



Year 8 Curriculum Intent

"Students will learn...a broad and informative curriculum that encompasses the key concepts of biology, chemistry and physics and how they link together to allow students to enjoy the awe and wonder of Science.

Students will be able to...deploy their scientific literacy and skills effectively, enabling them to not only think critically but also engage as informed citizens in scientific discussions, and recognize the value of science when making informed decisions; ultimately contributing as functional members of society."

Students will become...appreciative of the world around them, how it works, where it began and the impact they can have on it - all while being prepared for further study and employment in scientific fields, achieving their personal best regardless of their background".

Year 8 Curriculum Overview

Half term 1	Half term 2	Half term 3	Half term 4	Half term 5	Half term 6
Ecosystems: Plant Reproduction Earth: Earth Structure Organisms: Digestion Matter: Elements	Forces: Gravity Reactions: Metals and Non-Metals Ecosystems: Photosynthesis	Matter: Periodic Table Energy: Heating and Cooling Reactions: Types of Reaction	Organisms: Breathing and Respiration Earth: Climate	Ecosystems: Interdependence Electromagnets: Voltage, Resistance and Current	Electromagnetics: Electricity in the Home Earth: Earths Resources Waves: Properties and Effects
Key Question					
How do plants reproduce? What is the structure of the Earth? How are materials recycled in the rock cycle? How does the body break down the foods you eat? What are atoms, elements and compounds?	What is gravity and how does it affect the motion of objects? How do metals and non-metals react with different substances? How do plants produce food by photosynthesis?	How can we use the Periodic Table to predict element properties? How is thermal energy transferred and stored? What happens to the atoms in chemical reactions?	How does the body exchange gases with the environment? How does the body transfer energy from food by respiration? What causes climate change?	How do different organisms interact with each other and their environment? What is happening in a circuit when a current flows?	How do we use electricity in the home? How do we obtain the materials we need? How can we conserve the Earth's resources? How can we use the wave model to explain wave behaviour? What are the uses of different waves?
Key Vocabulary					
Pollen, pollination, fertilisation, seed dispersal, selective breeding Weathering, erosion, minerals, sedimentary, igneous, metamorphic Digestion, nutrient, deficiency, reagent, enzyme, intestine Atom, element, molecule, compound, chemical formula, polymer	Gravitational Field Strength, Mass, Weight, Orbits, Gravity, Newtons, Force Metal, Non-Metal, Reactivity, Salts, Oxidation, Reduction, Displacement Photosynthesis, stomata, light intensity, carbon dioxide, glucose minerals	Periodic table, physical properties, chemical properties, groups, period Work, thermal energy, temperature, conductor, insulator, conduction, convection, radiation Reactant, product, conservation, combustion, thermal decomposition	Breathing, lungs, alveoli, diffusion, aerobic, anaerobic, respiration, fermentation Atmosphere, global warming, greenhouse effect, pollution, combustion	Food web, food chain, predator, prey, energy transfer, interdependence, extinction, biodiversity Electron, current, potential difference (voltage), resistance, series, parallel, static electricity	Alternating and direct current, live, neutral, earth, National Grid, transformers Natural resources, ore, extraction, recycling, electrolysis Vibration, transverse, longitudinal, ultrasound, electromagnetic spectrum

Biology

Chemistry

Physics

	The knowledge you will need to recall	How you will apply this knowledge:	This links to:
1	Ecosystems: Plant Reproduction 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	- Describe the main steps that take place when a plant reproduces successfully. Identify parts of the flower and link their structure to their function. - Suggest how a plant carried out seed dispersal based on the features of its fruit or seed. - Explain why seed dispersal is important to survival of the parent plant and its offspring - Describe similarities and differences between the structures of wind pollinated and insect pollinated plants. - Suggest how plant breeders use knowledge of pollination to carry out selective breeding. - Develop an argument why a particular plant structure increases the likelihood of successful production of offspring	Year 7: Ecosystems: Human Reproduction Genes: Variation and Classification Year 9: Evolution and Inheritance Year 10: B7 Ecology Year 11: B6 Inheritance, variation and evolution
2	Earth: Earth Structure Sedimentary, igneous and metamorphic rocks can be inter converted over millions of years through weathering and erosion, heat and pressure, and melting and cooling.	- Explain why a rock has a particular property based on how it was formed. - Identify the causes of weathering and erosion and describe how they occur. - Construct a labelled diagram to identify the processes of the rock cycle - Identify circumstances that indicate fast processes of change on Earth and those that indicate slower processes. - Predict planetary conditions from descriptions of rocks on other planets. - Describe similarities and differences between the rock cycle and everyday physical and chemical processes. - Suggest how ceramics might be similar to some types of rock	Year 7; Earth: Universe Year 8 Earth Climate Earth Resources Year 10: C9: Atmosphere C10: Using Resources
3	Organisms: Digestion - The components of a balanced diet. - Consequences of imbalances in the diet- obesity, starvation and deficiency diseases. - The process of digestion and the functions of the organs of the digestive system. - The role of enzymes in digestion and the lock and key model of enzyme action.	- List the components of a balanced diet, what they are used for in the body and give examples of foods that they are found in. - State common deficiency diseases caused by the lack of key vitamins and minerals. - Explain the health issues linked with obesity and starvation. - Label the key organs in the digestive system and explain their function. - List common digestive enzyme and use the lock and key model to explain how enzymes work.	Year 8 Ecosystems: Breathing and respiration GCSE: Cell Biology, Organisation, Bioenergetics
4	Matter: Elements - The names of subatomic particles, where they are in an atom and their charges. - Definition for atoms, molecules, elements, compounds and mixtures. - Compounds and mixtures have different properties to the elements they are made from. - The symbols of known elements can be found on the Periodic Table. - Scientists represent compounds using chemical formulae. - How to name compounds using mono, di, ide and ate. - What polymers and composite materials are.	- Label a diagram of an atom. - Explain why the overall charge of an atom is zero. - Use the Periodic Table to identify elements and their chemical symbols. - Use observations from experiments to explain why a substance must be an element. - Represent atoms, molecules and elements, mixtures and compounds using particle diagrams. - Given chemical formulae, name the elements present and their relative proportions - Name compounds using their chemical formulae. - Explain the properties and uses of polymers and composites	Year 8 Matter: Periodic Table Year 8 Reactions: Types of reaction Reactions: Chemical energy GCSE: Atomic structure and the Periodic table, Structure and bonding, Chemical changes, Energy changes

	The knowledge you will need to recall	How you will apply this knowledge:	This links to:
1	Forces: Gravity - Mass and weight are different but related. - Mass is a property of the object; weight depends upon mass but also on gravitational field strength. - Every object exerts a gravitational force on every other object. - The force increases with mass and decreases with distance - Gravity holds planets and moons in orbit around larger bodies	• Explain unfamiliar observations where weight changes. • Draw a force diagram for a problem involving gravity. • Deduce how gravity varies for different masses and distances. Compare your weight on Earth with your weight on different planets using the formula • Compare and contrast gravity with other forces. • Draw conclusions from data about orbits, based on how gravity varies with mass and distance. • Suggest implications of how gravity varies for a space mission.	Year 7: Forces: Speed Year 9: Forces Pressure Earth: Solar System Year 10: P5 Forces
2	Reactions: Metals and Non-Metals - Metals and non-metals react with oxygen to form oxides which are either bases or acids. - Metals can be arranged as a reactivity series in order of how readily they react with other substances. - Some metals react with acids to produce salts and hydrogen. - Iron, nickel and cobalt are magnetic elements. - Mercury is a metal that is liquid at room temperature. - Bromine is a non-metal that is liquid at room temperature.	• Describe an oxidation, displacement, or metal-acid reaction with a word equation. • Use particle diagrams to represent oxidation, displacement and metal-acid reactions. • Identify an unknown element from its physical and chemical properties. • Place an unfamiliar metal into the reactivity series based on information about its reactions. • Deduce the physical or chemical changes a metal has undergone from its appearance. • Justify the use of specific metals and non-metals for different applications, using data provided. • Deduce a rule from data about which reactions will occur or not, based on the reactivity series	Year 7: Matter: Particle Model Matter Periodic Table Earth: Earths Resources Year 8: Reactions: Types of Reaction Year 9: Matter Bonding C2: Bonding
3	Ecosystems: Photosynthesis • Plant organ systems and adaptations, including the role of stomata in gas exchange. • The process and word equation for photosynthesis – what the plant needs for photosynthesis and produces during the reaction. • Uses of glucose including how glucose can be stored as starch in a leaf and testing for starch can indicate whether or not a plant has been photosynthesising. • Factors affecting rate of photosynthesis and how this can be measured practically. • Other factors effecting plant growth including minerals in the soil and the use of fertilisers.	• Identify and label key plant organs and systems, including the function of each one. • Recall the word equation for photosynthesis and the uses of glucose. • Carry out the process of testing a leaf for starch in the lab, • Recall factors which can affect the rate of photosynthesis and practically investigate the effect of light intensity on the rate of photosynthesis in pondweed. • Recall the function of named plant minerals and identify from photographs of plants any deficiency that may be in the soil they are grown in.	Year 8 Ecosystems: Breathing and respiration GCSE: Cell Biology, Organisation, Bioenergetics

	The knowledge you will need to recall	How you will apply this knowledge:	This links to:
1	Matter: Periodic Table - State where metals and non-metals are found on the Periodic Table. - State what the groups and periods of the Periodic Table tell you about the elements. - State the name and properties of the Group 1 elements. - State the name and properties of the Group 7 elements. - State the name and properties of the Group 0 elements.	- Label the Periodic Table to show the position of metals and non-metals. - Use data to describe a trend in physical properties. - Describe the reactions of any Group 1 element. - Describe the reactions of any Group 7 element. - Describe the reactions of any Group 0 element. - Use data showing a pattern in physical properties to estimate a missing value for an element. - Use data and observations to describe trends and predict reactivity of elements. - Explain displacement reactions for Group 7 elements.	Year 8 Reactions: Types of reaction GCSE: Atomic structure and the Periodic table, Structure and bonding, Chemical changes, Energy changes
2	Energy: Heating and cooling. - Describe what work is in Physics. - Define internal energy and temperature. - Identify materials as conductors or insulators. - State that conduction happens in solids. - State that convection happens in fluids. - State what infrared radiation is. - Identify ways of reducing energy transfers.	- Calculate work done. - Compare the work needed to move objects different distances. - Describe how levers and pulleys make work easier. - Describe how an object's temperature changes as it is heated or cooled. - Explain temperature change in terms of particles and energy. - Describe the process of conduction. - Describe the process of convection. - Sketch diagrams to show convection currents. - Compare infrared radiation emitted from different surfaces. - Investigate how to reduce heat loss by conduction, convection and radiation. - Explain how different ways of reducing energy transfer by heating work. - Calculate payback times and evaluate claims about insulation in the home.	Year 9 Forces: Pressure GCSE: Particle model of matter, Waves
3	Reactions: Type of reaction - State what combustion and oxidation is. - State the energy transfers involved in combustion. - State what thermal decomposition is. - State what is meant by conservation of mass.	- Write word equations for combustion reactions. - Investigate factors that affect combustion. - Write word equations for thermal decomposition reactions. - Explain why mass is conserved in a chemical reaction. - Use ratios to write balanced symbol equations.	Year 8 Reactions: Chemical energy GCSE: Chemical changes, Energy changes, Chemical analysis, Chemistry of the Atmosphere

	The knowledge you will need to recall	How you will apply this knowledge:	This links to:
1	Organisms: Breathing and respiration - The structure of the lungs and the process of gas exchange at the alveoli as an application for diffusion. - The mechanism of breathing to include the key muscles and volume/pressure changes involved. - The effect of smoking on the lungs and how asthma affects breathing and gas exchange. - The word equation for aerobic respiration and its importance to cells and the body. - The definition of anaerobic respiration and its application including during rigorous exercise and fermentation. - The effect of exercise on the body linked to respiration.	- Label a diagram of the lungs, identifying the key structures. - Explain the direction of diffusion of oxygen and carbon dioxide in the alveoli. - Explain the processes of inhalation and exhalation in terms of the contraction of the diaphragm and intercostal muscles and volume/pressure changes in the chest. Be able to identify from a diagram whether inhalation/exhalation is taking place. - Recall the word equation for respiration and its importance in releasing energy to cells and to muscles for movement. - Explain what happens in animal muscle cells during periods of vigorous exercise in terms of anaerobic respiration. - Explain how anaerobic respiration occurs in yeast and the products of this process. - Practically investigate the effects of exercise on pulse rate, and breathing rate, linking your findings to the process of respiration.	GCSE: Cell Biology, Organisation, Bioenergetics, Ecology
2	Earth: Climate - Carbon is recycled through natural processes in the atmosphere, ecosystems, oceans and the Earth's crust (such as photosynthesis and respiration) as well as human activities (burning fuels). - Greenhouse gases reduce the amount of energy lost from the Earth through radiation and therefore the temperature has been rising as the concentration of those gases has risen. - Scientists have evidence that global warming caused by human activity is causing changes in climate. - Methane and carbon dioxide are greenhouse gases. - Earth's atmosphere contains around 78% nitrogen, 21% oxygen, <1% carbon dioxide, plus small amounts of other gases	- 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 - Evaluate the implications of a proposal to reduce carbon emissions. - Evaluate claims that human activity is causing global warming or climate change. - Compare the relative effects of human-produced and natural global warming	Year 8 Earth Climate Year 10: C9: Atmosphere Energy: Heating and Cooling

	The knowledge you will need to recall	How you will apply this knowledge:	This links to:
1	Ecosystems: Interdependence - 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.	• Describe how a species' population changes as its predator or prey population changes. • Explain effects of environmental changes and toxic materials on a species' population. • Combine food chains to form a food web. • Explain issues with human food supplies in terms of insect pollinators • 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.	Year 7: Organisms: Cells Genes: Variation and Classification Year 8: Ecosystems: Photosynthesis Ecosystems: Plant Reproduction Year 9: Genes: Evolution and Inheritance Year 10: B7 Ecology
2	Electromagnets: Voltage, Resistance and Current - We can model voltage as an electrical push from the battery, or the amount of energy per unit of charge transferred through the electrical pathway. - In a series circuit, voltage is shared between each component. - In a parallel circuit, voltage is the same across each loop. - Components with resistance reduce the current flowing and shift energy to the surroundings. - Recall the formula: resistance (Ω) = potential difference (V) $\div$ current (A) - Current is a movement of electrons and is the same everywhere in a series circuit. - Current divides between loops in a parallel circuit, combines when loops meet, lights up bulbs and makes components work. - Around a charged object, the electric field affects other charged objects, causing them to be attracted or repelled. - The field strength decreases with distance. - Two similarly charged objects repel, two differently charged objects attract.	• Use the formula: resistance (Ω) = potential difference (V) $\div$ current (A) • Draw a circuit diagram to show how voltage can be measured in a simple circuit. Use the idea of energy to explain how voltage and resistance affect the way components work. Given a table of voltage against current. Use the ratio of voltage to current to determine the resistance. Use an analogy like water in pipes to explain why part of a circuit has higher resistance • Predict the effect of changing the rating of a battery or a bulb on other components in a series or parallel circuit. Justify the sizes of voltages in a circuit, using arguments based on energy. • Draw conclusions about safety risks, from data on voltage, resistance and current. • Describe how current changes in series and parallel circuits when components are changed. • Turn circuit diagrams into real series and parallel circuits, and vice versa. • 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 • Compare the advantages of series and parallel circuits for particular uses. • Evaluate a model of current as electrons moving from the negative to the positive terminal of a battery, through the circuit. • Suggest ways to reduce the risk of getting electrostatic shocks	Year 8: Electromagnetics: Electricity in the Home Year 9: Electromagnetics: Magnets and Electromagnets Year 11: P7 Magnetism and electromagnetism

	The knowledge you will need to recall	How you will apply this knowledge:	This links to:
1	Electromagnetics: Electricity in the Home - Understand the difference between AC and DC (alternating and direct current) and how both of these are used in society - Recall that UK mains electricity uses 230V and 50Hz - Recall the different parts of a plug and how to correctly wire a plug - Live wire is brown, neutral is blue and Earth is striped green & yellow - Live wire is on the right, neutral is on the left and Earth is at the top - Understand that materials are electrical insulators (plastic casing on plugs) or conductors (copper wires) - Identify the parts of the national grid - State examples of energy transfers in electrical appliances - Calculate energy transfers and the power of household appliances - Describe how energy bills are calculated in kWhs	• Explain why mains electricity uses AC and why batteries use DC in questions about electrical circuits or appliances. • Calculating energy or comparing electricity sources. • Label diagrams, spot mistakes in a plug, or describe how to wire one safely. • Explain the role of each wire in safety questions and explain what happens if wires are connected incorrectly. • Explain why certain materials are used in plugs, wires, or appliances in safety or materials questions. • Describe how electricity is transmitted and why transformers are used in distribution. • Explain how appliances work or identify useful and wasted energy. • Calculate how much energy an appliance uses or how powerful it is. • Calculate energy use and cost in questions about household energy bills.	Year 8: Electromagnetics: Electricity in the Home Year 9: Voltage, Resistance and Current Electromagnets Year 11: P7 Magnetism and electromagnetism
2	Earth: Earths Resources - There is only a certain quantity of any resource on Earth, so the faster it is extracted, the sooner it will run out. - Recycling reduces the need to extract resources. - Most metals are found combined with other elements, as a compound, in ores. - The more reactive a metal, the more difficult it is to separate it from its compound. - Carbon displaces less reactive metals, while electrolysis is needed for more reactive metals	• Explain why recycling of some materials is particularly important. • Describe how Earth's resources are turned into useful materials or recycled. • Justify the choice of extraction method for a metal, given data about reactivity. • Suggest factors to take into account when deciding whether extraction of a metal is practical • Suggest ways in which changes in behaviour and the use of alternative materials may limit the consumption of natural resources. • Suggest ways in which waste products from industrial processes could be reduced. • Use data to evaluate proposals for recycling materials.	Year 7; Earth: Universe Year 8 Earth Climate Year 10: C9: Atmosphere C10: Using Resources
3	Waves: Properties and Effects When a wave travels through a substance, particles move to and from. Energy is transferred in the direction of movement of the wave. Waves of higher amplitude or higher frequency transfer more energy. A physical model of a transverse wave demonstrates it moves from place to place, while the material it travels through does not, and describes the properties of speed, wavelength and reflection.	• Explain differences in the damage done to living cells by light and other waves, in terms of their frequency. • Explain how audio equipment converts sound into a changing pattern of electric current • Suggest reasons why sound waves can agitate a liquid for cleaning objects, or massage muscles for physiotherapy. • Evaluate electricity production by wave energy using data for different locations and weather conditions • Describe the properties of different longitudinal and transverse waves. • Use the wave model to explain observations of the reflection, absorption and transmission of a wave • Compare and contrast the properties of sound and light waves. • Suggest what happens when two waves combine	Year 7 Waves: Sound Matter: Particle Model Waves: Effects and Properties Year 8 Energy: Heating and Cooling Year 10: P6 Waves