


Curriculum Information

Science



What I learn about in the curriculum...

Year		Topics	 How does this build on from previous learning?	The key concepts we cover
7	Autumn 1	<ul style="list-style-type: none"> Working Scientifically Cell Biology 	<p>At KS2 students will have learnt the following scientific skills: gathering evidence, making simple predictions, basic data analysis and drawing conclusions and use of everyday equipment. We develop these in the working scientifically unit when we introduce more complex skills such as variables, advanced equipment and evaluation of methods.</p> <p>At KS2 (Animals, including humans) students will have basic knowledge of cells we build on this by introducing cell functions and specialised cells.</p>	<p>Drawing conclusions, analysing patterns, drawing conclusions, presenting data, the nature of matter, pure and impure substances, structure of cells, function of cells, organisation, Force diagrams, different types of forces, Male and female reproductive organs, menstrual cycle, hormones, childbirth, gas exchange, Food chains, food webs. Plant reproduction. Environmental effects of human activity. Our solar system and beyond. How to separate different mixtures.</p>
	Autumn 2	<ul style="list-style-type: none"> Elements and the Periodic table Energy Transfer 	<p>We build on KS2 knowledge of elements by introducing atomic structure, compounds, mixtures and using the periodic table.</p> <p>We develop students' knowledge of different types of energy when learning about energy transfers, energy stores, what happens to the energy and simple calculations of efficiency</p>	
	Spring 1	<ul style="list-style-type: none"> Reproduction Forces 1 	<p>During the reproduction unit we continue to build on the knowledge of cells by looking at egg and sperm cells in more detail as well as introducing reproductive systems.</p> <p>We build on KS2 knowledge of air resistance, water resistance, friction, levers and pulleys. We learn about contact, non contact forces, force diagrams, resistive forces, floating and sinking</p>	

	Spring 2	<ul style="list-style-type: none"> • Electricity • Particle Model 	<p>KS2 knowledge is simple circuits, linking brightness of bulbs and simple components. We extend this knowledge to more advanced components, circuit diagrams, voltage, current, resistance, parallel and series circuits.</p> <p>We develop solid, liquid and gas particle diagrams, state changes</p>	
	Summer 1	<ul style="list-style-type: none"> • Separating mixtures • Organisation 1 	<p>During the organisation 1 topic we build on knowledge gained at KS2 (Animals including humans) by further developing ideas of effect of exercise and exploring the functions of organ systems.</p> <p>During separating mixtures, we develop knowledge of key terms such as solute, solvent, solution, solubility and develop skills in techniques such as filtration, distillation, evaporation and chromatography</p>	
	Summer 2	<ul style="list-style-type: none"> • Space • Ecology • Microbes 	<p>During the ecology topic we build on knowledge gained at KS2 (Living things and their habitats) by developing ideas about interdependence of organisms and predator/prey cycles.</p> <p>In the Space topic, we develop KS2 knowledge of the movement of the moon and Earth in the solar system and the reason for day and night. We explore the solar system in more detail, they Universe, seasons, eclipses and space exploration.</p>	
8	Autumn 1	<ul style="list-style-type: none"> • Earth's resources • Organisation 2 (Digestion) 	<p>During the organisation 2 topic we build on knowledge gained at KS2 (Animals including humans) by further developing ideas of healthy diet and exploring the digestive system</p> <p>We develop knowledge of the periodic table when we look into metals and non-metals. Here we explore how to extract metals from their ores, the benefits of recycling and the importance of polymers and composites in daily life</p>	<p>Nutrition and digestion, energy and energy changes, physical changes, particle model, energy in matter, Materials / Chemical Reactions Gas Exchange systems, Cellular respiration, What waves are; how sound travels; how light travels; how we move; effect of drugs on the body; the effects of smoking, calculating speed and distance/time graphs; calculating pressure; combustion reactions; endothermic and exothermic</p>

	Autumn 2	<ul style="list-style-type: none"> Electricity (Energy costs) Forces (Speed and work) 	<p>We expand on year 7 electricity content and make it real world relevant by investigating renewable, non-renewable energy resources, calculating energy costs in the home and how much energy is in different foods.</p> <p>We develop knowledge of forces and investigate how to calculate speed, acceleration, relative motion, distance- time graphs, work done and moments</p>	<p>reactions, Adaptation, evolution, natural selection, biodiversity, earth composition, rock cycle, carbon cycle, earthquakes, volcanoes, Energy transfer and power ratings. Cost of electricity. Electricity generation. Renewable and non-renewable energy resources. Static. Magnetism. Electromagnets. DC motors.</p>
	Spring 1	<ul style="list-style-type: none"> Particle model (Pressure) Inheritance, Evolution and Variation 	<p>In the Inheritance, Evolution and Variation topic we further develop ideas from both the Cells topic and Reproduction topic as well as build on the Evolution and inheritance topic from KS2.</p> <p>We explore the particle model in more complex detail when we look into calculating pressure, pressure in liquids and atmospheric pressure.</p>	
	Spring 2	<ul style="list-style-type: none"> Chemical energy, Acid s and Alkalis Particle model (Heating and cooling) 	<p>We develop knowledge of chemical reactions and explore thermal changes, pH scale, acids and alkalis in everyday life, hazards, indicators and neutralisation.</p> <p>We further develop the particle model, changing state and cooling curves and heat transfers.</p>	
	Summer 1	<ul style="list-style-type: none"> Chemistry of the atmosphere 1 Bioenergetics 1 	<p>During the Bioenergetics 1 topic, students develop ideas about photosynthesis and respiration. Word equations for each reaction are introduced. This builds on concepts suggested at KS2 (Plants and Animals, including humans)</p> <p>We develop students' knowledge of the greenhouse effect, carbon cycle and climate change.</p>	
	Summer 2	<ul style="list-style-type: none"> Magnetism and electromagnets Waves 	<p>We expand on KS2 knowledge of magnets when looking at magnetic fields, magnetic forces, magnetic poles, investigating electromagnets and their uses.</p> <p>We expand on KS2 knowledge of light and sound when exploring waves. We examine waves and their properties, reflection, refraction, colour of light, volume and pitch, ear and eye structure</p>	

9	Autumn	<ul style="list-style-type: none"> • Cell Biology • Particle model of matter • Atomic structure and periodic table 	<p>Cell Biology builds on the Cells topic from KS3 by reviewing cell structure and developing ideas about transport in cells and how cells are formed. It also introduces different types of cells e.g. prokaryotes and eukaryotes.</p> <p>Particle model of matter builds on states of matter and their state changes along with more complex pressure concepts and explored density.</p> <p>Atomic structure and periodic table builds on the history of the atomic model, the development of the periodic table, ions and isotope and electron configuration</p>	<p>Cell Biology – differences in cell structure, cell division and stem cells.</p> <p>Organisation – digestive system, heart and circulatory system, coronary heart disease and plant transport systems</p> <p>Bioenergetics – aerobic and anaerobic respiration in humans and other organisms, photosynthesis</p> <p>Atomic structure and the Periodic Table – electronic configuration, development of the Periodic Table</p> <p>Bonding, structure and the properties of matter – giant and simple molecules</p>
	Spring	<ul style="list-style-type: none"> • Organisation • Bonding and properties of matter • Energy 	<p>Organisation builds on both Organisation 1 (Movement and Health) and Organisation 2 (Digestion) to explore in more detail how the digestive system, circulatory system and breathing system function. It also makes the connection between lifestyle choices and disease (introduced in Y7).</p> <p>Bonding and properties of matter build on the periodic table, atomic structure and electron configuration along with particle model.</p> <p>Energy builds on previous knowledge of energy stores and transfers in more complex examples, the advantages and disadvantages of different energy resources and more complex efficiency calculations.</p>	<p>Atomic structure and the Periodic Table – electronic configuration, development of the Periodic Table</p> <p>Chemistry of the atmosphere – Earth’s atmosphere, greenhouse gases, atmospheric pollutants</p> <p>Chemical changes – predicting patterns, extracting metals, rates of reaction, yield</p> <p>Particle model of matter – solids, liquids and gases, pressure, density</p> <p>Energy: stores and transfers, energy resources, calculations</p> <p>Electricity – current, voltage and resistance, components, national grid</p>
	Summer	<ul style="list-style-type: none"> • Bioenergetics • Electricity • Chemistry of the atmosphere 	<p>Bioenergetics builds on the Bioenergetics topic from Y8 by revisiting the concepts of photosynthesis and respiration and introducing more complexity e.g. symbol equations.</p> <p>Electricity builds on year 7 circuits knowledge and explores more complex relationships between voltage, current and resistance along with more complex calculations.</p> <p>Chemistry of the atmosphere builds on knowledge of greenhouse gasses and looks at the development of the atmosphere and its pollutants.</p>	

10	Autumn	<ul style="list-style-type: none"> • Infection and response • Atomic structure • Chemical changes 	<p>Infection and response builds on both Cell Biology and Organisation from Y9. Diseases caused by prokaryotes and eukaryotes are discussed. How the body's organ systems fight infection is explored. Atomic structure builds on KS3 knowledge of sub atomic particles, the development of the model of the atom and explores nuclear radiation. Chemical changes develops KS3 knowledge of the periodic table and reactions. We explore metal and non metal properties and how to extract metals according to the reactivity series.</p>	<p>Infection and response – pathogens, immunity, vaccination, antibiotics and antibiotic resistance Homeostasis and response – controlling internal conditions, nerve impulses Inheritance, variation and evolution – genetics, genetic disorders, reproduction, selective breeding, GM, cloning, natural selection</p> <p>Chemical changes – predicting patterns, extracting metals Energy changes – exothermic and endothermic reaction, electrolysis</p>
	Spring	<ul style="list-style-type: none"> • Homeostasis • Energy changes • Electrolysis • Forces 	<p>Homeostasis builds on the Organisation topic from Y9. It explores how the body's organ systems interact together to maintain internal conditions. Energy changes further develops students knowledge of the periodic table, chemical reactions, ions and the reactivity series when we explore exothermic, endothermic reaction and electrolysis. We build on students KS3 knowledge of different forces and basic speed calculations when we investigate more complex force diagrams, work done examples, speed and acceleration calculations and graphs.</p>	<p>Quantitative Chemistry – balancing equations, mole calculations, yield</p> <p>Atomic structure – development of the model of an atom, nuclear radiation Waves – waves in fluids and solids, Electromagnetic spectrum Forces – work done, energy transfers, elasticity, motion, momentum</p>
	Summer	<ul style="list-style-type: none"> • Inheritance and evolution • Waves 	<p>Inheritance and Evolution builds on various topics from KS3 including Reproduction (Y7) and Inheritance, Evolution and Variation (Y8). It further develops ideas about how characteristics are inherited and evidence for evolution. We build on KS3 knowledge of wave movement, key terms, calculations and explore how waves move in fluids and solids and the properties, uses and dangers of electromagnetic waves</p>	

11	Autumn	<ul style="list-style-type: none"> • Ecology • Hydrocarbons • Chemical analysis • Magnetism and electromagnetism • Space (Triple Physics only) 	<p>Ecology builds on the ecology topic from KS3 but also incorporates knowledge from Chemistry e.g. Chemistry of the Atmosphere. It further develops ideas about interdependence but also human impact on the environment. Hydrocarbons and chemical analysis develops students' knowledge of the periodic table, formulae and separating mixtures. We look into alkane and alkene structure, the uses of crude oil and extraction using fractional distillation, also, chromatography is developed by calculating R_f values and develop practical skills using gas tests. We develop KS3 knowledge of magnetism and electromagnetism when exploring magnetic fields and electromagnets in more detail and investigate motors. Triple Science students will develop their KS3 knowledge of Space when they investigate the solar system in more detail, the stellar life cycle and big bang evidence.</p>	<p>Ecology – ecosystems, biodiversity</p> <p>Organic chemistry – alkanes, alkenes, extraction, polymers, uses</p> <p>Chemical analysis – chromatography, formulations, identification of gases</p> <p>Using resources: Earth's resources, potable water, life cycle assessment, recycling</p> <p>Magnetism and electromagnetism – permanent and induced magnets, magnetic forces and fields, the motor effect</p> <p>*Space Physics – solar system, orbital motions, satellites, red shift. *Triple Science only</p>
	Spring	<p>Revision of fundamental knowledge</p> <p>Mock examinations and targeted intervention.</p>	<p>We will be able to use our prior knowledge from both KS3 and KS4 when revisiting fundamental areas of study and looking at exam technique, skills and required practical's during revision.</p>	

	Information
Personal Development within the Curriculum	<p>Students are fascinated by new discoveries and technologies and become increasingly aware of, and passionate about, the impact of science on their own health and wellbeing, the health of society and the health of the environment. Through learning in the sciences, children and young people develop their interest in, and understanding of, the living, material and physical world. They engage in a wide range of collaborative investigative tasks, which allows them to develop important skills to become creative, inventive and enterprising adults in a world where the skills and knowledge of the sciences are needed across all sectors of the economy.</p>
Extra Curricular Opportunities	<p>KS3 Science Club KS4 Science Club Science week activities Chemistry at the Black Country Museum Faraday challenge Biobake Nancy Rothwell Award</p>
Assessment	<p>Key Stage 3</p> <ul style="list-style-type: none"> • Students are assessed on their key subject specific knowledge including the ability to recall and apply key scientific vocabulary. • Students are also assessed on their practical skills including their ability to plan, carry out and set out data. To stretch students further assessment will also be on students ability to analyse data, communicate ideas, plan variables and review theories. • Students are also assessed on their understanding of the subject specific knowledge by applying their knowledge to unfamiliar contexts. • Throughout the lesson there is informal assessment to identify misconceptions within the lesson which allows staff to address misconceptions immediately with students. • ‘Do Now Tasks’ at the beginning of each lesson is a recall opportunity of previous lessons knowledge. • Live marking in lessons ensures that student work is also informally assessed within lesson as students complete GRIT tasks (extended independent tasks). • Students in year 7 and 8 also complete regular retrieval quizzes <p>Students complete three formal assessments across the year. These assessments are made up of different types of questions including fact recall, multiple choice, extended questions and gap fill activities. These are done in silence in lesson and the classroom teacher will use these to inform intervention to fill in the gaps in knowledge identified by the assessment.</p> <ul style="list-style-type: none"> • Informal assessment occurs during every lesson. • Retrieval quizzes as part of the diagnostic quizzing takes place as per the calendared schedule. • Formal assessments will occur once each term. <p>Key Stage 4</p> <p>Title of course studied: AQA Combined Science/<i>Separate Science</i></p> <p><u>Biology Paper 1</u> Cell Biology Organisation Infection and response</p>

	<p>Bioenergetics</p> <p><u>Chemistry Paper 1</u> Atomic structure and the periodic table Bonding, structure, and the properties of matter Quantitative chemistry Chemical changes Energy changes</p> <p><u>Physics Paper 1</u> Energy Electricity Particle model of matter Atomic structure</p> <p><u>Biology Paper 2</u> Homeostasis and response Inheritance, variation and evolution Ecology</p> <p><u>Chemistry Paper 2</u> The rate and extent of chemical change Organic chemistry Chemical analysis Chemistry of the atmosphere Using resources</p> <p><u>Physics Paper 2</u> Forces Waves Magnetism and electromagnetism <i>Space Physics</i></p>
Qualification Information	<p>https://filestore.aqa.org.uk/resources/science/specifications/AQA-8464-SP-2016 PDF -Combined Science https://www.aqa.org.uk/subjects/science/gcse/biology-8461/changes-for-2022 - Separate Science Biology https://www.aqa.org.uk/subjects/science/gcse/chemistry-8462/changes-for-2022 - Separate Science Chemistry https://www.aqa.org.uk/subjects/science/gcse/physics-8463/changes-for-2022 - Separate Science Physics</p>
Ways to Support your Child in this subject	<ul style="list-style-type: none"> • Ensure your child has a revision guide available to them. • Ensure your child completes homework to the best of their ability and on time. • Ensure your child revises previous classwork at home to embed knowledge long term. <p>At GCSE</p> <ul style="list-style-type: none"> • Ensure your child complete past papers and marks them using the past papers on Ello. • Ensure your child completes the GCSE topic questions and marks them using the mark schemes to practice the exam questions. These are all on Inspire.