

KS4 Science Curriculum – Intent

Our Key Stage 4 students follow the AQA GCSE specification. Throughout Year 10, knowledge from previous years is built upon as new content is introduced in line with the Trilogy or Separate science specifications. Students are encouraged to interleave new knowledge with revision from previous years through cross-curricular links. This instils aspiration, resilience and empowerment in all students, allowing them to take ownership of their learning outside the classroom and develop the necessary study skills that will aid them, not only in other subjects, but also as they continue into the next stages of their education, thus improving life chances for students.

Teaching is blocked into the three disciplines, which are taught in sequences to allow interleaving and opportunities for revision and making links between topics wherever possible. Scientific skills are further developed from Key Stage 3 and are taught wherever possible along with the AQA required practicals. Students are given regular formative assessments to monitor progress with skills and topics and allow for early intervention where necessary.

Year 10	Block 1	Block 2	Block 3	Block 4
Topic(s)	Cell Biology <ul style="list-style-type: none"> Eukaryotic and Prokaryotic Cells Animal and Plant Cells Cell specialisation Cell Differentiation Microscopy Culturing Microorganisms (T) Cell Division Stem Cells Transport in Cells Atomic Structure and the Periodic Table <ul style="list-style-type: none"> Atoms, elements, compounds, and mixtures Development of the model of the atom. Subatomic particles Relative atomic mass The periodic table and its development. Metals and non-metals Group 1, 7 and 0 Transition metals (T) Energy <ul style="list-style-type: none"> Energy stores and systems. Changes in energy. Power. Conservation and dissipation of energy. Efficiency. National and Global energy resources. 	Organisation <ul style="list-style-type: none"> Human digestive System The Heart and Blood Vessels Blood CHD Non-communicable disease, health and lifestyle. Cancer Plant tissues, organs and systems. Bonding, Structure and Properties of Matter <ul style="list-style-type: none"> Chemical bonds, ionic, covalent and metallic. How structure and bonding are related to the properties of substances. Structure and bonding of carbon. Bulk and surface properties of matter, including nanoparticles. Electricity <ul style="list-style-type: none"> Current, potential difference and resistance. Series and parallel circuits. Domestic uses and safety. Energy transfers in everyday appliances. Static electricity and electric fields (T) 	Infection and Response <ul style="list-style-type: none"> Communicable Diseases Human defence systems Vaccines Antibiotics and Painkillers Drug development and discovery. Monoclonal antibodies (T) Plant disease (T) Quantitative Chemistry <ul style="list-style-type: none"> Balancing equations and conservation of mass. Relative formula mass. Moles (HT) Amount of substances in equations (HT) Using moles to balance equations (HT) Limiting reactants (HT) Concentrations of solutions Yield and atom economy of chemical reactions (T) Amount of substance in relation to volumes of gases (T) Acids <ul style="list-style-type: none"> Reactions of acids Neutralisation of acids and salt production. pH scale and neutralisation. Titration (T) Strong and weak acids (HT) Particle Model <ul style="list-style-type: none"> Changes of state and the particle model. Internal energy and energy transfers. Particle motion in gases Pressure in gases (T) 	Bioenergetics <ul style="list-style-type: none"> Photosynthesis Aerobic and anaerobic respiration Metabolism Metals and Metal Extraction <ul style="list-style-type: none"> Reactivity of metals. Oxidation and reduction in terms of electrons (HT). Electrolysis of molten ionic compounds. Electrolysis of aqueous solutions. Reactions at electrodes as half-equations (HT) Energy Changes <ul style="list-style-type: none"> Energy transfer during exothermic and endothermic reactions Reaction profiles Chemical cells and fuel cells (T) Atomic Structure and Radiation <ul style="list-style-type: none"> Radioactive decay and nuclear radiation. Irradiation and contamination Hazards and uses of radioactive emissions (T) Background radiation (T) Nuclear Fission (T) Nuclear Fusion (T)
Dates	HT1/HT2	HT2/HT3	HT3/HT4	HT5/HT6
Links to Prior Learning	Cell Biology <ul style="list-style-type: none"> Year 7 - Cells Year 8 – Gas Exchange Systems Year 9 – Transport in Cells Atomic Structure and the Periodic Table <ul style="list-style-type: none"> Year 7 – Metals and non-metals Year 8 – Atoms, Elements, Compounds 	Organisation <ul style="list-style-type: none"> Year 8 – Gas Exchange Systems Year 8 – Nutrition and Digestion Year 8 – Photosynthesis Year 9 – Transport in Cells Bonding, Structure and Properties of Matter <ul style="list-style-type: none"> Year 8 – Atoms, elements and compounds 	Infection and Response <ul style="list-style-type: none"> Year 7 – Cells Year 8 – Photosynthesis Quantitative Chemistry <ul style="list-style-type: none"> Year 8 – Further Chemical Reactions Acids <ul style="list-style-type: none"> Year 7 – Acids and Alkalis 	Bioenergetics <ul style="list-style-type: none"> Year 8 – Respiration Year 8 – Photosynthesis Metals and Metal Extraction <ul style="list-style-type: none"> Year 7 – Metals and non-metals Year 8 – Obtaining Earth's Resources Energy Changes

	Energy <ul style="list-style-type: none"> Year 7 – Energy Changes and Transfers Year 8 – Energy Resources Year 9 – Insulating the home 	<ul style="list-style-type: none"> Year 9 – Chemical bonding Electricity <ul style="list-style-type: none"> Year 7 – Electrical circuits, PD and current Year 8 – Static electricity (T) Year 9 – Resistance Year 9 – Mains electricity 	<ul style="list-style-type: none"> Year 7 - Metals and non-metals Year 8 – Further Chemical Reactions Particle Model <ul style="list-style-type: none"> Year 7 – The particle model Year 9 – Specific heat capacity 	<ul style="list-style-type: none"> Year 8 – Further Chemical Reactions Year 8 – Energetics Atomic Structure and Radiation <ul style="list-style-type: none"> Year 8 – Atoms, elements and compounds
Key Practical Activities	Cell Biology <ul style="list-style-type: none"> Using a light microscope to observe, draw and label plant and animal cells. Investigate the effect of antiseptics or antibiotics on bacterial growth using agar plates (T) Investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue (Recap) Energy <ul style="list-style-type: none"> Determination of the specific heat capacity of one or more materials. Investigate the effectiveness of different materials as thermal insulators and the factors that may affect the insulation properties of a material (T) 	Organisation <ul style="list-style-type: none"> Using qualitative reagents to test for a range of carbohydrates, lipids and proteins. Investigate the effect of pH on the rate of reaction of amylase enzyme. Electricity <ul style="list-style-type: none"> Investigate the factors affecting the resistance of electrical circuits. (Recap) Investigate the I-V characteristics of a variety of circuit elements. 	Acids <ul style="list-style-type: none"> Preparation of a pure, dry sample of a soluble salt from an insoluble oxide or carbonate. Determination of the reacting volumes of solutions from a strong acid and strong alkali by titration (T) Particle Model <ul style="list-style-type: none"> Determine the densities of liquids, regular and irregular solid objects. 	Bioenergetics <ul style="list-style-type: none"> Investigate the effect of light intensity on the rate of photosynthesis using pondweed. Metals and Metal Extraction <ul style="list-style-type: none"> Investigate what happens when aqueous solutions are electrolysed using inert electrodes. Energy Changes <ul style="list-style-type: none"> Investigate the variables that affect temperature changes in reacting solutions.
Assessment	<ul style="list-style-type: none"> Formative assessments will regularly take place by staff within lessons, as well as regular work reviews carried out when a key concept has been delivered. Weekly homework will be set via. Educake to assess knowledge of the content covered within the current block, as well as from previous blocks and relevant content from KS3. Summative assessments will be completed at the end of each block of biology/chemistry and physics. Mock exams take place twice throughout the year. 			

Year 11	Block 1	Block 2	Block 3	Block 4	Block 5	Block 6
Topic(s)	Ecology <ul style="list-style-type: none"> Adaptations, interdependence, and competition. Organisation of an ecosystem. Water and carbon cycles. Decomposition (T) Biodiversity and human impacts. Trophic levels in an ecosystem (T) Food production and food security (T) Homeostasis and Response <ul style="list-style-type: none"> Introduction to homeostasis The human nervous system The brain (T) The eye (T) Temperature regulation (T) 	Homeostasis and Response <ul style="list-style-type: none"> Hormonal coordination in humans Control of blood glucose Control of water and nitrogen (T) Hormones in reproduction Contraception Hormones to treat infertility (HT) Negative feedback (HT) Plant hormones (T) Inheritance, variation and evolution <ul style="list-style-type: none"> Sexual and asexual reproduction Meiosis Advantages and disadvantages of sexual and asexual reproduction (T) DNA and the genome DNA structure (T) Genetic inheritance Variation and evolution Selective breeding Genetic engineering Cloning Theory of evolution (T) Speciation (T) Fossils and Extinction Antibiotic Resistance Classification 	Rates of Reaction <ul style="list-style-type: none"> Calculating rates of reaction Collision theory and Factors affecting reaction rate. Catalysis and activation energy Reversible reactions and dynamic equilibrium Effects of changing conditions on equilibrium (HT) Organic Chemistry <ul style="list-style-type: none"> Crude oil, hydrocarbons, and alkanes Fractional distillation, cracking, alkanes and alkenes. Reactions of alkenes and alcohols (T) Synthetic and naturally occurring polymers (T) 	Chemical Analysis <ul style="list-style-type: none"> Purity, formulations, and chromatography Identification of common gases. Identification of ions by chemical and spectroscopic means (T) Chemistry of the Atmosphere <ul style="list-style-type: none"> Composition of the Earth's atmosphere Earth's early atmosphere and how it changed. Carbon dioxide and methane as greenhouse gases. Common atmospheric pollutants and their sources. Using Resources <ul style="list-style-type: none"> Using the Earth's resources and obtaining potable water. Alternative metal extraction methods (HT) Life-Cycle Assessments and Recycling Corrosion, prevention and alloys (T) Ceramics, composites and polymers (T) The Haber process and NPK fertilisers (T) 	Forces and their effects <ul style="list-style-type: none"> Scalar and vector quantities Contact and non-contact forces Gravity Resultant Forces Work done and energy transfer. Elasticity Moments, levers, and gears (T) Pressure in fluids (T) Forces and Motion <ul style="list-style-type: none"> Distance and displacement Motion graphs Velocity and acceleration Newton's Laws of Motion Forces and braking Factors affecting stopping distance. Momentum (HT) Changes in momentum (T) 	Waves <ul style="list-style-type: none"> Transverse and longitudinal waves Properties of waves Reflection (T) Sound waves and ultrasound (T) Waves for detection and exploration (T) Electromagnetic Spectrum Properties of EM waves Uses and application of EM waves Lenses (T) Visible light (T) Black body radiation (T) Magnetism and Electromagnets <ul style="list-style-type: none"> Permanent and induced magnetism. Magnetic fields The motor effect. Generators and transformers (T) Microphones (T) Space Physics (T) <ul style="list-style-type: none"> Our solar system Orbital motion Life cycle of a star Red shift
Dates	HT1/HT2	HT2/HT3	HT3/HT4	HT4/HT5	HT5/HT6	HT6
Links to Prior Learning	Ecology Year 7 - Ecosystems Year 8 – The Earth's Climate Year 9 – Human Impacts on Earth Year 9 – Ecology Year 10 – Cell Biology Year 10 - Bioenergetics Homeostasis and Response	Homeostasis and Response Year 7 – Human Reproduction Year 8 – Nutrition and Digestion Inheritance, variation and evolution Year 7 – Cells Year 8 – Simple Variation Year 8 – DNA	Rates of Reaction Year 7 – Particle Model Year 8 – Further Chemical Reactions Year 9 – Rates of Reaction Year 10 – Energy Changes Organic Chemistry Year 8 – Obtaining Earth's Resources	Chemical Analysis Year 7 – Pure and Impure substances Year 9 – Chemical Bonding Chemistry of the Atmosphere Year 7 – Earth's Structure Year 8 – The Earth's Climate Year 9 – Human Impact on Earth	Forces and their effects <ul style="list-style-type: none"> Year 7 – Simple forces and speed Year 7 – Gravity Year 8 – Contact Forces Forces and Motion <ul style="list-style-type: none"> Year 7 – Simple forces and speed 	Waves <ul style="list-style-type: none"> Year 7 – Transverse and longitudinal waves Year 7 - Sound (T) Year 8 – Light (T) Year 9 – The electromagnetic spectrum (all)

	Year 8 - Respiration	Year 8 – Variation Between Species Year 9 - Inheritance Year 10 – Cell Biology Year 10 – Communicable Disease	Year 9 – Human Impact on Earth Year 9 – Structure and Bonding	Using Resources Year 8 – Obtaining Earth’s Resources Year 9 – Human Impact on Earth Year 10 – Metals and Metal Extraction	<ul style="list-style-type: none"> Year 9 – Forces and motion 	Magnetism and Electromagnets Year 8 – Magnets and electromagnets.
Key Practical Activities	Ecology <ul style="list-style-type: none"> Measure the population size of a common species in a habitat and investigate a factor affecting the distribution of this species. (Recap) Investigate the effect of temperature on the rate of decay of fresh milk by measuring pH change. (T) Homeostasis and Response <ul style="list-style-type: none"> Plan and carry out an investigation into the effect of a factor on human reaction time. 	Homeostasis and Response <ul style="list-style-type: none"> Investigate the effect of light or gravity on the growth of newly germinated seedlings (T) 	Rates of Reaction <ul style="list-style-type: none"> Investigate how changes in concentration affects rate of reaction. 	Chemical Analysis <ul style="list-style-type: none"> Investigate how paper chromatography can be used to separate and tell the difference between coloured substances. Use of chemical tests to identify the ions in ionic compounds (T) Using Resources <ul style="list-style-type: none"> Analysis and purification of water samples from different sources. 	Forces and their Effects <ul style="list-style-type: none"> Investigate the relationship between force and extension for a spring (Recap) Forces and Motion <ul style="list-style-type: none"> Investigate the effect of varying the force on the acceleration of an object of constant mass, and the effect of varying mass on the acceleration produced by constant force. 	Waves <ul style="list-style-type: none"> Identify the suitability of apparatus to measure the frequency, wavelength and wavespeed in a ripple tank and waves in a solid. Investigate the reflection and refraction of light by different substances. Investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface.
Assessment	<ul style="list-style-type: none"> Formative assessments will regularly take place by staff within lessons, as well as regular work reviews carried out when a key concept has been delivered. Weekly homework will be set via. Educake to assess knowledge of the content covered within the current block, as well as from previous blocks and relevant content from KS3. Summative assessments will be completed at the end of each block content. Mock exams take place at the end of every second block. 					