



The purpose of our curriculum	Our curriculum is based on identification of the key concepts and the knowledge and skills needed in Chemistry, Physics and Biology to enable our students to make maximum progress. In KS3 students develop their subject knowledge across Biology, Chemistry and Physics. Practical work is embedded throughout the curriculum in order for students to develop the skills needed to succeed in the practical aspect of GCSEs. In KS4, students follow Separate sciences (3 GCSEs), Combined Science Trilogy, or Combined Science Synergy (2 GCSEs)
How does the curriculum demonstrate progress?	The Science curriculum in KS3 is split into topics. In year 7 students build on their primary school knowledge of the key concepts underpinning Biology, Chemistry and Physics. In year 8 students recap and then deepen their knowledge of these key concepts and skills, in preparation for Year 9 and the start of GCSE content. Within each term, complete scientific skills lessons were they continue to develop their ability to ‘think and work like a scientist’. These lessons focus on areas such as: graph work, maths skills and asking scientific questions. At GCSE students follow the AQA syllabus in either Separate sciences or Combined Science (Trilogy or Synergy) Lessons consist of theory and practical work where students are tested regularly on their knowledge of key concepts, and their practical skills. Students in KS4 continue to develop and refine skills and understanding acquired from Years 7 and 8 by delving deeper into the topics covered earlier in their school life. The curriculum is built to revisit previous learning so that key concepts can be built upon with new knowledge and skills. At all Key Stages, lessons will consist of theory and practical activities with an emphasis on applying knowledge, and developing exam and practical skills as set out by the AQA exam board. During all lessons, teachers assess and check knowledge and skills with daily retrieval tasks and formative assessment to check for misconceptions and gaps in knowledge, identifying the need for intervention or re-teaching of a key idea. Students demonstrate their progress through group or independent work, which is assessed in class and individual teacher marking of student books. Feedback provides students with targets which help students to progress, and developing skills and understanding. Upon completion of each topic, students complete a multiple choice assessment followed by review work, targeting areas for improvement. At the end of each term; Autumn, Spring, Summer, students complete an assessment covering all content previously taught. These assessments are similar in style and format to GCSE papers, assessing skills, application of knowledge to novel situations and the analysis of new information. Assessments are teacher marked and students have Dedicated Improvement and Review Time (DIRT) following summative assessments. Teachers use data from assessments to plan reteach lessons which focus on closing any remaining gaps in knowledge, and deepening understanding before beginning a new topic.



	Year Group	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
What will be taught?	7	Introduction to science, health and safety and science skills. Matter –the particle model and separating mixtures Electromagnets – voltage and resistance Earth – Earth and the universe		Forces – speed and gravity Genes – Variation and human Organisms – Movement and cells		Energy – costs and transfers Reactions – metals, non-metals, acids and alkalis. Waves – sound and light Ecosystems – Interdependence and plant reproduction	
	8	Matter – Periodic table and elements Genes – Evolution and inheritance Waves - wave effect and properties Reactions – Chemical energy and types of reactions		Electromagnets – electromagnetism and magnetism Forces – force and pressure Organisms – breathing and digestion		Energy – Work and temperature changes Earth – Climate and Earths resources Ecosystems – Respiration and photosynthesis	
	9	B1 - Cells C1 – The Periodic Table P1 - Energy		B2 – Organisation	P6a – Properties of waves C9 – Chemistry of the atmosphere	P3 – Matter C8a – Analytical Chemistry	B7 – Ecology P6b – Electromagnetic waves
	10 – Biology	B4 - Bioenergetics	B5 - Response	B5 - Response	B7 - Ecology	Revision and review for mock exams	Revision and review for mock exams
	10 – Chemistry	C3 – Chemical Calculations	C4 – Chemical change	C5 – Energy changes	C6 – Rates of reaction	C8a – Analytical chemistry C9 – Chemistry of the atmosphere	Review and Revision for mock exams.
	10 – Physics	P2 - Electricity	P3 - Matter	P4 - Radioactivity	P6a – Properties of Waves P6b – Electromagnetic waves	P7 - Electromagnetism	Review and Revision for mock exams.



	10 – Trilogy	B3 – Disease C3 – Chemical Calculations P3 – Matter P4 - Radioactivity	P6a – Properties of waves C8a – Analytical Chemistry	C9 – Chemistry of the atmosphere P6b – Electromagnetic waves C7a – Organic Chemistry	B7 – Ecology P7 - Electromagnetism	Review and Revision for mock exams.
	10 - Synergy	S4 – Atmosphere, ecosystems and inheritance	S5 – Building blocks for understanding	S6 – Interactions over small and large distances		Review and Revision for mock exams.
	11 – Biology	B5 - Response	B6 – Inheritance, variation and evolution	B7 - Ecology	B7 Ecology Revision	Revision
	11 – Chemistry	C5 – Energy changes	C6 – Rates of reaction C7 – Organic Chemistry	C8 – Analytical Chemistry C9 – Chemistry of the Atmosphere	C10 – Using Resources	C10 – Using Resources Revision
	11 - Physics	P5 - Forces	P6 - Waves	P7 - Electromagnetism	P8 - Space	Revision
	11 – Trilogy	P3 - Matter B4 - Bioenergetics C4 – Chemical Change P4 – Radioactivity C5 – Energy changes	B5 – Response C6 – Rates of Reaction P5 – Forces C9 – Chemistry of the atmosphere	B6 – Inheritance, Variation and Evolution C7 – Organic Chemistry C8 – Analytical chemistry P6 - Waves	P7 - Electromagnetism B7 - Ecology C10 – Using Resources	Revision
	11 - Synergy	S5 – Building blocks for understanding S6 – Interactions over small and large differences	S7 – Movement and interactions	S8 – Spaceship Earth – sustainable future	Revision	Revision



Term	Key concepts and skills
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Autumn 1&2	<u>Introduction to science, health and safety and science skills.</u> • Hazard symbols • Scientific equipment • Taking measurements • Identifying variables • Drawing graphs • Planning and collection of experimental data <u>Matter –the particle model and separating mixtures</u> • 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 • The differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density; the anomaly of ice-water transition • Atoms and molecules as particles • 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 • Brownian motion in gases • Diffusion in liquids and gases driven by differences in concentration • The difference between chemical and physical changes <u>Earth – earth and the universe</u> • 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 • The composition of the Earth
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- The structure of the Earth
- The rock cycle and the formation of igneous, sedimentary and metamorphic rocks

Electromagnets – voltage and resistance

- Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge
- Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current
- Differences in resistance between conducting and insulating components (quantitative)
- 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



Spring 1&2

Energy – costs and transfers

- Comparing energy values of different foods (from labels) (kJ)
- Comparing power ratings of appliances in watts (W, kW)
- Comparing amounts of energy transferred (J, kJ, kW hour)
- Domestic fuel bills, fuel use and costs
- Fuels and energy resources

Organisms – movement and cells

- 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 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



Spring 1&2
Summer
1&2

Waves – sound and light

- Frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound
- Sound needs a medium to travel, the speed of sound in air, in water, in solids
- Sound produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal
- The auditory range of humans and animals
- Light waves travelling through a vacuum; speed of light
- The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface
- Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye
- Light transferring energy from source to absorber, leading to chemical and electrical effects; photosensitive material in the retina and in cameras
- Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection

Ecosystems – interdependence and plant reproduction

- 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
- Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms



Forces – speed and gravity

- Gravity force, weight = mass x gravitational field strength (g), on Earth $g=10 \text{ N/kg}$, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and sun (qualitative only)
- Speed and the quantitative relationship between average speed, distance and time (speed = distance $\div$ time)
- The representation of a journey on a distance-time graph
- Relative motion: trains and cars passing one another

Genes – variation and human reproduction

- 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
- Differences between species
- The variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation
- The variation between species and between individuals of the same species meaning some organisms compete more successfully, which can drive natural selection
- Changes in the environment which 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

Reactions – metals, non-metals, acids and alkalis.

- The chemical properties of metal and non-metal oxides with respect to acidity
- 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
- Reactions of acids with metals to produce a salt plus hydrogen
- Reactions of acids with alkalis to produce a salt plus water



- What catalysts do



Term	Key concepts and core skills
Autumn 1&2	<u>Matter – periodic table and elements</u> • The varying physical and chemical properties of different elements • The principles underpinning the Mendeleev periodic table • The 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 • A simple (Dalton) atomic model • Differences between atoms, elements and compounds • Chemical symbols and formulae for elements and compounds • Conservation of mass changes of state and chemical reactions <u>Genes – evolution and inheritance</u> • Heredity as the process by which genetic information is transmitted from one generation to the next • A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model <u>Waves - wave effect and properties</u> • Waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition • Pressure waves transferring energy; use for cleaning and physiotherapy by ultrasound; waves transferring information for conversion to electrical signals by microphone • The similarities and differences between light waves and waves in matter <u>Reactions – Chemical energy and types of reactions</u> • Exothermic and endothermic chemical reactions (qualitative) • Combustion, thermal decomposition, oxidation and displacement reactions



Spring 1&2

Electromagnetic – electromagnetism and magnetism

- 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, DC motors (principles only)

Earth – Climate and Earths resources

- Earth as a source of limited resources and the efficacy of recycling
- The composition of the atmosphere
- The production of carbon dioxide by human activity and the impact on climate
- The order of metals and carbon in the reactivity series
- The use of carbon in obtaining metals from metal oxides
- Properties of ceramics, polymers and composites (qualitative)

Forces – force and pressure

- 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
- Forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only)
- Change depending on direction of force and its size
- Opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface
- Forces as pushes or pulls, arising from the interaction between 2 objects
- Using force arrows in diagrams, adding forces in 1 dimension, balanced and unbalanced forces
- Moment as the turning effect of a force
- Non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets, and forces due to static electricity
- Simple machines give bigger force but at the expense of smaller movement (and vice versa): product of force and displacement unchanged

Organisms – breathing and digestion



- The content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed
- Calculations of energy requirements in a healthy daily diet
- The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases
- The tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts)
- The importance of bacteria in the human digestive system
- Plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots
- The structure and functions of the gas exchange system in humans, including adaptations to function
- The mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases, including simple measurements of lung volume
- The impact of exercise, asthma and smoking on the human gas exchange system
- The effects of recreational drugs (including substance misuse) on behaviour, health and life processes



Summer 1&2	<u>Energy – work and temperature changes</u> • Changes with temperature in motion and spacing of particles • Internal energy stored in materials • Energy changes on changes of state (qualitative) • 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 • Heating and thermal equilibrium: temperature difference between 2 objects leading to energy transfer from the hotter to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature difference; use of insulators • Other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels • 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 • Forces measured in Newtons, measurements of stretch or compression as force is changed • Force-extension linear relation; Hooke's Law as a special case • Work done and energy changes on deformation • 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 <u>Ecosystems – respiration and photosynthesis</u> • 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 • 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
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- The adaptations of leaves for photosynthesis
- The role of leaf stomata in gas exchange in plants



Term	Key concepts and core skills
Autumn 1&2	<u>B1 - Cells</u> <u>Cell structure and transport</u> • Cells in animals and plants. • Specialised cells developed by stem cells and the ethical issues surround the uses, treatments and harvesting of them. <u>Cell division</u> • Cell cycle • Compare and contrast meiosis and mitosis in terms of chromosomes <u>C1 – The periodic table</u> • Structure of the atom • Development of the model of the atom • History of the periodic table • Trends in groups <u>P1 – Energy</u> <u>Conservation and dissipation for energy</u> • Law of conservation of energy • Energy stores and mechanisms of transfer <u>Energy transfers by heating</u> • Energy transfers by convection, conduction, and radiation. • Methods of preventing energy transfer, linked to housing and thermos flasks <u>Energy resources</u> • Types of energy resources - renewable and non-renewable energy • Evaluate the use of energy resources for a specific environment.
Spring 1	<u>B2 – Organisation</u> • Cells, organs, tissues • The digestive system • Enzymes



	• Circulatory System • Transport of substances around the body
Spring 2	<u>P6a – Wave properties</u> • Compare and contrast longitudinal and transverse waves. • Reflection and refraction • Ripple tank <u>C9 – Chemistry of the atmosphere</u> • Greenhouse effect • Atmospheric pollutants • Human impact on the atmosphere
Summer 1	<u>P3 – Matter</u> • Particle model of matter • Change of state and related energy • Calculating density <u>C8a – Analytical chemistry</u> • Tests for different gases • Chromatography to separate mixtures
Summer 2	<u>B7 – Ecology</u> • Feeding relationships in an ecosystem • Recycling of carbon and water. • Human impact on ecosystems, • Land and water pollution, deforestation and global warming. • How we can maintain biodiversity. <u>P6b – Electromagnetic Waves</u> • Properties, uses and dangers of electromagnetic waves



Separate Sciences

Term	Biology	Chemistry	Physics
Autumn 1	<u>B4 – Bioenergetics</u> <u>Photosynthesis</u> • Photosynthesis as a chemical reaction • Factors affecting the rate of photosynthesis <u>Respiration</u> • Respiration as a chemical reaction • Use of glucose • Metabolism • Effect of exercise on the body	<u>C3 – Chemical Calculations</u> • Law of conservation of mass • Calculations linking amount of substance to concentration • Manipulating equations using concentration and the concept of the mole	<u>P2 – Electricity</u> <u>Electric circuits</u> • Components in electrical circuits • Comparing parallel and series circuits • Relationship between current, voltage and resistance • Manipulation of equations <u>Electricity in the home</u> • How electricity is used in devices, • Efficiency of electrical devices • Electrical safety, including wiring of a plug • The national grid
Autumn 2	<u>B5 – Response</u> <u>The nervous system</u> • Human body responses to stimuli • Reflex arc • Structure and function of the brain and the eye <u>Hormonal control</u> • The endocrine system • The role of hormones in reproduction, the menstrual cycle and IVF.	<u>C4 – Chemical change</u> <u>Chemical changes</u> • Reactions of acids with metals and alkalis • Reactivity series and extraction of metals from their ore. <u>Electrolysis</u> • Electrolysis as a technique for extracting metals – aqueous and molten	<u>P3 – Matter</u> • Particle model • Change of state and related energy • Calculating density
Spring 1	• Plant hormones and their function <u>Homeostasis in action</u> • Control of blood glucose levels	<u>C5 - Energy Changes</u> • Energy changes in exothermic and endothermic reactions	<u>P4 – Radioactivity</u> • Comparison of alpha, beta and gamma radiation



	Control of water, temperature and nitrogen	Generating electricity using chemical cells and fuel cells	- How ionising radiation affects the human body and the associated risks - Use of ionising radiation in healthcare and industry
Spring 2	<u>B6 - Response</u>	<u>C6 - Rates and equilibrium</u> - Factors affecting rate of reaction - Collision theory - Reversible reactions	<u>P6a – Wave properties</u> - Compare and contrast longitudinal and transverse waves. - Reflection and refraction - Ripple tank <u>P6b – Electromagnetic Waves</u> - Properties, uses and dangers of electromagnetic waves
Summer 1	<u>B7 – Ecology</u> - Feeding relationships in an ecosystem - Recycling of carbon and water. - Human impact on ecosystems, - Land and water pollution, deforestation and global warming. - How we can maintain biodiversity.	<u>C9 – Chemistry of the atmosphere</u> - Greenhouse effect - Atmospheric pollutants - Human impact on the atmosphere <u>C8a – Analytical chemistry</u> - Tests for different gases - Chromatography to separate mixtures	<u>P7 – Electromagnetism</u> How to make an electromagnet Factors affecting strength of electromagnets
Summer 2	Reteach and revision of key concepts from Y9 and Y10 in preparation for mock exams		



Term	Key concepts and core skills
Autumn 1&2	<u>B3 – Disease</u> <u>Communicable diseases</u> • Explore a range of communicable diseases including viral, bacterial, and fungal diseases • How the human defense system works. <u>Preventing and treating diseases</u> • Drug development and testing process, including double blind trials and the placebo effect • How vaccinations, painkillers and antibiotics work <u>Non-communicable diseases</u> • Effect of smoking, diet and exercise on health • Risks of alcohol and carcinogens • <u>C3 – Chemical Calculations</u> • Law of conservation of mass • Calculations linking amount of substance to concentration <u>P3 – Matter</u> • Particle model • Change of state and related energy • Calculating density <u>P4 – Radioactivity</u> • Comparison of alpha, beta and gamma radiation • How ionising radiation affects the human body and the associated risks • Use of ionising radiation in healthcare and industry
Spring 1	<u>P6a – Wave properties</u> • Compare and contrast longitudinal and transverse waves. • Reflection and refraction • Ripple tank



	<u>C8a – Analytical chemistry</u> • Tests for different gases • Chromatography to separate mixtures
Spring 2	<u>C9 – Chemistry of the atmosphere</u> • Greenhouse effect • Atmospheric pollutants • Human impact on the atmosphere <u>P6b – Electromagnetic Waves</u> • Properties, uses and dangers of electromagnetic waves <u>C7a – Organic Chemistry</u> • Crude oil as a feedstock • Making crude oil useful through fractional distillation and cracking • Properties of hydrocarbon molecules
Summer 1	<u>B7 – Ecology</u> • Feeding relationships in an ecosystem • Recycling of carbon and water. • Human impact on ecosystems, • Land and water pollution, deforestation and global warming. • How we can maintain biodiversity. <u>P7 – Electromagnetism</u> • How to make an electromagnet • Factors affecting strength of electromagnets
Summer 2	Reteach and revision of key concepts from Y9 and Y10 in preparation for mock exams

Curriculum Intent

Year 10 – Key concepts and skills



Combined Science - Synergy

Term	Key concepts and core skills
Autumn 1&2	<u>S4 – Atmosphere, ecosystems and inheritance</u> <u>The Earth's atmosphere</u> • Evolution of the Earth's atmosphere • Human impact and climate change <u>Ecosystems and Biodiversity</u> • Feeding relationships in an ecosystem • Recycling of carbon and water. • Human impact on ecosystems, • Land and water pollution, deforestation and global warming. • How we can maintain biodiversity. <u>Variation</u> • Gene, DNA and chromosomes • Gene inheritance • Natural selection • Theory of evolution • Classification • Genetic engineering • Selective breeding
Spring 1 &2	<u>S5 – Building blocks for understanding</u> • History of the periodic table • Trends in groups • Law of conservation of mass • Calculations linked to amount of substance <u>S6 – Interactions over small and large differences</u> <u>Forces and energy changes</u> • Vectors • Use of equations to calculate weight and gravitational potential energy • Hooke's Law
Summer 1	<u>S6 – Interactions over small and large differences</u> <u>Structure and bonding</u>



	• Representing ionic and covalent bonding • Properties of ionic, simple and giant covalent structures <u>Magnetism</u> • Magnetic field • The Earth as a magnet • Electromagnets
Summer 2	Reteach and revision of key concepts from Y9 and Y10 in preparation for mock exams

Curriculum Intent

Year 11 – Key concepts and skills

Separate Sciences



Term	Biology	Chemistry	Physics
Autumn 1	<u>B5 – Response</u> <u>The nervous system</u> - Human body responses to stimuli - Reflex arc - Structure and function of the brain and the eye <u>Hormonal control</u> - The endocrine system - The role of hormones in reproduction, the menstrual cycle and IVF. - Plant hormones and their function <u>Homeostasis in action</u> - Control of blood glucose levels Control of water, temperature and nitrogen	<u>C5 - Energy Changes</u> - Energy changes in exothermic and endothermic reactions - Generating electricity using chemical cells and fuel cells	<u>P5 – Forces</u> <u>Forces in balance</u> - Scalar and vector properties - Contact and non-contact forces - Resultant forces - Gravity and weight <u>Motion</u> - Application of Newton’s laws of motion <u>Forces and motion</u> - Distance, time, velocity relationships - Calculation of acceleration <u>Forces and pressure</u> - Pressure in fluids - Atmospheric pressure <u>Momentum</u> - Conservation of momentum - Manipulation of equations
Autumn 2	<u>B6 – Inheritance, variation and evolution</u> <u>Reproduction</u> - Cell division in reproduction - Inheritance of genes - Inherited disorders, such as cystic fibrosis <u>Variation and evolution</u> - Variation between organisms in a species - Natural selection - Impact and ethics of selective breeding and genetic engineering	<u>C6 - Rates and equilibrium</u> - Factors affecting rate of reaction - Reversible reactions - Application of Le Chatelier’s principle <u>C7 – Organic Chemistry</u> <u>Crude oil and fuels</u> - Crude oil as a feedstock - Making crude oil useful through fractional distillation and cracking - Properties of hydrocarbon molecules <u>Organic reactions</u>	<u>P6 – Waves</u> <u>Wave properties</u> - Compare and contrast longitudinal and transverse waves <u>The electromagnetic spectrum</u> - Properties and uses of electromagnetic waves <u>Light</u> - Explaining reflection and refraction



	<u>Genetics and evolution</u> • Classification systems • Fossil record as evidence for evolution and extinction	• Reactions of alkanes and alkenes to form useful products <u>Polymers</u> • Structure and properties of synthetic and natural polymers • How polymers are formed	
Spring 1		<u>C8a – Analytical chemistry</u> • Tests for different gases • Chromatography to separate mixtures <u>C8b – Advanced analytical chemistry</u> • Tests for anions and cations • Use of instrumental methods for detecting substances <u>C9 – Chemistry of the atmosphere</u> • Greenhouse effect • Atmospheric pollutants • Human impact on the atmosphere	<u>P7 – Electromagnetism</u> • How to make an electromagnet • Factors affecting strength of electromagnets
Spring 2	<u>B7 – Ecology</u> • Feeding relationships in an ecosystem • Recycling of carbon and water. • Human impact on ecosystems, • Land and water pollution, deforestation and global warming.	<u>C10 – Using resources</u> • Extraction of resources from the Earth's crust • Environmental impact of making and using resources	<u>P8 – Space</u> • Lifecycle of stars • Our expanding universe
Summer 1	• How we can maintain biodiversity. Revision	Revision	Revision
Summer 2	GCSE Exam series	GCSE Exam series	GCSE Exam series



Combined Science - Trilogy

Term	Key concepts and core skills
Autumn 1&2	<u>P3 – Matter</u> • Particle model • Change of state and related energy • Calculating density <u>B4 – Bioenergetics</u> <u>Photosynthesis</u> • Photosynthesis as a chemical reaction • Factors affecting the rate of photosynthesis <u>Respiration</u> • Respiration as a chemical reaction • Use of glucose • Metabolism Effect of exercise on the body <u>C4 – Chemical change</u> <u>Chemical changes</u> • Reactions of acids with metals and alkalis • Reactivity series and extraction of metals from their ore. <u>Electrolysis</u> Electrolysis as a technique for extracting metals – aqueous and molten <u>P4 – Radioactivity</u> • Comparison of alpha, beta and gamma radiation • How ionising radiation affects the human body and the associated risks • Use of ionising radiation in healthcare and industry
Spring 1	<u>B5 – Response</u> <u>The nervous system</u> • Human body responses to stimuli



	• Reflex arc • Structure and function of the brain and the eye <u>Hormonal control</u> • The endocrine system • The role of hormones in reproduction, the menstrual cycle and IVF. • Plant hormones and their function <u>Homeostasis in action</u> • Control of blood glucose levels • Control of water, temperature and nitrogen <u>C6 - Rates and equilibrium</u> • Factors affecting rate of reaction • Collision theory • Reversible reactions
Spring 2	<u>B6 – Inheritance, variation and evolution</u> <u>Reproduction</u> • Cell division in reproduction • Inheritance of genes • Inherited disorders, such as cystic fibrosis <u>Variation and evolution</u> • Variation between organisms in a species • Natural selection • Impact and ethics of selective breeding and genetic engineering <u>Genetics and evolution</u> • Classification systems • Fossil record as evidence for evolution and extinction <u>C7 – Organic Chemistry</u> <u>Crude oil and fuels</u> • Crude oil as a feedstock • Making crude oil useful through fractional distillation and cracking • Properties of hydrocarbon molecules



	<u>C8a – Analytical chemistry</u> • Tests for different gases • Chromatography to separate mixtures
Summer 1	<u>P7 – Electromagnetism</u> • How to make an electromagnet Factors affecting strength of electromagnets <u>B7 – Ecology</u> • Feeding relationships in an ecosystem • Recycling of carbon and water. • Human impact on ecosystems, • Land and water pollution, deforestation and global warming. • How we can maintain biodiversity.
Summer 2	Revision – Summer Exam Series

Year 11 – Key concepts and skills

Combined Science - Synergy

Term	Key concepts and core skills
Autumn 1&2	<u>S5 – Building blocks for understanding</u> <u>Periodic table and calculations</u> • History of the periodic table • Trends in groups <u>Chemical quantities</u> • Law of conservation of mass • Calculations linked to amount of substance <u>S6 – Interactions over small and large differences</u> <u>Forces and energy changes</u>



	• Vectors • Use of equations to calculate weight and gravitational potential energy • Hooke's Law <u>Structure and bonding</u> • Representing ionic and covalent bonding • Properties of ionic, simple and giant covalent structures <u>Magnetism</u> • Magnetic field • The Earth as a magnet • Electromagnets
Spring 1	<u>S7 – Movement and interactions</u> • Motion • Newton's laws • Circuits • Mains electricity • Acids and alkalis • Rates of reaction • Energy, rates and reactions • Equilibria • Electrons and chemical reactions
Spring 2	<u>S8 – Spaceship Earth – sustainable future</u> • Carbon chemistry • Material resources • Energy resources
Summer 1	Revision
Summer 2	Revision – Summer Exam Series



Science Curriculum Topic Sequencing and Building Schema Overview

Year 7 Science Topics			
Unit Title	Prior learning from KS2	Links to other Science units in KS3	Links to KS4 courses
7.0 Introduction to practical Science	Working scientifically	All	Required practicals
7.1 Matter - particle model & separating mixtures	States of matter & properties and changes of materials	7.1 7.9 7.11 8.1	C1 Atomic structure; P3 Molecules and Matter; C1 States of Matter; C7 Crude oil and fuels; C8 Chemical analysis; S7 Atoms into Ions; S8 Resources
7.2 Forces - Speed and Gravity	Forces	7.1 7.4 8.7	P5 Motion; P5 Forces in balance; P5 Forces and Motion; S6 Forces and Energy
7.3 Earth - Earth and the universe	Earth & Space	7.1 7.3 8.6	C9 The Earth's Atmosphere; S4 Earth's atmosphere; P8 Space
7.4 Energy - costs and transfers		7.1 8.9	P1 Energy transfers by heating
7.5 Organisms - movement and cells	Animals including humans	7.1 7.8 7.10 8.8	B1 Cell structure; B1 Cell division; B3 Preventing and treating disease; S1 Cells; S3 Preventing Disease; B5 The nervous system
7.6 Waves - Sound & Light	Sound topic, light topic	7.1 8.3	S1 Waves; P6 Light



7.7 Ecosystems - interdependence & reproduction	Living things and their habitats	7.1 7.6 8.10	B6 Genetics and evolution; B7 Adaptations' interdependence and competition; S4 ecosystems and biodiversity; B7 Biodiversity and ecosystems
7.8 Electromagnets - voltage & resistance	Electricity	7.1 7.2 8.5	C4 Electrolysis; P2 Electrical circuits; P2 Electricity in the home; P7 Electromagnetism; S8 Resources
7.9 Genes - variation and human	Evolution and inheritance	7.1 7.6 8.2 8.8	B2 Organising plants and animals; B6 Variation and evolution; B6 Genetics and evolution; S4 Inheritance and variation
7.10 Reactions - metals & non-metals, acids & alkalis	Properties and changes of materials	7.1 7.2 8.4	C4 Chemical changes, S7 Acids and alkalis; S8 Resources



Year 8 Science Topics			
Unit Title	Prior learning from KS2	Links to other Science units in KS3	Links to KS4 courses
8.1 Matter - periodic table and elements	States of Matter	7.1 7.2 8.4 8.6	C1 Atomic structure; C1 Periodic Table; P3 Molecules and matter; C7 Crude oil and fuels; C7 Organic reactions; C7 Polymers; S5 Periodic Table and calculations; S7 Atoms into ions
8.2 Genes - evolution and inheritance	Evolution and inheritance	7.1 7.10	B1 Cell structure; B6 Variation and evolution; B6 Genetics and evolution; S4 Inheritance and variation
8.3 Waves - wave effect and properties	Sound topic, light topic	7.1 7.7	S1 Waves; S3 Radiation and risk; P4 Radioactivity; P6 Wave properties; P6 The electromagnetic spectrum
8.4 Reactions - chemical energy and types of reaction	Properties and changes of materials	7.1 7.11 8.1 8.9	C4 Chemical changes; C5 Energy changes; C6 Rates and equilibrium
8.5 Electromagnets electromagnetism and magnetism	Forces and magnets, electricity	7.1 7.9	S7 Electricity; S6 Magnetism
8.6 Earth - climate and Earth's resources	Earth and Space	7.1 7.4 8.1	C9 The Earth's atmosphere; C10 The Earth's resources; C10 Using our resources; S4 Earth's atmosphere



	8.7 Forces - force and pressure	Forces	7.1 7.3	P5 Forces and pressure; S6 Forces and Energy; S7 Forces
	8.8 Organisms - breathing and digestion	Animals, including humans	7.1 7.6 7.10 8.10	B2 Organisation and the digestive system; S2 Human Biology
	8.9 Energy - work and temperature changes		7.1 7.5 8.4	P1 Conservation and dissipation of energy; P1 energy transfers by heating; S6 Forces and Energy; S8 Resources
	8.10 Ecosystems - respiration and photosynthesis	Living things and their habitat topic, plants topic	7.1 7.8 8.8	B2 Organising plants and animals; S2 Plant Biology; B4 Photosynthesis; B4 Respiration



AQA GCSE Biology Topics (Separate Science + Trilogy)			
Unit Code	Unit Title	Prior learning from KS3	Links to other Science units in KS4
B1	Cell structure and transport	7.6 Organisms - movement and cells; 8.2 Genes - evolution and inheritance	B1, B2, B4, B6
	Cell division	7.6 Organisms - movement and cells	B1, B6
B2	Organisation and the digestive system	8.8 Organisms -breathing and digestion	B1, B4, B5, B6
	Organising animals and plants	7.10 Genes - variation and human; 8.10 Ecosystems - respiration and photosynthesis	B7
B3	Communicable disease	7.6 Organisms - movement and cells	B3
	Preventing and treating disease		
	Non-communicable diseases		
B4	Photosynthesis	8.10 Ecosystems - respiration and photosynthesis	B1 B2
	Respiration		
B5	The nervous system	7.6 Organisms - movement and cells	B2, B5
	Hormonal coordination		

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	Homeostasis in action		
B6	Reproduction	7.8 Ecosystems - interdependence and reproduction	B1, B2, B7
	Variation and evolution	7.10 Genes -variation and human; 8.2 Genes - evolution and inheritance	
	Genetics and evolution	7.10 Genes -variation and human; 8.2 Genes - evolution and inheritance	
B6	Adaptations, interdependence and competition	7.8 Ecosystems - interdependence and reproduction	B2, B6
	Organising and ecosystems		
	Biodiversity and ecosystems		



AQA GCSE Chemistry Topics (Separate Science + Trilogy)			
Unit Code	Unit Title	Prior learning from KS3	Links to other Science units in KS4
C1	Atomic structure	7.2 Matter - particle model and separating mixtures	C1, C2, C3, C4, C7, C8, P2, P3, P4
	The Periodic Table	8.1 Matter - periodic table and elements	
C2	Structure and bonding	7.2 Matter - particle model and separating mixtures 8.1 Matter - periodic table and elements	C1, C1, C4, 9C.6, C5, C6, C7, C7
C3	Chemical calculations	7.11 Reactions – metals and non-metals	C1, C4
C4	Chemical changes	7.11 Reactions - metals and non-metals 8.4 Reactions - chemical energy and types of reaction 7.9 Electromagnets - voltage and resistance	C1, C2, C3, C7, C8, C10
	Electrolysis		
C5	Energy changes	8.4 Reactions - chemical energy and types of reaction	C2, C4, C6
C6	Rates and equilibrium	8.4 Reactions - chemical energy and types of reaction	C2, C5
C7	Crude oil and fuels	7.2 Matter - particle model and separating mixtures 8.1 Matter - periodic table and elements	C1, C2, C4, C7, C7

Curriculum Intent



	Organic reactions (Separate science only)		C2, C7, C7
	Polymers (Separate science only)		C7, C7
C8	Chemical analysis	7.2 Matter - particle model and separating mixtures	C1, C1, C4
C9	The Earth's atmosphere	7.4 Earth - Earth and the universe; 8.6 Earth - climate and Earth's resources	C10, C10
C10	The Earth's resources	8.6 Earth - climate and Earth's resources	C9
	Using our resources		C4, P1, C9



AQA GCSE Physics Topics (Separate Science + Trilogy)			
Unit Code	Unit Title	Prior learning from KS3	Links to other Science units in KS4
P1	Conservation and dissipation of energy	7.5 Energy - costs and transfers 8.9 Energy - work and temperature changes 8.9 Energy - work and temperature changes	P7, C10
	Energy transfer by heating		
	Energy resources		
P2	Electric circuits	7.9 Electromagnets - voltage and resistance	C1, C4, P2, P5, P7
	Electricity in the home		
P3	Molecules and matter	7.2 Matter - particle model and separating mixtures 8.1 Matter - periodic table and elements	C1, P1
P4	Radioactivity	8.3 Waves - wave effect and properties	P6, C1
P5	Forces in balance	7.3 Forces - speed and gravity 8.7 Forces - force and pressure	P1, P2, P5, P8
	Motion		
	Forces and motion		
	Forces and pressure		

Curriculum Intent



P6	Wave properties	7.7 Waves - Sound and light 8.3 Waves - wave effect and properties	P1, P4, P8
	The electromagnetic spectrum		
	Light		
P7	Electromagnetism	7.9 Electromagnets - voltage and resistance 8.5 Electromagnets, electromagnetism and magnetism	P2
P8	Space (Separate science only)	7.4 Earth - Earth and the universe	P5, P6



AQA GCSE Synergy Science			
Unit Code	Unit Title	Prior learning from KS3	Links to other Science units in KS4
S1	1.1 States of Matter	7.2 Matter - particle model and separating mixtures 7.6 Organisms - movement and cells 7.7 Waves - sound and light	S2, S3, S4, S5, S6, S7
	1.2 Atomic Structure		
	1.3 Cells		
	1.4 Waves		
S2	2.1 Human Biology	8.8 Organisms - breathing and digestion 8.10 Ecosystems - respiration and photosynthesis	S1, S4
	2.2 Plant Biology		
S3	3.1 Lifestyle and health	7.6 Organisms – movement and cells 8.3 Waves - wave effect and properties	S1, S2
	3.2 Radiation and risk		
	3.3 Preventing disease		
S4	4.1 Earth's atmosphere	7.4 Earth - Earth and the universe; 7.8 Ecosystems - interdependence and reproduction 7.10 Genes - variation and human 8.6 Earth - climate and Earth's resources	S1, S2, S8
	4.2 Ecosystems and biodiversity		
	4.3 Inheritance and variation		
S5	5.1 Periodic Table and calculations	8.1 Matter - periodic table and elements	S1
	5.2 Chemical Quantities		

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S6	6.1 Forces and energy	7.3 Forces - speed and gravity 8.5 Electromagnets, electromagnetism and magnetism 8.7 Forces - force and pressure 8.9 Energy - work and temperature changes	S1, S7
	6.2 Structure and bonding		
	6.3 Magnetism		
S7	7.1 Forces	7.2 Matter - particle model and separating mixtures 7.11 Reactions - metals and non-metals, acids and alkalis 8.1 Matter - periodic table and elements 8.7 Forces - force and pressure 8.5 Electromagnets, electromagnetism and magnetism	S1, S6
	7.2 Electricity		
	7.3 Acids and alkalis		
	7.4 Rates of reaction		
	7.5 Atoms into ions		
S8	8.1 Carbon chemistry	7.2 Matter - particle model and separating mixtures 7.9 Electromagnets - voltage and resistance 7.11 Reactions - metals and non-metals 8.9 Energy - work and temperature changes	S2, S4, S5
	8.2 Resources		