

Key Stage 3 Science: Curriculum Outline

This curriculum aims to ensure that all Future Academies students become scientifically literate who are able to recognise the importance of rational explanation, capable of scientific analysis and knowledgeable about the contribution that the sciences make to our theoretical and practical understanding of the world. It is designed so that foundational concepts are introduced at the outset and are carefully built upon over three years, ensuring students develop an increasingly sophisticated and specialised understanding of the separate sciences. As such, students benefit from a coherent and cumulative curriculum that enables them to grasp increasingly specialised concepts and to develop a rigorous understanding of scientific knowledge. Each long term, students cover one topic from biology, chemistry and physics. There is a strong focus on retrieval practice and interleaving learning: each topic begins by explicitly returning to relevant prior learning and ends with an assessment and an interleaved test based on another topic. A practical skills assessment is placed at the end of the unit to enable students to connect their learning to a set of practical techniques and real-world applications. All too often, learning about science involves a series of disjointed lessons and unconnected information that is difficult to remember or fully understand. As such, a key principle of this curriculum is that the sciences can and should be taught through meaningful narratives that enable students to form long-term memories. This is seen through the explicit, planned-for links between relevant topics and an emphasis, where relevant, on the chronological development of scientific discoveries and theories, and of their cultural importance.

YEAR 7	TERM 1 AND 2	TERM 3 AND 4	TERM 5 AND 6
Biology	Cells: Cell structure Microscopy Specialisation/differentiation Stem cells Organisation Mitosis	The human body Diffusion Digestion Digestive enzymes The heart Blood vessels	Ecology Communities Biotic/abiotic factors Food chains Trophic levels Biomass
Chemistry	Particles Atomic structure and states of matter physical changes and state symbols Separating mixtures: filtration and evaporation Separating mixtures: chromatography	Atoms Atoms/elements/compounds and mixtures Mass/charge atom Development of the atomic model The periodic table The development of the periodic table Electronic structure Groups 1/7/0	Acids and alkalis Conservation of mass and chemical equations Acids/bases Salts Neutralisation Strong and weak acids
Physics	Energy Energy stores and systems Energy transfers Conservation/dissipation Heat transfer and temperature Renewable and non-renewable resources	Forces Contact/non-contact Gravity Resultant forces Forces and elasticity Speed Newton's first law: motion	Waves The nature of waves and their properties The reflection of light The refraction of light Sound waves Using waves for detection and exploration Electromagnetic waves

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YEAR 8	TERM 1 AND 2	TERM 3 AND 4	TERM 5 AND 6
Biology	Health and disease Prokaryotes and eukaryotes Culturing/preventing microorganism growth Coronary heart disease and health issues Lifestyle and disease, and cancer Communicable disease Human defence systems Vaccination, antibiotics and painkillers	Reproduction Mitosis Human reproduction Hormones in reproduction Meiosis Sexual and asexual reproduction Advantages and disadvantages of sexual asexual reproduction	Genetics/inheritance Chromosomes and DNA Inheritance Inherited disorders Sex determination Variation Genetics
Chemistry	Metals Metals/non-metals Group 1 Metallic bonding Properties of metals and alloys Metal reactivity The reactions of metals and acids.	Non-metals Chemical bonding Covalent bonding Properties of small molecules and giant covalent structures Structure and bonding in carbon molecules	Organic chemistry Fuels Carbon compounds as fuels Alkanes and alkenes The reactions of alkenes and alcohols Polymers
Physics	Motion Resultant forces Work done and energy transfer Scalar and vector quantities Forces and motion (mass and acceleration)	Energy and matter Energy changes in systems Particle model and changes in state Internal energy and energy transfers Particle model and pressure Pressure	Space The solar system Planets, orbits and satellites The life cycle of a star Red shift

YEAR 9	TERM 1 AND 2	TERM 3 AND 4	TERM 5 AND 6
Biology	Evolution and biodiversity Eukaryotes and prokaryotes Sexual and asexual reproduction Variation and adaptations Evolution and evidence Fossils and extinction Resistant bacteria Classification Biodiversity and maintaining it	Plant biology Osmosis Plant organ systems Plant disease Photosynthesis Plant hormones	Physiology Active transport Respiration The brain The eye Hormones in reproduction Contraception
Chemistry	Ionic bonding and electrolysis Group 1 Group 7 Group 0 Properties of transition metals Ionic bonding Ionic compounds Electrolysis	Energy changes and rates of reaction Conservation of mass and balanced chemical equations Percentage yield Exothermic and endothermic reactions Rates of reaction Reversible reactions and dynamic equilibrium	Chemical Analysis Pure and impure substances, and formulations Chromatography Identification of common gases. Identification of ions by chemical and spectroscopic analysis.
Physics	Newtonian mechanics Power Moments, levers and gears Newton's 1 st law Newton's 2 nd law Newton's 3 rd law Forces and braking Momentum	Electricity and magnetism Circuit symbols Electrical charge and current Current, resistance and voltage Series circuits Domestic uses and safety Energy transfers Power Electric fields, poles of a magnet and magnetic fields	Radiation Atoms and isotopes Atoms and radiation Hazards and uses of radiation Nuclear fission and fusion Black body radiation