SCIENCE			YEAR 7		
	Topic	**Knowledge** **What will students know by the end of this unit?**	**Skills** **What skills will students have developed by the end of this unit?**	**Big Idea** **What are the essential ideas which students could not leave school without?**	**Cross Curricular** **What links to other subjects / enrichment might be made?**
AUTUMN TERM	**Being a scientist**	The aims of this topic are: To ensure all Y7 students have a basic understanding and working knowledge of the practical skills outlined. To ensure all Y7 students are prepared for the practical demands of the Year 7 topics. (Assume all pupils have not completed any practical work at KS2!)	Identify variables and values Describe a simple relationship between variables Design a simple table of results correctly with units Plot a bar chart and plot a line graph Write a simple conclusion linking variables and describing a trend Be familiar with and correctly use a range of scientific equipment including a clamp stand, boiling tube, measuring cylinder, dropping pipette, Bunsen burner, metre rule, masses Design a three part risk assessment for a science practical	Using science & experiment to investigate the world around use using scientific method to propose & test theory, skills needed for being a science student & a career in science (Gatsby benchmark 4)	Maths- Graph drawing, variables, units in Y7 and 8 D+T- safety & risk assessment English – literacy for purpose – writing risk assessments and understanding key scientific vocabulary
	Energy	We can describe how jobs get done using an energy model where energy is transferred from one store at the start to another at the end. When energy is transferred, the total is conserved, but some energy is dissipated, reducing the useful energy.	Compare the amounts of energy transferred by different foods and activities. Represent the energy transfers from a renewable or non-renewable resource to an electrical device in the home. Show how energy is transferred between energy stores in a range of real-life examples. Calculate the useful energy and the amount dissipated, given values of input and output energy. Explain how energy is dissipated in a range of situations.	Energy cannot be created or destroyed Electrical power is produced by both renewable and non-renewable resources and these have an environmental impact	History- James Joule. Maths- calculation of energy, food- energy, calories Geog- energy resources formation of fossil fuel D &T insulation Maths- graphs
	Cells	Multicellular organisms are composed of cells which are organised into tissues, organs and systems to carry out life processes. There are many types of cell. Each has a different structure or feature so it can do a specific job. Both plant and animal cells have a cell membrane, nucleus, cytoplasm and mitochondria. Plant cells also have a cell wall, chloroplasts and usually a permanent vacuole.	Use a light microscope to observe and draw cells. Communicate ideas. Critique claims.	All living things called organisms are made of cells. There are different types of cells. Cells are made of various parts which have a specific function. Cells work together to make tissues, organs and organ systems. If cells do not function normally disease may develop.	Maths- magnitude, unit conversion in Y7 RS- ethics of stem cells History- hook and discovery of microscopes Art and DT - code signing a cell model, Yelena James – under the sea, coral and deep sea organisms English – communication skills - written literacy
	Particles	Properties of solids, liquids and gases can be described in terms of particles in motion but with differences in the arrangement and movement of these same particles: closely spaced and vibrating (solid), in random motion but in contact (liquid), or in random motion and widely spaced (gas). Observations where substances change temperature or state can be described in terms of particles gaining or losing energy. A substance is a solid below its melting point, a liquid above it, and a gas above its boiling point.	Communicating scientific ideas & the use of models in describing scientific theories., and identification of possible limitations therein. Explain the properties of solids, liquids and gases based on the arrangement and movement of their particles. Also explain unfamiliar observations such as gas pressure & state changes in terms of particles. Draw diagrams of particles to explain observations about changes of state, gas pressure and diffusion. Further risk assessment & interpretation of observations	Everything is made of matter, which can be considered to be made up of particles. The properties & reactions of substances can be explained by considering how particles move & interact.	History- Brownian motion and particles, Dance/Drama- modelling particles English- writing of poetry Maths- number line, cooling curve
SPRING TERM	**Chemical Reactions**	When energy is transferred, the total is conserved, but some energy is dissipated, reducing the useful energy.	**Further development of use of variables; testing hypotheses; estimating risk; collecting & presenting data.** Making & Recording Experimental Observations Describe reactions with a word equation Interpret Hazard symbols Introduction to naming the salts produced when acids react. Use data and observations to determine the pH of a solution and explain what this shows. Explain how neutralisation reactions are used in a range of situations & describe a method for how to make a neutral solution from an acid and alkali. **PRACTICAL SKILLS** Handling Acids & Alkalis safely Using Indicators to determine pH	What is a chemical change/reaction Concept of a chemical reaction leading to new products being formed.	D + T- health and safety, acids in food; acids used in DT for etching., etc Literacy - *acidus* meaning 'sour' -root of words; Art- use of chemical reactions & indicators to produce different colours for creating pictures; Maths- graphs (neutralisation) & data interpretation in Y7-9, collecting and presenting data in Y8-9
	Electricity	Current is a movement of electrons and is the same everywhere in a series circuit. Current divides between loops in a parallel circuit, combines when loops meet, lights up bulbs and makes components work. Around a charged object, the electric field affects	Build circuits, using ammeters to measure current in series and parallel circuits. Describe and explain with a model how current changes in series and parallel circuits when components are changed. Turn circuit diagrams into real series and parallel circuits, and vice versa.	What is current? How can we model current to make predictions?	D + T- Resistance and building circuits, maths graphs drawing and direct and inverse proportion, textiles- different materials and their tendency to charge electrically.

		other charged objects, causing them to be attracted or repelled. The field strength decreases with distance.	Describe what happens when charged objects are placed near to each other or touching. Use a sketch to describe how an object charged positively or negatively became charged up.		
	Mixtures	A pure substance consists of only one type of element or compound and has a fixed melting and boiling point. Mixtures may be separated due to differences in their physical properties. The method chosen to separate a mixture depends on which physical properties of the individual substances are different. Air, fruit juice, sea water and milk are mixtures. Liquids have different boiling points.	Able to identify the suitable technique to separate out a mixture of substances. Practical skills of carrying out filtration, evaporation or chromatography Explain how substances dissolve using the particle model & use the solubility curve of a solute to explain observations about solutions. Use evidence from chromatography & melting/boiling to begin to assess purity & identify unknown substances in mixtures.	The concept of a mixture & how it is different to a pure substance. Analysis of purity & techniques to purify impure substances is a key concept used in the chemical industry.	Maths- graphs in Y8 and 9 Art- inks and chromatography Business, Economics - the role of purification in chemical manufacturing & the petrochemical industry, etc.
SUMMER TERM	**Nutrition & digestion**	The body needs a balanced diet with carbohydrates, lipids,proteins, vitamins, minerals, dietary fibre and water, for its cells' energy, growth and maintenance. Iron is a mineral important for red blood cells. Calcium is a mineral needed for strong teeth and bones. Vitamins and minerals are needed in small amounts to keep the body healthy. Organs of the digestive system are adapted to break large food molecules into small ones which can travel in the blood to cells and are used for life processes.	Design a diet for a person with specific dietary needs. Critique claims for a food product or diet by analysing nutritional information. Make deductions from medical symptoms showing problems with the digestive system. Practical skills - assessing risk, identifying variables, presenting data in tables and graphs. Communicating ideas Critiquing claims	Understand what constitutes a healthy diet and be able to make informed choices about diet throughout life to maintain optimum health and prevent disease.	Food technology- Food groups and food tests, deficiency diseases PE- healthy diet and importance of exercise History- scurvy Citizenship- media literacy MFL – healthy living at KS4
	Reproduction	The menstrual cycle prepares the female for pregnancy and stops if the egg is fertilised by a sperm. The menstrual cycle lasts approximately 28 days. If an egg is fertilised it settles into the uterus lining. The developing foetus relies on the mother to provide it with oxygen and nutrients, to remove waste and protect it against harmful substances. Plants have adaptations to disperse seeds using wind, water or animals. Plants reproduce sexually to produce seeds, which are formed following fertilisation in the ovary.	Explain why pregnancy is more or less likely at certain stages of the menstrual cycle. Explain whether substances are passed from the mother to the foetus or not. Use a diagram to show stages in development of a foetus from the production of sex cells to birth. Describe causes of low fertility in male and female reproductive systems. Identify key events on a diagram of the menstrual cycle. Make deductions about how contraception and fertility treatments work. Predict the effect of cigarettes, alcohol or drugs on the developing foetus.	How is life created? Organisms reproduce sexually and asexually. Understand how humans reproduce and the physical changes that occur to enable humans to reproduce. Plant reproduction is important for the production of food crops and other plant-based resources. Plant reproduction is also vital for maintaining biodiversity.	Citizenship- relationships and contraception, gender and sex and menstrual cycle effects of drugs and alcohol, media literacy English- extended writing e.g. consider sentence stems to scaffold this skill Maths- scaling of cells Y7 – area and length scale factors, and Y9 exponentials RS – Medical ethics in Y9 term 3 and 4
	Magnets	Magnetic materials, electromagnets and the Earth create magnetic fields which can be described by drawing field lines to show the strength and direction. The stronger the magnet, and the smaller the distance from it, the greater the force a magnetic object in the field experiences.	Use the idea of field lines to show how the direction or strength of the field around a magnet varies. Explain observations about navigation using Earth's magnetic field.	What do magnets do? What is a field? The Earth has a magnetic field	Maths- graph, d & t materials, citizenship- media literacy, geography- magnetic poles

SCIENCE **YEAR 8**

	Topic	Knowledge What will students know by the end of this unit?	Skills What skills will students have developed by the end of this unit?	Big Idea What are the essential ideas which students could not leave school without?	Cross Curricular What links to other subjects / enrichment might be made?
AUTUMN TERM	Elements & The Periodic Table	Substances and elements Particle Diagrams Simple compounds. Elements The periodic table Chemical reactions	Name compounds using their chemical formulae. Given chemical formulae, name the elements present and their relative proportions. Construct chemical formulae from a list of common ions Represent atoms, molecules and elements, mixtures and compounds using particle diagrams. Use observations from chemical reactions to decide if an unknown substance is an element or a compound. Use data to describe a trend in physical properties. Describe the reaction of an unfamiliar Group 1 or 7 element. Use data showing a pattern in physical properties to estimate a missing value for an element. Use observations of a pattern in chemical reactions to predict the behaviour of an element in a group.	Build on Year 7 understanding that everything is made of matter, which can be considered to be made up of particles. These particles are most often compounds made from the 118 elements of the periodic table, so everything around us is made from the diverse range of elements found on the periodic table.	
	Movement, breathing and Respiration	The parts of the human skeleton work as a system for support, protection, movement and the production of new blood cells. Antagonistic pairs of muscles create movement when one contracts and the other relaxes. In gas exchange, oxygen and carbon dioxide move between alveoli and the blood. Oxygen is transported to cells for aerobic respiration and carbon dioxide, a waste product of respiration, is removed from the body. Breathing occurs through the action of muscles in the ribcage and diaphragm. The amount of oxygen required by body cells determines the rate of breathing. Respiration is a series of chemical reactions, in cells, that breaks down glucose to provide energy and form new molecules. Most living things use aerobic respiration but switch to anaerobic respiration, which provides less energy, when oxygen is unavailable. Yeast fermentation is used in brewing and bread- making.	Identify a pattern in data from a results table or bar chart. Identify variables that you could not control properly. Identify aspects of the method that did not go according to plan. Comment on whether your findings fit with known scientific explanations. Suggest a scientific reason for your findings. Suggest other possible conclusions that could be drawn from your data. Write in a style to fit purpose and audience. Use clear language and well-formed sentences. Record the observation you want to explain.	The role of the skeleton and muscles in the body, and how to prevent injury and damage. To understand that all living cells respire, that some organisms require oxygen for this process, some don't, but all require glucose as their source of chemical energy for this process.	P.E. Food technology- bacterium/ yeast respiration (although bio raising agents is in year 9 in food) Maths- Graph skills (bar charts KS2 maths) reading graphs Y7 and data analysis e.g. calculating a mean
	Waves	Ray models Refraction and reflection Light waves Sound waves Frequency	Use the wave model to explain observations of the reflection, absorption and transmission of a wave Use ray diagrams of eclipses to describe what is seen by observers in different places. Use ray diagrams to describe how light passes through lenses and transparent materials. Describe how lenses may be used to correct vision. Explain observations where coloured lights are mixed or objects are viewed in different lights. Explain differences in the damage done to living cells by light and other waves, in terms of their frequency. Describe the properties of different longitudinal and transverse waves. Explain observations where sound is reflected, transmitted or absorbed by different media. Explain observations of how sound travels using the idea of a longitudinal wave. Describe the amplitude and frequency of a wave from a diagram or oscilloscope picture. Use drawings of waves to describe how sound waves change with volume or pitch Explain how audio equipment converts sound into a changing pattern of electric current.	Light can be reflected and refracted, which leads to many important applications, including medical applications. Mechanical waves are caused by vibrations (building on the particle model in Year7) and can cannot travel through a vacuum.	D & T - behaviour of light and sound in different materials; maths – calculating speed and changing units to SI Biology – structure and function of the eye Biology – use of electromagnetic waves in medicine and damage that can be caused to cells

	More Chemical reactions	Chemical changes Metals Rusting Displacement reaction Thermal decomposition Exothermic and endothermic reactions.	Use particle diagrams to show what happens in a reaction. Make predictions about masses in reactions using the principle of conservation of mass Predict products and construct word equations for the reactions of metals with oxygen (oxidation), combustion reactions, displacement reactions and thermal decomposition reactions. Place an unfamiliar metal into the reactivity series based on information about its reactions. Explain why a reaction is an example of thermal decomposition. Explain simple observations about mass in a chemical or physical change. Use experimental observations to distinguish exothermic and endothermic reactions.	An understanding of the Periodic table and using ideas from it to develop their understanding of atoms, and the language of chemistry through chemical formulae, word equations and symbol equations. Build on Year 7 understanding of chemical change and how we can use periodic table to predict outcomes.	Corrosion & Rusting link to DT & use of materials in design The importance of metals to the economy – link to Business/Economics Computing – the use of metals in computer components such as heat sink
SPRING TERM	Forces	Force Motion Speed Equilibrium Mass and weight Gravitational force Pressure Levers and Pulleys	Use the formula: speed = distance (m) / time (s) or distance-time graphs, to calculate speed. Illustrate a journey with changing speed on a distance-time graph, and label changes in motion. Describe how the speed of an object varies when measured by observers who are not moving, or moving relative to the object. Sketch the forces acting on an object, and label their size and direction. Explain whether an object in an unfamiliar situation is in equilibrium. Describe factors which affect the size of frictional and drag forces. Describe how materials behave as they are stretched or squashed. Describe what happens to the length of a spring when the force on it changes. Use the formula: weight (N) = mass (kg) x gravitational field strength (N/kg). Compare your weight on Earth with your weight on different planets using the formula. Explain unfamiliar observations where weight changes. Draw a force diagram for a problem involving gravity. Deduce how gravity varies for different masses and distances. Use the formula: fluid pressure, or stress on a surface = force (N) / area (m^2). Use diagrams to explain observations of fluids in terms of unequal pressure. Explain why objects either sink or float depending upon their weight and the upthrust acting on them. Explain observations where the effects of forces are different because of differences in the area over which they apply Given unfamiliar situations, use the formula to calculate fluid pressure or stress on a surface. Draw a diagram to explain how a lever makes a job easier. Compare the work needed to move objects different distances	Students should understand the concept of forces and their effects and be able apply these ideas to several contexts.	Maths: graph drawing and interpretation; algebra D and T: deformation of materials, levers

	Photosynthesis and interdependence	Plants and algae do not eat, but use energy from light, together with carbon dioxide and water to make glucose (food) through photosynthesis. They either use the glucose as an energy source, to build new tissue, or store it for later use. Plants have specially-adapted organs that allow them to obtain resources needed for photosynthesis. Iodine is used to test for the presence of starch. Organisms in a food web (decomposers, producers and consumers) depend on each other for nutrients. So, a change in one population leads to changes in others. The population of a species is affected by the number of its predators and prey, disease, pollution and competition between individuals for limited resources such as water and nutrients. Insects are needed to pollinate food crops.	Suggest how particular conditions could affect plant growth. Suggest reasons for particular adaptations of leaves, roots and stems. Compare the movement of carbon dioxide and oxygen through stomata at different times of day Suggest what might happen when an unfamiliar species is introduced into a food web. Develop an argument about how toxic substances can accumulate in human food. Make a deduction based on data about what caused a change in the population of a species.	Students should all understand that all food sources originally take energy from the sun and convert it to chemical energy that sustains all food chains. The interdependence of these organisms is essential to maintain all life, and that the role of insects as pollinators within this system is vital.	Geography - Y11 topic 7
	Climate and Resources	Combustion Carbon cycle Global warming Greenhouse gases & the earth's atmosphere	Construct word equations for complete and incomplete combustion of a fuel Use a diagram to show how carbon is recycled in the environment and through living things. Describe how human activities affect the carbon cycle. Describe how global warming can impact on climate and local weather patterns.	Climate change and the impact of chemical processes on our environment	Big overlap with Geography in Y7, 10 and 13 re: Global Warming, Carbon Cycle and Socio-economic Effects of Climate change Maths – the economic and environmental impacts of fast fashion e.g. Christmas jumpers RS – Y9 term 3 and 4 Climate change and environmental ethics English – word equations – playing with language
	Variation	There is variation between individuals of the same species. Some variation is inherited, some is caused by the environment and some is a combination. Variation between individuals is important for the survival of a species, helping it to avoid extinction in an always changing environment. Students should know that inheritance is due to DNA, but that environmental factors can also influence variation. Natural selection is a theory that explains how species evolve and why extinction occurs. Biodiversity is vital to maintaining populations. Within a species variation helps against environment changes, avoiding extinction. Within an ecosystem, having many different species ensures resources are available for other populations, like humans.	Identify groups who could benefit or be harmed positively or negatively by a new discovery or invention. Describe how each group could benefit or be harmed. Describe how the new discovery or invention could affect you. Identify possible consequences to particular habitats. Describe possible consequences to animals dependent on these habitats. Identify individuals or organisations who may gain or lose money from a new technology. Describe how it would affect each group financially.	That although we are all the same species we are all made unique due to the combination of genetic material we carry. These variations allow us to have both similarities and differences, which over long periods of time allowed natural selection to occur so that we have the range of species we see on earth today. It must be understood that this biodiversity is vital to all species due to the ecological links we all share (building upon ideas in interdependence earlier in the year).	Geography Citizenship
SUMMER TERM	Electromagnetism	An electromagnet uses the principle that a current through a wire causes a magnetic field. Strength of the field depends on number of turns & strength of the current	Use a diagram to explain how an electromagnet can be made and how to change its strength. Design an experiment to investigate the link between magnetic field strength & turns/current. Explain the choice of electromagnets or permanent magnets for a device in terms of their properties.	Electromagnets exist in everyday objects including loudspeakers, relays, bells, etc	D and T: devices that use electromagnets Maths: graph drawing

BIOLOGY **YEAR 9**

	Topic	Knowledge What will students know by the end of this unit?	Skills What skills will students have developed by the end of this unit?	Big Idea What are the essential ideas which students could not leave school without?	Cross Curricular What links to other subjects / enrichment might be made?
Half Term 1	Cell structure - Eukaryotes and prokaryotes	Pupils learn the similarities and differences between animal, plant and bacterial cells. They will know the names and functions of cell organelles in eukaryotic and prokaryotic cells, as well as which of these are specific to plant cells. Cells may be specialised to carry out a particular function, students will learn a range specialised cells and how they are adapted to their function. Microscopes are used to view cells that are too small to see with the naked eye. Students will learn how to use microscopes and the advantages and disadvantages of using light and electron microscopes.	Construct a table to compare similarities and differences in animal and plant cells. To compare bacterial cells with animal and plant cells Literacy - Read through the adaptations of a range of cells and select the key points to summaries this information. Numeracy - Microscopy calculations and converting units. Use a light microscope to observe, draw and label a section of plant and animal cells including a magnification scale.	That all living things are made from cells. The functions of the structures within cells and how cells are specialised. Numeracy skills involving sizes and scales.	Maths – Y7 numeracy skills of scales and magnification/ standard form.
Half Term 2	Cell transport	Students will build upon their knowledge of cell structure to understand how substances are transported into and out of plant and animal cells. They will gain a secure understanding of diffusion, active transport and osmosis and be able to define using key terms, as well as explaining why each process occurs within that situation/within that organism. The factors that affect movement across cell membranes are covered. Again, students will apply these ideas to new situations. Key terms are of importance in this topic and students are encouraged to use correct scientific terminology.	Maths skills - Calculating Surface area/ SA:vol Students will investigate the effect of salt or sugar solutions on plant tissue. Numeracy – Calculate percentages, percentage change, use negative numbers and construct graphs. Literacy – use of new scientific terms, such as diffusion, osmosis, active transport and isotonic. Application of these contexts to living organisms, such as and the effects that movement of salts and water can have on other systems within the body.	To have an understanding of the processes occurring within their body (building upon the Big idea of all living things are made from cells) and an understanding of how these processes can be affected by things we do to our body (e.g. smoking and gas exchange/ diet and mass)	Numeracy - maths SA/SA:vol Y8 and 9, calculating % in Y7. PHSE/ Food and nutrition/ PE - effects of diet - why certain molecules are needed in body
Half Term 3	Organ systems and principles of hierarchy	As covered in half term 1, all living things are made up of cells that carry out the 7 life processes. Students will now build upon this knowledge by learning that specialised cells group into a tissue which carries out a specific function. Organs are groups of specialised tissue that carry out a specific function. Organ systems are made of organs that function together to carry out a specific role within the body. The role of the key organ systems will be covered.	Identification of key organs and organ systems in the body, their function and how they work together. Key literacy ideas - use of correct terminology.	All students need to know what's going on inside their own bodies, how the organs link together and the roles and adaptations of those organs.	PE/ Food and nutrition/ PHSE- an understanding of the way their own body works and what it needs to function.
Half Term 4	The digestive system and enzymes	Having learnt about cells, cell transport and the organisational hierarchy of the body, these ideas are all brought together to learn about how the digestive system works to digest and absorb food. Students will learn the enzymes involved in the digestion of carbohydrates, lipids and proteins, the factors that affect the rate of enzyme-controlled reactions and be able to apply these ideas using correct terminology. Students should be able to recall the sites of production and the action of amylase, proteases and lipases. Students will learn how bile assists the digestion of lipids in the small intestine. The products of digestion are used to build new carbohydrates, lipids and proteins. Some glucose is used in respiration.	Key literacy – optimum, enzyme, substrate, complex, product, active site, denature. Numeracy – interpretation of graphical data, using keys, using scale, introduction of rate of reaction. Maths skills – Calculate the rate using a tangent.	Students should have a knowledge of their body's processes, and why their internal environment is so important (will link in to homeostasis in Year 11). Students can start to gain an understanding of why a massive change in body temperature can be so dangerous to an organism.	Food and nutrition - denaturing of proteins Maths/ Chemistry - graphical interpretation and rates from gradients in Y8 and 10 Maths – tangent lines in Y10-11
Half Term 5 & 6	The circulatory system	The year ends by looking at another organ system in the body that relies on the ideas covered in earlier topics, such as the organisational hierarchy and cell transport. Students will learn the structure of the heart, arteries, veins and capillaries, as well as the route of blood throughout the body. They will learn how the heart and lungs work together the deliver oxygen to all of the cells in the body. Finally, having learnt the key details about how the human body functions throughout Year 9, students will learn about what happens when one of these organ systems doesn't function as it should in the context of coronary heart disease and the treatments that are available.	Literacy – evaluating the advantages and disadvantages of various treatments for coronary heart disease. Numeracy – Interpretating graphs in terms of correlation and causation, calculating cardiac output using stroke rate and stroke volume. Heart dissection to develop practical biology skills.	Students need to understand how their bodies work and why maintaining a healthy diet is important for ensuring it functions correctly. Strong links to risk factors for non-communicable diseases and respiration (both Year 10).	Food and nutrition – importance of a healthy diet and the effects of high cholesterol. PE – heart rate in response to exercise and why it increases. Maths – data analysis and interpretation.

CHEMISTRY **YEAR 9**

	Topic	Knowledge What will students know by the end of this unit?	Skills What skills will students have developed by the end of this unit?		Big Idea What are the essential ideas which students could not leave school without?	Cross Curricular What links to other subjects / enrichment might be made?
AUTUMN TERM	FUNDAMENTALS OF CHEMISTRY	<u>Atomic structure</u> *The development of the model of the atom (common content with physics) & development of theories.* *A simple model of the atom, symbols, relative atomic mass, electronic charge and isotopes incl. relative electrical charges of subatomic particles; size and mass of atoms.* *The sum of the protons and neutrons in an atom is its mass number.* *How to calculate relative atomic mass for isotopes.* *How to describe electronic structure/configuration for the first 20 elements.* *A mixture consists of two or more elements or compounds not chemically combined together. The chemical properties of each substance in the mixture are unchanged. Mixtures can be separated by physical processes, particularly distillation, filtration, crystallisation & chromatography.*	Students should be able to… … Discuss the history & development of the atomic model. … Describe and give examples of processes of separation & suggest suitable separation and purification … Use the nuclear model to describe atoms. … relate size and scale of atoms to objects in the physical world. … calculate the relative atomic mass of an element given the percentage abundance of its isotopes. … Give the name, symbol & describe the electronic configuration for the first 20 elements, up to Ca. … Name compounds formed from these elements … Write word & symbol equations	All matter is made of atoms, which themselves are made up of subatomic particles. The structure (property & reactivity) of matter is a consequence of the elements & compounds that constitute that matter.	Atomic Structure link to physics Calculations of Mr/Isotopic mass, etc requires Maths skills Practical skills wrt. key chemical techniques	
		<u>Bonding & Structure</u> *Chemical bonds as ionic, covalent and metallic* *How to Describe & draw diagrams to show the bonding in ionic, covalent & metallic substances.*	Students should be able to… … explain chemical bonding in terms of electrostatic forces and the transfer or sharing of electrons. … draw dot and cross diagrams for ionic compounds formed by metals in Groups 1 and 2 with non-metals in Groups 6 and 7. … work out the charge on the ions of metals and non-metals from the group number of the element, limited to the metals in Groups 1 and 2, and non-metals in Groups 6 and 7. … deduce that a compound is ionic and describe the limitations of various representations. … work out the empirical formula of an ionic compound from a given diagram/model. … draw dot and cross diagrams for covalent bonding in simple molecules and describe the limitations of using various models/diagrams … deduce the molecular formula of a substance from a given model or diagram		Analytical thinking wrt. identifying patterns and linking observation to theory	
SPRING TERM	THE PERIODIC TABLE	<u>The Periodic Table</u> *History and development of the periodic table* *Metals and non-metals* *The Noble Gases (Group 0)* *The Alkali metals (Group 1)* *The Halogens (Group 7)*	Students should be able to… … to describe these steps in the development of the periodic table. … explain the differences between metals and non-metals on the basis of their characteristic physical and chemical properties. … explain how the atomic structure of metals and non-metals relates to their position in the periodic table … explain how the reactions of elements are related to the arrangement of electrons in their atoms and hence to their atomic number. … explain how properties of the elements in Groups 0, 1 & 7 depend on the outer shell of electrons of the atoms … Predict properties from given trends down the groups.			

SUMMER TERM	REACTIVITY OF METALS & RESOURCES/RECYCLING	<u>Reactivity of Metals</u> *Knowledge of how metals react and that the reactivity of a metal is related to its tendency to form positive ions.* *Metals can be arranged in order of their reactivity in a reactivity series. Unreactive metals such as gold are found in the Earth as the metal itself, but most metals are found as compounds that require chemical reactions to extract the metal.* *Metals less reactive than carbon can be extracted from their oxides by reduction with carbon (Smelting)* *Defining & recognising Oxidation & Reduction.* <u>Resources & Recycling</u> *Appreciation that Earth provides us with all the resources we need & use, however there is only a certain quantity of any resource.* *Identification of resources as renewable or non-renewable.* *Know the importance of recycling in preserving Earth's resources*	Students should be able to… … explain reduction and oxidation in terms of loss or gain of oxygen. … recall and describe the reactions, if any, of potassium, sodium, lithium, calcium, … magnesium, zinc, iron and copper with water or dilute acids. … place these metals order of reactivity and explain how the reactivity is related to the tendency of the metal to form its positive ion … deduce an order of reactivity of metals based on experimental results … interpret or evaluate specific metal extraction processes when given appropriate information … identify the substances which are oxidised or reduced in terms of gain or loss of oxygen. … Write ionic equations for displacement reactions … Explain why recycling of some materials is particularly important. … Describe how Earth's resources are turned into useful materials or recycled. … Suggest ways in which changes in behaviour and the use of alternative materials may limit the consumption of natural resources.	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'.	Link to Economics & sustainable development of mineral ores & mining, etc. Sustainability & Importance of Recycling Environmentally & Economically History – From Iron age to Industrial revolution and blast furnace, etc. Analytical thinking wrt. identifying patterns and linking observation to theory

PHYSICS **YEAR 9**

	Topic	**Knowledge** **What will students know by the end of this unit?**	**Skills** **What skills will students have developed by the end of this unit?**	**Big Idea** **What are the essential ideas which students could not leave school without?**	**Cross Curricular** **What links to other subjects / enrichment might be made?**
Half Term 1	Electricity	The concept of current as charge flow Use of the rope loop model Rules for current flow in series and parallel circuits Unit for current and the ammeter The effect of resistance on current flow in series and parallel circuits Circuit symbols Making circuits from diagrams and drawing circuit diagrams from descriptions	Building series and parallel circuits and putting ammeters in circuits Risk assessing practical work	What is the effect of resistance on current?	D&T electrical circuits. Chemistry structure of atom, materials
Half Term 2	Electricity	The concept of potential difference as energy per charge Rules for the potential difference in series and parallel circuits Unit for pd and the voltmeter Making circuits from diagrams and drawing circuit diagrams from descriptions	Building circuits and putting voltmeters in circuits Risk assessing	What is potential difference?	Maths-algebra, graph drawing, interpretation of graphs in terms of rate, inverse and direct proportion

Half Term 3	Electricity	The concept of resistance, its units Measurement of resistance via measurement of current and pd The ohm; calculating resistance	Building circuits to simultaneously measure current and pd and using mathematical skills and the formula for ohm's law to calculate resistance	What is the relationship between potential difference, current and resistance?	Maths-algebra, graph drawing, interpretation of graphs in terms of rate, inverse and direct proportion
Half Term 4	Energy in the home	The difference between renewable and non-renewable energy resources. The advantages and disadvantages of each energy resource	Study skills: using a variety of materials to research energy resources Practical skills: using models to demonstrate electrical energy production Presentation skills: sharing information with other groups	How can we get our electrical power in a sustainable way?	Geography - energy resources for electricity generation, including renewables and fossil fuels. Biology - biofuels. Citizenship - our role as custodians of the planet, choices about which energy providers to use
Half Term 5	Energy in the home	Calculating energy used in the home The three pin plug and its parts The mechanisms of heat flow in terms of particles	Maths skills: calculating energy use Practical skills: wiring a plug Practical skills: demonstrating conduction, convection and radiation	How can we reduce our energy usage? Electrical safety	Maths - algebra, calculating costs, changing units, graph plotting. D and T - design of wind turbine. D and T - electrical safety for mains voltage, design of plugs, wiring a plug
Half Term 6	Space	The Earth's place in the Solar System and how it affects conditions on the Earth Seasons – link to tilt of Earth's axis Day length – link to spin of Earth on its axis Imagining and calculating distances in space The cause and effect of gravity on astronomical structures	Maths skills: calculating the time to traverse the solar system, distance to the nearest stellar neighbour	What is our place in the Universe?	Maths - estimations of distances, number of stars etc, changing units for measuring vast distances (the light year) Geography/ Biology - seasons and days and their effects for living things. History - evolution of scientific ideas. English/ Art/ D and T - interpreting a long piece of text and summarising as a piece of art/cartoon. Careers - visit to Jodrell Bank