

WIXAMS ACADEMY **SUBJECT** 5 YEAR CURRICULUM PLAN 2021-2022

KEY: UNIT TITLE PRIOR LEARNING NEEDED/RE-CAPPED – BUILDING DEPTH HOW ASSESSED?

KS 3 NATIONAL CURRICULUM DESCRIPTOR/KS4 ASSESSMENT OBJECTIVE WIDER CURRICULUM LINKS

Academy curriculum intent: *To provide EVERY student the opportunity to acquire academic excellence and those skills, qualities and experiences that develop well-rounded, successful and happy members of modern society.*

- A 5 Year curriculum design approach for most subjects providing a logically sequenced educational journey.
- We follow the full National Curriculum at Key Stage 3 (KS3) to give our students the broadest and best start to their secondary education.
- We believe in personalisation and choice, so we offer one of the broadest ranges of KS4 GCSE option subjects in the Borough.
- Students are encouraged, but not forced to take EBacc subjects, resulting in significantly more students choosing these subjects, compared to National average.
- Knowledge and skill acquisition are key.
- We have a 'Teach to the Top' mantra, where challenge is always present and differentiation ensures all students have the scaffolding and support to 'Access the Top'
- EVERY student has access to the full ambitious curriculum. We do not reduce, narrow or restrict the curriculum for any learners.
- We pride ourselves on an extremely rich 'wider curriculum' including extracurricular; electives; trips and visits; values; oracy to increase our students' 'Cultural Capital'
- We base our curriculum design and implementation on proven educational research methods.

Subject Curriculum Intent:

We are committed to providing a stimulating, engaging and intellectually challenging curriculum to enable all of our students to develop their fundamental understanding of the world around them. Our curriculum will explore the generalisations, principles and models which connect concepts, enabling students to see the world analytically, to explain phenomena and make predictions.

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	Year 7 INTRODUCE	Year 8 DEVELOP	Year 9 EMBED	Year 10 SECURE	Year 11 MASTER
Aim	Year 7 will introduce students to key terminology, concepts and core skills needed to have success in this subject. In Science we build transferable knowledge for topics that provide a concrete understanding essential for year 8 and beyond.	Year 8 will develop the core skills introduced in year 7, placing greater emphasis on developing depth and understanding around key knowledge. In Science we build upon the transferable knowledge from year 7. In this year, students are encouraged to develop their understanding of concrete topics and apply them in an abstract way.	Year 9 will embed key knowledge so that it is firmly fixed in the long term memory. In Science we return to key knowledge from KS3 –Cell Biology, Atomic structure and Particle Theory and fix that knowledge in memory whilst adding depth of understanding through increased vocabulary and perspectives on issues.	Year 10 will secure knowledge so that it can be recalled, explored and built upon with ease. In Science we introduce more complex theories and processes that are reliant on the fundamental knowledge that is acquired in KS3 and year 9.	Year 11 will demonstrate mastery in the subject knowledge, making connections with other topics/subjects and applying it to different contexts. In Science we refine the skills of assessment, decision making and analytical processes.
Unit 1	<p>Particle model</p> <p>The particle model of matter is one of the most useful scientific models because it describes matter in all three states. Understanding how the particles of matter behave is vital if we hope to understand science! The model also helps us to understand what happens to the particles when matter changes from one state to another. This particular topic will be interleaved into a number of Biology, Chemistry and Physics units throughout the 5 year curriculum.</p> <p>KS2: Compare and group materials together, according to whether they are solids, liquids or gases.</p> <p>Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in</p>	<p>Breathing</p> <p>We are studying Breathing after elements to help us develop our knowledge of atoms and molecules and how they fit into the hierarchical levels of organisation. We study Breathing before respiration. We discuss how oxygen is taken in through the lungs before learning about how the cells use oxygen to generate energy through the process of respiration.</p> <p>At key stage 2, you learnt that the lungs are the organ where oxygen enters the blood before being transported around the body. You know that breathing is essential for life and that humans breathe faster when exercising. You should recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.</p>	<p>B1 Cell Biology</p> <p>Cells are the building blocks of life. Everything in the biosphere (and beyond) consists of systems within systems, so studying how cells work will give you a good foundation to examine more “important” or “interesting” concepts. Life creates order out of entropy— this is how individuals, populations, species, and entire communities operate. A cell is arguably the smallest living system, and marks the line between life and nonlife.</p> <p>The B1 Cell Biology unit will develop and expand upon knowledge students have acquired from the cell unit of the KS3 curriculum. Students will already understand the fundamentals of cell biology in terms of structures found within plant and animal cells.</p>	<p>B3 Infection and response</p> <p>Students understand cellular biology and organisational hierarchy. They understand how the body functions and how lifestyle choices and environmental factors can affect non-communicable diseases. Students have studied the circulatory system and the components of blood. They can also identify eukaryotic and prokaryotic cells (bacteria). They are now ready to learn about the body’s defence mechanisms and prevention/treatment methods for communicable diseases.</p> <p>B1 Cell Biology: Eukaryotic and Prokaryotic cells (Bacteria) Specialised cells (red, white blood cells).</p> <p>B2 Organisation:</p>	<p>C3 Quantitative Chemistry</p> <p>Students understand atomic structure. They are able to identify the number of protons, neutrons and electrons in an atom. Students understand the differences between elements, compounds and mixtures and can calculate the relative formula mass of a compound. Students have developed their understanding of the particle model to enable them to explain rates of reaction, pressure and solubility.</p> <p>C1 Atomic structure: Using atomic masses to calculate relative formula mass. Solubility of substances.</p> <p>C2 Bonding: How compounds are formed. Ionic, covalent and metallic bonding.</p>

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	<p>degrees Celsius (°C). Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</p> <p>Interdependence: Knowledge of particles and conservation of materials is needed to comprehend the cycling of materials through feeding relationships.</p> <p>Earth structure: Knowledge of particles and conservation of materials is needed to comprehend the cycling of materials through physical cycles such as the rock cycle.</p> <p>Elements: Students require a basic knowledge of particles as building blocks before comprehending the structure of an atom.</p> <p>Separating mixtures: Particle theory is required to understand how changes of state can explain the methods of separation.</p> <p>Types of reaction: Particles are involved in chemical reactions.</p> <p>KS3 National curriculum descriptor: the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density; the anomaly of ice-water transition.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>	<p>Particle model: Explain how gases such as carbon dioxide and oxygen diffuse into and out of the alveoli.</p> <p>Photosynthesis: To understand the importance of this process.</p> <p>Climate: Discuss the impact of pollution on human airways.</p> <p>KS3 National curriculum descriptor: the structure and functions of the gas exchange system in humans, including adaptations to function.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>	<p>Students have studied Cell structure, DNA, specialised cells, diffusion at KS3.</p> <p>B4 Bioenergetics: Plant cell structure for photosynthesis and respiration.</p> <p>B5 Homeostasis: knowledge of specialised cells for how the Brain functions and types of contraception.</p> <p>B6 Inheritance, variation and evolution: Knowledge of chromosomes, mitosis and stem cells when studying sexual/asexual reproduction, meiosis and the genome. Sex determination, variation and evolution.</p> <p>KS4 Assessment Objectives:</p> <ul style="list-style-type: none"> • AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. • AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. • AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures. <p>In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>	<p>Components of blood and health issues that arise from lifestyle choices. Understanding of plant tissues and organ systems when studying types of bacterial, viral and fungal diseases.</p> <p>B6 Inheritance, variation and evolution: Knowledge of communicable and non-communicable diseases when studying inherited diseases.</p> <p>C10 Using resources: Knowledge of plant diseases and response when discussing the Haber process and importance of NPK fertilisers in keeping plants healthy.</p> <p>KS4 Assessment Objectives:</p> <ul style="list-style-type: none"> • AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. • AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. • AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures. <p>In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>	<p>P3 Matter: Particle model explains how substances dissolve. Particle model explains how changes in temperature or volume can affect pressure.</p> <p>C4 Chemical changes: Students have been introduced to the concept of balancing equations. Studied a variety of different reactions including neutralisation reactions. Link to titrations and using moles to calculate concentration.</p> <p>C7 Organic chemistry: Using moles to calculate the amount of product formed during hydrocarbon combustion reactions.</p> <p>KS4 Assessment Objectives:</p> <ul style="list-style-type: none"> • AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. • AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. • AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures. <p>In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>
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<p>Unit 1 skills and knowledge end points</p>	<p>Relate features of the particle model to the properties of materials in different states.</p> <p>Knowledge: 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.</p>	<p>Investigate a claim linking height to lung volume.</p> <p>Knowledge: 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.</p>	<p>Explain how structural differences between types of cells enables them to perform specific functions within the organism.</p> <p>Knowledge:</p> <ul style="list-style-type: none"> cells as the basic structural unit of all organisms; adaptations of cells related to their functions; the main sub-cellular structures of eukaryotic and prokaryotic cells stem cells in animals and meristems in plants enzymes factors affecting the rate of enzymatic reactions the importance of cellular respiration; the processes of aerobic and anaerobic respiration carbohydrates, proteins, nucleic acids and lipids as key biological molecules 	<p>To be able to evaluate how pathogens such as viruses and bacteria cause infectious diseases in animals and plants.</p> <p>Knowledge:</p> <ul style="list-style-type: none"> the relationship between health and disease communicable diseases including sexually transmitted infections in humans (including HIV/AIDs) non-communicable diseases bacteria, viruses and fungi as pathogens in animals and plants body defences against pathogens and the role of the immune system against disease reducing and preventing the spread of infectious diseases in animals and plants the process of discovery and development of new medicines the impact of lifestyle factors on the incidence of non-communicable diseases 	<p>Use quantitative analysis to determine the formulae of compounds and the equations for reactions. Given this information, use quantitative methods to determine the purity of chemical samples and to monitor the yield from chemical reactions.</p> <p>Knowledge:</p> <ul style="list-style-type: none"> quantitative interpretation of balanced equations concentrations of solutions in relation to mass of solute and volume of solvent
<p>Unit 2</p>	<p>Movement</p> <p>Studied before cells so that students understand how the body works on a macroscopic level before learning about it on a microscopic level. Breathing and Digestion studied in year 8 to complete the Organisms Big Idea.</p> <p>KS2: Basic parts of the digestive system, the role of muscles and bones, basic parts of the circulatory system.</p>	<p>Separating mixtures</p> <p>This would ordinarily be taught early in year 7 to help students reinforce the differences between elements, compounds and mixtures. They would then learn about elements/compounds in greater detail, including atomic structure.</p> <p>This unit includes a number of key experiments that provide students with skills that they will develop further throughout their GCSE's. Last year due to Covid-19, opportunities for practical work were limited so this unit was</p>	<p>C1 Atomic structure</p> <p>Atomic Structure is a fundamental part of Chemistry. Knowing about the electrons, neutrons, protons can help you understand what's going on in chemistry! For example, if you know an element has 6 protons, you will of course remember the element is carbon! This is very useful in future studies.</p> <p>Electrons, neutrons and protons are very important. Therefore, we have to learn about atomic structure. If we know how the electrons are arranged,</p>	<p>C6 Rates of reaction</p> <p>Students have an understanding of types of reaction. This unit is taught within the same term as C4 Chemical changes as knowledge can be reinforced within both units. They also understand that the speed of a reaction can be controlled by different factors, such as light and CO₂ intensity in photosynthesis. They should now be able to combine this knowledge with particle theory to explain how rates of reaction can be controlled on an atomic level.</p>	<p>B6 Inheritance, variation and evolution</p> <p>Students have studied Cell Biology and Organisation so understand cellular structure and DNA. Students have some understanding of sexual and asexual reproduction and the process of mitosis. Students will study ecology around the same time and will be able to form connections between adaptations and the need for genetic variation.</p> <p>B1 Cell Biology:</p>

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	<p>Identify that humans and some other animals have skeletons and muscles for support, protection and movement.</p> <p>Forces: explain the role of forces in physical activity and muscular strength.</p> <p>Cells: Specialised cells and organelle functions. Forces: explain the role of forces in physical activity and muscular strength.</p> <p>KS3 National curriculum descriptor: the function of muscles and examples of antagonistic muscles.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>	<p>moved to year 8 to allow students an opportunity to learn these scientific skills.</p> <p>KS2: Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.</p> <p>Particle model: Refer to the particle theory to explain how particles of salt dissolve into water particles.</p> <p>Particle model: (Boiling: How increasing temperature in liquids provides particles with more energy. This enables the particles to break down the solute more easily).</p> <p>Particle model: Re-visit particle model to explain changes of state. Students need to understand the processes of evaporation and condensation.</p> <p>Matter Big Idea: Separating mixtures revisited when studying Elements and the Periodic table.</p> <p>Types of reaction: Processes such as crystallisation, distillation and chromatography will be revisited here.</p> <p>KS3 National curriculum descriptor: Simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>	<p>we can make sure we understand the covalent bonds and ionic bonds.</p> <p>They are all related to electrons, electrons and electrons. To learn the structure of an atom, it isn't too difficult at all. So learning doesn't harm anything. In contrast, it helps us understand a lot of chemical reactions and how those chemistry takes place.</p> <p>The C1 unit will develop and expand upon knowledge students have acquired from the periodic table unit of the KS3 curriculum. Students will already understand the fundamentals of atomic structure and the arrangement of the periodic table.</p> <p>Students have studied elements and the periodic table at KS3. They have a basic understanding of what elements, compounds and mixtures are and can explain how to separate mixtures. They have been introduced to practical techniques such as filtration, chromatography, distillation and crystallisation. They have been introduced to types of reactions such as combustion and displacement. Learning about atomic structure in greater detail will help develop their understanding of why these reactions occur and explain trends in reactivity.</p> <p>C2 Bonding: Atomic structure in Ionic, covalent and metallic bonding.</p> <p>C3 Quantitative Chemistry: Knowledge of atomic mass to calculate relative formula mass (molar mass) and ultimately moles etc.</p>	<p>B4 Bioenergetics: Rate of photosynthesis can be controlled by increasing light intensity etc.</p> <p>B2 Organisation: Students learnt about the importance of biological catalysts in digestion.</p> <p>Chemical changes: Students understand a wide range of chemical reactions.</p> <p>P3 Particle model of matter: Students understand the effect of changing conditions on the behaviour of particles. This is essential to understand the importance of particles in collision theory.</p> <p>C5 Energy changes: Necessary to understand how exothermic and endothermic reactions influence the position of equilibrium.</p> <p>C10 Using resources: Link Haber process conditions to rates of reaction and why compromises need to be made to produce the optimum amount of ammonia.</p> <p>B7 Ecology: Rates of reaction linked to conditions for decomposition.</p> <p>C7 Organic chemistry: Rates of reaction and dynamic equilibrium can be linked to reactions in organic chemistry.</p> <p>KS4 Assessment Objectives:</p> <ul style="list-style-type: none"> • AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. 	<p>Animal and plant cell structures/functions. Specialised cells (gametes). DNA and cell division (mitosis) for growth and repair.</p> <p>C7 Organic chemistry: Links to fossils and crude oil.</p> <p>C9 Earth and the atmosphere: Use of fossil fuels and the impact on the atmosphere.</p> <p>B7 Ecology: Animal and plant adaptations linked to sexual reproduction and the importance of genetic variation in natural selection.</p> <p>KS4 Assessment Objectives:</p> <ul style="list-style-type: none"> • AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. • AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. • AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures. <p>In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>
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			<p>C8 Chemical analysis: Understanding of elements/compounds and pure substances. Chromatography. Group 7 reactivity trends for halides.</p> <p>P2 Electricity: Knowledge of electronic structure for static charge.</p> <p>KS4 Assessment Objectives:</p> <ul style="list-style-type: none"> • AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. • AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. • AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures. <p>In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>	<ul style="list-style-type: none"> • AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. • AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures. <p>In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>	
<p>Unit 2 skills and knowledge end points</p>	<p>Explore how the skeletal system and muscular system in a chicken wing work together to cause movement.</p> <p>Knowledge: 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.</p>	<p>Devise ways to separate mixtures, based on their properties.</p> <p>Knowledge: 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.</p> <p>Fact: Air, fruit juice, sea water and milk are mixtures. Liquids have different boiling points.</p>	<p>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.</p> <p>Knowledge:</p> <ul style="list-style-type: none"> • a simple model of the atom consisting of the nucleus and electrons, relative atomic mass, electronic charge and isotopes • the number of particles in a given mass of a substance • the modern Periodic Table, showing elements arranged in order of atomic number 	<p>To be able to use collision theory to evaluate the impact of changing conditions on the rate of reaction.</p> <p>Knowledge:</p> <ul style="list-style-type: none"> • factors that influence the rate of reaction: varying temperature or concentration, changing the surface area of a solid reactant or by adding a catalyst • factors affecting reversible reactions 	<p>To be able to explain how an understanding of genetic variation and natural selection has allowed scientists to explore genetic engineering.</p> <p>Knowledge:</p> <ul style="list-style-type: none"> • the genome as the entire genetic material of an organism • how the genome, and its interaction with the environment, influence the development of the phenotype of an organism • the potential impact of genomics on medicine

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			<ul style="list-style-type: none"> position of elements in the Periodic Table in relation to their atomic structure and arrangement of outer electrons properties and trends in properties of elements in the same group characteristic properties of metals and non-metals chemical reactivity of elements in relation to their position in the Periodic Table 		<ul style="list-style-type: none"> most phenotypic features being the result of multiple, rather than single, genes single gene inheritance and single gene crosses with dominant and recessive phenotypes sex determination in humans genetic variation in populations of a species the process of natural selection leading to evolution the evidence for evolution developments in biology affecting classification the importance of selective breeding of plants and animals in agriculture the uses of modern biotechnology including gene technology; some of the practical and ethical considerations of modern biotechnology
Unit 3	<p>Separating mixtures</p> <p>Reinforces the differences between elements, compounds and mixtures. Important to help develop an understanding of elements/compounds in greater detail, including atomic structure. This unit includes a number of key experiments that provide students with skills that they will develop further throughout their GCSE's (e.g. Chromatography, distillation, and crystallisation).</p> <p>KS2: Know that some materials will dissolve in liquid to form a solution, and describe how to recover a</p>	<p>Contact forces</p> <p>We are studying Contact forces before the work and pressure so that you can better understand the effects that particles can have when exerting a force on an object.</p> <p>At key stage 2, students developed the idea of frictional force and weight, and the convention of arrows to illustrate the forces acting on familiar objects.</p> <p>Energy stores: Explain how friction results in an increase in the thermal energy store of the surroundings.</p>	<p>P1 Energy</p> <p>Energy is essential to life and all living organisms. The sun, directly or indirectly, is the source of all the energy available on Earth. Our energy choices and decisions impact Earth's natural systems in ways we may not be aware of, so it is essential that we choose our energy sources carefully. Understanding stores of energy and energy efficiency and dissipation will allow students to explain how energy flows through an ecosystem.</p> <p>The P1 unit will develop and expand upon knowledge students have acquired from the energy unit of the</p>	<p>C4 Chemical changes</p> <p>Students have a deep understanding of atomic structure. They can explain how chemical bonds are created when electrons are transferred. Loss and gain of electrons will allow students to understand oxidation and reduction. Studied around the same time as rates of reaction so that connections can be made between types of reaction and controlling the rate.</p> <p>C1 Atomic structure: Trends in reactivity in group 1, 2 and 7 can help students understand how different elements react.</p>	<p>C7 Organic Chemistry</p> <p>KS3 Big Idea Matter: Periodic table and elements.</p> <p>C1 Atomic structure is necessary to understand bonding.</p> <p>C2 Bonding, particularly covalent bonding to understand the formation of organic molecules. Knowledge of intermolecular forces is needed to explain boiling points in larger molecules.</p> <p>C2 Polymers, formation, properties and uses.</p> <p>C9 Atmospheric pollutants produced by combustion of organic molecules.</p>

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	<p>substance from a solution. Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.</p> <p>Particle model: Refer to the particle theory to explain how particles of salt dissolve into water particles.</p> <p>Particle model: (Boiling: How increasing temperature in liquids provides particles with more energy. This enables the particles to break down the solute more easily).</p> <p>Particle model: Re-visit particle model to explain changes of state. Students need to understand the processes of evaporation and condensation.</p> <p>Matter Big Idea: Separating mixtures revisited when studying Elements and the Periodic table.</p> <p>Types of reaction: Processes such as crystallisation, distillation and chromatography will be revisited here.</p> <p>KS3 National curriculum descriptor: Simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>	<p>Work: Applying a force over a distance requires work to be done.</p> <p>KS3 National curriculum descriptor: forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>	<p>KS3 curriculum. Students will already understand types of energy store and energy transfer. Students will have also studied Hooke’s law in year 8 when studying contact forces. Students understand how energy is generated by respiration in all living organisms. They can explain how this energy is transferred from one organism to another and the importance of energy to support other life processes.</p> <p>P2 Electricity: knowledge of energy transfers in a system links to electrical charge and current, energy transfer in everyday appliances and the national grid.</p> <p>P6 Waves: Transverse and longitudinal waves transfer energy.</p> <p>C9 Chemistry of the atmosphere: National and global energy resources linked to Global Warming.</p> <p>C5 Energy Changes: Knowledge of energy stores and transfer linked to reaction profiles.</p> <p>B7 Ecology: Energy transfers and efficiency linked to levels of organisation and how materials are cycled. Also linked to trophic levels and pyramids of number/biomass.</p> <p>KS4 Assessment Objectives:</p> <ul style="list-style-type: none"> • AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. • AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. 	<p>C2 Bonding: Ionic bonding is essential for oxidation and reduction.</p> <p>Understanding the properties of graphite will explain why it is used as an electrode for electrolysis.</p> <p>P3 Particle model: Linked to solubility of salts.</p> <p>B2 Organisation: Knowledge of the pH scale and neutralisation can be linked to the digestive system.</p> <p>P2 Electricity: Circuits can be linked to electrolysis.</p> <p>C6 Rates of reaction: Link types of reaction to how the rate is controlled.</p> <p>C10 Using resources: pH scale and neutralisation in making fertilisers. Metal oxides linked to preventing corrosion. Soluble salts and neutralisation linked with waste water treatment.</p> <p>KS4 Assessment Objectives:</p> <ul style="list-style-type: none"> • AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. • AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. • AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures. 	<p>C10 Using the Earth's resources sustainably when discussing the production, use and disposal of polymers.</p> <p>B1 DNA linked to naturally occurring polymers.</p> <p>C3 Quantitative chemistry: Using moles to calculate the amount of product formed during hydrocarbon combustion reactions.</p> <p>KS4 Assessment Objectives:</p> <ul style="list-style-type: none"> • AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. • AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. • AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures. <p>In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>
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			<ul style="list-style-type: none"> • A03: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures. <p>In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>	<p>In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>	
<p>Unit 3 skills and knowledge end points</p>	<p>Devise ways to separate mixtures, based on their properties.</p> <p>Knowledge: 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.</p> <p>Fact: Air, fruit juice, sea water and milk are mixtures. Liquids have different boiling points.</p>	<p>Investigate factors that affect the size of frictional or drag forces.</p> <p>Knowledge: When the resultant force on an object is zero, it is in equilibrium and does not move, or remains at constant speed in a straight line. One effect of a force is to change an object's form, causing it to be stretched or compressed. In some materials, the change is proportional to the force applied.</p>	<p>Explain how the work output of steam engines became a key tool for understanding chemical reactions and biological systems.</p> <p>Knowledge:</p> <ul style="list-style-type: none"> • energy changes in a system involving heating, doing work using forces, or doing work using an electric current: calculating the stored energies and energy changes involved • power as the rate of transfer of energy • conservation of energy in a closed system, dissipation • calculating energy efficiency for any energy transfers • renewable and non-renewable energy sources used on Earth, changes in how these are used 	<p>To be able to predict the products formed from various chemical reactions.</p> <p>Knowledge:</p> <ul style="list-style-type: none"> • determination of empirical formulae from the ratio of atoms of different kinds • balanced chemical equations, ionic equations and state symbols • identification of common gases • the chemistry of acids; reactions with some metals and carbonates • pH as a measure of hydrogen ion concentration and its numerical scale • electrolysis of molten ionic liquids and aqueous ionic solutions • reduction and oxidation in terms of loss or gain of oxygen. 	<p>To be able to identify the differences in molecular structure and physical and chemical properties of a variety of organic molecules.</p> <p>Knowledge:</p> <ul style="list-style-type: none"> • fractional distillation of crude oil and cracking to make more useful materials • extraction and purification of metals related to the position of carbon in a reactivity series
<p>Unit 4</p>	<p>Interdependence</p> <p>At key stage 2, you were able to construct and interpret a variety of food chains, identifying producers, predators and prey. You were able to recognise that environments can change and that this can sometimes pose dangers to</p>	<p>Heating and cooling</p> <p>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</p>	<p>B2 Organisation</p> <p>B1 Cell Biology: Cell structure linked to organisational hierarchy. Cancer caused by uncontrollable cell division (mitosis)</p>	<p>P5 Forces</p> <p>KS3: Contact forces and speed. P3 Particle model of matter: Linked to pressure in fluids. P1 Energy: Discuss the similarities in the theories conservation of</p>	<p>P8 Space Physics</p> <p>KS3 Space and Earths structure P5 Forces: The effect of the non-contact force Gravity in the universe. C9 Chemistry of the atmosphere: When comparing planets and</p>

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	<p>living things. You grouped animals, plants and materials according to similarities and differences. You Identified how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.</p> <p>Energy transfer: Explain how energy can be transferred from the sun (chemical store) through light to the carbohydrates.</p> <p>Energy transfer: Dissipation at each step in the food chain or web means that the top of the food chain is reached when the energy used in seeking food exceeds the useful energy gained from it.</p> <p>Knowledge of particles and conservation of materials is also needed to comprehend the cycling of materials through feeding relationships, and physical cycles such as the rock cycle.</p> <p>KS3 National curriculum descriptor: the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>	<p>useful energy. This knowledge will be developed within the Energy Big Idea.</p> <p>Understanding that solids melt at different temperatures. Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.</p> <p>Energy dissipation and efficiency: To describe where energy is wasted in a system and to calculate efficiency.</p> <p>Energy stores: To be able to identify different energy stores and describe the transfer of energy between them.</p> <p>Photosynthesis: Explain how energy can be transferred from the sun (chemical store) through light to the carbohydrates.</p> <p>Interdependence: Dissipation at each step in the food chain or web means that the top of the food chain is reached when the energy used in seeking food exceeds the useful energy gained from it.</p> <p>KS3 National curriculum descriptor: heating and thermal equilibrium: temperature difference between 2 objects leading to energy transfer from the hotter to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature difference; us of insulators.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>	<p>C2 Bonding: Effect of surface area. Connections can be formed between intestinal villi and nanoparticles.</p> <p>P3 Particle model of matter: Density linked to surface area.</p> <p>C6 Rates of reaction: how surface area can affect the rate of reaction. Enzymes as biological catalysts.</p> <p>KS4 Assessment Objectives:</p> <ul style="list-style-type: none"> • AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. • AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. • AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures. <p>In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>	<p>momentum and conservation of energy.</p> <p>C9 Chemistry of the atmosphere: Atmospheric pressure can be re-visited when discussing gases in the atmosphere.</p> <p>KS4 Assessment Objectives:</p> <ul style="list-style-type: none"> • AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. • AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. • AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures. <p>In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>	<p>differences in atmospheres, link to Earth's atmosphere.</p> <p>P6 Waves: Visible light (light-year) as a measure of distance in the Universe.</p> <p>KS4 Assessment Objectives:</p> <ul style="list-style-type: none"> • AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. • AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. • AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures. <p>In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>
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Unit 4 knowledge end points	<p>Use a model to investigate the impact of changes in a population of one organism in others in the ecosystem.</p> <p>Knowledge: 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.</p> <p>Fact: Insects are needed to pollinate food crops.</p>	<p>Investigate how to prevent heat loss by conduction, convection and radiation.</p> <p>Knowledge: The thermal energy of an object depends upon its mass, temperature and what it's made of. When there is a temperature difference, energy transfers from the hotter to the cooler object. Thermal energy is transferred through different pathways, by particles in conduction and convection, and by radiation.</p>	<p>To be able to explain the structure and functions of various biological systems.</p> <p>Knowledge:</p> <ul style="list-style-type: none"> the need for transport systems in multicellular organisms, including plants the relationship between the structure and functions of the human circulatory system 	<p>To be able to analyse the mechanical uses of forces.</p> <p>Knowledge:</p> <ul style="list-style-type: none"> forces and fields: electrostatic, magnetic, gravity forces as vectors calculating work done as force x distance; elastic and inelastic stretching pressure in fluids acts in all directions: variation in Earth's atmosphere with height, with depth for liquids, up-thrust force (qualitative) 	<p>To be able to identify celestial bodies and explain what is causing the Universe to expand.</p> <p>Knowledge</p> <ul style="list-style-type: none"> the main features of the solar system.
Unit 5	<p style="text-align: center;">Energy transfer</p> <p>Energy transfer: Explain how energy can be transferred from the sun (chemical store) through light to the carbohydrates.</p> <p>Energy transfer: Dissipation at each step in the food chain or web means that the top of the food chain is reached when the energy used in seeking food exceeds the useful energy gained from it.</p> <p>Knowledge of particles and conservation of materials is also needed to comprehend the cycling of materials through feeding</p>	<p style="text-align: center;">Earth resources</p> <p>Studied after Energy Transfer. Students can explain how energy can be transferred from the sun (chemical store) through light to plants to enable them to respire and create carbohydrates.</p> <p>They can also explain how dissipation at each step in the food chain or web means that the top of the food chain is reached when the energy used in seeking food exceeds the useful energy gained from it.</p> <p>KS2: Construct and interpret a variety of food chains, identifying producers, predators and prey.</p>	<p style="text-align: center;">P3 Particle model of matter</p> <p>KS3: Matter (Particle model)</p> <p>P1 Energy: Recall energy stores and discuss the effect of gaining energy on particle motion and states of matter.</p> <p>P2 Electricity: Specific latent heat and specific heat capacity. Reinforce with knowledge of circuits and the transfer of electrical energy.</p> <p>C9 Chemistry of the atmosphere: Particle model linked to atmospheric pressure.</p> <p>KS4 Assessment Objectives:</p>	<p style="text-align: center;">B5 Homeostasis and response</p> <p>B2 Organisation: Recall hierarchy of organ systems. Discuss how enzymes require optimum conditions provided by homeostasis.</p> <p>B1 Cell Biology: Recall stem cells and specialised cells in the brain, CNS and eye. Specialised gametes discussed with contraception methods.</p> <p>C1 Atomic structure and P3 Particle model: Solubility of glucose.</p> <p>C4 Chemical changes: Chemical contraception methods.</p>	<p style="text-align: center;">P6 Waves</p> <p>P1 Energy: Energy is transferred as waves.</p> <p>P4 Atomic structure: Link the electromagnetic spectrum to radiation and the effects it has on the body.</p> <p>B5 Homeostasis: Recall the structure of the eye and function of the lens when discussing how light is refracted through lenses.</p> <p>KS4 Assessment Objectives:</p>

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	<p>relationships, and physical cycles such as the rock cycle.</p> <p>Movement: Explain the need for chemical energy to provide a kinetic energy store in the muscles.</p> <p>KS3 National curriculum descriptor: Simple machines give bigger force but at the expense of smaller movement: product of force and displacement unchanged.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>	<p>Recognise that environments can change and that this can sometimes pose dangers to living things. Animals, plants and materials can be grouped according to similarities and differences.</p> <p>Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.</p> <p>Energy transfer: Explain how energy can be transferred from the sun (chemical store) through light to the carbohydrates.</p> <p>Energy transfer: Dissipation at each step in the food chain or web means that the top of the food chain is reached when the energy used in seeking food exceeds the useful energy gained from it.</p> <p>Climate: The use of raw materials from the Earth have a profound impact on our Climate. Burning fossil fuels CO₂ and other atmospheric pollutants that lead to Global warming and acid rain for example.</p> <p>KS3 National curriculum descriptor: Earth as a source of limited resources and the efficacy of recycling.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>	<ul style="list-style-type: none"> • AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. • AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. • AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures. <p>In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>	<p>B6 Inheritance, variation and evolution: Link homeostatic control to adaptations and variation.</p> <p>B7 Ecology: Link homeostatic control to how organisms survive in different ecosystems.</p> <p>KS4 Assessment Objectives:</p> <ul style="list-style-type: none"> • AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. • AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. • AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures. <p>In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>	<ul style="list-style-type: none"> • AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. • AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. • AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures. <p>In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>
<p>Unit 5 knowledge end points</p>	<p>Explain the energy transfers in a hand-crank torch.</p> <p>Knowledge:</p>	<p>Predict the method used for extracting metal based on its position in the reactivity series.</p> <p>Knowledge:</p>	<p>To be able to predict the behaviour of solids, liquids and gases.</p> <p>Knowledge:</p>	<p>To be able to evaluate how nervous and hormonal mechanisms maintain a constant internal environment.</p> <p>Knowledge:</p>	<p>Use your understanding of mechanical waves to explain our ability to build comfortable and safe structures and how we can make the most of electromagnetic waves in</p>

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	<p>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.</p>	<p>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.</p>	<ul style="list-style-type: none"> relating models of arrangements and motions of the molecules in solid, liquid and gas phases to their densities melting, evaporation, and sublimation as reversible changes calculating energy changes involved on heating, using specific heat capacity; and those involved in changes of state, using specific latent heat links between pressure and temperature of a gas at constant volume, related to the motion of its particles (qualitative) 	<ul style="list-style-type: none"> principles of nervous coordination and control in humans the relationship between the structure and function of the human nervous system the relationship between structure and function in a reflex arc principles of hormonal coordination and control in humans hormones in human reproduction, hormonal and non-hormonal methods of contraception homeostasis 	<p>modern technologies such as imaging and communication systems.</p> <p>Knowledge:</p> <ul style="list-style-type: none"> amplitude, wavelength, frequency, relating velocity to frequency and wavelength transverse and longitudinal waves electromagnetic waves, velocity in vacuum; waves transferring energy; wavelengths and frequencies from radio to gamma-rays velocities differing between media: absorption, reflection, refraction effects production and detection, by electrical circuits, or by changes in atoms and nuclei uses in the radio, microwave, infra-red, visible, ultra-violet, X-ray and gamma-ray regions, hazardous effects on bodily tissues
<p>Unit 6</p>	<p>Voltage and resistance</p> <p>KS2: Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. Compare and give reasons for variations in how components function. Use recognised symbols when representing a simple circuit in a diagram.</p> <p>Recognise some common conductors and insulators, and associate metals with being good conductors. Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. Compare and give reasons</p>	<p>Respiration</p> <p>Students now understand cellular structure and the particle model. They can explain how substances can be transferred into and out of cells through diffusion. They have also studied life processes such as movement and plant reproduction. They understand the importance of energy and are ready to develop their understanding of how this energy is generated.</p> <p>KS2: Students have a simple understanding that humans breathe in oxygen. (may also have knowledge Of breathing out carbon dioxide).</p>	<p>C2 Bonding, structure and properties of matter</p> <p>C1 Atomic structure: Knowledge of atomic structure and electron arrangement is required to discuss how atoms form compounds. This enables students to explain how ions are formed and why electrons can shared in covalent bonding.</p> <p>C3 Quantitative Chemistry: Knowledge of atoms and bonding is required to construct balanced symbol equations and supports understanding of moles and the theory of conservation of mass.</p>	<p>C5 Energy</p> <p>P1 Energy: Energy stores and transfer of energy will explain how reactions can be identified as endothermic or exothermic. This will also support understanding of energy profile diagrams.</p> <p>KS4 Assessment Objectives:</p> <ul style="list-style-type: none"> AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. AO3: Analyse information and ideas to: interpret and evaluate; make 	<p>C8 Chemical analysis</p> <p>C1 Atomic structure: Recall how understanding element and compounds can form pure substances. Develop understanding of the chromatography separation technique. Knowledge of group 7 halogens will be required for halides and chlorine tests.</p> <p>B1 Cell Biology: Diffusion of substances can be discussed with chromatography.</p>

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	<p>for variations in how components function. Use recognised symbols when representing a simple circuit in a diagram.</p> <p>Identify common appliances that run on electricity. Construct a simple series electrical circuit. Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. Recognise that a switch opens and closes a circuit. Recognise some common conductors and insulators, and associate metals with being good conductors. Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. Compare and give reasons for variations in how components function. Use recognised symbols when representing a simple circuit in a diagram.</p> <p>Energy transfer: use the idea of energy transfer and conservation to explain the difference in the brightness of two bulbs in series and parallel.</p> <p>KS3 National curriculum descriptor: potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference to current.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>	<p>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. Students have been taught about diffusion in Cells and Particle Model.</p> <p>Breathing: Address the misconception that breathing and respiration are the same. Revisit the process of gas exchange so that students understand that diffusion of gases is occurring within the cells.</p> <p>Human Reproduction: Students understand the importance of processes such as gas exchange and respiration. They can apply this knowledge to how the foetus is supported by the placenta and umbilical cord. Allowing the exchange of gases and glucose to create energy for growth through respiration.</p> <p>Evolution: Organisms better suited to their environment will have an advantage when competing for food. This allows respiration to occur so energy is generated for reproduction, allowing them to pass on their genes. Natural selection.</p> <p>Photosynthesis: All living organisms respire. This provides energy to the plant and allows it to grow and photosynthesise.</p> <p>Climate: Respiration is an important process in the carbon cycle.</p> <p>KS3 National curriculum descriptor: aerobic and anaerobic respiration in</p>	<p>C4 Chemical changes: Oxidation of metals. Recall the properties of graphite when discussing its use as an electrode in electrolysis.</p> <p>C7 Organic Chemistry: Recall polymers when learning about the different types of polymer reactions, addition and condensation. Knowledge of polymers is useful when discussing cracking, in terms of intermolecular forces between longer molecules (boiling points).</p> <p>C9 Chemistry of the atmosphere: Atmospheric pollutants released when polymers are disposed of.</p> <p>C10: Life cycle assessments of metals and polymers.</p> <p>P2 Electricity: Electrical conductivity properties of graphite.</p> <p>KS4 Assessment Objectives:</p> <ul style="list-style-type: none"> • AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. • AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. • AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures. <p>In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>	<p>judgments and draw conclusions; develop and improve experimental procedures.</p> <p>In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>	<p>C4 Chemical changes: Recall different types of reaction and link this to how we can test for the products formed.</p> <p>KS4 Assessment Objectives:</p> <ul style="list-style-type: none"> • AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. • AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. • AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures. <p>In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>
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		<p>living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>			
<p>Unit 6 knowledge end points</p>	<p>Compare the voltage drop across resistors connected in series in a circuit.</p> <p>Knowledge: 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.</p>	<p>Use data from investigating fermentation with yeast to explore respiration.</p> <p>Knowledge: 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. Fact: Yeast fermentation is used in brewing and bread making.</p>	<p>To be able to explain how the type of bonding impacts the structure and properties of different materials.</p> <p>Knowledge:</p> <ul style="list-style-type: none"> changes of state of matter in terms of particle kinetics, energy transfers and the relative strength of chemical bonds and intermolecular forces types of chemical bonding: ionic, covalent, and metallic bulk properties of materials related to bonding and intermolecular forces bonding of carbon leading to the vast array of natural and synthetic organic compounds that occur due to the ability of carbon to form families of similar compounds, chains and rings structures, bonding and properties of diamond, graphite, fullerenes and graphene 	<p>To be able to classify reactions as endothermic or exothermic and how this is determined by the amount of energy needed or released when making/breaking bonds.</p> <p>Knowledge:</p> <ul style="list-style-type: none"> Measurement of energy changes in chemical reactions (qualitative) Bond breaking, bond making, activation energy and reaction profiles (qualitative) 	<p>To be able to evaluate how the use of qualitative tests allow scientists to detect specific chemicals.</p> <p>Knowledge:</p> <ul style="list-style-type: none"> distinguishing between pure and impure substances separation techniques for mixtures of substances: filtration, crystallisation, chromatography, simple and fractional distillation
<p>Unit 7</p>	<p>Energy costs</p> <p>KS2: Understanding of food chains and digestion linked to calculating the amount of energy in food.</p> <p>Energy transfer: How energy is transferred between energy stores. Dissipation of energy.</p>	<p>Inheritance</p> <p>KS2: Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.</p> <p>Variation: Students will explore genetic cross diagrams and the probability of</p>	<p>B4 Bioenergetics</p> <p>B1 Cell Biology: Knowledge of plant cell structure is required for developing an understanding of photosynthesis.</p> <p>B2 Organisation: Recall the respiratory and circulatory system when discussing</p>	<p>P4 Atomic structure</p> <p>C1 Atomic Structure: Students need to be able to identify the number of protons, neutrons and electrons in an atom. They need to be able to calculate the changes that occur in</p>	<p>P7 Magnetism and electromagnetism</p> <p>C9 Chemistry of the atmosphere: Link poles of a magnet to the magnetosphere of the Earth.</p> <p>P2 Electricity: Magnetic fields linked to electric fields.</p>

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	<p>Voltage and resistance: Calculate the power of an appliance. Explain how electricity is generated and transmitted through the national grid.</p> <p>Heating and cooling: energy costs linked to insulation of homes.</p> <p>KS3 National curriculum descriptor: Comparing energy values of different foods and compare power ratings of appliances in watts.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>	<p>acquiring certain characteristics. Explaining how variation exists within a population</p> <p>Cells: Identify the structures in plant and animal cells. Students need to understand what a nucleus is before learning that DNA is stored within it.</p> <p>Human reproduction: Link to fertilisation by explaining haploid and diploid number of chromosomes.</p> <p>KS3 National curriculum descriptor: a simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>	<p>how reactants of respiration are delivered to cells.</p> <p>C6 Rates of reaction: Link temperature to how it affects the rate of photosynthesis.</p> <p>B5 Homeostasis: The importance of photosynthesis to healthy plant growth (plant hormones and germination).</p> <p>B7 Ecology: The role of photosynthesis and respiration in food chains (life processes). Understand the importance of plants and photosynthesis when discussing deforestation.</p> <p>C9 Chemistry in the atmosphere: Deforestation and the effect of reducing photosynthesis on the atmosphere and how it contributes to global warming.</p> <p>C10 Using resources: Link plants and photosynthesis to sustainable development.</p> <p>KS4 Assessment Objectives:</p> <ul style="list-style-type: none"> • AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. • AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. • AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures. <p>In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>	<p>the mass of the nucleus when radiation is emitted.</p> <p>P6 Waves: Link the electromagnetic spectrum to radiation and the effects it has on the body.</p> <p>KS4 Assessment Objectives:</p> <ul style="list-style-type: none"> • AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. • AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. • AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures. <p>In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>	<p>P6 Waves: Recall knowledge of transverse and longitudinal waves when teaching about loudspeakers, microphones etc.</p> <p>KS4 Assessment Objectives:</p> <ul style="list-style-type: none"> • AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. • AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. • AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures. <p>In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>
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<p>Unit 7 knowledge end points</p>	<p>Compare the running costs of fluorescent and filament light bulbs.</p> <p>Knowledge: We pay for our domestic electricity usage based on the amount of energy transferred. Electricity is generated by a combination of resources which each have advantages and disadvantages. Calculate the cost of home energy usage, using the formula: cost = power (kW) x time (hours) x price (per kWh).</p> <p>Fact: Food labels list the energy content of food in kilojoules (kJ).</p>	<p>Model the inheritance of a specific trait and explore the variation in the offspring produced</p> <p>Knowledge: Inherited characteristics are the result of genetic information, in the form of sections of DNA called genes, being transferred from parents to offspring during reproduction. Chromosomes are long pieces of DNA which contain many genes. Gametes, carrying half the total number of chromosomes of each parent, combine during fertilisation.</p> <p>Facts: The DNA of every individual is different, except for identical twins. There is more than one version of each gene eg different blood groups.</p>	<p>Explain the processes of photosynthesis and respiration and how they allow plants animals to perform biological functions.</p> <p>Knowledge:</p> <ul style="list-style-type: none"> • photosynthesis as the key process for food production and therefore biomass for life • the process of photosynthesis • factors affecting the rate of photosynthesis 	<p>To be able to explain the changes that occur within the nuclei of radioactive materials and evaluate their uses.</p> <p>Knowledge:</p> <ul style="list-style-type: none"> • the nuclear model and its development in the light of changing evidence • masses and sizes of nuclei, atoms and small molecules • differences in numbers of protons, and neutrons related to masses and identities of nuclei, isotope characteristics and equations to represent changes • ionisation; absorption or emission of radiation related to changes in electron orbits • radioactive nuclei: emission of alpha or beta particles, neutrons, or gamma-rays, related to changes in the nuclear mass and/or charge • radioactive materials, half-life, irradiation, contamination and their associated hazardous effects, waste disposal • nuclear fission, nuclear fusion and our sun’s energy 	<p>To be able to explain that a magnet moving in a coil can produce electric current and also that when current flows around a magnet it can produce movement.</p> <p>Knowledge:</p> <ul style="list-style-type: none"> • exploring the magnetic fields of permanent and induced magnets, and the Earth’s magnetic field, using a compass • magnetic effects of currents, how solenoids enhance the effect • how transformers are used in the national grid and the reasons for their use
<p>Unit 8</p>	<p>Speed</p> <p>KS2: Compare how things move on different surfaces. Notice that some forces need contact between two objects, but magnetic forces can act at a distance. Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. Identify the effects of air resistance, water resistance and friction that act between moving surfaces. Recognise that some</p>	<p>Wave properties</p> <p>Energy transfer: When a wave travels through a substance, particles move to and fro. Energy is transferred in the direction of movement of the wave. Waves of higher amplitude or higher frequency transfer more energy.</p> <p>Wave properties: understanding of frequency and wavelengths linked to energy transfer within the electromagnetic spectrum.</p>	<p>C9 Chemistry and our atmosphere</p> <p>B4 Bioenergetics: Recall the processes photosynthesis and respiration to explain how the Earth’s atmosphere formed.</p> <p>C2 Bonding: Discuss the impact of the manufacture and disposal of polymers on the atmosphere.</p> <p>P1 Energy: Use knowledge of national and global energy sources to discuss the impact on the environment.</p>	<p>C3 Quantitative chemistry</p> <p>Students understand atomic structure. They are able to identify the number of protons, neutrons and electrons in an atom. Students understand the differences between elements, compounds and mixtures and can calculate the relative formula mass of a compound. Students have developed their understanding of the particle model to enable them to explain rates of reaction, pressure and solubility.</p>	

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	<p>mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.</p> <p>Sound: Link the speed equation to how ultrasound is used to detect how far away an object is.</p> <p>Universe: Link to the speed of light and distances of objects from the sun/earth.</p> <p>KS3 National curriculum descriptor: speed and the quantitative relationship between average speed, distance and time (speed = distance/time)</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>	<p>KS3 National curriculum descriptor: waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>	<p>B7 Ecology: Connections can be made between the carbon cycle, greenhouse gases, global warming, deforestation and the reduction of biodiversity.</p> <p>KS4 Assessment Objectives:</p> <ul style="list-style-type: none"> • AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. • AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. • AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures. <p>In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>	<p>C1 Atomic structure: Using atomic masses to calculate relative formula mass. Solubility of substances.</p> <p>C2 Bonding: How compounds are formed. Ionic, covalent and metallic bonding.</p> <p>P3 Matter: Particle model explains how substances dissolve. Particle model explains how changes in temperature or volume can affect pressure.</p> <p>C4 Chemical changes: Students have been introduced to the concept of balancing equations. Studied a variety of different reactions including neutralisation reactions. Link to titrations and using moles to calculate concentration.</p> <p>C7 Organic chemistry: Using moles to calculate the amount of product formed during hydrocarbon combustion reactions.</p> <p>KS4 Assessment Objectives:</p> <ul style="list-style-type: none"> • AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. • AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. • AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures. 	
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				In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.	
Unit 8 knowledge end points	<p>Investigate variables that affect the speed of a toy car rolling down a slope.</p> <p>Knowledge: If the overall, resultant force on an object is non-zero, its motion changes and it slows down, speeds up or changes direction.</p> <p>Facts: A straight line on a distance-time graph shows constant speed, a curving line shows acceleration. The higher the speed of an object, the shorter the time taken for a journey.</p>	<p>Use the wave model to explain observations of the reflection, absorption and transmission of waves.</p> <p>Knowledge: 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.</p>	<p>Investigate the contribution that natural and human chemical processes make to our carbon dioxide emissions.</p> <p>Knowledge:</p> <ul style="list-style-type: none"> evidence for composition and evolution of the Earth's atmosphere since its formation evidence, and uncertainties in evidence, for additional anthropogenic causes of climate change potential effects of, and mitigation of, increased levels of carbon dioxide and methane on the Earth's climate common atmospheric pollutants: sulphur dioxide, oxides of nitrogen, particulates and their sources 	<p>Use quantitative analysis to determine the formulae of compounds and the equations for reactions. Given this information, use quantitative methods to determine the purity of chemical samples and to monitor the yield from chemical reactions.</p> <p>Knowledge:</p> <ul style="list-style-type: none"> quantitative interpretation of balanced equations <p>concentrations of solutions in relation to mass of solute and volume of solvent</p>	
Unit 9	<p style="text-align: center;">Gravity</p> <p>KS2: Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.</p> <p>Speed: Linked to contact and non-contact forces.</p> <p>Forces: Identifying contact and non-contact forces.</p> <p>Speed: Explain how the force of gravity affects terminal velocity.</p> <p>Energy transfer: Evaluate energy transfer between gravitational potential energy and kinetic energy.</p>	<p style="text-align: center;">Wave effects</p> <p>Energy transfer: When a wave travels through a substance, particles move to and fro. Energy is transferred in the direction of movement of the wave. Waves of higher amplitude or higher frequency transfer more energy.</p> <p>Wave properties: understanding of frequency and wavelengths linked to energy transfer within the electromagnetic spectrum.</p> <p>P4 Atomic structure: Develop understanding about ionising radiation and the impact on human health.</p>	<p style="text-align: center;">C5 Energy changes</p> <p>P1 Energy: Energy stores and transfer of energy will explain how reactions can be identified as endothermic or exothermic. This will also support understanding of energy profile diagrams.</p> <p>KS4 Assessment Objectives:</p> <ul style="list-style-type: none"> AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. AO3: Analyse information and ideas to: interpret and evaluate; make 	<p style="text-align: center;">P2 Electricity</p> <p>P1 Energy: Recall the equation for power. Discuss energy transfers in a system and efficiency.</p> <p>C1 Atomic structure and C2 Bonding: Discuss how the properties of metals allow them to conduct electricity. Knowledge of atomic structure and formation of ions is important for understanding static electricity.</p> <p>P7 Magnetism and electromagnetism: Knowledge of electricity is essential to understand electromagnetism and the functionality of devices such as loudspeakers and transformers.</p>	

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	<p>Universe: Explain how the force of gravity enables planets in our solar system to orbit the sun.</p> <p>KS3 National curriculum descriptor: non-contact forces; gravity forces acting at a distance on Earth and in space, forces between magnets, and forces due to static electricity.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>	<p>KS3 National curriculum descriptor: pressure waves transferring energy; use for cleaning and physiotherapy by ultrasound; waves transferring information for conversion to electrical signals by microphone.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>	<p>judgments and draw conclusions; develop and improve experimental procedures.</p> <p>In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>	<p>KS4 Assessment Objectives:</p> <ul style="list-style-type: none"> • AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. • AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. • AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures. <p>In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>	
<p>Unit 9 knowledge end points</p>	<p>Explain the way in which an astronaut's weight varies on a journey to the moon.</p> <p>Knowledge: 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.</p> <p>Fact: g on Earth = 10 N/kg. On the moon it is 1.6 N/kg.</p>	<p>Relate the impact of different types of waves on living cells to their frequency and the energy carried by the wave.</p> <p>Knowledge: When a wave travels through a substance, particles move to and fro. Energy is transferred in the direction of movement of the wave. Waves of higher amplitude or higher frequency transfer more energy.</p>	<p>To be able to classify reactions as endothermic or exothermic and how this is determined by the amount of energy needed or released when making/breaking bonds.</p> <p>Knowledge:</p> <ul style="list-style-type: none"> • Measurement of energy changes in chemical reactions (qualitative) • Bond breaking, bond making, activation energy and reaction profiles (qualitative) 	<p>To be able to explain how differences in the microstructure of conductors, semiconductors and insulators makes it possible to design components and build electric circuits.</p> <p>Knowledge:</p> <ul style="list-style-type: none"> • measuring resistance using p.d. and current measurements • exploring current, resistance and voltage relationships for different circuit elements; including their graphical representations • quantity of charge flowing as the product of current and time • drawing circuit diagrams; exploring equivalent resistance for resistors in series • the domestic a.c. supply; live, neutral and earth mains wires, safety measures • power transfer related to p.d. and current, or current and resistance 	

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	Metals and non-metals	Periodic table		B7 Ecology	
Unit 10	<p>KS2: Associate metals with being good conductors.</p> <p>Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.</p> <p>Metals and non-metals: Define physical and chemical properties. Categorise examples.</p> <p>Separating mixtures: discuss state symbols. What does aqueous mean? Link to solutions and solubility. Naming products links to pure substances and mixtures.</p> <p>Periodic table: Explain how the periodic table is separated into metals and non-metals based on physical and chemical properties.</p> <p>Elements: Metallic and non-metallic properties.</p> <p>Types of reaction: Metallic and non-metallic chemical properties.</p> <p>KS3 National curriculum descriptor: the periodic table: periods and groups; metals and non-metals.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>	<p>Elements: Students can identify elements, compounds and mixtures. Students can identify the elements present in chemical formulae.</p> <p>Metals and non-metals: Students can identify properties of metals and non-metals and can explain reactions with oxygen, water and acids.</p> <p>Metals and non-metals: Re-cap the reactivity series and displacement reactions before analysing the displacement reactions of Halogens.</p> <p>Elements: Link trends in chemical properties of the alkali metals and halogens to their electronic structure.</p> <p>KS3 National curriculum descriptor: How patterns in reactions can be predicted with reference to the periodic table.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>		<p>Students will study Inheritance, variation and evolution around the same time and will be able to form connections between adaptations and the need for genetic variation.</p> <p>Students have an understanding of food chains/webs from KS3.</p> <p>Students have also studied Photosynthesis and understand how plants are adapted to convert the sun's energy into glucose.</p> <p>B4 Bioenergetics: Link the process of photosynthesis to trophic levels (producers).</p> <p>P1 Energy: Food chains and webs can link to energy transfers within a system and energy efficiency and dissipation.</p> <p>C9 Chemistry of the atmosphere: Connections can be made between the carbon cycle, greenhouse gases, global warming, deforestation and the reduction of biodiversity.</p> <p>C10 Using resources: Sustainable development can be linked to maintaining biodiversity.</p> <p>B6 Inheritance, variation and evolution: Animal and plant adaptations linked to sexual reproduction and the importance of genetic variation in natural selection.</p> <p>KS4 Assessment Objectives:</p>	

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				<ul style="list-style-type: none"> • AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. • AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. • AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures. <p style="color: green;">In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>	
<p>Unit 10 knowledge end points</p>	<p>Use experimental results to suggest an order of reactivity of various metals.</p> <p>Knowledge: 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.</p> <p>Facts: 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.</p>	<p>Sort elements using chemical data and relate this to their position in the periodic table.</p> <p>Knowledge: The elements in a group all react in a similar way and sometimes show a pattern in reactivity. As you go down a group and across a period the elements show patterns in physical properties.</p> <p>Facts: Metals are generally found on the left side of the table, non-metals on the right. Group 1 contains reactive metals called alkali metals. Group 7 contains non-metals called halogens. Group 0 contains unreactive gases called noble gases.</p>		<p>To be able to explain how humans are threatening biodiversity as well as the natural systems that support it.</p> <p>Knowledge:</p> <ul style="list-style-type: none"> • levels of organisation within an ecosystem • some abiotic and biotic factors which affect communities; the importance of interactions between organisms in a community • how materials cycle through abiotic and biotic components of ecosystems • the role of microorganisms (decomposers) in the cycling of materials through an ecosystem • organisms are interdependent and are adapted to their environment • the importance of biodiversity • methods of identifying species and measuring distribution, frequency and abundance of species within a habitat 	

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				<ul style="list-style-type: none"> positive and negative human interactions with ecosystems 	
Unit 11	<p style="text-align: center;">Plant reproduction</p> <p>KS2: Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</p> <p>Describe the life process of reproduction in some plants and animals.</p> <p>Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</p> <p>Respiration: Linked to life processes such as plant reproduction.</p> <p>Photosynthesis: Converting sunlight to glucose for use in respiration to generate energy for reproduction.</p> <p>Inheritance: Sexual reproduction leads to variation. Gregor Mendel pea plants experiment.</p> <p>KS3 National curriculum descriptor: reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>	<p style="text-align: center;">Photosynthesis</p> <p>KS2: Knowledge that plants make their own food using sunlight. Knowledge that plants need soil to grow healthily.</p> <p>Respiration: All living organisms respire to produce energy for life processes. Glucose needed for respiration is created by the process of photosynthesis.</p> <p>Respiration: Recall the equation for respiration and explain the importance of the process in plants. Plant reproduction: Recall the structures of a plant and their functions.</p> <p>Particle model: Explain how gases such as carbon dioxide and oxygen diffuse into and out of the leaf. Digestion/Breathing: Explain the adaptations of exchange surfaces and link them to alveoli/villi/roots.</p> <p>Particle Theory: Process of diffusion (Osmosis) when discussing evaporation (Transpiration). Light: Link to colour spectrum, reflection of light.</p> <p>Particle model: Explain how an increase in temperature provides particles with more energy resulting in an increased rate of photosynthesis.</p> <p>Universe: Link light intensity to temperature and the how the tilt of the Earth creates the seasons.</p> <p>Digestion: Enzymes become denatured as the temperature increases.</p>		<p style="text-align: center;">C10 Using resources</p> <p>C4 Chemical changes: Waste water treatment can be linked to knowledge about solubility and neutralisation reactions. Corrosion and prevention is linked to understanding reactions of metals. Neutralisation and titrations linked to making fertilisers.</p> <p>C2 Bonding: Requires knowledge about the structure of metals and polymers.</p> <p>B2 Organisation: Need for fertilisers linked to plant organ systems.</p> <p>B3 Infection and response: Knowledge of plant diseases and mineral deficiencies will allow students to identify the type of fertiliser required.</p> <p>P3 Particle model: Knowledge of particle theory and solubility can explain how filtration is used in waste water treatment.</p> <p>KS4 Assessment Objectives:</p> <ul style="list-style-type: none"> AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures. AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures. AO3: Analyse information and ideas to: interpret and evaluate; make judgments and draw conclusions; develop and improve experimental procedures. 	

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		<p>Climate: Link the greenhouse effect to how greenhouses are an effective farming method for improving crop yields.</p> <p>KS3 National curriculum descriptor: the dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plant and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>		<p>In class teacher assessment. Termly summative tests and end of year 9/10/11 summative tests.</p>	
Unit 11 knowledge end points	<p>Use models to evaluate the features of various types of seed dispersal.</p> <p>Knowledge: 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.</p> <p>Facts: Flowers contain the plant's reproductive organs. Pollen can be carried by the wind, pollinating insects or other animals.</p>	<p>Use lab tests on leaves to show that chlorophyll is essential for photosynthesis.</p> <p>Knowledge: 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.</p> <p>Fact: Iodine is used to test for the presence of starch.</p>		<p>To be able to evaluate a resources life cycle assessment and explain how resources can be used in a sustainable way.</p> <p>Knowledge:</p> <ul style="list-style-type: none"> life cycle assessment and recycling to assess environmental impacts associated with all the stages of a product's life the viability of recycling of certain materials carbon compounds, both as fuels and feedstock, and the competing demands for limited resources 	
Unit 12	<p>Acids and alkalis</p> <p>KS2: Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes</p>	<p>Work</p> <p>Contact forces: Applying a contact force over a distance requires work to be done.</p>			

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	<p>associated with burning and the action of acid on bicarbonate of soda.</p> <p>Elements: Re-cap elements, compound and mixtures as well as how to write of understand chemical formulae.</p> <p>Separating Mixtures: Re-cap solubility in terms of solvents and solutes when explaining the difference between concentrated and dilute acids.</p> <p>KS3 National curriculum descriptor: defining acids and alkalis in terms of neutralisation reactions.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>	<p>Energy transfer: Work done has the same units as energy – joules. This is because energy is the ability to do work. So you must have energy to do work. Work done is equal to energy transferred.</p> <p>KS3 National curriculum descriptor: work done and energy changes on deformation.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>			
<p>Unit 12 knowledge end points</p>	<p>Devise an enquiry to compare how well indigestion remedies work.</p> <p>Knowledge: The pH of a solution depends on the strength of the acid: strong acids have lower pH values than weak acids. Mixing an acid and alkali produces a chemical reaction, neutralisation, forming a chemical called a salt and water.</p> <p>Facts: Acids have a pH below 7, neutral solutions have a pH of 7, alkalis have a pH above 7. Acids and alkalis can be corrosive or irritant and require safe handling. Hydrochloric, sulfuric and nitric acid are strong acids. Acetic and citric acid are weak acids.</p>	<p>Explain how an electric motor raising a weight is doing work.</p> <p>Knowledge: Work is done and energy transferred when a force moves an object. The bigger the force or distance, the greater the work. Machines make work easier by reducing the force needed. Levers and pulleys do this by increasing the distance moved, and wheels reduce friction.</p>			
	<p>Sound</p>	<p>Climate</p>			

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Unit 13	KS2: Identify how sounds are made, associating some of them with something vibrating. Recognise that vibrations from sounds travel through a medium to the ear. Find patterns between the pitch of a sound and features of the object that produced it. Find patterns between the volume of a sound and the strength of the vibrations that produced it. Recognise that sounds get fainter as the distance from the sound source increases. Particle theory: Explain how the speed of sound varies in different states of matter. Speed (Forces): Calculate speed of a wave. Particle theory: Explain why ultrasound waves travel through water more easily than in air. Transfer of energy and vibrating particles in solids when explaining how ultrasound is used to treat kidney stones. Speed (Forces): Use the equation speed = distance/time to explain how ultrasound is used to detect how far away an object is. KS3 National curriculum descriptor: sound needs a medium to travel, the speed of sound in air, in water, in solids. In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.	KS2: Recognise that environments can change and that this can sometimes pose dangers to living things. May have explored human impact on the environment including deforestation. Photosynthesis: Link to plant minerals and the greenhouse effect. Greenhouses as a farming method to improve crop yields. KS3 National curriculum descriptor: the composition of the atmosphere. In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.			

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<p>Unit 13 knowledge end points</p>	<p>Relate changes in the shape of an oscilloscope trace to changes in pitch and volume.</p> <p>Knowledge: Sound consists of vibrations which travel as a longitudinal wave through substances. The denser the medium, the faster sound travels. The greater the amplitude of the waveform, the louder the sound. The greater the frequency (and therefore the shorter the wavelength), the higher the pitch. Facts: Sound does not travel through a vacuum. The speed of sound in air is 330 m/s, a million times slower than light.</p>	<p>Investigate the contribution that natural and human chemical processes make to our carbon dioxide emissions.</p> <p>Knowledge: 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.</p> <p>Facts: 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.</p>			
<p>Unit 14</p>	<p style="text-align: center;">Earth structure</p> <p>KS2: Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. Describe in simple terms how fossils are formed when things that have lived are trapped within rock. Recognise that soils are made from rocks and organic matter.</p> <p>Forces: Physical weathering of rocks arises from forces generated by expansion and contraction and the freezing and thawing of water.</p> <p>KS3 National curriculum descriptor: the structure of the Earth.</p>	<p style="text-align: center;">Evolution</p> <p>KS2: Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. The development of the theory of natural selection. His work exploring birds and their beaks.</p> <p>Cells: Identify the structures in plant and animal cells. Students need to understand what a nucleus is before learning that DNA is stored within it.</p> <p>Variation: students can identify types of genetic and environmental variation within a community.</p>			

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	<p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>	<p>Inheritance: Students have explored genetic cross diagrams and the probability of acquiring certain characteristics.</p> <p>Human reproduction: Link to fertilisation by explaining haploid and diploid number of chromosomes.</p> <p>KS3 National curriculum descriptor: the variation between species and between individuals of the same species meaning some organisms compete more successfully, which can drive natural selection.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>			
<p>Unit 14 knowledge end points</p>	<p>Model the process that are responsible for rock formation and link these to the rock features.</p> <p>Knowledge: Sedimentary, igneous and metamorphic rocks can be inter converted over millions of years through weathering and erosion, heat and pressure, and melting and cooling.</p> <p>Fact: The three rock layers inside Earth are the crust, the mantle and the core.</p>	<p>Review the evidence for theories about how a particular species went extinct.</p> <p>Knowledge: 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.</p>			
<p>Unit 15</p>	<p>Human reproduction</p> <p>Students study human reproduction before variation. This will enable staff to refer back to human reproduction and how it results in genetic variation. Students will also need to recall human reproduction when studying genetic inheritance in year 8.</p>	<p>Magnetism</p> <p>KS2: Notice that some forces need contact between two objects, but magnetic forces can act at a distance. Observe how magnets attract or repel each other and attract some materials and not others. Compare and group together a variety of everyday</p>			

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	<p>KS2: Describe the changes as humans develop to old age (including focussing on puberty). Describe the life process of reproduction in some plants and animals.</p> <p>Inheritance: sexual reproduction linked to genetic variation.</p> <p>KS3 National curriculum descriptor: Reproduction in humans, including the structure and function of the male and female reproductive systems, menstrual cycle, gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>	<p>materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. Describe magnets as having two poles. Predict whether two magnets will attract or repel each other.</p> <p>Contact forces: students can identify three non-contact forces: magnetism, gravity and electrostatic.</p> <p>Electromagnets: An electromagnet is a type of magnet in which the magnetic field is produced by an electric current.</p> <p>KS3 National curriculum descriptor: magnetic poles, attraction and repulsion.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>			
Unit 15 knowledge end points	<p>Relate advice to pregnant women to ideas about transfer of substances to the embryo.</p> <p>Knowledge: The menstrual cycle prepares the female for pregnancy and stops if the egg is fertilised by a sperm. The developing foetus relies on the mother to provide it with oxygen and nutrients, to remove waste and protect it against harmful substances.</p> <p>Facts: The menstrual cycle lasts approximately 28 days. If an egg is fertilised it settles into the uterus lining.</p>	<p>Explore the magnetic field pattern around different types or combinations of magnets.</p> <p>Knowledge: 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.</p> <p>Facts: Two 'like' magnetic poles repel and two 'unlike' magnetic poles attract. Field lines flow from the north-seeking pole to the south-seeking pole.</p>			
	Light	Digestion			

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<p>Unit 16</p>	<p>KS2: Recognise that they need light in order to see things and that dark is the absence of light. Notice that light is reflected from surfaces. Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. Recognise that shadows are formed when the light from a light source is blocked by an opaque object. Find patterns in the way that the size of shadows change. Recognise that light appears to travel in straight lines. Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. We see things because they give out light or light is reflected from there into our eyes.</p> <p>Particle model: Re-cap the density of solids, liquids and gases to explain how the speed of light changes as it passes through different mediums.</p> <p>KS3 National curriculum descriptor: the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>	<p>KS2: Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.</p> <p>Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. Describe the simple functions of the basic parts of the digestive system in humans. Knowledge of bacteria as a microorganism.</p> <p>Particle model: Explain how digested food diffuses through villi and into the blood.</p> <p>KS3 National curriculum descriptor: the tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>			
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<p>Unit 16 knowledge end points</p>	<p>Use ray diagrams to model how light passes through lenses and transparent materials.</p> <p>Knowledge: When a light ray meets a different medium, some of it is absorbed and some reflected. For a mirror, the angle of incidence equals the angle of reflection. The ray model can describe the formation of an image in a mirror and how objects appear different colours. When light enters a denser medium it bends towards the normal; when it enters a less dense medium it bends away from the normal. Refraction through lenses and prisms can be described using a ray diagram as a model.</p> <p>Facts: Light travels at 300 million metres per second in a vacuum. Different colours of light have different frequencies.</p>	<p>Evaluate how well a model represents key features of the digestive system.</p> <p>Knowledge: The body needs a balanced diet with carbohydrates, lipids, proteins, vitamins, minerals, dietary fibre and water, for its cells' energy, growth and maintenance. Organs of the digestive system are adapted to break large food molecules into small ones which can travel in the blood to cells and are used for life processes.</p> <p>Facts: 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.</p>			
<p>Unit 17</p>	<p>Variation</p> <p>KS2: Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.</p> <p>Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. Animals and plants are often adapted to their environment through differences in their structure. Forces: Relationships between force, area and pressure can be used to explain adaptation in animals - to explain, for example, why polar bears and camels have large feet for walking on snow and sand.</p>	<p>Elements</p> <p>KS2: Simple understanding of a mixture and basic separation techniques.</p> <p>Types of reaction: Identify atoms, elements, compounds and mixtures. Predicting and naming products.</p> <p>Earth's resources: Recycling of polymers</p> <p>KS3 National curriculum descriptor: differences between atoms, elements and compounds. A simple (Dalton) atomic model.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>			

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	<p>Inheritance: Students will explore genetic cross diagrams and the probability of acquiring certain characteristics. Explaining how variation exists within a population.</p> <p>Evolution: Genetic variation may result in advantageous characteristics which favour natural selection.</p> <p>KS3 National curriculum descriptor: Variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>				
<p>Unit 17 knowledge end points</p>	<p>Graph data relating to variation and explain how it may lead to the survival of a species.</p> <p>Knowledge: 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.</p>	<p>Compare the properties of elements with the properties of a compound formed from them.</p> <p>Knowledge: Most substances are not pure elements, but compounds or mixtures containing atoms of different elements. They have different properties to the elements they contain.</p> <p>Fact: The symbols of hydrogen, oxygen, nitrogen, carbon, hydrogen, iron, zinc, copper, sulfur, aluminium, iodine, bromine, chlorine, sodium, potassium and magnesium.</p>			
<p>Unit 18</p>	<p>Universe</p> <p>KS2: Describe the movement of the Earth, and other planets, relative to the Sun in the solar system. Describe the movement of the Moon relative</p>	<p>Electromagnets</p> <p>Magnetism: An electromagnet is a type of magnet in which the magnetic field is produced by an electric current.</p>			

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	<p>to the Earth. Describe the Sun, Earth and Moon as approximately spherical bodies. Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.</p> <p>Universe is studied before the Earth's structure so that students fully understand the planets position within the solar system.</p> <p>Speed: Use the speed equation to calculate the distance of planets from the sun or Earth using knowledge of the speed of light.</p> <p>Forces: Explain how the application of force moves extremely large objects in planetary motion.</p> <p>KS3 National curriculum descriptor: Our sun as a star, other stars in our galaxy, other galaxies.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>	<p>Voltage and resistance: Electromagnets usually consist of wire wound into a coil. Discuss how the length of the wire affects resistance.</p> <p>Current: Electromagnets usually consist of wire wound into a coil. A current through the wire creates a magnetic field which is concentrated in the hole, denoting the centre of the coil.</p> <p>P6 Waves: Electromagnets and Flemings left hand rule.</p> <p>KS3 National curriculum descriptor: The magnetic effect of a current, electromagnets, DC motors.</p> <p>In class teacher assessment. Termly summative tests and end of year 7/8 summative tests.</p>			
<p>Unit 18 knowledge end points</p>	<p>Relate observations of changing day length to an appropriate model of the solar system.</p> <p>Knowledge: The solar system can be modelled as planets rotating on tilted axes while orbiting the Sun, moons orbiting planets and sunlight spreading out and being reflected. This explains day and year length, seasons and the visibility of objects from Earth. Our solar system is a tiny part of a galaxy, one of many billions in the Universe. Light takes minutes to reach Earth</p>	<p>Investigate ways of varying strength of an electromagnet.</p> <p>Knowledge: An electromagnet uses the principle that a current through a wire causes a magnetic field. Its strength depends on the current, the core and the number of coils in the solenoid.</p> <p>Fact: The magnetic field of an electromagnet decreases in strength with distance.</p>			

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	from the Sun, four years from our nearest star and billions of years from other galaxies.				
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Add more/remove units if required

Do not change the colours of the text used.

UNIT TITLE- State the title of the unit

PRIOR LEARNING NEEDED/RE-CAPPED FROM KS2 – Identify what you need to re-cap from the previous KS or topic(s) in order to achieve success & depth

HOW ASSESSED? – What is the final outcome (e.g. essay/test) and how will it be marked e.g.