

KS3 Science Curriculum – Intent

The purpose of our Key Stage 3 science curriculum is to provide robust foundations to allow students to develop into analytical, methodical and innately inquisitive scientists. The three disciplines are divided into 10 key areas which are first introduced in Year 7 and are built upon in Year 8 and Year 9. As a department, we strive to inspire all pupils to support them to gain a deep understanding of scientific knowledge, and the discipline itself. Students from Year 7 are immersed into practical work to support the scientific knowledge which is taught. Students improve their scientific enquiry skills by developing their data analysis and data presentation skills from their own experimental results, which they can then use to draw conclusions linking to their scientific knowledge. Students are given opportunities for retrieval practice most lessons, and are explicitly taught numeracy in the form of ratios, converting units and rearranging formulae as part of the science curriculum.

Our ambitious Year 9 curriculum aims to bridge the gap between KS3 and GCSE. Students will build on the ideas that they have developed in year 7 and 8, bringing them together into bigger and more comprehensive ideas. It is our goal at all students should be prepared to study science at KS4 and beyond, based on the foundations they have mastered during years 7-9.

Year 7

Dates	Topic(s)	National Curriculum Links
Block 1	Organisms <ul style="list-style-type: none"> Cells The Skeletal System Matter <ul style="list-style-type: none"> The Particle Model Pure and Impure Substances 	Cells <ul style="list-style-type: none"> Cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope The functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts The similarities and differences between plant and animal cells The role of diffusion in the movement of materials in and between cells The structural adaptations of some unicellular organisms The hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms. Skeletal System <ul style="list-style-type: none"> The structure and functions of the human skeleton, to include support, protection, movement and making blood cells. Biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles. The function of muscles and examples of antagonistic muscles. Particle Model <ul style="list-style-type: none"> The properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure. Changes of state in terms of the particle model. Conservation of material and of mass, and reversibility, in melting, freezing, evaporation, sublimation, condensation, dissolving Similarities and differences, including density differences, between solids, liquids and gases. Brownian motion in gases Diffusion in liquids and gases driven by differences in concentration. The difference between chemical and physical changes. Pure and Impure Substances <ul style="list-style-type: none"> The concept of a pure substance. Mixtures, including dissolving. Diffusion in terms of the particle model Simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography. The identification of pure substances.
Block 2	Forces <ul style="list-style-type: none"> Simple forces and Speed Gravity 	Forces Simple Forces and Speed <ul style="list-style-type: none"> Forces as pushes or pulls, arising from the interaction between two objects. Forces measured in Newton. Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces.

	<ul style="list-style-type: none"> Forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only) Opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface. Change depending on direction of force and its size. Speed and the quantitative relationship between average speed, distance, and time (speed = distance ÷ time) Relative motion: trains and cars passing one another. <p>Gravity</p> <ul style="list-style-type: none"> Non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets and forces due to static electricity. Gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun <p>Genes</p> <ul style="list-style-type: none"> Human Reproduction Simple Variation <p>Human Reproduction</p> <ul style="list-style-type: none"> Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta. <p>Simple Variation</p> <ul style="list-style-type: none"> Differences between species. Heredity as the process by which genetic information is transmitted from one generation to the next. The variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation
Block 3	<p>Reactions</p> <ul style="list-style-type: none"> Acids and Alkalis Metals and non-metals <p>Electricity and Magnetism</p> <ul style="list-style-type: none"> Conductors and Insulators Electrical circuits, PD and current <p>Acids and Alkalis</p> <ul style="list-style-type: none"> Chemical reactions as the rearrangement of atoms. Representing chemical reactions using formulae and using equations. defining acids and alkalis in terms of neutralisation reactions. The pH scale for measuring acidity/alkalinity; and indicators. <p>Metals and Non-Metals</p> <ul style="list-style-type: none"> The Periodic Table: periods and groups; metals and non-metals. The properties of metals and non-metals. The chemical properties of metal and non-metal oxides with respect to acidity. Reactions of acids with metals to produce a salt plus hydrogen. Reactions of acids with alkalis to produce a salt plus water <p>Conductors and Insulators</p> <ul style="list-style-type: none"> Differences in resistance between conducting and insulating components. <p>Electrical Circuits, PD and Current</p> <ul style="list-style-type: none"> Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.)
Block 4	<p>Energy</p> <ul style="list-style-type: none"> Energy Changes and Transfers <p>Energy Changes and Transfers</p> <ul style="list-style-type: none"> Energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change. Comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with movements, temperatures, changes in positions in a field, in elastic distortions and in chemical compositions. Using physical processes and mechanisms, rather than energy, to explain the intermediate steps that bring about such changes. Work done and energy changes on deformation. Simple machines give bigger force but at the expense of smaller movement: product of force and displacement unchanged. Other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels.

	Ecosystems <ul style="list-style-type: none"> • Reproduction in Plants • Interdependence 	Plant Reproduction <ul style="list-style-type: none"> • Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. Interdependence <ul style="list-style-type: none"> • The interdependence of organisms in an ecosystem, including food webs and insect pollinated crops. • The importance of plant reproduction through insect pollination in human food security. • How organisms affect, and are affected by, their environment, including the accumulation of toxic materials.
Block 5	Earth <ul style="list-style-type: none"> • Earth's Structure • Beyond the Earth's Atmosphere Waves <ul style="list-style-type: none"> • Transverse and longitudinal waves • Sound 	Earth's Structure <ul style="list-style-type: none"> • The composition of the Earth • The structure of the Earth. • The rock cycle and the formation of igneous, sedimentary and metamorphic rocks. • Properties of ceramics. Beyond the Earth <ul style="list-style-type: none"> • Our Sun as a star, other stars in our galaxy, other galaxies. • The seasons and the Earth's tilt, day length at different times of year, in different hemispheres. • The light year as a unit of astronomical distance. Sound <ul style="list-style-type: none"> • Sound needs a medium to travel, the speed of sound in air, in water, in solids. • Frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound. • Sound produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal. • Auditory range of humans and animals. • Pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound; waves transferring information for conversion to electrical signals by microphone.
Assessment		<ul style="list-style-type: none"> • Formative assessments will regularly take place by staff within lessons, as well as at least one work review carried out per unit when a key concept has been delivered. • Summative assessment to take place at the end of each two-unit block, containing elements of any content delivered so far. • Weekly homework will be set via. Educake to assess knowledge of the content covered within the current block, as well as from previous blocks. • Regular formative assessment of key disciplinary knowledge based around AQA's working scientifically requirements: <ul style="list-style-type: none"> ○ Estimating Risks ○ Planning variables ○ Making Predictions ○ Drawing Tables ○ Calculating Averages ○ Drawing Graphs ○ Calculations

Year 8

Dates	Topic(s)	National Curriculum Links
Block 1	<p>Matter</p> <ul style="list-style-type: none"> Atoms, Elements and Compounds The Periodic Table <p>Forces</p> <ul style="list-style-type: none"> Contact Forces Pressure 	<p>Atoms, Elements, Compounds</p> <ul style="list-style-type: none"> A simple (Dalton) atomic model. Differences between atoms, elements, and compounds. Chemical symbols and formulae for elements and compounds. Properties of polymers and composites (qualitative). <p>Periodic Table</p> <ul style="list-style-type: none"> The varying physical and chemical properties of different elements. The principles underpinning the Mendeleev Periodic Table. Periods and groups; metals and non-metals. How patterns in reactions can be predicted with reference to the Periodic Table. The properties of metals and non-metals <p>Contact Forces</p> <ul style="list-style-type: none"> Forces measured in newtons, measurements of stretch or compression as force is changed. Forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water Force/extension linear relation; Hooke’s Law as a special case Moment as the turning effect of a force <p>Pressure</p> <ul style="list-style-type: none"> Atmospheric pressure decreases with increase of height as weight of air above decreases with height. Pressure in liquids, increasing with depth; upthrust effects, floating and sinking. Pressure measured by ratio of force over area – acting normal to any surface.
Block 2	<p>Ecosystems</p> <ul style="list-style-type: none"> Respiration Photosynthesis <p>Reactions</p> <ul style="list-style-type: none"> Further Chemical Reactions Energetics 	<p>Respiration</p> <ul style="list-style-type: none"> Aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life. A word summary for aerobic respiration. The process of anaerobic respiration in humans and micro-organisms, including fermentation, and a word summary for anaerobic respiration. The differences between aerobic and anaerobic respiration in terms of the reactants, the products formed and the implications for the organism. <p>Photosynthesis</p> <ul style="list-style-type: none"> The reactants in, and products of, photosynthesis, and a word summary for photosynthesis. The dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere. The adaptations of leaves for photosynthesis. <p>Further Chemical Reactions</p> <ul style="list-style-type: none"> Chemical reactions as the rearrangement of atoms. Combustion, thermal decomposition and displacement reactions. Conservation of mass changes of state and chemical reactions. <p>Energetics</p> <ul style="list-style-type: none"> Energy changes on changes of state (qualitative).

	<p>Electricity and Magnetism</p> <ul style="list-style-type: none"> • Static electricity • Magnets and Electromagnets 	<ul style="list-style-type: none"> • Changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction. • The importance of maintaining biodiversity and the use of gene banks to preserve hereditary material. <p>Static Electricity</p> <ul style="list-style-type: none"> • Separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects. • The idea of electric field, forces acting across the space between objects not in contact. <p>Magnets and Electromagnets</p> <ul style="list-style-type: none"> • Magnetic poles, attraction, and repulsion • Magnetic fields by plotting with compass, representation by field lines. • Earth's magnetism, compass, and navigation • The magnetic effect of a current, electromagnets, D.C. motors (principles only)
Assessment		<ul style="list-style-type: none"> • Formative assessments will regularly take place by staff within lessons, as well as at least one work review carried out per unit when a key concept has been delivered. • Summative assessment to take place at the end of each two-unit block, containing elements of any content delivered so far. • Weekly homework will be set via. Educake to assess knowledge of the content covered within the current block, as well as from previous blocks. • Regular formative assessment of key disciplinary knowledge based around AQA's working scientifically requirements. In addition to the Y7 skills, the following areas will be monitored: <ul style="list-style-type: none"> ○ Writing Methods ○ Analysing Hypotheses/Predictions ○ Minimising Errors ○ Describing Patterns in Data ○ Evaluation

Year 9

Year 9	Block 1	Block 2	Block 3	Block 4	Block 5
Topic(s)	Organisms <ul style="list-style-type: none"> Diffusion Osmosis Active Transport Adaptations of leaves Determination of concentration of sugar in plant cells. Forces <ul style="list-style-type: none"> Forces and motion Velocity/time graphs Acceleration Terminal velocity 	Ecosystems <ul style="list-style-type: none"> Adaptations, interdependence and competition. Sampling techniques Matter <ul style="list-style-type: none"> Ions and ionic bonding Covalent Bonding Metallic Bonding How bonding and structure relate to properties. 	Energy <ul style="list-style-type: none"> Conduction, convection and radiation. Specific heat capacity Domestic fuel bills Insulating the home Reactions <ul style="list-style-type: none"> Collision Theory Factors affecting rate of reaction. Calculating rates of reaction 	Earth <ul style="list-style-type: none"> Human impacts on the Earth and its climate. Electricity and Magnetism <ul style="list-style-type: none"> Calculating resistance Measuring resistance in series and parallel circuits Investigating factors affecting resistance. Mains electricity The National Grid 	Waves <ul style="list-style-type: none"> The Electromagnetic Spectrum Uses of EM waves Risks of EM waves Measuring wave speed Genes <ul style="list-style-type: none"> Inheritance Selective Breeding Cloning techniques
Dates					
Assessment	<ul style="list-style-type: none"> Formative assessments will regularly take place by staff within lessons, as well as at least one work review carried out per unit when a key concept has been delivered. Summative assessment to take place at the end of each two-unit block, containing elements of any content delivered so far. Weekly homework will be set via. Educake to assess knowledge of the content covered within the current block, as well as from previous blocks. Regular formative assessment of key disciplinary knowledge based around AQA's working scientifically requirements: <ul style="list-style-type: none"> Estimating Risks Planning variables Making Predictions Drawing Tables Calculating Averages Drawing Graphs Calculations Writing Methods Analysing Hypotheses/Predictions Minimising Errors Describing Patterns in Data Evaluation 				