Curriculum Content: Science

Year Group	Topics Include	By the end of the year, students should know:
7	Organisms ● Skeleton ● Muscles ● Multicellular organisms	● The parts of the human skeleton work as a system for support, protection, movement and the production of new blood cells. Antagonistic pairs of muscles create movement when one contracts and the other relaxes ● Multicellular organisms are composed of cells which are organised into tissues, organs and systems to carry out life processes. There are many types of cell. Each has a different structure or feature so it can do a specific job.
7	Ecosystems ● Food webs	● Organisms in a food web (decomposers, producers and consumers) depend on each other for nutrients. So, a change in one population leads to changes in others. The population of a species is affected by the number of its predators and prey, disease, pollution and competition between individuals for limited resources such as water and nutrients.
7	Interdependence ● Seed dispersal	● Plants have adaptations to disperse seeds using wind, water or animals. Plants reproduce sexually to produce seeds, which are formed following fertilisation in the ovary.
7	Genes ● Variation ● Menstrual cycle	● There is variation between individuals of the same species. Some variation is inherited, some is caused by the environment and some is a combination. Variation between individuals is important for the survival of a species, helping it to avoid extinction in an always changing environment. ● The menstrual cycle prepares the female for pregnancy and stops if the egg is fertilised by a sperm. The developing foetus relies on the mother to provide it with oxygen and nutrients, to remove waste and protect it against harmful substances.
7	Matter Solids liquids and gases Mixtures can be separated	● Properties of solids, liquids and gases can be described in terms of particles in motion but with differences in the arrangement and movement of these same particles: closely spaced and vibrating (solid), in random motion but in contact (liquid), or in random motion and widely spaced (gas). Observations where substances change temperature or state can be described in terms of particles gaining or losing energy. ● A pure substance consists of only one type of element or compound and has a fixed melting and boiling point. Mixtures may be separated due to differences in their physical properties. The method chosen to separate a mixture depends on which physical properties of the individual substances are different. Metals and non-metals react with oxygen to form oxides which are either bases or acids. Metals can be arranged as a reactivity series in order of how readily they react with other substances. Some metals react with acids to produce salts and hydrogen.

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7	Reactions • Metals and non-metals • Acids and alkalis	• The pH of a solution depends on the strength of the acid: strong acids have lower pH values than weak acids. Mixing an acid and alkali produces a chemical reaction, neutralisation, forming a chemical called salt and water.
7	Earth • Earth Structure. • Universe	• Sedimentary, igneous and metamorphic rocks can be interconverted over millions of years through weathering and erosion, heat and pressure, and melting and cooling. • The solar system can be modelled as planets rotating on tilted axes while orbiting the Sun, moons orbiting planets and sunlight spreading out and being reflected. This explains day and year length, seasons and the visibility of objects from Earth. Our solar system is a tiny part of a galaxy, one of many billions in the Universe. Light takes minutes to reach Earth from the Sun, four years from our nearest star and billions of years from other galaxies.
7	Forces • Speed • gravity	• If the overall, resultant force on an object is non-zero, its motion changes and it slows down, speeds up or changes direction. • Mass and weight are different but related. Mass is a property of the object; weight depends upon mass but also on gravitational field strength. Every object exerts a gravitational force on every other object. The force increases with mass and decreases with distance. Gravity holds planets and moons in orbit around larger bodies.
7	Energy • energy costs • energy transfers	• We can model voltage as an electrical push from the battery, or the amount of energy per unit of charge transferred through the electrical pathway. In a series circuit, voltage is shared between each component. In a parallel circuit, voltage is the same across each loop. Components with resistance reduce the current flowing and shift energy to the surroundings. • Current is a movement of electrons and is the same everywhere in a series circuit. Current divides between loops in a parallel circuit, combines when loops meet, lights up bulbs and makes components work. Around a charged object, the electric field affects other charged objects, causing them to be attracted or repelled. The field strength decreases with distance. • We pay for our domestic electricity usage based on the amount of energy transferred. Electricity is generated by a combination of resources which each have advantages and disadvantages. Calculate the cost of home energy usage, using the formula: cost = power (kW) x time (hours) x price (per kWh). • We can describe how jobs get done using an energy model where energy is transferred from one store at the start to another at the end. When energy is transferred, the total is conserved, but some energy is dissipated, reducing the useful energy.

7	Waves ● sound ● light	● Sound consists of vibrations which travel as a longitudinal wave through substances. The denser the medium, the faster sound travels. The greater the amplitude of the waveform, the louder the sound. The greater the frequency (and therefore the shorter the wavelength), the higher the pitch. ● When a light ray meets a different medium, some of it is absorbed and some reflected. For a mirror, the angle of incidence equals the angle of reflection. The ray model can describe the formation of an image in a mirror and how objects appear different colours. When light enters a denser medium it bends towards the normal; when it enters a less dense medium it bends away from the normal. Refraction through lenses and prisms can be described using a ray diagram as a model.
7		Assessment Each paper will be assessed by multiple choice, structured, closed short answer and open response. 1st All year 7 modules including light and sound (taught in year 8) and matter light organisms forces. (Wk 9) 2nd All year 7 modules and matter light organisms forces and sound. Also reactions ecosystems and electromagnets (wk 23) 3rd All year 7 &8 modules (wk 36)
8	Organisms ● Breathing ● Digestion	● In gas exchange, oxygen and carbon dioxide move between alveoli and the blood. Oxygen is transported to cells for aerobic respiration and carbon dioxide, a waste product of respiration, is removed from the body. Breathing occurs through the action of muscles in the ribcage and diaphragm. The amount of oxygen required by body cells determines the rate of breathing ● The body needs a balanced diet with carbohydrates, lipids, proteins, vitamins, minerals, dietary fibre and water, for its cells' energy, growth and maintenance. Organs of the digestive system are adapted to break large food molecules into small ones which can travel in the blood to cells and are used for life processes.
8	Ecosystems ● Respiration ● Photosynthesis	● Respiration is a series of chemical reactions, in cells, that breaks down glucose to provide energy and form new molecules. Most living things use aerobic respiration but switch to anaerobic respiration, which provides less energy, when oxygen is unavailable ● Plants and algae do not eat, but use energy from light, together with carbon dioxide and water to make glucose (food) through photosynthesis. They either use the glucose as an energy source, to build new tissue, or store it for later use. Plants have specially-adapted organs that allow them to obtain resources needed for photosynthesis. ●

8	Genes ● Evolution ● Inheritance	● Natural selection is a theory that explains how species evolve and why extinction occurs. Biodiversity is vital to maintaining populations. Within a species variation helps against environment changes, avoiding extinction. Within an ecosystem, having many different species ensures resources are available for other populations, like humans. ● Inherited characteristics are the result of genetic information, in the form of sections of DNA called genes, being transferred from parents to offspring during reproduction. Chromosomes are long pieces of DNA which contain many genes. Gametes, carrying half the total number of chromosomes of each parent, combine during fertilisation
8	Matter ● Periodic table ● Elements	● The elements in a group all react in a similar way and sometimes show a pattern in reactivity. As you go down a group and across a period the elements show patterns in physical properties. Most substances are not pure elements, but compounds or mixtures containing atoms of different elements. They have different properties to the elements they contain.
8	Reactions ● Chemical energy ● Types of transfers	● During a chemical reaction bonds are broken (requiring energy) and new bonds formed (releasing energy). If the energy released is greater than the energy required, the reaction is exothermic. If the reverse, it is endothermic. ● Combustion is a reaction with oxygen in which energy is transferred to the surroundings as heat and light. Thermal decomposition is a reaction where a single reactant is broken down into simpler products by heating. Chemical changes can be described by a model where atoms and molecules in reactants rearrange to make the products and the total number of atoms is conserved. ● ●
8	Earth ● Climate ● Earth resources	● Carbon is recycled through natural processes in the atmosphere, ecosystems, oceans and the Earth's crust (such as photosynthesis and respiration) as well as human activities (burning fuels). Greenhouse gases reduce the amount of energy lost from the Earth through radiation and therefore the temperature has been rising as the concentration of those gases has risen. ● Scientists have evidence that global warming caused by human activity is causing changes in climate. There is only a certain quantity of any resource on Earth, so the faster it is extracted, the sooner it will run out. ● Reduces the need to extract resources. Most metals are found combined with other elements, as a compound, in ores. The more reactive a metal, the more difficult it is to separate it from its compound. Carbon displaces less reactive metals, while electrolysis is needed for more reactive metals.
8	Forces ● Contact forces ● Pressure	● When the resultant force on an object is zero, it is in equilibrium and does not move, or remains at constant speed in a straight line. One effect of a force is to change an object's form, causing it to be stretched or compressed. In some materials, the change is proportional to the force applied. ● Pressure acts in a fluid in all directions. It increases with depth due to the increased weight of fluid, and results in an upthrust. Objects sink or float depending on whether the weight of the object is bigger or

		smaller than the upthrust. Different stresses on a solid object can be used to explain observations where objects scratch, sink into or break surfaces.
8	Electromagnets ● Electromagnets ● Magnetism	● An electromagnet uses the principle that a current through a wire causes a magnetic field. Its strength depends on the current, the core and the number of coils in the solenoid. ● Magnetic materials, electromagnets and the Earth create magnetic fields which can be described by drawing field lines to show the strength and direction. The stronger the magnet, and the smaller the distance from it, the greater the force a magnetic object in the field experiences.
8	Energy ● Heating and cooling	● Work is done and energy transferred when a force moves an object. The bigger the force or distance, the greater the work. Machines make work easier by reducing the force needed. Levers and pulleys do this by increasing the distance moved, and wheels reduce friction.
8	Waves ● Wave effects ● Wave properties	● When a wave travels through a substance, particles move to and fro. Energy is transferred in the direction of movement of the wave. Waves of higher amplitude or higher frequency transfer more energy. ● A physical model of a transverse wave demonstrates it moves from place to place, while the material it travels through does not, and describes the properties of speed, wavelength and reflection.
		Assessment Each paper will be assessed by multiple choice, structured, closed short answer and open response. 1st All year 7 modules including light and sound (taught in year 8) and matter light organisms forces. (Wk 9) 2nd All year 7 modules and matter light organisms forces and sound. Also reactions ecosystems and electromagnets (wk 23) 3rd All year 7 &8 modules (wk 36)
9	Cells ● Cell structure ● Cell division ● Stem cells ● Transport in cells	● Cells are the basic unit of all forms of life. The structural differences between types of cells enables them to perform specific functions within the organism. These differences in cells are controlled by genes in the nucleus. ● For an organism to grow, cells must divide by mitosis producing two new identical cells. If cells are isolated at an early stage of growth before they have become too specialised, they can retain their ability to grow into a range of different types of cells. ● This phenomenon has led to the development of stem cell technology. This is a new branch of medicine that allows doctors to repair damaged organs by growing new tissue from stem cells.

9	Organisation ● The human digestive system ● The heart and CHD ● Non-communicable diseases ● Cancer ● Plant tissues	● To understand the human digestive system which provides the body with nutrients and the respiratory system that provides it with oxygen and removes carbon dioxide. In each case they provide dissolved materials that need to be moved quickly around the body in the blood by the circulatory system. Damage to any of these systems can be debilitating if not fatal. ● Although there has been huge progress in surgical techniques, especially with regard to coronary heart disease, many interventions would not be necessary if individuals reduced their risks through improved diet and lifestyle. ● The plant's transport system is dependent on environmental conditions to ensure that leaf cells are provided with the water and carbon dioxide that they need for photosynthesis.
9	Atomic Structure ● Atoms elements and compounds ● Development of the atom ● RAM ● Periodic table	● The periodic table provides chemists with a structured organisation of the known chemical elements from which they can make sense of their physical and chemical properties. ● The historical development of the periodic table and models of atomic structure provide good examples of how scientific ideas and explanations develop over time as new evidence emerges. ● The arrangement of elements in the modern periodic table can be explained in terms of atomic structure which provides evidence for the model of a nuclear atom with electrons in energy levels.
9	Quantitative chemistry ● Conservation of mass ● RFM ● Moles	● The historical development of the periodic table and models of atomic structure provide good examples of how scientific ideas and explanations develop over time as new evidence emerges. ● The arrangement of elements in the modern periodic table can be explained in terms of atomic structure which provides evidence for the model of a nuclear atom with electrons in energy levels. ● Chemists use quantitative analysis to determine the formulae of compounds and the equations for reactions. Given this information, analysts can then use quantitative methods to determine the purity of chemical samples and to monitor the yield from chemical reactions. ● Chemical reactions can be classified in various ways. Identifying different types of chemical reaction allows chemists to make sense of how different chemicals react together, to establish patterns and to make predictions about the behaviour of other chemicals. ● Chemical equations provide a means of representing chemical reactions and are a key way for chemists to communicate chemical ideas.
9	Electricity ● Current PD and resistance ● Domestic uses and safety	● Electric charge is a fundamental property of matter everywhere. Understanding the difference in the microstructure of conductors, semiconductors and insulators makes it possible to design components and build electric circuits. Many circuits are powered with mains electricity, but portable electrical devices must use batteries of some kind. ● Electrical power fills the modern world with artificial light and sound, information and entertainment, remote sensing and control.

		• The fundamentals of electromagnetism were worked out by scientists of the 19th century. However, power stations, like all machines, have a limited lifetime. If we all continue to demand more electricity this means building new power stations in every generation –but what mix of power stations can promise a sustainable future?
9	Particle model • Density of materials • Internal energy • Particle model	• The particle model is widely used to predict the behaviour of solids, liquids and gases and this has many applications in everyday life. It helps us to explain a wide range of observations and engineers use these principles when designing vessels to withstand high pressures and temperatures, such as submarines and spacecraft. It also explains why it is difficult to make a good cup of tea high up a mountain! • How energy stores can be transferred to chemical stores to raise their temperatures (specific heat capacity) or break their bonds (latent heat).
10	Infection and Response • Communicable diseases • Human defence system • Vaccination • Antibiotics • Drugs	• Pathogens are microorganisms such as viruses and bacteria that cause infectious diseases in animals and plants. They depend on their host to provide the conditions and nutrients that they need to grow and reproduce. They frequently produce toxins that damage tissues and make us feel ill. • Explore how we can avoid diseases by reducing contact with them, as well as how the body uses barriers against pathogens. • Once inside the body our immune system is triggered which is usually strong enough to destroy the pathogen and prevent disease. When at risk from unusual or dangerous diseases our body's natural system can be enhanced by the use of vaccination. • Since the 1940s a range of antibiotics have been developed which have proved successful against a number of lethal diseases caused by bacteria. Unfortunately many groups of bacteria have now become resistant to these antibiotics. The race is now on to develop a new set of antibiotics.
10	Bioenergetics • Photosynthesis • Respiration • Exercise • Metabolism	• Explore how plants harness the Sun’s energy in photosynthesis in order to make food. This process liberates oxygen which has built up over millions of years in the Earth’s atmosphere. • Both animals and plants use this oxygen to oxidise food in a process called aerobic respiration which transfers the energy that the organism needs to perform its functions. Conversely, anaerobic respiration does not require oxygen to transfer energy. • During vigorous exercise the human body is unable to supply the cells with sufficient oxygen and it switches to anaerobic respiration. This process will supply energy but also causes the build-up of lactic acid in muscles which causes fatigue.
10	Homeostasis • Control of human body • Nervous system • Endocrine system	• Cells in the body can only survive within narrow physical and chemical limits. They require a constant temperature and pH as well as a constant supply of dissolved food and water. In order to do this the body requires control systems that constantly monitor and adjust the composition of the blood and

	● Contraception ● Negative feedback	tissues. These control systems include receptors which sense changes and effectors that bring about changes. ● Explore the structure and function of the nervous system and how it can bring about fast responses. Explore the hormonal system which usually brings about much slower changes. ● Hormonal coordination is particularly important in reproduction since it controls the menstrual cycle ● An understanding of the role of hormones in reproduction has allowed scientists to develop not only contraceptive drugs but also drugs which can increase fertility.
10	Rates of reaction ● Calculating rates ● Reversible reactions	● Chemical reactions can occur at vastly different rates. Whilst the reactivity of chemicals is a significant factor in how fast chemical reactions proceed, there are many variables that can be manipulated in order to speed them up or slow them down. ● Chemical reactions may also be reversible and therefore the effect of different variables needs to be established in order to identify how to maximise the yield of desired product.
10	Chemistry of the Atmosphere ● Composition of Earth atmosphere ● Greenhouse gases ● Pollutants	● Understanding energy changes that accompany chemical reactions is important for this process. In industry, chemists and chemical engineers determine the effect of different variables on reaction rate and yield of product. ● Whilst there may be compromises to be made, they carry out optimisation processes to ensure that enough product is produced within a sufficient time, and in an energy-efficient way. ● The Earth's atmosphere is dynamic and forever changing. The causes of these changes are sometimes man-made and sometimes part of many natural cycles. ● Scientists use very complex software to predict weather and climate change as there are many variables that can influence this. ● The problems caused by increased levels of air pollutants require scientists and engineers to develop solutions that help to reduce the impact of human activity.
10	Using Resources ● Potable water ● LCA	● Industries use the Earth's natural resources to manufacture useful products. In order to operate sustainably, chemists seek to minimise the use of limited resources, use of energy, waste and environmental impact in the manufacture of these products. ● Chemists also aim to develop ways of disposing of products at the end of their useful life in ways that ensure that materials and stored energy are utilised. ● Pollution, disposal of waste products and changing land use has a significant effect on the environment, and environmental chemists study how human activity has affected the Earth's natural cycles, and how damaging effects can be minimised. ●
10	Energy ● Energy stores	● Energy cannot be created or destroyed it can only be transferred from one store to another.

	• Power • Conservation of energy	• Stored gravitational energy can be used in theme park rides to produce kinetic energy. Other energy stores are produced that are less useful so this energy is said to be dissipated. • Energy stores are used to do work. The efficiency of these transfers can be increased. • It is very important that national and global energy stores are maintained at a sustainable level. •
10	Forces • Forces and their interactions • Motion • Newtons Laws • Momentum	• The interactions of forces allows us to explain gravity and resultant forces. • Scientist analyse forces when designing a great variety of machines and instruments, from road bridges and fairground rides to atomic force microscopes. Anything mechanical can be analysed in this way. • Recent developments in artificial limbs use the analysis of forces to make movement possible. • Understanding motion and using graphs to interpret data. Using Newton's Laws of motion to explain how materials react.
10	Atomic Structure (physics) • Atoms and isotopes • Nuclear radiation	• Ionising radiation is hazardous but can be very useful. Although radioactivity was discovered over a century ago, it took many nuclear physicists several decades to understand the structure of atoms, nuclear forces and stability. • Early researchers suffered from their exposure to ionising radiation. Rules for radiological protection were first introduced in the 1930s and subsequently improved. Today radioactive materials are widely used in medicine, industry, agriculture and electrical power generation
10	Waves • Waves in air fluids and solids • Electromagnets	• Wave behaviour is common in both natural and man-made systems. Waves carry energy from one place to another and can also carry information. Designing comfortable and safe structures such as bridges, houses and music performance halls requires an understanding of mechanical waves • Modern technologies such as imaging and communication systems show how we can make the most of electromagnetic waves.
		Assessment Each paper will be assessed by multiple choice, structured, closed short answer and open response 1st cells, waves, organisation, bonding, atom structure, quantitative chemistry, energy electricity and infection (Wk 11) 2nd Paper 1 (wk 22)

		3rd Paper 2 (wk 29-30)
11	Inheritance and Evolution ● Sexual and asexual reproduction ● Meiosis ● DNA and genome ● Variation ● Evolution ● Selective breeding ● Genetic engineering ● Extinction ● Classification	● The number of chromosomes are halved during meiosis and then combined with new genes from the sexual partner to produce unique offspring. ● Gene mutations occur continuously and on rare occasions can affect the functioning of the animal or plant. These mutations may be damaging and lead to a number of genetic disorders or death. Very rarely a new mutation can be beneficial and consequently, lead to increased fitness in the individual. ● Variation generated by mutations and sexual reproduction is the basis for natural selection; this is how species evolve. ● An understanding of these processes has allowed scientists to intervene through selective breeding to produce livestock with favoured characteristics. Once new varieties of plants or animals have been produced it is possible to clone individuals to produce larger numbers of identical individuals all carrying the favourable characteristic. ● Scientists have now discovered how to take genes from one species and introduce them in to the genome of another by a process called genetic engineering. In spite of the huge potential benefits that this technology can offer, genetic modification still remains highly controversial.
11	Ecology ● Communities ● Adaptations ● Levels of organisation ● Cycles ● Biodiversity ● Waste control ● Land use ● Deforestation ● Global warming	● The Sun is a source of energy that passes through ecosystems. Materials including carbon and water are continually recycled by the living world, being released through respiration of animals, plants and decomposing microorganisms and taken up by plants in photosynthesis. ● All species live in ecosystems composed of complex communities of animals and plants dependent on each other and that are adapted to particular conditions, both abiotic and biotic. ● These ecosystems provide essential services that support human life and continued development. In order to continue to benefit from these services humans need to engage with the environment in a sustainable way. ● Explore how humans are threatening biodiversity as well as the natural systems that support it. Consider some actions we need to take to ensure our future health, prosperity and well-being.
11	Chemical change ● Reactivity of metals ● Reaction of acids ● Electrolysis	● Understanding of chemical changes began when people began experimenting with chemical reactions in a systematic way and organizing their results logically. Knowing about these different chemical changes meant that scientists could begin to predict exactly what new substances would be formed and use this knowledge to develop a wide range of different materials and processes. ● It also helped biochemists to understand the complex reactions that take place in living organisms. The extraction of important resources from the earth makes use of the way that some elements and compounds react with each other and how easily they can be ‘pulled apart’
11	Energy change ● Exothermic reactions	● Scientist can predict how acids react with metals bases and carbonates. Using this to produce useful salts often for fertilisers.

	● Reaction profiles ● Fuel cells	● Energy changes are an important part of chemical reactions. The interaction of particles often involves transfers of energy due to the breaking and formation of bonds. Reactions in which energy is released to the surroundings are exothermic reactions, while those that take in thermal energy are endothermic. These interactions between particles can produce heating or cooling effects that are used in a range of everyday applications. ● Some interactions between ions in an electrolyte result in the production of electricity. Cells and batteries use these chemical reactions to provide electricity. Electricity can also be used to decompose ionic substances and is a useful means of producing elements that are too expensive to extract any other way.
11	Organic Chemistry ● Carbon compounds ● Polymers	● The chemistry of carbon compounds is so important that it forms a separate branch of chemistry. A great variety of carbon compounds is possible because carbon atoms can form chains and rings linked by C-C bonds. ● Organic chemistry gets its name from the fact that the main sources of organic compounds are living, or once-living materials from plants and animals. These sources include fossil fuels which are a major source of feedstock for the petrochemical industry. ● Chemists are able to take organic molecules and modify them in many ways to make new and useful materials such as polymers, pharmaceuticals, perfumes and flavourings, dyes and detergents. ● Analysts have developed a range of qualitative tests to detect specific chemicals. The tests are based on reactions that produce a gas with distinctive properties, or a colour change or an insoluble solid that appears as a precipitate. ● Instrumental methods provide fast, sensitive and accurate means of analysing chemicals, and are particularly useful when the amount of chemical being analysed is small. Forensic scientists and drug control scientists rely on such instrumental methods in their work. ●
11	Magnetism ● Permanent magnets ● Motor effect	● Electromagnetic effects are used in a wide variety of devices. Engineers make use of the fact that a magnet moving in a coil can produce electric current and also that when current flows around a magnet it can produce movement. It means that systems that involve control or communications can take full advantage of this. ● In the past century, astronomers and astrophysicists have made remarkable progress in understanding the scale and structure of the universe, its evolution and ours. New questions have emerged recently. ‘Dark matter’, which bends light and holds galaxies together but does not emit electromagnetic radiation, is everywhere – what is it? And what is causing the universe to expand ever faster?

GCSE Key Information

Qualification: GCSE trilogy AQA double award or GCSE AQA separate sciences

Exam Board: AQA

https://www.aqa.org.uk/subjects/science/gcse/biology-8461
https://www.aqa.org.uk/subjects/science/gcse/chemistry-8462
https://www.aqa.org.uk/subjects/science/gcse/physics-8463
https://www.aqa.org.uk/subjects/science/gcse/combined-science-trilogy-8464

Exam structure and content

- Separate sciences have two written exam for 1 hour 45 minutes for each subject. (100 marks.
- The papers are at Foundation and Higher Tier
- Trilogy Science have six written exam for 1 hour 15 minutes (70 marks)
- The papers are at Foundation and Higher Tier
- Each paper will be assessed by multiple choice, structured, closed short answer and open response.

Chemistry

- Topics 1–5: Atomic structure and the periodic table; Bonding, structure, and the properties of matter; Quantitative chemistry, Chemical changes; and Energy changes.
- Topics 6–10: The rate and extent of chemical change; Organic chemistry; Chemical analysis, Chemistry of the atmosphere; and using resources.

Biology

- Topics 1–4: Cell biology; Organisation; Infection and response; and Bioenergetics.
- Topics 5–7: Homeostasis and response; Inheritance, variation and evolution; and Ecology.

Physics

- Topics 1-4: Energy; Electricity; Particle model of matter; and Atomic structure.
- Topics 5-8: Forces; Waves; Magnetism and electromagnetism; and Space physics.

Big ideas	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Year 11**
Forces	Speed and gravity	Contact forces pressure		Forces 1 Forces 2	Space
Electromagnets	Voltage and resistance Current	Electromagnets magnetism	Electricity part 1 Electricity part 2		Magnetism
Energy	Energy cost Energy transfers	Work Heating and cooling	Particle model	Energy. Atomic Structure	Energy change
Waves	Sound and light	Wave effect Wave properties		Waves	
Matter	Particle model separating	Periodic table elements	Atomic structure (chem) Quantitative chemistry Particle model	Atom structure (phy)	
Reactions	Metals and non-metals Acids and alkalis	Chemical energy Types of reactions	Bonding	Rates of reactions	Chemical change Energy change Organic chemistry Chemical analysis

Earth	Earth structure Universe	Climate Earth resources		Chemistry of the Atmosphere. Using Resources	Ecology
Organisms	Movement Cells	Breathing Digestion	B1 Cells B2 Organisation	Infection and response Homeostasis	
Ecosystems	Interdependence Plant reproduction	Respiration and photosynthesis		Bioenergetics	Ecology
genes	Variation Human Reproduction	Evolution Inheritance			Inheritance and evolution