Curriculum Overview				
Year Group	**Term**	**Unit of Work**	**Assessment Content**	**Vocabulary mapping**
7	**1/2**	**Particles** **Particles and cells are taught early in Year 7 because they build the scientific vocabulary and conceptual tools students need to succeed across all science disciplines.** **Students have the following prior knowledge from ks2, they can group materials according to whether they are solid, liquid or gas. Observe that some materials change state when heated or cooled Measure temperature at which changes of state occur. Identify the part played by evaporation and condensation in the water cycle.** **During this module students are taught about diffusion, and this is common theme in both particles and cells and underpins the behaviour of particles.** This unit of work begins with the particle model and the movement of particles in diffusion and changing state. Separation techniques are then taught, which forms the bases for the first Chemistry unit at GCSE. Within separation, students plan and carry out a practical based on rock salt purification. Distillation and saturation are also covered towards the end of the unit, followed by the effect of temperature on solubility. For many students in Year 7 this is their first genuine	In class assessment tasks made up of short and longer answer questions. The unit is assessed in the end of autumn term test, and end of year chemistry test in term 4.	1. Atom: *The smallest particle of matter, which all things are made of.* 2. Properties: A quality of a substance or material that describes its appearance or how it behaves. *3.* Physical: *To do with how things move or arrange themselves.* *4.* Pressure: *The amount of force applied on an area.* 5. Separation: *Dividing up a mixture into its various parts.* 6. Solute: *The solid or gas that is dissolved in a liquid* 7. Solution: *A mixture of a dissolved substance in a liquid.* 8. Specific: *Characteristic of a property of a particular substance.* 9. Temperature: How hot or cold an object is

		experience of working in a science laboratory! Science Club is open to all Year 7 students. Students will: • Know the arrangement of particles in a solid, liquid and gas, and link this to their properties. • Understand why some substances are classified as pure and others as impure and be able to describe techniques to separate mixtures. • Be able to explain changes of state in terms of the particle model.		
	1/2	**Cells** **Students have prior knowledge from ks2 about what makes something living and non-living. This is built on when they learn about the 7 life processes. They would have learnt about diffusion during the particle module; this is a foundational concept that helps students understand how particles move and interact.** This unit of work begins with how to use a microscope to estimate size, then looks at cell structure in unicellular organisms before moving on to plants and animals as multicellular organisms, linking structures to the 7 life functions. From there, organisation of multicellular organisms in terms of cells-tissues-organs-systems and why complex organisms need these systems to keep cells alive. Diffusion and transport are the connecting ideas. The digestive system and breathing system are used as two example systems, but the focus really is on the adaptations of these systems	In class assessment tasks made up of short and longer answer questions. The unit is assessed in the end of autumn term test and the end of year biology test in term 5.	1. Cell: *Smallest building block of a living organism* 2. Magnification: *Making small objects appear larger* 3. Multicellular: Made of many cells. 4. Nucleus: A cell component that contains the genetic information and controls the cell. 5. Organ: Group of different tissues working together to perform a function. 6. Organism: A living thing. 7. Unicellular: Made of one cell. 8. Specialised: Contains specific features that allow it to do a particular job

		in terms of diffusion – introducing ideas such as thin membranes, surface area and blood supply. Students will: • Know the parts of a plant cell and an animal cell, and their function. • Be able to make comparisons between plant and animal cells. • Understand the relationship between cells, tissues and organs and describe the function of the main organ systems. • Be able to use a microscope to produce an image of a cell in focus.		9. Prokaryote: Cells where genetic material is not contained in the nucleus but as a DNA loop. 10. Eukaryotic: Cells containing cytoplasm, cell membranes and genetic material is held in the nucleus.
	3/4	**Energy** **Energy is taught early in Year 7 because it's a key idea that helps explain how the world works, prepares students for later science, and builds core skills in observation, thinking, and explanation. From ks2 students are aware that energy is found in food sources, it is obtained from the sun and the basic concept of thermal energy (heating and cooling).** This unit of work begins with looking at the main energy stores and pathways, forming a foundation for KS4. This follows on to look at conservation of energy and the three methods of heat transfer, conduction, convection and radiation. From there, students will study the relationship between power and energy, introducing SI units, and how to calculate electricity costs. It finishes with a study of energy resources, starting with the formation and use of fossil fuels, moving to renewable	In class assessment tasks made up of short and longer answer questions. The unit is assessed in the end year physics test in term 6.	1. Energy: What is needed to make something happen. 2. Efficiency: the amount of input energy transfer which is usefully transferred. 3. Dissipated: A term used to describe ways in which energy is wasted. 4. Conservation: Nothing is created or destroyed. 5. Gravitational: Energy stored in an object that is high up. 6. Elastic: a material that can change shape when a force is applied and return to its original shape when the force is removed.

		sources, a lesson evaluating the relative merits of both. The unit provides many opportunities for developing working scientifically skills. Students will: • Know the law of conservation of energy and be able to apply it to situations involving energy transfers. • Understand the difference between power and energy. • Be able to describe examples of energy transfers. • Be able to describe how thermal energy transfers from one place to another. • Know the appropriate SI units of energy and power. • Be able to compare different fuels and energy resources.		
	3/4	**Chemical Reactions** **This module builds upon the particle model and on how particles change depending on how they are bonded. It also draws upon their Ks2 knowledge of physical and chemical changes.** This unit begins by reminding students of the work completed in KS2 on physical and chemical change and a circus of experiments for the students to see how to spot evidence for a chemical reaction. This work continues into using oxidation as a common example of a reaction and simple word equations are introduced. The link between oxidation and combustion is made. Particle diagrams support the idea of the conservation	In class assessment tasks made up of short and longer answer questions. The unit is assessed in the end of year chemistry test in term 4.	1. Element: A substance made of only one type of atom: all the types of atoms are listed on the periodic table. 2. Compound: Substance that is made up of two or more different elements chemically bonded together. 3. Chemical: To do with the bonds between atoms. *4.* Physical: *To do with how things move or arrange themselves.* 5. Conservation: Nothing is created or destroyed.

		of mass, and simple calculations show that mass in = mass out. The unit then moves onto acids and alkalis, using simple indicators and neutralization as a further common chemical reaction. Planning and observing skills are developed through a simple investigation about antacids. Students will: • Know how to use observations with indicators and the pH scale to identify substances as acids, alkalis or neutral. • Understand the dangers associated with using acids and alkalis and how to use them safely. • Be able to describe neutralisation in terms of the reaction between an acid and an alkali.		6. Neutralisation: A chemical reaction in which an acid and alkali react together to form a salt and water. 7. Reactant: A starting substance in a chemical reaction. 8. Product: A finishing substance in a chemical reaction. 9. Salt: A compound in which the hydrogen atoms of an acid are replaced with the atoms of a metal.
	5/6	**Reproduction** **Students are taught about the life process of reproduction in some plants and animals during Ks2. This module develops their knowledge on plant and animal reproduction and advances their understanding on how this links to genetics.** This unit begins with the structure of the male and female reproductive system and progresses to sexual reproduction, fertilization, embryo development and implantation, development of the foetus, birth and growth. The cycle is completed by coming back to puberty and menstruation. The unit then moves on to look at plant sexual reproduction and seed dispersal methods. Finally, what is meant by a species and examples of variation within a species are covered, with opportunities to collect and display data to develop understanding of types of data.	In class assessment tasks made up of short and longer answer questions. The unit is assessed in the end of year biology test in term 5.	1. Pollination: Transfer of pollen from the male part of a flower to the female Part. 2. Gamete A sex cell 3. Fertilisation: The fusion of male and female gamete nuclei 4. Cell Smallest building block of a living organism 5. Chromosomes A DNA molecule with part or all the genetic material of an organism.

		Students will: • Know the parts of the structure of the male and female reproductive system. • Understand the functions of the parts of the reproductive system. • Be able to describe the processes of menstruation and fertilisation and identify the stages of gestation and birth. • Know the function of each part of the flower, • Understand how pollination occurs. • Be able to evaluate different seed dispersal techniques in plants. • Know the difference between continuous and discontinuous variation.		
	5/6	**Forces** **Forces and reproduction are taught later in Year 7 because they rely on earlier learning (particles, cells, scientific skills), involve more complex or sensitive ideas, and are best understood once students have developed a stronger foundation in scientific thinking and maturity. This sequencing supports better understanding and engagement.** **Students are aware of the differences between contact and non-contact forces from KS2 and this module builds upon this.** This unit begins by naming forces, drawing forces diagrams and measuring forces. This leads into looking at effect of balanced and unbalanced forces on the motion of objects. Students investigate how to find the	In class assessment tasks made up of short and longer answer questions. The unit is assessed in the end of year physics test in term 6.	1. Deformation: The changing of an object's shape. 2. Elastic: A material that can change shape when a force is applied and return to its original shape when the force is removed. 3. Gravitational: Energy stored in an object that is high up 4. Weight: The force of gravity on an object 5. Work: The energy transferred when a force moves an object 6. Mass: The amount of stuff in an object (kg)

		gravitational field strength on Earth, allowing them to calculate the weight of an object on Earth. With the relevant data provided about gravitational field strength of other planets, they can calculate weight on other planets. The link is made between force and pressure, allowing students to perform pressure calculations and use the idea of pressure to explain everyday situations. The unit progresses onto to how forces affect the speed of an object, making speed calculations and interpreting distance-time graphs. Students will: • Know how to use diagrams with correctly labelled force arrows to display a range of forces in different situations. • Understand how to interpret force diagrams to determine weight of an object. • Be able to calculate pressure, weight and average speed using appropriate equations. • Be able to relate the description of a journey to a distance-time graph. During Term 6 we begin the Year 8 Ecology unit, making the most of the weather to begin fieldwork in our wildlife area.		
8	1	**Digestion and Nutrition** **Nutrition and digestion (biology) and light (physics) are taught at the start of Year 8 Science because they are engaging, build on Year 7 knowledge, and help students transition into more complex scientific ideas.** **The topic Digestion and nutrition naturally follows from cells and reproduction taught in Year 7. It helps students understand how body systems work together**	In class assessment tasks made up of short and longer answer questions. The unit is assessed again in the end of autumn term test and end of year biology test in term 6.	1) Carbohydrate: A substance found in living things that is made from carbon, hydrogen and oxygen and can be used for respiration. 2) Energy: What is needed to make something happen 3) Glucose: A type of sugar which is used for respiration

		(e.g. digestive system breaking down nutrients that cells need to function). This unit builds on the work done in year 7 on organ systems and diffusion. It begins by establishing the components of food and the use of each within the body. Student will look at what is meant by a balanced diet and the consequences when nutritional and calorie intake is inadequate or excessive. Students will carry out practical to test foods for the main components and then move on to look at the organs of the digestive system and the role each plays in digestion. The role of enzymes is introduced as part of this, as well as the role of gut bacteria. Students will: • Know the components of a balanced diet and why each component is needed by the body. • Understand the consequences of a diet that is not balanced. • Be able to evaluate how different lifestyles have different energy needs. • Be able to describe how and explain why foods are broken down in the digestive system, in terms of enzymes.		4) Respiration: A process in organisms in which energy is released from substances. 5) Reactant: reactant A starting substance in a chemical reaction. 6) Osmosis: The movement of water molecules across a partially permeable membrane from a region of higher water concentration to a region of lower water concentration.
	2	**Light** **Students gain a concrete, observational understanding of light in Ks2, they understand how it helps us see, and how shadows form. When they reach Year 8, they build on this by learning more abstract, model-based ideas like ray diagrams, reflection/refraction laws, and**	In class assessment tasks made up of short and longer answer questions. The unit is assessed again in the mid-year test and end of year physics test in term 4.	1) Energy: What is needed to make something happen. 2) Reflection: The bouncing back of light from a shiny surface.

		eventually concepts like lenses and the electromagnetic spectrum. The unit builds on work done at KS2, students should know that light travels in straight lines, is reflected and enters the eye to see. The unit begins by looking at light as a wave, that transfers energy and what happens when it meets different surfaces. Electrical and chemical effects are studied by way of a solar cell investigation. The unit then moves to reflection and refraction in more detail. This offers the opportunity to look at reproducibility in data and accuracy of measurements. It then moves on to vision and problems with vision, the colours of the spectrum and how colour is seen and then how different coloured light can be produced and affects the colour of objects. The final section deals with the Earth in space, the cause of seasons and the Earth's place in the universe. Connections between this and light can be explored – light years, speed of light, daylength, seasonal temperature changes. Students will: • Know how light interacts with different materials. • Be able to describe the effects of absorption of light in terms of energy. • Be able to use ray diagrams to show how images are formed. • Understand why we have seasons on Earth. • Be able to calculate weight of objects on different planets.		3) Refraction: The bending of light as it moves from one material to another. 4) Wavelength: The length between two peaks in a wave. 5) Transerve: A wave that oscillates at right angles to the axis along which the wave travels. 6) Efficiency: The amount of input energy transfer which is usefully Transferred 7) Gravitational: Energy stored in an object that is high up.

		• Be able to describe the properties that affect the sizes of gravitational forces between different objects in the Solar system. • Be able to compare the relative sizes of different astronomical structures within the universe using astronomical distances.		
	3	**Periodic Table** **This module builds on prior knowledge from year 7 as students learn about the particle model of matter, and differences between elements, compounds and mixture. This module provides a basic understanding of the atomic structure which is the gateway to more advance chemistry.** This unit of work begins with what an element is and how elements can combine or mix to form compounds and mixtures. Some work is then done linking elements to the periodic table and their significance. Following this, compounds are studied in more detail including naming them and how to write a formula. This links to the next area of conservation of mass showing the same numbers of atoms on each side of a balanced symbol equation and use the reaction of magnesium and oxygen to help develop an understanding of this. The periodic table is then looked at in more detail starting first with the Dalton atomic model and moving on to the nuclear model and electron configuration. Group 1 and 7 and their main properties are then looked at in further detail including their reactivity and general uses. Students will: • Know the patterns of reactivity of group 1 and group 7 elements.	In class assessment tasks made up of short and longer answer questions. The unit is assessed again in the autumn term and end of year chemistry test in term 5.	1. Element: A substance made of only one type of atom: all the types of atoms are listed on the periodic table. 2. Compound: Substance that is made up of two or more different elements chemically bonded together. 3. Conservation: Nothing is created or destroyed. 4. Reactant: A starting substance in a chemical reaction. 5. Product: A finishing substance in a chemical reaction. 6. Properties: A quality of a substance or material that describes its appearance or how it behaves. 7. Reactivity: The easiness of a substance to form a new chemical substance. 8. Atom: The smallest particle of matter, which all things are made of. 9. Protons: A subatomic particle with a relative charge of +1 and a relative mass of 1 that is

		• Understand the differences between elements, compounds and mixtures. • Be able to represent chemical reactions as word equations and apply this to the law of conservation of mass.		found in the nucleus of an atom.
	3/4	**Electricity and Magnetism** **Electricity and magnetism are taught in Year 8 because they build on earlier knowledge, in Ks2 students are introduced to simple circuits, this built upon on year 7 when they explore basic energy types and transfers and in year 8 this modules challenges students to think critically and scientifically, while preparing them for more advanced topics in later years** This unit begins with electricity – what it is and how current behaves in series and parallel circuits. Ohm's Law is introduced in a simple way. The unit then switches to magnetism and then the link between the two before investigating how to make electromagnets and some uses of them. Students will: • Know what current is and how to describe its behaviour in series and parallel circuits • Understand how insulators are charged by friction, and describe the forces between charged objects • Be able to correctly use apparatus to measure current and potential difference • Be able to identify conductors and insulators and calculate resistance values using appropriate units	In class assessment tasks made up of short and longer answer questions. The unit is assessed in the end of year physics test in term 4.	1) Energy: What is needed to make something happen. 2) Components: A part of a circuit e.g., bulb. 3) Resistance: How much a component slows down the electric current. 4) Current: The rate of flow of charge through a circuit 5) Efficiency: The amount of input energy transfer which is usefully transferred

		• Be able to draw and interpret simple magnetic field diagrams • Be able to describe how electromagnets and direct current motors work **Earth's**		
	4/5	**Earth's Materials** **The Earth module is taught in Year 8 to bridge earlier knowledge with more advanced scientific and environmental concepts. During Ks2 students are taught about the structure of the Earth, simple weather and seasons.** **This module also has strong cross-curricular links with geography, especially in areas like the rock cycle, climate, and resource management. This helps students develop a well-rounded understanding of both the physical processes shaping the Earth and the human impact on our planet.** The unit begins by looking at the structure of the Earth and some basic plate tectonics to highlight the changing nature of the surface and how this can lead to earthquakes and volcanoes. The formation of the three different types of rock and their physical properties is then covered, as well as fossil formation. The unit then moves on to the atmosphere, how it has changed over the Earth's history and more recently, and the human impact on that. Finally, the properties of some of the materials made from earth's resources and recycling. • Students will: • Know the structure and composition of the Earth and link this to the rock cycle.	In class assessment tasks made up of short and longer answer questions. The unit is assessed in the end of year chemistry test in term 5.	1. Renewable: An energy resource that can be replenished. 2. Pressure: The amount of force applied on an area. 3. Compression: Making a substance take up less space by pushing the particles closer together. 4. Polymer: A large molecule made of small, similar molecules joined Together. 5. Properties: A quality of a substance or material that describes its appearance or how it behaves.

		• Understand that climate change is linked to human activity. • Be able to explain how carbon is recycled in the Earth's atmosphere. •		
	6	**Ecological Relationships** **The unit begins by recapping basic KS2 knowledge of food chains, and basic habitats and building on this to look at food webs, what organisms are dependent on each other for and bioaccumulation.** Students will then look at factors that affect populations of organisms, impacts of changing populations and carry out some field work to estimate daisy population on the playing fields. They then move on to classify living organisms, focusing on the features of the main chordate group. This leads into how well adapted organisms are to their environment and how these adaptations may improve over time by mutations and natural selection. The unit finishes by focusing on biodiversity and the importance of taking steps to maintain, and where possible improve, biodiversity. Students will: • Know how to use a food web to describe feeding relationships. • Understand how a changing environment may affect the organisms in a food web • Be able to explain how variation allow organisms to compete, and the way this drives natural selection	In class assessment tasks made up of short and longer answer questions. The unit is assessed in the end of year biology test in term 6.	1. Herbivore: An animal that feeds on plants 2. Photosynthesis: The process of producing glucose from carbon dioxide and water, using light. 3. Cell: Smallest building block of a living organism. 4. Biomass Total dry mass of one animal or plant species in a food chain or food web. 5. Nucleus: A cell component that contains the genetic information and controls the cell.

		• Be able to describe how a species may become extinct • Be able to describe the importance of maintaining biodiversity and how gene banks can be used for preservation		
9	**1**	**Photosynthesis** **Photosynthesis is taught early in Year 9 because it is a key biological process that connects earlier knowledge of cells and ecosystems, taught in year 7 and 8 to more advanced ideas like energy flow, respiration, and environmental science.** **It's conceptually rich, experimentally engaging, and essential for success in later biology topics — especially at GCSE level. It has cross curricula links to geography through the carbon cycle and climate change**. This unit provides the foundation for work in KS4 on limiting factors in photosynthesis, energy transfer through an ecosystem and the mineral requirements of plants. The unit starts with exploring the structure and function of roots, with emphasis on its adaptations. The unit then progresses on to the process of photosynthesis and its importance. This will include understanding that the carbon dioxide for photosynthesis comes from the air, that chlorophyll enables a plant to utilise light in photosynthesis, the role of the leaf in photosynthesis, the importance and roles of the xylem and phloem and the importance of photosynthesis to humans and other animals. Students will:	In class assessment tasks made up of short and longer answer questions. This unit is assessed in the end of autumn term test and the end of year biology test.	1. Photosynthesis: The process of producing glucose from carbon dioxide and water, using light. 2. Energy: What is needed to make something happen. 3. Respiration: A process in organisms in which energy is released from substances. 4. Chloroplast: A tiny sac inside a plant cell that contains chlorophyll for Photosynthesis. 5. Pollination: Transfer of pollen from the male part of a flower to the female part.

		• Know the structure and function of the parts of a green plant • Understand how leaves are adapted to carry out photosynthesis • Be able to describe how roots take up minerals, nutrients and water from the soil • Be able to describe photosynthesis in a word equation representing products and reactants • Be able to describe how leaves are adapted to carry out photosynthesis • Be able to describe the role of plants in maintaining the levels of gases in the atmosphere • Be able to describe the importance of pollination on food security		
	1/2	**Matter** **Matter is taught early in Year 9 because it provides a crucial bridge between the basic chemistry introduced in Years 7–8 (atoms, elements, compounds and mixtures) and the more advanced chemical concepts such as ions and bonding. It reinforces core ideas while introducing more detailed models of matter, atomic structure, and the periodic table.** **The matter topic also builds on the particles and forces and motion topics we met in Year 7.** In this topic students will reinforce their understanding of the particle model, kinetic theory and resultant	In class assessment tasks made up of short and longer answer questions. This unit is assessed in the end of autumn term test and of year physics test.	1. Atom: *The smallest particle of matter, which all things are made of.* 2. Pressure: *The amount of force applied on an area.* 3. Density: How much mass an object has compared to how much space it takes up. 4. Specific: Characteristic of a property of a particular substance. 5. Temperature: How hot or cold an object is.

		forces. They will learn to apply these to situations revolving around pressure and diffusion. Students will: • Know how particles are arranged in the three states of matter • Understand how the motion of particles in different states of matter are linked to the different behaviours • Be able to describe the factors that affect pressure in fluids • Be able to compare and explain differences in density between solids, liquids and gases		
	2	**Forces in Action** **Forces in Action is taught in Year 9 to build on students' prior understanding of forces from Key Stage 2 (where they learn about pushes, pulls, and gravity) and Year 7 (where they study basic contact and non-contact forces). By Year 8, students explore more complex ideas like pressure and motion, which prepares them for the Year 9 extension into moments, levers, and turning forces.** This unit builds on forces from year 7 to look at how forces can cause turning effects, how this can be amplified, how forces can cause deformation and what elastic deformation is, how forces are linked to energy (work done) and how machines can reduce the force needed to do a particular job. Lots of opportunity to make links with real life objects (bikes, cars, screwdrivers) engineering, tools etc. There is a lot of maths, although the relationships are simple, so	In class assessment tasks made up of short and longer answer questions. This unit is assessed in the end of autumn term test and of year physics test.	1. Deformation: The changing of an object's shape 2. Elastic: A material that can change shape when a force is applied and return to its original shape when the force is removed. 3. Gravitational: Energy stored in an object that is high up 4. Weight: The force of gravity on an object 5. Work: The energy transferred when a force moves an object 6. Mass: The amount of stuff in an object (kg) 7. Conservation: Nothing is created or destroyed.

		challenge can be built by rearrangement and unit changes. Students will: • Know that a moment is the turning effect of a force and relate this to force multipliers. • Be able to calculate a moment • Understand that energy cannot be created or destroyed • Be able to describe energy transfers and conservation of energy for the deformation of objects • Be able to measure extension or compression and relate this to the force applied to a spring and to Hooke's law • Be able to describe balanced forces in relation to mechanical systems		
	2/3	**Reactivity** **Reactivity is taught in Year 9 to build on students' understanding of chemical reactions developed through Key Stage 2, where they observe simple changes like burning or rusting, and in Year 7, where they explore acids, alkalis, and basic chemical reactions. In Year 8, students learn about elements and the Periodic Table, which sets the stage for comparing how different metals react with acids, water, and oxygen. The Year 9 focus on reactivity introduces key concepts like reactivity series, displacement reactions, and practical investigations, helping students explain why some substances react more vigorously than others. This prepares them for more advanced topics in GCSE chemistry, such as extraction of metals and rates of reaction.**	In class assessment tasks made up of short and longer answer questions. The unit is assessed in the end of year chemistry test.	1. Element: A substance made of only one type of atom: all the types of atoms are listed on the periodic table. 2. Compound: Substance that is made up of two or more different elements chemically bonded together. 3. Reactant: A starting substance in a chemical reaction. 4. Product: A finishing substance in a chemical reaction. 5. Properties: A quality of a substance or material that describes its appearance or how it behaves.

		This unit is the groundwork for much of the Chemistry at GCSE – particularly the work on metal extraction, but also the ideas around useful materials from the Earth, particularly metals. The unit begins by recapping the work covered in year 8 on basic atomic structure and electron configuration and then adds on neutron numbers, atomic mass and formula mass. Writing chemical formulae and balancing equations are brought together too, and this is a good place to start students writing symbol equations if they haven't already done so. The second part of the unit introduces the reactivity series and how it can be used to predict and explain reaction outcomes. Students will: • Know how to use the reactivity series of metals • Be able to use patterns of reactivity to make predictions for chemical reactions • Be able to 2 link the properties and uses of a metal to its position in the reactivity series		6. Reactivity: The easiness of a substance to form a new chemical substance. 7. Displacement: A reaction in which a more reactive element takes the place of a less reactive element from its compounds. 8. Neutralisation: A chemical reaction in which an acid and alkali react together to form a salt and water.
	4	**Rates of Reaction** **Rates of reaction is taught in Year 9 to build on students' prior knowledge of chemical changes and particle theory. In Year 7, students are introduced to chemical reactions, learning to identify evidence of change such as fizzing, colour change, or temperature shifts. In Year 8, they develop a deeper understanding of the particle model and how energy and collisions play a role in reactions. By Year 9, students are ready to apply this understanding to investigate how factors like temperature, concentration, surface area, and catalysts affect the speed of a reaction.**	In class assessment tasks made up of short and longer answer questions. The unit is assessed in the end of year chemistry test.	1. Endothermic: A reaction in which energy is transferred to the reacting substances from their surroundings. 2. Exothermic: A reaction in which energy is transferred from reacting substances to their surroundings. 3. Decomposition: Breaking down a substance into smaller parts. 4. Energy: What is needed to make something happen.

		This topic will introduce the idea of rates and factors that affect rates for the first time. How rates are measured is covered first, focusing on the element of time that is essential. The ideas of surface area and catalysts are introduced. The unit then covers types of reaction – endothermic, exothermic, combustion as a type of oxidation reaction and thermal decomposition. • Students will: • Know the factors that affect the rate of a reaction • Be able to describe combustion, thermal decomposition and oxidation, representing them as symbol equations • Be able to describe how a catalyst affects the rate of a reaction • Be able to describe the differences between an exothermic and endothermic reaction, and link these to energy changes		5. Oxidation: A reaction where oxygen is added to a substance.
	4	**Biological Systems** **Biological systems are taught in Year 9 to help students understand how different parts of the body work together to support movement and energy release. In year 7 and 8 students have learned about the skeletal system and antagonistic muscle pairs, which form the foundation for understanding how the body moves. They have studied respiration as the process that releases energy from food, which muscles need to function. By Year 9, students are ready to connect these ideas, exploring how the muscular and respiratory systems interact to support physical activity.**	In class assessment tasks made up of short and longer answer questions. The unit is assessed in the end of year biology test.	1) Respiration: A process in organisms in which energy is released from substances. 2) Aerobically: Requires the presence of oxygen. 3) Anaerobic: When respiration occurs without oxygen. 4) Cilia: Small hairs on the surface of some cells 5) Organ: Group of different tissues working together to perform a function.

		This unit of work begins with a recap of organizational hierarchy, with students recalling the function of different organ systems. Students will then focus on the skeletal and muscular systems, considering how these two interact to produce movement and locomotion. Students will be introduced to the concept of antagonistic muscle pairings and will investigate the forces exerted by different muscles involved in movement. Students will then examine the respiratory system, looking at the mechanism of breathing, lung volumes and the role of diffusion in gas exchange. The impacts of drugs and exercise on the respiratory and other systems will be explored. Finally, students will consider the basis of life by investigating the structure and function of DNA. The work of key scientists and a model for inheritance will be introduced. Through this unit students will be introduced to key biological concepts such as DNA as a blueprint for life and its link to cells, tissues, organs, organ systems and organisms. Students will: • Know the similarities and differences between aerobic and anaerobic respiration • Be able to explain the functions of the skeleton, and describe the function of antagonistic muscle pairings • Be able to explain how the use of recreational drugs and smoking can affect biological systems, such as during gas exchange and gestation • Be able to explain the respiratory system as a mechanism of breathing and gas exchange (to allow substances to diffuse)		6) Tissue: A group of specialised cells working together to perform a function. 7) Organism: A living thing. 8) Respiration: A process in organisms in which energy is released from substances.

		• Be able to describe how genetic material can be inherited, and the role of Watson, Crick, Wilkins and Franklin in the discovery of DNA structure		
	4	**Sound** **This unit builds on the work in year 8 on light waves and makes several links to it. In year 7 and 8 students are introduced to basic waves and energy concepts, and Year 9 builds on this by exploring how sound is produced, travels through different media, and is detected by our ears. This topic develops students' understanding of wave properties like frequency, amplitude, and pitch, linking to real-world applications such as hearing, music, and technology.** The unit begins by reviewing the work from year 8 and establishing the different types of wave. Waves in matter are introduced and water and sound waves are used as examples of this. The idea of absorption of energy leading to an increase in the thermal store of a substance is revisited here too. The unit then looks at the speed of sound in different media and is a chance to revisit accurate language around particle theory. Then, uses of ultrasound and how microphones and loudspeakers work. • Students will: • Know that sound is a wave • Understand that sound cannot travel through a vacuum • Be able to compare light, mechanical and sound waves	In class assessment tasks made up of short and longer answer questions. The unit is assessed in the end of year physics test.	1. Wavelength: The length between two peaks in a wav 2. Reflection: The bouncing back of light from a shiny surface. 3. Vacuum: A space containing no particles at all. 4. Ultrasound: Sound waves that have frequencies higher than the range of human hearing. 5. Energy: What is needed to make something happen. 6. Absorption: The process of taking in energy or a substance.

		• Be able to describe the process of reflection, absorption and superposition (add or cancel waves) • Be able to compare human and animal auditory ranges using appropriate units • Be able to describe uses of sound and ultrasound, including industrial and medical use		
	5	**Introduction to Biology at GCSE Cell Biology** **Cell biology is the first GCSE concept taught at the end of Year 9 because it provides the essential foundation for understanding all living organisms. After building basic knowledge of cells and life processes in earlier years, Year 9 students are ready to explore cells in more depth—covering topics like cell structure, functions, and cell division. Teaching cell biology early in Year 9 helps students grasp key concepts such as how cells form tissues and organs, which are critical for later topics in biology like genetics, health, and disease. Starting with cell biology also introduces students to the scientific skills of microscopy and investigation.** Cells are the basic unit of all forms of life. In this section we explore how 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. Students will: • Know the key differences between prokaryotic and eukaryotic cells	Peer and self-assessment of GCSE style questions in class. End of topic assessment in class.	1. Cell: *Smallest building block of a living organism* 2. Magnification: *Making small objects appear larger* 3. Multicellular: Made of many cells. 4. Nucleus: A cell component that contains the genetic information and controls the cell. 5. Organ: Group of different tissues working together to perform a function. 6. Organism: A living thing. 7. Unicellular: Made of one cell. 8. Specialised: Contains specific features that allow it to do a particular job 9. Prokaryote: Cells where genetic material is not contained in the nucleus but as a DNA loop.

		• Understand the function of key organelles within the cells • Be able to use a microscope to make observations, and be able to calculate order of magnitude		10. Eukaryotic: Cells containing cytoplasm, cell membranes and genetic material is held in the nucleus.
	6	**Introduction to Chemistry at GCSE Separating Mixtures** **Year 9 students are introduced to GCSE Chemistry concepts like Separating Mixtures to build on their earlier science learning and prepare them for more complex topics. By Year 9, students have a solid understanding of materials and their properties from previous years. Learning about methods to separate mixtures—such as filtration, evaporation, and chromatography—helps them understand how substances can be purified and analysed, which is essential for studying chemical reactions and compounds later. Introducing this topic early also develops their practical skills and scientific thinking.** A mixture consists of two or more elements or compounds not chemically combined. The chemical properties of each substance in the mixture are unchanged. Mixtures can be separated by physical processes such as filtration, crystallisation, simple distillation, fractional distillation and chromatography. These physical processes do not involve chemical reactions, and no new substances are made. Students will: • Know the difference between pure and impure. • Understand the physical process used to separate mixtures	Peer and self-assessment of GCSE style questions in class. End of topic assessment in class.	1. Element: A substance made of only one type of atom: all the types of atoms are listed on the periodic table. 2. Compound: Substance that is made up of two or more different elements chemically bonded together. 3. Chemical: To do with the bonds between atoms *4.* Physical: *To do with how things move or arrange themselves.* 5. Conservation: Nothing is created or destroyed. 6. Neutralisation: A chemical reaction in which an acid and alkali react together to form a salt and water. 7. Reactant: A starting substance in a chemical reaction. 8. Product: A finishing substance in a chemical reaction. 9. Salt: A compound in which the hydrogen atoms of an acid are replaced with the atoms of a metal.

		• Be able to suggest a method to separate a given mixture. **Introduction to Physics at GCSE The Particle Model of Matter** 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 variety of observations and engineers use these principles when designing vessels to withstand high temperature and pressure, such as submarines and spacecraft. It also explains why it is difficult to make a good cup of tea high up in a mountain! Students will: • Know that the particle model is used to explain and make predictions about the behaviour of solids, liquids and gases. • Be able to draw simple diagrams to model the difference between solids, liquids and gases. • Understand that the differences in density between different states of matter is due to the arrangement of atoms or molecules. **Cell Biology B1** **The first GCSE topic is delivered at the end of term 6 for year 9. Cells are the basic unit of life, so understanding them is essential before moving on to more complex biological systems. All other topics (like tissues, organs, inheritance, ecosystems, and disease) build on cell structure and function. This unit builds on**	Peer and self-assessment of GCSE style questions in class. End of topic assessment in class. This unit will be assessed in the end of year Biology paper.	1. Active transport: The movement of substances from a dilute solution to a more concentrated solution, against the concentration gradient so requires energy. 2. Binary fission: reproduction by simple cell division 3. Cell cycle: The three-stage process of cell division in a body cell that involves mitosis and results in the formation of two identical daughter cells 4. Differentiate: The process where cells become specialised for a particular function. 5. Mitosis: part of the cell cycle where one set of new chromosomes is pulled to each end of the cell to form two identical nuclei during cell division. 6. Osmosis: The diffusion of water through a partially permeable membrane from a dilute solution to a concentrated solution.

		the basic cell biology learnt in KS3 so they can build on ideas already familiar with them in more depth. 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. Students will: • Understand how cells and organs are adapted for their functions • Know the key stages in the cell cycle Be able to describe how substances are transported into and out of cells by diffusion, osmosis and active transport		
10	**1**	**Organisation B2** **Organisation is the logical next step after learning about cells. This topic builds on cell biology, it looks at how cells form tissues, tissues form organs, and organs form systems — building on that foundational knowledge. Organisation shows how groups of cells work together to perform vital functions such as digestion and circulation. This helps students see biology in context and understand how the body and plants work as a whole.** In this unit we will learn about the human digestive system which provides the body with nutrients and the	Peer and self-assessment of GCSE style questions in class. End of topic assessment in class. This unit will be assessed in the end of year biology paper.	1. Amino acids: The building blocks of proteins. 2. Amylase: Enzyme that speeds up the digestion of starch into sugars. 3. Aorta: Artery that leaves the heart from the left ventricle to carry oxygenated blood to the body. 4. Alveoli: Tiny air sacs in the lungs that increase the surface area for gaseous exchange.

		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 regarding coronary heart disease, many interventions would not be necessary if individuals reduced their risks through improved diet and lifestyle. We will also learn how 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. Students will: • Understand the role of enzymes in digestion, the heart in circulation and the importance of healthy lifestyle choices • Know the products of digestion and their importance, the functions of the different components of the blood and how substances move into and out of cells • Be able to evaluate the advantages and disadvantages of medical treatments **Atomic Structure and the Periodic Table C1** **Atomic Structure is taught first in the Chemistry course because it provides the essential foundation for understanding everything else in chemistry. Everything**	Peer and self-assessment of GCSE style questions in class. End of topic assessment in class. This unit will be assessed in the end of year Chemistry paper.	5. Atria: The upper chambers of the heart. 6. Bile: Neutralises stomach acid and emulsifies fats. 7. Denatured: The breakdown of the molecular structure of a protein so it no longer functions 8. Enzymes: Biological catalysts 9. Ventricles: lower chambers of the heart. 10. Stent: A metal mesh placed in a blocked artery to pen it up. 1. Atom: The smallest particle of an element that retains the properties of that element. 2. Element: A substance made of only one type of atom. 3. Compound: A substance made when two or more elements are chemically bonded together. 4. Nucleus: The central part of an atom, containing protons and neutrons; it holds most of the atom's mass. 5. Proton: A positively charged subatomic particle found in the

		in chemistry involves atoms, elements, and compounds. **To understand chemical reactions, bonding, the periodic table, or rates of reaction, students must first know, what atoms are, what they're made of (protons, neutrons, electrons) and how they behave.** **You can't explain why substances react or how new substances form without first understanding atoms.** 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. Students will: • Know the nuclear model of the atom • Understand how the position of an element on the Periodic Table relates to its structure • Be able to describe the atom of an elements using the Periodic Table **Atomic Structure P4** **Teaching Atomic Structure in Physics at the same time as teaching The Atom in Chemistry makes a lot of**	Peer and self-assessment of GCSE style questions in class. End of topic assessment in class. This unit will be assessed in the end of year Physics paper.	nucleus. Charge: +1, Mass: 1 6. Neutron: A neutral subatomic particle found in the nucleus. Charge: 0, Mass: 1 7. A negatively charged subatomic particle that orbits the nucleus in shells. Charge: -1, Mass: very small (≈0) 8. Atomic Number: The number of protons in an atom. 9. Mass Number: The total number of protons and neutrons in an atom. 10. Isotope: Atoms of the same element (same number of protons) with different numbers of neutrons.

		sense as it helps students make connections across the subjects. Both Chemistry and Physics cover: The structure of the atom (protons, neutrons, electrons), the nucleus and electron shells, subatomic particles (and their charge and mass), atomic models (Bohr, Dalton, Rutherford) **Teaching both together helps students reinforce key ideas and reduces confusion when the same terms come up in different lessons.** 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 generators. • Students will: • Know that atoms are made of protons, neutrons and electrons and their relative charge and mass, and that elements have different isotopes • Know the types of nuclear radiation, their uses and dangers • Understand that the atomic model has changed overtime		

		• Be able to use the properties of radiation to justify the use of radioisotopes in different scenarios • Be able to write equations to represent nuclear decay		
	2	**Energy P1** **We continue with energy as the second unit in physics in year 10 because it is a core concept that underpins almost every topic in physics (and science more broadly). Students can gain the conceptual foundations of energy which can later be applied to electricity, forces, waves etc..)** **Students are introduced to essential mathematic skills such as, the use of formulae, rearranging formulae, handling units and drawing and interpreting graphs. Energy is easily linked to everyday contexts and global issues; this units helps to engage students early in the course and show the relevance of physics to their lives.** The concept of energy emerged in the 19th century. The idea was used to explain the work output of steam engines and then generalised to understand other heat engines. It also became a key tool for understanding chemical reactions and biological systems. Limits to the use of fossil fuels and global warming are critical problems for this century. Physicists and engineers are working hard to identify ways to reduce our energy usage. Students will:	Peer and self-assessment of GCSE style questions in class. End of topic assessment in class. This unit will be assessed in the end of year Physics paper.	1. Energy store: A way in which energy is held or kept in a system. 2. Kinetic energy: The energy an object has due to its motion. 3. Gravitational potential energy: Energy stored in an object due to its height above the ground. 4. Elastic potential energy: The energy stored in a stretched or compressed object. 5. Thermal Energy: The energy an object has due to the motion of its particles; related to temperature. 6. Work Done: Energy transferred when a force moves an object. 7. Power: The rate of energy transfer or work done. 8. Efficiency: A measure of how much useful energy is transferred. 9. Dissipation: The spreading out and loss of energy, often as

		• Understand how energy is transferred along energy pathways • Know that energy cannot be created or destroyed • Be able to carry out energy calculations **Bonding, Structure, and Properties of Matter C2** **We teach Bonding, Structure, and the Properties of Matter after Atomic Structure in Chemistry because it builds directly on the knowledge students gain about atoms. Students need to know; what atoms are, how electrons are arranged in shells, what ions are and how they form.** **These are core to understanding bonding — especially ionic and covalent bonds, which rely on the movement or sharing of electrons.** Chemists use theories of structure and bonding to explain the physical and chemical properties of materials. Analysis of structures shows that atoms can be arranged in a variety of ways, some of which are	Peer and self-assessment of GCSE style questions in class. End of topic assessment in class. This unit will be assessed in the end of year Chemistry paper.	waste heat to the surroundings. 10. Specific Heat Capacity: The amount of energy required to raise the temperature of 1 kg of a substance by 1°C. 1. Ionic bonding: A type of chemical bond formed when electrons are transferred from a metal to a non-metal, creating oppositely charged ions that attract. 2. Covalent bonding: A chemical bond formed when two non-metal atoms share pairs of electrons to achieve a full outer shell. 3. Metallic bonding: Bonding between metal atoms where positive metal ions are surrounded by a sea of delocalised electrons that hold the structure together. 4. Giant ionic lattice: A regular 3D arrangement of alternating positive and negative ions held together by strong electrostatic forces in all directions. 5. Simple molecular substance: A substance made of small molecules held together by strong covalent

		molecular while others are giant structures. Theories of bonding explain how atoms are held together in these structures. Scientists use this knowledge of structure and bonding to engineer new materials with desirable properties. The properties of these materials may offer new applications in a range of different technologies. • Infection and Response. • Students will: • Know that there are three types of strong chemical bond: ionic, covalent and metallic. • Understand how the properties of a substance can be explained by the type of chemical bonds within it • Be able to explain chemical bonding in terms of electrostatic forces and the transfer or sharing of electrons		bonds, but with weak intermolecular forces between the molecules. 6. Giant covalent structure: A structure in which atoms are bonded by strong covalent bonds in a continuous network (e.g. diamond, graphite, silicon dioxide). 7. Delocalised electrons: Electrons that are not bound to a single atom and are free to move, especially in metallic structures — allowing electricity to flow. 8. Intermolecular forces: Weak forces of attraction between molecules. They are much weaker than covalent, ionic, or metallic bonds.
	3 into 4	**Infection and Response B3** **We teach Infection and Response after Cell Biology and Organisation Biology because it builds logically on the knowledge students have already gained. Understanding how cells work helps students grasp how infections affect the body and how the body responds at a cellular level.** **Knowledge gained in infection and response also sets up topics taught in year 11, such as, homeostasis and response (how the body stays balanced), inheritance,**	Peer and self-assessment of GCSE style questions in class. End of topic assessment in class. This unit will be assessed in the end of year Biology paper.	1. Pathogen – A microorganism that causes disease (e.g. bacteria, viruses, fungi, protists). 2. Bacteria – Single-celled organisms that can reproduce rapidly and produce toxins. 3. Virus – Non-living infectious agents that replicate inside host cells, causing cell damage.

		variation and evolution (natural selection and resistance), ecology (disease impact in ecosystem. 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. This section will 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 using vaccination. Since the 1940s a range of antibiotics have been developed which have proved successful against several 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. Students will: • Be able to be able to explain how diseases caused by viruses, bacteria, protists and fungi are spread in animals and plants • Be able to explain the role of the immune system in the defence against disease GCSE Biology students will also learn about monoclonal antibodies and plant defences.	Peer and self-assessment of GCSE style questions in class. End of topic assessment in class.	4. Immune system – The body's defence system against pathogens, involving white blood cells. 5. Phagocytosis – The process by which white blood cells engulf and destroy pathogens. 6. Antibodies – Proteins produced by white blood cells to target specific antigens on pathogens. 7. Vaccination – Introducing small amounts of dead or inactive pathogens to stimulate immunity. 8. Antibiotics – Medicines that kill bacteria but not viruses (e.g. penicillin). 9. Drug testing – The process of testing new medicines for safety, effectiveness, and dosage. 10. Herd immunity – When a high percentage of a population is immune, reducing disease spread. 1. Relative Atomic Mass (Ar) - The average mass of an atom of an element, compared to 1/12th the mass of a carbon-12 atom.

		Quantitative Chemistry C3 **We teach quantitative chemistry after bonding because understanding bonding provides the foundation needed to grasp the calculations and concepts in quantitative chemistry.** **Before doing any calculations (e.g. molar masses, reacting masses), students need to understand how elements combine to form compounds.** **Ionic and covalent bonding help explain why compounds have certain formulas, which are essential in calculations.** 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. Students will: • Know the law of conservation of mass • Understand how the law of conservation of mass applies to balancing chemical equations	This unit will be assessed in the end of year Biology paper.	2. Relative Formula Mass (Mr) - The sum of the relative atomic masses (Ar) of all the atoms in a compound. 3. Mole - A unit that represents 6.02×10^{23} particles (atoms, molecules, ions) of a substance. 4. Avogadro's Constant - The number of particles in one mole of a substance: 6.02×10^{23}. 5. Conservation of Mass - In a chemical reaction, mass is not lost or gained – the total mass of reactants equals the total mass of products. 6. Limiting Reactant - The reactant that is completely used up first, limiting how much product is formed. 7. Concentration - The amount of solute (in grams or moles) in a given volume of solution (e.g. g/dm^3 or mol/dm^3). 8. Empirical Formula - The simplest whole number ratio of atoms in a compound. 9. Percentage Yield - A comparison of the actual yield to the theoretical yield, expressed as a percentage.

		• Be able to interpret chemical formulae and use them to calculate, in a range of scenarios • At higher tier, be able to use the concept of the mole **Electricity P2** **The Electricity topic is taught after Energy because the energy topic provides essential foundational knowledge that helps students understand how electrical systems work in terms of energy transfers. These ideas are essential for understanding electrical components, which involve energy being transferred from one form to another (e.g. from chemical energy in a battery to electrical energy in a circuit).** 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	Peer and self-assessment of GCSE style questions in class. End of topic assessment in class. This unit will be assessed in the end of year Physics paper.	10. Atom Economy - A measure of how efficient a reaction is. 1. Current (I) - The flow of electrical charge (electrons) around a circuit. Measured in amperes (A). 2. Potential Difference (V) - The energy transferred per unit of charge (also called voltage). Measured in volts (V). 3. Resistance (R) - How much a component resists the flow of current. Measured in ohms (Ω). 4. Charge (Q) - A property of particles like electrons. The total charge flowing depends on current and time. Measured in coulombs (C). 5. Ohm's Law - States that current is directly proportional to potential difference if temperature is constant (for ohmic conductors). 6. Series Circuit - A circuit where components are connected in one loop, so current is the same everywhere. 7. Parallel Circuit - A circuit where components are connected across the same

		this means building new power stations in every generation – but what mix of power stations can promise a sustainable future? Students will: • Know that electric current is a flow of electrons • Understand that the size of the current depends upon the potential difference and the resistance and know the current and potential difference characteristics of different components. • Be able to apply the equations from the unit and solve problems relating to series and parallel circuits • Know the characteristics of mains electricity and the electrical safety features in the home		two points, so potential difference is the same across each branch. 8. Power (P) - The rate of energy transfer. 9. Energy Transferred (E) - The total energy supplied to a component or circuit. 10. National Grid - A network of cables and transformers that distributes electricity across the country. Uses step-up and step-down transformers for efficiency.
	5	**Chemical Change C4** **Chemical Changes is taught after Quantitative Chemistry because the quantitative topic gives students the skills needed to understand and analyze chemical reactions more deeply. Before students study chemical reactions in detail (like reactions of acids or electrolysis), they need to understand how to: calculate masses, balance equations and use moles and concentrations. This is essential to make sense of how much reactant is used and how much product is made in chemical changes.**	Peer and self-assessment of GCSE style questions in class. End of topic assessment in class. This unit will be assessed in the end of year Chemistry paper.	1. Exothermic Reaction - A reaction that releases energy to the surroundings, usually as heat – temperature increases. 2. Endothermic Reaction - A reaction that absorbs energy from the surroundings – temperature decreases. 3. Reaction Profile - A graph that shows the energy of reactants and products during a chemical reaction, including activation energy and overall energy change.

		Understanding of chemical changes began when people began experimenting with chemical reactions in a systematic way and organising 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'. Students will: • Know that during a chemical reaction, new products are made • Understand that there are different types of chemical reaction • Be able to describe a range of different types of chemical reaction and make predictions using the reactivity series of metals **Particle Model of Matter P3** **We teach particle models of matter at the end of year 10 because it builds on earlier energy and matter topics.** **The Particle Model deepens this understanding by connecting energy and matter on the particle level (e.g. kinetic theory, changes of state).**	Peer and self-assessment of GCSE style questions in class. End of topic assessment in class. This unit will be assessed in the end of year Physics paper.	4. Activation Energy - The minimum energy required for a reaction to start (i.e. to break bonds in reactants). 5. Bond Energy (Bond Enthalpy) - The amount of energy required to break one mole of a bond in a molecule. 6. Neutralisation - An exothermic reaction between an acid and a base that forms salt and water. 7. Thermal Decomposition - An endothermic reaction where a compound breaks down when heated. 1. Density - The mass per unit volume of a substance. 2. Specific Heat Capacity - The energy needed to raise the temperature of 1 kg of a substance by 1°C. 3. Specific Latent Heat - The energy required to change the state of 1 kg of a substance without changing its temperature. 4. Internal Energy - The total energy stored inside a system by the particles, due to their kinetic energy (movement) and potential energy

		The Particle Model includes conceptually demanding ideas that often involve multi-step calculations, so it's better taught after students have had time to build confidence with maths and physics skills earlier in the year. We continue with the topic students first met at the end of Year 9. Here we find out why it is difficult to make that good cup of tea up a mountain! Students will: • Understand the idea of internal energy • Know that changes in internal energy can lead to a change in temperature or a change of state • Be able to apply the concept of internal energy to changes of state and gas pressure to solve problems **Bioenergetics B4** **Bioenergetics is taught at the end of year 10 because it builds on prior knowledge such as cells and organisation which are essential foundations for understanding processes like photosynthesis and aerobic/anaerobic respiration.** **Bioenergetics links directly to homeostasis, ecology, and inheritance, which are taught in Year 11.** We will 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	Peer and self-assessment of GCSE style questions in class. End of topic assessment in class. This unit will be assessed in the end of year Biology paper.	(positions relative to each other). 5. Change of State - A physical process where a substance changes between solid, liquid, or gas, involving energy changes but no change in mass or temperature during the actual change. 6. Pressure - The force exerted per unit area, caused by particles colliding with the walls of a container. 1. Photosynthesis - The process by which green plants use sunlight to make glucose from carbon dioxide and water. 2. Chlorophyll - The green pigment in chloroplasts that absorbs light energy needed for photosynthesis. 3. Glucose - A type of sugar made during photosynthesis and used in respiration to release energy. 4. Limiting Factor - A condition (e.g. light, carbon dioxide, temperature) that restricts the rate of photosynthesis when in short supply. 5. Respiration - The process of releasing energy from

		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. Students will: • Know the factors that affect the rate of photosynthesis and how plants use the glucose that is made, and that living things can respire aerobically and anaerobically • Understand that light intensity, temperature and carbon dioxide levels are limiting factors of photosynthesis, and how the human body responds to exercise • Be able to describe the processes of photosynthesis, and be able to compare aerobic and anaerobic respiration		glucose, which happens in all living cells. 6. Anaerobic Respiration 7. Respiration without oxygen. In humans, it produces lactic acid and less energy. 8. Oxygen Debt - The amount of extra oxygen needed after exercise to break down lactic acid and remove it from cells. 9. Metabolism - All the chemical reactions in the body, including breaking down molecules (like in respiration) and building new ones (like proteins or enzymes).
	6	**Energy Changes C5** **Energy change is taught at the end of year 10 because it builds on topics already studied such as chemical reactions, bonding and structure and chemical calculations. These are essential for understanding why energy is released or absorbed in reactions and how to calculate energy changes from bond enthalpies.**	End of Year PPE Exams. Three GCSE passed papers, Biology Paper 1 (B1 to B4), Chemistry Paper 1 (C1 to C5) and Physics Paper 1 (P1 to P4).	1. Rate of Reaction - The speed at which reactants are converted into products in a chemical reaction. 2. Collision Theory - A theory that explains how reactions occur: particles must collide with enough energy

		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. Students will: • Know the law of conservation of energy • Understand that chemical reactions can be either exothermic or endothermic • Be able to interpret and draw simple energy profile diagrams, and at higher tier, calculate the energy changes using bond energies **Rate and Extent of Chemical Change C6** **In the last chemistry topic students learn about endothermic/exothermic reactions and energy profiles. This topic acts as a bridge between foundational knowledge and more complex applications. The rate of reaction topic picks up from there, asking how fast energy is transferred and how**	Peer and self-assessment of GCSE style questions in class. End of topic assessment in class.	(activation energy) and the correct orientation to react. 3. Activation Energy - The minimum amount of energy needed for particles to react when they collide. 4. Catalyst - A substance that speeds up a reaction without being used up, by lowering the activation energy. 5. Reversible Reaction - A reaction where the products can react to reform the reactants. Represented with a ⇌ symbol. 6. Dynamic Equilibrium - When the rate of the forward reaction equals the rate of the backward reaction, and the concentrations of reactants and products stay constant (in a closed system).

		conditions affect this. This is also a commonly examined topic so teaching it here gives ample time for students to revise the concepts learnt. 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. 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. Students will: • Know the factors that affect the rate of reaction • Understand how collision theory can be used to explain why different factors affect the rate of reaction • Be able to calculate the rate of reaction **Homeostasis and Response B5** **Homeostasis requires the prior knowledge of cells, systems and bioenergetics to understand how the body controls temperature, glucose, and water**	Peer and self-assessment of GCSE style questions in class. End of topic assessment in class.	1. Homeostasis - The regulation of internal conditions in the body (like temperature, water, and blood sugar) to maintain a stable internal environment, despite external changes. 2. Receptor - A cell or organ that detects stimuli (changes in the environment), such as temperature, light, or glucose levels. 3. Coordination Centre - Organs like the brain, spinal cord, or pancreas that receive information from receptors and process it.

		balance and the roles of the nervous and endocrine systems. 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 tissues. These control systems include receptors which sense changes and effectors that bring about changes. We will explore the structure and function of the nervous system and how it can bring about fast responses. We will also 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. Students will: • Know that the human body must have control systems to function properly and that this is called homeostasis • Know that the homeostasis may involve nervous or hormonal responses • Understand the importance of maintaining conditions inside the body • Be able to describe how hormones control fertility and blood-glucose levels, and describe how information is from receptors is passed along cells in the nervous system		4. Effector - Muscles or glands that respond to a stimulus and bring about a change, such as moving a hand or releasing a hormone. 5. Negative Feedback - A process that reverses a change in the body to return to normal levels. Example: lowering body temperature after a fever. 6. Nervous System - The system that uses electrical impulses to quickly send messages between the brain, spinal cord, and body. 7. Reflex Arc - A fast, automatic response to a stimulus that bypasses the brain (e.g., pulling your hand away from something hot). 8. Endocrine System - A system of glands that release hormones into the bloodstream to control body functions more slowly and for longer periods. 9. Insulin - A hormone produced by the pancreas that lowers blood glucose levels by helping cells absorb glucose. 10. Glucagon - A hormone that raises blood glucose levels by

		GCSE Biology extends this unit to include the brain and eye, controlling body temperature, and the kidney and water balance.		triggering the liver to release stored glucose.
11	1	**Rate and Extent of Chemical Change** We pick up where we left this topic at the end of Year 10. **Homeostasis** We pick up where we left this topic at the end of Year 10.	Peer and self-assessment of GCSE style questions in class. End of topic assessment in class.	
	2	**Organic Chemistry** **In year 10 students have learnt about compounds, bonding, chemical reactions and structure, formulae and properties. A solid understanding of these topics is needed before moving onto organic chemistry.** **It also links to the later topics of polymers and plastics, biological molecules (in Biology) as well as having real-world applications like fuels, pharmaceuticals, and materials science. Placing it in Year 11 helps students make cross-topic and cross-subject links, especially useful for those considering A-level sciences.** 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. This branch of 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	Peer and self-assessment of GCSE style questions in class. End of topic assessment in class.	1. Hydrocarbon - A compound made only of hydrogen and carbon atoms. 2. Alkane - A saturated hydrocarbon with only single bonds between carbon atoms. 3. Alkene - An unsaturated hydrocarbon that contains at least one carbon-carbon double bond (C=C). 4. Crude Oil - A finite (non-renewable) mixture of hydrocarbons found underground, formed from ancient biomass under heat and pressure. 5. Fractional Distillation - The process of separating crude oil into different fractions based on boiling points. 6. Cracking - The process of breaking down large

		them in many ways to make new and useful materials such as polymers, pharmaceuticals, perfumes and flavourings, dyes and detergents. Students will: • Know that crude oil is made from the remains of ancient biomass and that it can be separated into smaller, more useful, fractions, and cracked into shorter chain molecules • Understand that the properties of alkanes are linked to the size of the molecules, and that the need for cracking relates to supply and demand of more useful hydrocarbons • Be able to explain how fractional distillation works in terms of evaporation and condensation GCSE Chemistry extends this topic to include the reactions of alkenes, alcohols and carboxylic acids, and the production of polymers. **Forces** **The forces topic is one of the most substantial and mathematically demanding topics in GCSE Physics, which is why it's typically taught in year 11. The knowledge gained from the energy unit in year 10 supports the understanding of forces and their effects.** Engineers 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	Peer and self-assessment of GCSE style questions in class. End of topic assessment in class.	hydrocarbon molecules into smaller, more useful ones like alkenes and alkanes. 7. Combustion - A reaction where a substance reacts with oxygen, releasing energy, usually in the form of heat and light. 8. Saturated - Molecules that contain only single bonds between carbon atoms (e.g., alkanes). 9. Unsaturated - Molecules that contain at least one double bond between carbon atoms (e.g., alkenes). 10. Polymerisation - A reaction where many small molecules (monomers) join together to form a large molecule (polymer). 1. Force - A push or pull acting on an object due to interaction with another object. 2. Resultant Force - The single force that has the same effect as all the forces acting on an object combined. 3. Scalar – a quantity that has only magnitude (size).

		Students will: • Know the properties of scaler and vector quantities • Understand a range of forces and their interactions and relate this to motion • Be able to apply the equations related to forces. **GCSE Physics only:** • Know how to calculate the size of forces, or its distance from a pivot. • Understand how safety features such as air bags change momentum • Be able to apply calculations relating to force, mass, velocity and acceleration to explain how the changes involved are inter-related. **Variation and Inheritance** **This is one of the most complex, abstract, and knowledge-rich topics in the curriculum. Before tackling variation and inheritance, students need to understand cells and DNA structure, mitosis and meiosis, reproduction (sexual and asexual) and protein synthesis (in higher tier). These foundational ideas are taught earlier in Year 10 and early Year 11, so inheritance is placed strategically afterward to ensure students are ready.** **Inheritance and variation questions are often high-mark, extended response, or maths-linked (e.g. 5- or 6-mark Punnett square questions), so teaching this later ensures it is fresh in students' minds before final exams, and there is time to revisit and reinforce it during revision.**	Peer and self-assessment of GCSE style questions in class. End of topic assessment in class.	4. Vector – a quantity that has magnitude and direction. 5. Weight - The force of gravity acting on an object. 6. Mass - The amount of matter in an object. 7. Hooke's Law - The extension of a spring is directly proportional to the force applied, up to the elastic limit. 8. Momentum - A measure of motion, calculated by mass × velocity. 9. Terminal Velocity - The constant speed reached by a falling object when air resistance equals the weight, and there is no resultant force. 1. DNA - A double helix molecule that carries the genetic instructions used in the development and functioning of all living organisms. 2. Gene - A small section of DNA that codes for a specific protein. 3. Allele - Different forms of the same gene, e.g. dominant or recessive versions. 4. Genotype - The genetic makeup of an organism — the

		In this topic we will discover how 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 into 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. Students will: • Know the structure of DNA and define a genome. • Understand that the process of meiosis leads to non-identical cells whereas mitosis produces identical cells. • Be able to discuss the importance of understanding the human genome. **Biology only:**		combination of alleles it has (e.g. Bb, bb). 5. Phenotype - The physical appearance or characteristic that results from the genotype (e.g. brown eyes, attached earlobes). 6. Dominant - An allele that always shows in the phenotype, even if only one copy is present (represented by a capital letter, e.g. B). 7. Recessive - An allele that only shows in the phenotype if two copies are present (represented by a lowercase letter, e.g. b). 8. Homozygous - When both alleles for a gene are the same (e.g. BB or bb). 9. Heterozygous - When the alleles for a gene are different (e.g. Bb). 10. Mutation - A change in the DNA sequence of a gene. It can be harmless, harmful, or beneficial, and may lead to variation.

		• Know the structure of DNA in terms of bases that code for particular amino acids which make particular proteins. Understand how protein synthesis in the ribosomes		
	3	**Ecology B7** **This topic is conceptually more accessible and less mathematically demanding than prior year 11 topics which makes it a good topic to end with as revision begins.** **Ecology brings together earlier topics such as photosynthesis, natural selection and adaptation for survival. The field investigation practical is easier to carry out in spring when natural resources are available.** **Ecology includes modern environmental issues (e.g. biodiversity, pollution, climate change). Teaching it at the end lets teachers tie in up-to-date discussions, making it engaging and meaningful as students finish the course.** 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	Peer and self-assessment of GCSE style questions in class. End of topic assessment in class.	1. Ecosystem - A community of living organisms (biotic factors) and their non-living environment (abiotic factors) interacting together. 2. Habitat - The natural environment where an organism lives, which provides food, shelter, and the right conditions to survive. 3. Producer - An organism, usually a green plant or algae, that makes its own food through photosynthesis. 4. Consumer - An organism that eats other organisms to gain energy. 5. Decomposer - Microorganisms like bacteria and fungi that break down dead plants and animals, 6. returning nutrients to the environment.

		particular conditions, both abiotic and biotic. These ecosystems provide essential services that support human life and continued development. To continue to benefit from these services humans need to engage with the environment in a sustainable way. In this section we will explore how humans are threatening biodiversity as well as the natural systems that support it. We will also consider some actions we need to take to ensure our future health, prosperity and well-being. Students will: • Know that an ecosystem is the interaction of a community of living organisms (biotic) with the non-living (abiotic) parts of their environment • Understand that photosynthetic organisms are the producers of biomass for life on Earth Be able to extract and interpret information relating to different factors that affect populations within an ecosystem **Ecology (GCSE Biology only)** Students following the separate science (triple) pathway also learn about the decay cycle and explore trophic (feeding) levels in more depth and explore human impacts on the environments. **Waves** **Waves are taught here in the course as it's one of the more mathematically and conceptually challenging topics that require maturity. It builds on prior learning and students need a solid foundation in energy**	Peer and self-assessment of GCSE style questions in class. End of topic assessment in class.	7. Food Chain - A simple diagram showing how energy flows from one organism to another through feeding relationships. 8. Biodiversity - The variety of different species of organisms in an ecosystem. 9. Competition - The struggle between organisms for limited resources such as food, light, water, or territory. 10. Pollution - The introduction of harmful materials into the environment (e.g. air, water, or land), which can reduce biodiversity. 11. Carbon Cycle - The process by which carbon moves through the atmosphere, living organisms, fossil fuels, and oceans, involving processes like photosynthesis, respiration, and combustion. 1. Wave - A repeating disturbance that transfers energy from one place to another without transferring matter. 2. Amplitude - The maximum displacement of a wave from its rest position.

		transfer, particles and vibrations and basic formula manipulation. 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. Students will: • Know the properties of transverse and longitudinal waves. • Understand how waves travel and the properties of electromagnetic waves. • Be able to discuss the uses of each type of electromagnetic radiation and relate this to their properties. **Physics only:** • Know how convex and concave lenses refract light • Understand how the colour of an object is related to the absorption, transmission and reflection of different wavelengths of light • Be able to explain how objects appear different colours when using coloured filters. **Chemical Analysis** **Chemical analysis is taught at this point in the course because it involves more advanced ideas, skills, and**	Peer and self-assessment of GCSE style questions in class. End of topic assessment in class.	3. Wavelength (λ) - The distance between two identical points on a wave (e.g. crest to crest or trough to trough). 4. Frequency (f) - The number of waves that pass a point in one second. 5. Wave Speed (v) - The speed at which a wave travels through a medium. 6. Transverse Wave - A wave where the vibrations are perpendicular to the direction the wave travels. 7. Longitudinal Wave - A wave where the vibrations are parallel to the direction the wave travels. 8. Reflection - When a wave bounces off a surface and changes direction. 9. Refraction - The bending of waves as they enter a new medium and change speed. 10. Electromagnetic Spectrum - A range of transverse waves that all travel at the speed of light in a vacuum, including radio, microwaves, infrared, visible light, ultraviolet, X-rays, and gamma rays.

		application of earlier content such as, bonding and structure, acids, bases, and reactions and separating techniques. **This makes chemical analysis best suited to later in the course, after students are confident with core chemistry.** 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. Students will: • Know the difference between a pure substance and a formulation • Understand how to test for hydrogen, oxygen, carbon dioxide and chlorine. • Be able to explain how paper chromatography separates mixtures and interpret chromatograms and identify the R_f from chromatograms. **Chemistry only:** • Know how to identify metal ions from flame tests • Be able to identify products either through testing or observation		1. Pure Substance - A substance made up of only one type of element or compound, with a fixed boiling/melting point. 2. Formulation - A mixture designed for a specific purpose, made by carefully mixing components in set proportions (e.g. paint, medicine). 3. Chromatography - A technique used to separate mixtures of substances based on how they move through a material (usually paper). 4. Rf Value - A number used to identify substances in chromatography. 5. Flame Test - A method for identifying metal ions by the colour of flame they produce when heated. 6. Precipitate - A solid formed when two solutions react and form an insoluble product, often used in ion tests. 7. Carbonate Test - A test where acids are added to a carbonate, producing carbon dioxide gas, which turns limewater cloudy.

		Chemistry of the Atmosphere **This topic is taught now because it requires prior knowledge such as combustion reactions, gases and pollutants and Earth science basics which links with Geography. These are covered earlier in the course, making it easier to grasp how the atmosphere formed and changed over billions of years.** **It is a conceptually lighter topic than previously taught units in chemistry, so it is placed later in the course, when students are preparing for exams and benefit from a less mathematically demanding topic.** 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. Students will: • Know how gases in the early atmosphere formed and how that has changed over time • Understand the human impact of the atmosphere and how this leads to climate change. • Be able to explain the environmental impacts of climate change and ways to reduce this.	Peer and self-assessment of GCSE style questions in class. End of topic assessment in class.	8. Halide Test - A test using silver nitrate after acidifying with nitric acid. 9. Sulfate Test - A test for sulfate ions using barium chloride, which forms a white precipitate of barium sulfate. 1. Greenhouse Gases - Gases like carbon dioxide (CO_2), methane (CH_4), and water vapour that trap heat in the Earth's atmosphere. 2. Global Warming - The gradual increase in Earth's average temperature due to the enhanced greenhouse effect. 3. Carbon Footprint - The total amount of carbon dioxide and other greenhouse gases emitted by a person, product, or activity over its lifetime. 4. Climate Change - Long-term changes in temperature, precipitation, and weather patterns due to increasing levels of greenhouse gases. 5. Atmosphere - The layer of gases surrounding Earth, composed mostly of nitrogen

				(78%), oxygen (21%), and small amounts of other gases. 6. Combustion - A chemical reaction where a substance reacts with oxygen, releasing energy, carbon dioxide, and sometimes pollutants. 7. Pollutant - A harmful substance released into the environment, such as sulfur dioxide or nitrogen oxides, which can cause acid rain. 8. Evolution of the Atmosphere - The changes in Earth's atmosphere over billions of years,
	4	**Magnetism and Electromagnetism** **This is the final topic for physics in the combined pathway because it is conceptually advanced. Magnetism involves invisible forces, fields, and abstract concepts. These ideas require a strong foundation in earlier physics topics like electricity and forces, which are covered earlier in the course.**	GCSE paper 2 PPE exams.	1. Magnetic Field - The region around a magnet where magnetic materials (like iron) and moving charges experience a force. 2. Permanent Magnet - A magnet that produces its own magnetic field and retains its magnetism.

		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. Students will: • Know the difference between permanent and induced magnets. • Understand how the magnetic effect of a current and how this can be useful. • Be able to plot the magnetic field of a magnet, a straight wire and explain how a solenoid can increase the magnetic effect of the current. **Using Resources** **This topic serves as a great way to wrap up the course by connecting chemistry to real-world applications, sustainability, and environmental issues, whilst building upon the foundations of previously learnt chemistry knowledge.** 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.		3. Induced Magnet - A material that becomes magnetic when placed in a magnetic field but loses magnetism when the field is removed. 4. Electromagnet - A magnet created by electric current flowing through a wire, often coiled into a solenoid. 5. Solenoid - A coil of wire that produces a strong, uniform magnetic field when current flows through it. 6. Motor Effect - When a current-carrying wire placed in a magnetic field experiences a force. 7. Magnetic Force - The force experienced by a moving charge or current in a magnetic field. 8. Right-Hand Rule - A method to predict the direction of magnetic field, current, or force in the motor effect. 9. Fleming's Left-Hand Rule - Used to predict the direction of force on a wire in a magnetic field (used in motors).

		Students will: • Know the difference between finite and renewable resources and the impact of these resources on the environment • Understand how water is treated to make it potable • Be able to carry out simple life cycle assessments and evaluate ways of reducing the use of limited resources. **Chemistry only:** • Know that most metals in everyday use are alloys • Understand the Haber process and how ammonia is used in the production of NPK fertilisers. • Be able to explain how the commercially used conditions for the Haber process are related to availability and cost. **Space (GCSE Physics only)** **To study space students, need understanding of forces and gravity, energy and electromagnetic radiation, knowledge gained from previous topics. Teaching space last lets students apply all this knowledge cohesively.** Questions about where we are, and where we came from, have been asked for thousands of years. 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		10. Magnetic Flux Density (B) - A measure of the strength of a magnetic field, in tesla (T). 1. Finite Resources - Natural resources that cannot be replaced once used, such as fossil fuels and minerals. 2. Sustainable Development - Using resources in a way that meets current needs without harming the ability of future generations to meet theirs. 3. Potable Water - Water that is safe to drink and free from harmful bacteria and pollutants. 4. Desalination - The process of removing salt from seawater to make it potable. 5. Life Cycle Assessment (LCA) - A method to evaluate the environmental impact of a product through its entire life — from raw material extraction to disposal. 6. Recycling - The process of reprocessing used materials to make new products, reducing waste and conserving resources.

		not emit electromagnetic radiation, is everywhere – what is it? And what is causing the universe to expand ever faster? Students will: • Know how our solar system was created • Understand the stages that a star goes through in its lifetime • Be able to explain how red-shift provides evidence for the Big Bang model		7. Bioleaching - Using bacteria to extract metals from low-grade ores. 8. Phyto-mining - Using plants to absorb metal compounds from soil, which are then harvested to extract metals. 1. Orbit - The path an object takes as it moves around another object due to gravity. 2. Gravity - The force of attraction between two masses, keeping planets and moons in orbit. 3. Satellite - An object that orbits a planet or star. 4. Red Shift - The increase in wavelength of light from distant galaxies, showing they are moving away from us. 5. Cosmic Microwave Background Radiation - The low-energy radiation left over from the Big Bang, evidence for the origin of the universe. 6. Big Bang Theory - The scientific explanation that the universe began from a small, hot, dense state and has been expanding since.

				7. Star - A massive ball of hot gases undergoing nuclear fusion, producing light and heat. 8. Planet - A celestial body that orbits a star, is spherical, and has cleared its orbit of other debris. 9. Light Year - The distance light travels in one year (about 9.46 trillion km), used to measure vast space distances. 10. Black Hole - A region of space where gravity is so strong that nothing, not even light, can escape.
	5	Preparation for the GCSE exams. The first three of six papers usually take place in term 5.	GCSE Double Award Science: Trilogy 3 papers each 1 hour and 15 minutes. Or/ GCSE Biology 2 papers, each 1 hour 45 minutes. GCSE Chemistry 2 papers, each 1 hour 45 minutes. GCSE Physics 2 papers, each 1 hour 45 minutes.	
	6	Preparation for the GCSE exams. The second three of six papers usually take place in term 6.	GCSE Double Award Science: Trilogy 3 papers each 1 hour and 15 minutes.	

			Or/ GCSE Biology 2 papers, each 1 hour 45 minutes. GCSE Chemistry 2 papers, each 1 hour 45 minutes. GCSE Physics 2 papers, each 1 hour 45 minutes.	