man-made and sometimes part of many natural cycles.
To operate sustainably, chemists seek to minimise the use of limited resources, the use of energy, waste and the environmental impact of the manufactured products.

Waves carry energy from one place to another.
Modern technologies such as imaging & communication systems depend upon waves.
A magnet around a coil of wire can produce an electric current.

Opportunities & Adaptations

KS4 Science Support
Science competitions

KS4 Science Support
Science competitions

KS4 Science Support
Science competitions

KS4 Science Intervention
Science lectures

KS4 Science Intervention
Science lectures

KS4 Science Intervention
Science lectures

Assessment

End of unit tests
Knowledge organiser tests
End of year exams

End of unit tests
Knowledge organiser tests
End of year exams

End of unit tests
Knowledge organiser tests
End of year exams

End of unit tests
Knowledge organiser tests
Mock exams
GCSE Combined Science exams B1 & B2 (75 mins)
GCSE Biology exams B1&B2 (105 mins)

End of unit tests
Knowledge organiser tests
Mock exams
GCSE Combined Science exams C1 & C2 (75 mins)
GCSE Chemistry exams C1&C2 (105 mins)

End of unit tests
Knowledge organiser tests
Mock exams
GCSE Combined Science exams P1 & P2 (75 mins)
GCSE Physics exams P1&P2 (105 mins)

Biology

Chemistry

Physics

Forensic Science

Biology

Chemistry

Physics

Forensic Science

Unit topics

Biological molecules
Cells
Organisms exchange substances with their environments
Genetic information, variation & relationships between organisms

Physical chemistry
Inorganic chemistry
Organic chemistry

Measurements & their errors
Particles & radiation
Waves & optics
Mechanics & materials
Electricity

Principles and Applications of Science I
Practical Investigation Skills
Forensic Investigation Procedures in Practice

Energy transfers in and between organisms
Organisms respond to changes in their internal & external environments
Genetics, populations, evolution & ecosystems
The control of gene expression

Physical chemistry
Inorganic chemistry
Organic chemistry

Further mechanics
Thermal physics
Fields
Nuclear physics
Turning points in physics

Practical Scientific Procedures and Techniques
Physiology of Human Body Systems
Forensic Fire Investigation

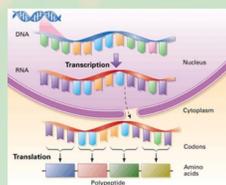
Core Knowledge & Concepts

Biological molecules:
Monomers & polymers, carbohydrates, lipids, proteins, enzymes, nucleic acids, DNA, RNA, DNA replication, ATP, water, inorganic ions.

Cells:
Cell structure, eukaryotic cells, prokaryotic cells, studying cells, how cells arise from other cells, transport across cell membranes, cell recognition & the immune system.

Organisms exchange substances with their environments:
Gas exchange, surface area to volume ratio, digestion & absorption, mass transport in animals & plants.

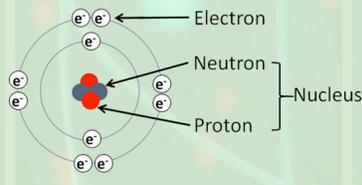
Genetic information, variation & relationships between organisms:
DNA, genes & chromosomes, DNA & protein synthesis, genetic diversity, mutation during meiosis, adaptation & genetic diversity, species & taxonomy, biodiversity within a community, investigating biodiversity.



Physical chemistry:
Atomic structure, the amount of substance, bonding in matter, energy in reactions, the kinetics of reactions, equilibrium, oxidation & reduction during reactions.

Inorganic chemistry:
Patterns in properties across the Periodic Table, Group 2 elements and compounds, Group 7 elements & compounds.

Organic:
An introduction to organic chemistry, properties and reactions of alkanes, halogenoalkanes, alkenes and alcohols, organic analysis.



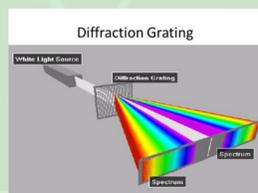
Measurements & their errors:
SI units, errors in experimentation, estimating quantities.

Particles & radiation:
Constituents of the atom, stable & unstable nuclei, classifying particles, antiparticles, photons, particle interactions, photoelectric effect, energy levels of electrons, photon emission, wave-particle duality.

Waves & optics:
Progressive & stationary waves, refraction, diffraction, interference, superposition of waves.

Mechanics & materials:
Moments, motion in a straight line, projectile motion, Newton's laws of motion, momentum, work, power, energy conservation, bulk properties of solids, the Young modulus.

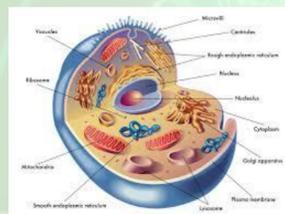
Electricity:
Current electricity, resistivity, electric circuits, potential dividers, electromotive force, internal resistance.



Principles and Applications of Science I:
Atomic structure and the periodic table, properties of elements and reactivity; cell structure, specialisation and tissues: waves, properties and applications of waves.

Practical Investigation Skills:
Experimental design, controlling variables, reliability and error, health and safety, data collection and processing; enzymes, diffusion, plant distribution, energy from fuels, electric circuits.

Forensic Investigation Procedures in Practice:
Crime scene preservation, collection of evidence, analytical techniques, evaluation, recording forensic evidence, drawing conclusions.

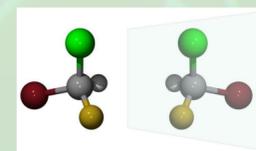
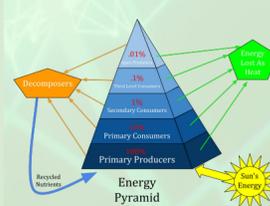


Energy transfers in and between organisms:
Photosynthesis, respiration, energy & ecosystems, nutrient cycles.

Organisms respond to changes in their internal & external environments:
Stimuli detection & response, nervous coordination, nerve impulse, synaptic transmission, skeletal muscle contraction, homeostasis, control of blood glucose concentration, control of blood water potential.

Genetics, populations, evolution & ecosystems:
Inheritance, populations, evolution & speciation, populations in ecosystems.

The control of gene expression:
Alteration of DNA sequence in proteins, features of gene expression control, gene expression & cancer, using genome projects, recombinant DNA technology, genetic fingerprinting.



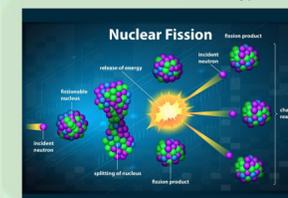
Further mechanics:
Periodic motion, simple harmonic motion, resonance.

Thermal physics:
Thermal energy transfer, ideal gases, kinetic theory of molecules.

Fields:
Force fields, gravitational fields, gravitational potential, orbits of satellites, electric fields, Coulomb's law, electric field strength, electric potential, capacitance, charging & discharging capacitors, magnetic fields, magnetic flux density, flux linkage, electromagnetic induction, alternating current, transformers.

Nuclear physics:
Radioactivity, Rutherford's scattering experiment, alpha, beta & gamma radiation, radioactive decay, nuclear instability, $E=mc^2$, nuclear fission.

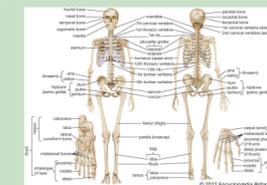
Turning points in physics:
Discovery of the electron, specific charge, Millikan's experiment, wave-particle duality, photoelectricity, electron microscopes, special relativity, Michelson-Morley experiment, time dilation, mass & energy.



Practical Scientific Procedures and Techniques:
Preparation of standard solutions, titration, colorimetry, cooling curves, calibration of instruments, chromatography, scientific skills evaluation.

Physiology of Human Body Systems:
Structure of human skeleton, functions of joints, structure and function of muscle, musculoskeletal disorders and treatment, structure and function of lymphatic system, disorders and treatment, digestive system structure and function, digestive disorders and treatment, diet and nutrition, deficiency disorders symptoms and treatment.

Forensic Fire Investigation:
Chemistry of combustion, methods of extinguishing fire, causes and behaviour of fire, processing a fire scene, role played by agencies in fire prevention and investigation.



Opportunities

Biology field trip
Subject support sessions

Subject support sessions
RSC Analyst Competition
Industry visit
Chemistry Olympiad

Subject support sessions

Subject support sessions

Subject support sessions

Subject support sessions
Chemistry Olympiad

Subject support sessions

Subject support sessions

Assessment

Baseline assessment
Knowledge tests per unit
Application tests per unit
End of year test

Baseline assessment
Knowledge tests per unit
Application tests per unit
End of year test

Baseline assessment
Knowledge tests per unit
Application tests per unit
End of year test

Baseline assessment
Knowledge tests – Unit 1
Application tests
Assignments
Mock exams
BTEC examinations (Unit 1 and 3)

Knowledge tests per unit
Application tests per unit
Mock exams
GCE Biology exams P1, P2 & P3 (2hrs)

Knowledge tests per unit
Application tests per unit
Mock exams
GCE Chemistry exams P1, P2 & P3 (2hrs)

Knowledge tests per unit
Application tests per unit
Mock exams
GCE Physics exams P1, P2 & P3 (2hrs)

Knowledge checks per Learning Aim
Assignments
Practical activities