



# Science Long Term Curriculum Plan 2024/25

Throughout our curriculum planning we remain focused on delivering a 21<sup>st</sup> century curriculum designed to ensure Pupils are well prepared for the future.

Years 3-6 and Year 9 take part in Forest School during the academic year (each of the years go for a term, this can vary yearly).

Subject	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
<i>Frogs Class</i>	<p>Frog class follow the EYFS framework throughout the academic year; the science content is taught throughout the curriculum 'Understanding the World'.</p> <p>During the year they will explore:</p> <ul style="list-style-type: none"> <li>Animals including humans; healthy eating, exercise &amp; hygiene</li> <li>Use of Everyday Materials; identification of properties, similarities &amp; differences and their uses</li> <li>Animals including humans; life cycles</li> <li>Plants; growing bulbs/seeds,</li> <li>Living things and their habitats; explore things that are living and things that are not, animals and habitats,</li> <li>Living things and their habitats; food chains</li> </ul>					
<p><i>Honeybees</i></p> <p>NC Year 1/2 PA Stage K6/7/8/9</p>	<p><b>Animals including humans: (Biology)</b> Describe the importance for humans of exercise, eating the right number of different types of food and hygiene/cleaning: teeth, ears, eyes, bodies To look at the different parts of a human body. To look and discuss our facial features. To label common parts of a human body and our senses. To look at babies and their young and sort them into categories Notice that animals including humans have offspring which grow into adults. To understand the importance of a healthy diet. <b>Working Scientifically</b></p>	<p><b>Uses of everyday materials: (Physics)</b> Identify and compare the suitability of a variety of everyday materials, including wood, metal plastic glass brick rock paper and cardboard for particular uses.  Compare a group different types of materials: float and non-float. Describe the simple physical properties of an everyday material. Performing simple test.  weather <b>Working Scientifically</b> Observing closely using simple equipment. Performing simple tests</p>	<p><b>Animals including humans (Biology)</b> Notice that animals including humans have off -spring which grow into adults. <b>Working Scientifically</b> Identifying and classifying</p>	<p><b>Plants: (Biology)</b> Observe and describe how seeds and bulbs grow into mature plants.  Find out and describe how plants need water, light, and a suitable temperature to grow and stay healthy.  <b>Working Scientifically</b> Observing closely using simple equipment Gathering and recording data to help in answering questions</p>	<p><b>Living things and their habitats: (Biology)</b> Explore and compare the differences between things that are living, dead and things that have never been alive. Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants and how they depend on each other. Identify and name a variety of plants and animals in their habitats including micro-habitats <b>Working Scientifically</b> Identifying and classifying</p>	<p><b>Living things and their habitats: (Biology)</b> Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain and identify and name different sources of food <b>Working Scientifically</b> Identifying and classifying</p>

		<p>Asking simple questions and recognising that they can be answered in different ways.</p> <p><b>Seasonal changes</b> Observe changes across the 4 seasons. Observe and describe weather associated with the seasons and how day length varies.</p>				Using their observations and ideas to suggest answers to questions.	
Year 3 Hedgehogs Class	NC Year 3 PA Stage K8- stage 1	<p><b>Forces and magnets (Physics)</b> compare how things move on different surfaces. 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 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, depending on which poles are facing.</p> <p><b>Working Scientifically</b></p>	<p><b>Light (Physics)</b> 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 changes.</p> <p><b>Working Scientifically</b> Asking relevant questions and using different types of scientific enquiries to answer them Setting up simple practical enquiries, comparative, and fair tests Making careful</p>	<p><b>Rocks (Physics)</b> 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><b>Working Scientifically</b> Making careful observations Identifying differences, similarities, or changes</p>	<p><b>Animals, including humans (Biology)</b> identify that animal, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat identify that humans and some other animals have skeletons and muscles for support, protection, and movement.</p> <p><b>Working Scientifically</b> Asking relevant questions and using different types of scientific enquiries to answer them Using straightforward scientific evidence to answer questions</p>	<p><b>Plants (Biology)</b> identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant. investigate the way in which water is transported within plants. explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</p> <p><b>Working Scientifically</b> Making careful observations Gathering, recording, classifying, and presenting data Using results to draw simple conclusions,</p>	<p><b>Inventions</b> Famous inventors/inventions that made the world a better place.</p> <ul style="list-style-type: none"> <li>• Marie Curle</li> <li>• George Washington Carver</li> <li>• William Smith</li> <li>• Inge Lehmann</li> </ul> <p><b>Working Scientifically</b> To ask relevant questions and use evidence from scientific enquiries to answer them and support findings. To gather, record, classify and present data in a variety of ways to help in answering questions by investigating. To identify changes related to scientific ideas.</p>

		<p>Setting up simple practical enquiries, comparative, and fair tests</p> <p>Making careful observations</p> <p>Gathering, recording, classifying, and presenting data</p>	<p>observations</p> <p>Recording findings using simple scientific language</p>			<p>make predictions for new values and suggest improvements</p>	
<p>Year 4 Foxes Class</p> <p>NC Year 4 PA Stage 1-3</p>	<p><b>Electricity</b> (Physics)</p> <p>Identify common appliances that run on electricity.</p> <p>Construct a simple series electrical circuit, including cells, wires, bulbs, switches, and buzzers.</p> <p>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.</p> <p>Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a sample series circuit.</p> <p>Recognise some common conductors and insulators, and associate metals with being good</p>	<p><b>States of matter</b> (Chemistry)</p> <p>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 degrees Celsius.</p> <p>Identify the part played by evaporation and condensation in the water cycle and associate the rate of the evaporation with temperature.</p> <p><b>Working Scientifically</b></p> <p>Setting up simple practical enquiries, comparative, and fair tests</p>	<p><b>Living things and their habitats</b> (Biology)</p> <p>Recognise that living things can be grouped in a variety of ways.</p> <p>Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.</p> <p>Recognise that environments can change and that this can sometimes pose dangers to living things.</p> <p><b>Working Scientifically</b></p> <p>Asking relevant questions and using different types of scientific enquiries to answer them</p> <p>Making careful observations</p> <p>Gathering, recording, classifying, and presenting data</p>	<p><b>Sounds</b> (Physics)</p> <p>Identify how sounds are made associating some of them with something vibration.</p> <p>Recognise that vibrations from a sound travel through a medium to the ear.</p> <p>Find patterns between the pitch of a sound and features of the object that produced it.</p> <p>Find patterns between the volume of a sound and the strength of the vibrations that produced it.</p> <p>Recognise that sounds get fainter as the distance from the sound source increases.</p> <p><b>Working Scientifically</b></p> <p>Asking relevant questions and using different types of scientific enquiries to answer them</p> <p>Setting up simple</p>	<p><b>Animals, including humans</b> (Biology)</p> <p>Describe the simple functions of the basic parts of the digestive system in humans.</p> <p>Identify the different types of teeth in humans and their simple function.</p> <p>Construct and interpret a variety of food chains, identifying producers, predators, and prey.</p> <p><b>Working Scientifically</b></p> <p>Asking relevant questions and using different types of scientific enquiries to answer them</p> <p>Making careful observations</p> <p>Gathering, recording, classifying, and presenting data</p> <p>Using results to draw</p>	<p><b>Inventions</b></p> <p>Famous inventors/inventions that made the world a better place.</p> <ul style="list-style-type: none"> <li>• Maria Telkes</li> <li>• Lord Kelvin</li> <li>• Thomas Edison</li> <li>• Invention of toothpaste</li> </ul> <p>Design and create an invention to help and improve lives.</p> <p><b>Working Scientifically</b></p> <p>To use scientific evidence from comparative tests to support findings.</p> <p>To take accurate measurements using standard units and a range of equipment, including thermometers.</p> <p>To identify changes relating to simple scientific ideas and</p>	

		<p>conductors.</p> <p><b>Working Scientifically</b></p> <p>Asking relevant questions and using different types of scientific enquiries to answer them</p> <p>Setting up simple practical enquiries</p> <p>Making careful observations</p> <p>Recording findings using simple scientific language, drawings, and labelled diagrams</p> <p>Using results to draw simple conclusions</p>	<p>Taking accurate measurements using standard units</p> <p>Gathering, recording, classifying, and presenting data</p> <p>Recording findings using simple scientific language</p> <p>Identifying differences, similarities or changes relating to simple scientific ideas and processes</p>		<p>practical enquiries</p> <p>Reporting on findings from enquiries, including oral and written explanations</p> <p>Using straightforward scientific evidence to answer questions or to support their findings</p>	<p>simple conclusions</p>	<p>processes.</p> <p>Make careful observations.</p>
<p>Year 5 Penguins Class &amp; Eagles Year B</p> <p>Year 5 PA Stage 3 - 5</p>	<p><b>Forces (Physics)</b></p> <p>Explain that unsupported objects fall towards Earth because of the force of gravity acting between the Earth and the falling object.</p> <p>Identify the effects of air resistance, water resistance and friction, that act between moving services.</p> <p>Recognise that some mechanisms, including levers, pulleys, and gears, allow a smaller force to have a greater effect.</p> <p><b>Working Scientifically</b></p> <p>Planning different types of scientific enquiries to</p>	<p><b>Earth &amp; Space (Physics)</b></p> <p>Describe the movement of the Earth, and other planets, relative to the sun in the solar system</p> <p>Describe the movement of the Moon relative to the Earth.</p> <p>Describe the Sun, Earth, and Moon as approximately spherical bodies.</p> <p>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><b>Working Scientifically</b></p> <p>Recording data and results of increasing</p>	<p><b>Animals including humans (Biology)</b></p> <p>Describe the changes as humans develop to old age</p> <p><b>Working Scientifically</b></p> <p>Reporting and presenting findings from enquiries, including conclusions, casual relationships, and explanations of and degree of trust in results, in oral and written forms.</p>	<p><b>Living things and their habitats (Biology)</b></p> <p>Describe the differences in the life cycles of a mammal, an amphibian, an insect, and a bird</p> <p>Describe the life process of reproduction in some plants and animals</p> <p><b>Working Scientifically</b></p> <p>Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter, bar, and line graphs</p>	<p><b>Properties and changes of materials (Chemistry)</b></p> <p>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>Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution</p> <p>Use knowledge of solids, liquids, and gases to decide how mixtures might be separated, including through filtering, sieving, and</p>	<p><b>Inventions</b></p> <p>Famous inventors/inventions that made the world a better place.</p> <ul style="list-style-type: none"> <li>• David Attenborough</li> <li>• CSI Technicians</li> <li>• Margaret Hamilton</li> <li>• Eva Crane</li> <li>• Stephanie Kwolek</li> <li>• Leonardo Da Vinci</li> </ul> <p>Design and create an invention to help and improve lives.</p> <p><b>Working Scientifically</b></p> <p>Use knowledge of solids, liquids, and gases to</p>	

		<p>answer questions, including recognising, and controlling variables where necessary</p> <p>Taking measurements using a range of scientific equipment with increasing accuracy and precision</p> <p>Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter, bar, and line graphs</p> <p>Using test results to make predictions to set up further tests</p>	<p>complexity using scientific diagrams and labels, classification keys, tables, scatter, bar, and line graphs</p> <p>Identify scientific evidence that has been used to support or refute ideas</p>			<p>evaporating</p> <p>Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood, and plastic</p> <p>Demonstrate that dissolving, mixing and changes of state are reversible changes</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><b>Working Scientifically</b></p> <p>Planning different types of scientific enquiries to answer questions, including recognising, and controlling variables where necessary</p> <p>Taking measurements using a range of scientific equipment with increasing accuracy and precision</p> <p>Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter, bar,</p>	<p>decide how mixtures might be separated, including through filtering, sieving, and evaporating</p> <p>To identify scientific evidence that has been used to support or refute ideas or arguments.</p> <p>To describe how scientific ideas have changed over time.</p>
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Year 6 Falcons Class & Eagles Year A	<b>Evolution and Inheritance</b>  <b>Biology</b> Recognise that living things have changed over time and that fossils provide information about living things years ago Recognise that living things produce offspring that varies Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution Evolution fact file Whale adaptation (non-chronological report) <b>Working Scientifically</b> Identify differences, similarities or changes related to simple scientific ideas and processes Ask relevant questions and use different types of scientific enquiries to answer them	<b>Living Things and Their Habitats</b>  <b>Biology</b> Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants, and animals Give reasons for classifying plants and animals based on specific characteristics Animal fact file <b>Working Scientifically</b> Gather, record, and classify data in a variety of ways to help in Make systematic and careful observations and, where appropriate, taking accurate measurements using standard units.	<b>Light</b> <b>Physics</b> Recognise that light travels in straight lines & 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 objects, to our eyes Explain why shadows have the same shape as the objects that cast them  <b>Working Scientifically</b> Set up simple practical enquiries, comparative, and fair tests Record findings using simple scientific language, drawings, labelled diagrams and keys, bar charts, and tables Report on findings from enquiries, including oral and written explanations, displays and presentations of results and conclusions Use results to draw simple conclusions, make predictions for new values and suggest	<b>Electricity</b> <b>Physics</b> 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  <b>Working Scientifically</b> Set up simple practical enquiries, comparative, and fair tests Record findings using simple scientific language, drawings, labelled diagrams and keys, bar charts, and tables Report on findings from enquiries, including oral and written explanations, displays and presentations of results and conclusions Use results to draw simple conclusions, make predictions for new values and suggest further questions	<b>Animals Including Humans</b> <b>Biology</b> Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood Recognise the impact of diet, exercise, drugs, and lifestyle on the way their bodies function Describe the ways in which nutrients and water are transported within animals, including humans. Healthy living leaflet  <b>Working Scientifically</b> Use results to draw simple conclusions, make predictions for new values Ask relevant questions and use different types of scientific enquiries to answer them	<b>Scientists and Inventors</b> Famous inventors/inventions that made the world a better place. <ul style="list-style-type: none"> <li>• Stephen Hawkings</li> <li>• Libbie Hyman</li> <li>• Marie Maynard Daly</li> <li>• Alexander Fleming</li> <li>• Mary Leakey</li> <li>• Steve Jobs</li> <li>• Dr Daniel Hale Williams</li> </ul> Explanation text - inventor Debate – global warming Persuasive piece – recycling  <b>Working Scientifically</b> Use a range of equipment, including thermometers Recording findings using simple scientific language, keys, bar charts, and tables Use results to draw simple conclusions, suggest improvements and raise further questions Use straightforward scientific evidence to	

				improvements and raise further questions Present data in a variety of ways to help in answering questions	Use a range of equipment, including thermometers and data loggers Present data in a variety of ways to help in answering questions		answer questions or to support their findings
Year 7 (Skills and knowledge)  NC Year: 7 PA Stage: 3-10	<p><b>Introduction Unit – Working Scientifically</b></p> <p>An introduction to the science room, health and safety, key pieces of equipment and scientific skills (how to plan investigations to answer scientific questions).</p> <p><b>Cells</b></p> <p>Pupils are introduced to cells as the building blocks of all living organisms. Pupils will look at the structures in plants and animal cells. They will look at the adaptation of specialised cells. They will learn about the process of diffusion by which substances move into and out of cells. They will also study the unicellular organisms, euglena, and amoeba.</p>	<p><b>Structure and function of body systems</b></p> <p>Pupils build on the concept of cells as building blocks of all living organisms. Pupils are introduced first to the levels of organisation present within a multicellular organism, starting with the cell. Then, the focus turns to two organ systems – the respiratory system (through looking at breathing and the process of gas exchange) and the skeletal system. Finally, Pupils will consider the roles of skeleton, including looking in detail as its role in movement through the study of joints and antagonistic muscles.</p> <p><b>Particles and their behaviour</b></p> <p>Pupils are introduced to the particle model and how to use it to explain</p>	<p><b>Elements, atoms and compounds</b></p> <p>Pupils are introduced to the concepts of atoms, elements, molecules, and compounds, and use their knowledge of particles to start naming molecules and compounds and writing chemical symbols and chemical formulae.</p> <p><b>Reactions</b></p> <p>Pupils are introduced to chemical reactions. They will develop their knowledge by looking at different types of chemical reactions, including oxidation, combustion, and decomposition. Pupils will also learn how to represent chemical substances and reactions using ratios and how to write word equations and balanced formula equations.</p>	<p><b>Forces</b></p> <p>Introduces Pupils to forces that are all around them. Pupils learn that forces act on stationary objects and that, without forces, nothing would be able to move. They also study how forces can change the shape of an object and investigate Hooke's law. Pupils will take measurements using Newton meters and develop their graph drawing skills.</p> <p><b>Sound</b></p> <p>Introduces Pupils to longitudinal and transverse waves and looks at what happens when waves meet each other or hit a barrier. Pupils look at sound waves in more detail, what mediums sound waves can travel through, and how they are detected by the ear and microphone.</p>	<p><b>Reproduction</b></p> <p>Introduces Pupils to the process of sexual reproduction in both plants and animal cells. It begins by introducing the emotional and physical changes which take place during adolescence, which is likely to tie in with what Pupils are currently experiencing. Pupils then study human reproductive systems, and the processes involved in reproduction. The second half of the chapter focuses on plant reproduction, including fertilisation, germination, and seed dispersal. To align with the National Curriculum, this chapter covers the biology of sexual reproduction between a male and female.</p> <p><b>Acids and Alkalis</b></p> <p>Pupils are introduced to the term acid, alkali,</p>	<p><b>Light</b></p> <p>Introduces Pupils to some properties of light and how light travels. Pupils compare how the eye and the camera work. They gain an understanding of the effect of coloured filters on light and the effect of coloured light on different coloured objects. Throughout the chapter, Pupils will learn about the behaviour of light in different situations where light interacts with matter, such as reflection, refraction, and dispersion.</p> <p><b>Space</b></p> <p>Introduces Pupils to some of the celestial objects that they can see in the night sky as well as other objects in the Universe. They gain an understanding of how the planets in our Solar System formed. Pupils</p>	

			the properties of substances in the three states of matter. The chapter also introduces the concept of density and diffusion and the factors that affect them		Throughout the chapter, Pupils will learn about the features of waves and how they are represented. Pupils will study how the amplitude and frequency of a sound wave affects its loudness and pitch.	base and neutral, and they are taken through the reactions between acid and metals and bases, called neutralisation reactions, and some examples of how useful these can be. The chapter looks at pH for the first time as a measure of how acidic a solution is, and the pH range associated with acidic, alkaline, and neutral substances.	will learn why seasonal changes occur in the UK and other regions on Earth. Pupils will learn about the apparent motion of celestial objects and apply this knowledge to explain the phases of the Moon and eclipses.
Enrichment Opportunities							
Year 8 (Skills and knowledge)  NC Year: 8 PA Stage: 3-10	<p><b>Health and Lifestyle</b></p> <p>Pupils will be introduced to the components of a balanced diet and its importance in maintaining health. They will study the process of digestion, concentrating on the role of enzymes, bacteria, and some of the main organs in the digestive system. Pupils will look at the effects of drugs on the body, focusing on smoking and alcohol.</p> <p><b>The Periodic Table</b></p> <p>Pupils develop their knowledge about elements, learning how to distinguish between metal and non-metal</p>	<p><b>Separation Techniques</b></p> <p>Pupils learn about pure substances and mixtures, how to determine if a substance is pure, and the differences between the term's solute, solvent, solution, and solubility. They compare mixtures and compounds and learn about different ways to separate the substances in a mixture and when each is appropriate, including filtration, evaporation, distillation, and chromatography. Pupils develop their skills of representing and analysing data by plotting solubility data and using this to</p>	<p><b>Working Scientifically</b></p> <p>To develop Pupils understanding of how to answer scientific questions and analyse findings.</p> <p><b>Biological Processes</b></p> <p>Pupils will study the process of photosynthesis, how leaves are adapted to maximise this process, and its importance for all life on Earth. They will look at the effects of minerals on plant growth. Pupils will explore the process of respiration, beginning with aerobic respiration. Pupils will then compare this with anaerobic</p>	<p><b>Energy</b></p> <p>Introduces Pupils to energy resources, stores, and transfers. Pupils will look at how electricity is generated by renewable and non-renewable resources. They will be introduced to stores of energy and methods of transfer between stores, in particular, by particles, radiation, and forces. Pupils will also explore the links between energy, work done, and power, and will have the opportunity to develop their mathematical skills to real-life scenarios when calculating work done, power, and the cost of using domestic</p>	<p><b>Motion and Pressure</b></p> <p>Introduces Pupils to speed, pressure, and turning forces. Pupils will look at how motion can be described using distance-time graphs. They will be introduced to pressure in gases, in liquids, and on solids. Pupils will also study situations in which a force has a turning effect. Pupils will have the opportunity to develop their mathematical skills by using equations to calculate speed and pressure.</p> <p><b>Metals and Other Materials</b></p>	<p><b>Earth</b></p> <p>Pupils learn about the composition of the Earth and its atmosphere. They are reintroduced to three different types of rocks, sedimentary, igneous, and metamorphic rocks, and describe how they are made, their properties and uses, and how their properties make them suitable for their uses. The rock cycle and the carbon cycle are explored, allowing Pupils to consider how materials are recycled naturally. Pupils also study the greenhouse effect, global heating, and climate change, and explore how to look</p>	



		<p>elements. Chemical and physical properties are introduced, and the chemical and physical properties and uses of some typical metals and non-metals, and elements in Group 1, 7, and 0 are explored.</p>	<p>describe how solubility changes with temperature.</p> <p><b>Electricity and Magnetism</b></p> <p>Introduces Pupils to electric fields, current, and magnetism. Pupils will look at how to build simple circuits and take measurements of current and potential difference. Pupils will study electromagnets and plan how to investigate the shape of magnetic fields. Pupils will develop their mathematical skills as they learn how to change the subject in an equation.</p>	<p>respiration in animals and fermentation in plants.</p>	<p>appliances.</p>	<p>Pupils learn about the reactions of metals with acids, with oxygen, and with water, and write word equations for these reactions. They describe the reactivity series and use this to predict the reactivity of metals with acids, with oxygen, and with water. Displacement reactions are explored, including the displacement reaction between a metal compound and carbon as a method for extracting the metal from its ore. Pupils look at the properties of ceramics, some polymers, and some composites, and explain how the properties of these materials make them suitable for their uses.</p>	<p>after and protect the Earth by preventing climate change and preserving our natural resources by recycling.</p> <p><b>Ecosystem and Adaptations</b></p> <p>Pupils will begin by looking at the feeding relationships within food chains and webs, and how this can result in bioaccumulation. Pupils study the interdependence of organisms by looking at what happens to the population of one organism when the population of another is changed; this is studied within food web diagrams, and graphically through predator-prey interactions. Pupils will then look in detail at the adaptations of a number of organisms that enable them to be successful competitors and survive in harsh and changing environments.</p> <p><b>Inheritance</b></p> <p>Pupils will look at the variation in characteristics in organisms within a</p>
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Enrichment Opportunities							
Year 9 (Skills and knowledge)  NC Year: 9 PA Stage: 3-10	<p><b>Forces and Motion</b></p> <p>Applies concepts Pupils have learnt at KS3, such as balanced and unbalanced forces, to more challenging situations, such as a skydiver. In KS3, Pupils have begun to quantify motion and physical properties, such as the stiffness of a spring, and have calculated speed and weight. This chapter extends quantification to</p>	<p><b>Cells</b></p> <p>Pupils will learn how the development of microscopes has helped us to understand cells and how specialised plant cells – phloem and xylem – are adapted to transport materials around a plant. They will investigate how the body responds to the increased demands for energy during exercise and the factors that</p>	<p><b><u>Energy</u></b></p> <p>Pupils engage more fully with the fundamental idea of energy stores and begin to quantify how much energy is in them and moving between them. Examples of energy stores include the thermal store of a ball or the air in a room and the kinetic store of a moving object. Energy is an abstract concept that</p>	<p><b>Fertilisation and Implantation</b></p> <p>Pupils will compare sexual reproduction in plants and animals. They will look at pregnancy prevention using contraception before interpreting menstrual cycle diagrams. They will investigate factors that affect seed dispersal and the steps that should be taken to collect valid data. Finally, they will</p>	<p><b>Working Scientifically</b></p> <p>Developing recording and presenting data. Developing analysing data.</p> <p><b>Useful Chemical Reactions</b></p> <p>Explores further chemical reactions, with a focus on metals and the reactivity series. Pupils will first cover metals and their</p>	<p><b>Variations and Natural Selections</b></p> <p>Pupils will discover why many characteristics are affected by both the environment and inheritance before looking at the different types of adaptations animals have that increase their chances of survival and reproduction. They will investigate organism distribution along a</p>	

		<p>resultant force and acceleration. Distance-time graphs are reviewed and speed-time graphs are introduced. Instantaneous speeds and accelerations are calculated from tangents.</p> <p><b>Particle model and state of change</b></p> <p>Covers the particle model and state changes that Pupils will have encountered before. Pupils will look at the particle model and then move onto substances, states of matter, energy changes during state changes, and finally limitations of the model.</p>	<p>affect the rate of diffusion. Finally, they will find out about prokaryotic cells and the process of active transport.</p> <p><b>Cell systems</b></p> <p>Pupils will revisit the hierarchical nature of the levels of organisation within an organism. They will look at the role of enzymes in the digestive system and how they can be used commercially in washing detergents. They will discover the main features of exchange surfaces and their function in multicellular organisms, focusing on the alveoli in the lungs, villi in the intestines, and the structure of a leaf. Finally, they will study transport systems in both animals and plants by looking at the circulatory system and the transpiration stream.</p> <p><b>Atoms and The Periodic Table</b></p> <p>Pupils will start with the development of the Periodic Table, then the structure of atoms, metals and non-metals,</p>	<p>can be stored in any of these stores and can move between them but cannot be created or destroyed. When energy moves from one store to another, something changes in the physical world, for example, the temperature of an object goes down or a moving object gets faster.</p> <p><b>Chemical Changes</b></p> <p>Pupils first need to understand the difference between a chemical and a physical change, reactants, and products, and how to write and balance simple chemical equations. Then they look into different types of chemical reactions. After this, Pupils will learn about conservation of mass, combustion, and exothermic and endothermic reactions.</p>	<p>discover how different alleles affect which characteristic is most likely to be displayed in an organism's offspring and how some organisms reproduce asexually.</p> <p><b>Wave, Sound and Light</b></p> <p>Pupils to practice explaining physical phenomena by talking about waves. It contains lots of uses of waves, including ultrasound scans, telescopes, and x-rays. Pupils will also think about the risks associated with waves and how to balance risk and communicate conclusions to the public. Pupils will be familiar with sound waves (including ultrasound), (surface) water waves, and visible light.</p>	<p>properties. They then study the reactivity series, displacement reactions, and catalysts before concluding with some more mathematical topics, including relative mass and yields. This unit provides excellent opportunity for practical work and practicing maths skills in science.</p>	<p>transect and study how antibiotic-resistant bacteria evolve as a result of natural selection. Finally, they will look at the techniques scientists are using to maintain biodiversity, along with the abiotic and biotic factors that affect an organism living in an ecosystem.</p> <p><b>Electricity and Magnetism</b></p> <p>Pupils revisit ideas from Year 8 with more detail. Applications of phenomena, such as static electricity, link abstract concepts to observable phenomena. Pupils will cover new uses of series and parallel circuits and explore why some materials are magnetic and others are not. Introduces some big new ideas: inducing p.d. and the generator. Pupils will know that you can induce a magnetic field around a wire by passing current through it, but not that you can induce a p.d. across a wire or a current through a loop by moving it past a magnet.</p>
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			Group 2 elements, and compounds, before concluding with electron configuration and bonding				
Enrichment Opportunities							
Year 10 AQA Content (Skills and knowledge)  NC Year: 10/11 PA Stage: 3-10	<p><b>Cell Structure and Transport</b></p> <p>Pupils will learn about microscopy and cells and explore how the development of microscopy techniques, particularly electron microscopy, has enabled scientists to investigate the sub-cellular structures. Pupils learn to differentiate between animal and plant cells, differentiate between eukaryotic and prokaryotic cells, and identify adaptations of specialised animal and plant cells (they will be able to use the formula). Pupils will also learn about the transport of material into and out of cells by diffusion, osmosis, and active transport. When studying the processes for transferring material, Pupils will explain how adaptations of exchange surfaces and link these to the processes of material transport.</p>	<p><b>Conservation and Dissipation of Energy</b></p> <p>Pupils will continue to develop their understanding of energy and energy transfer begun in Key Stage 3. This includes development of an energy stores model and the processes, such as forces and electrical currents, through which energy can be transferred. Pupils will learn how to measure the work done by a force acting over a distance and how this concept can be used to analyse energy changes in gravitational stores, through lifting and falling, and elastic potential stores during stretching using the relevant mathematical relationships. The conservation of energy through changes in the gravitational, kinetic, and elastic stores will also be discussed. They will consider the</p>	<p><b>Photosynthesis</b></p> <p>Pupils will study photosynthesis in both plants and algae. Pupils will study the adaptations of leaves to achieve maximum efficiency in photosynthesis. Pupils will study factors that affect the rate of photosynthesis. Pupils will consider the use of greenhouses and study how the conditions can be monitored and manipulated to achieve the highest rate of photosynthesis.</p> <p><b>Respiration</b></p> <p>Pupils will study respiration and should be able to recall that this is one of the most important processes in living cells. Pupils will look at mitochondria as the site of respiration. Pupils should be able to list examples of living processes that need the energy released from</p>	<p><b>Organisation and The Digestive System</b></p> <p>Pupils will learn about the principles of organisation. Building on their knowledge of differentiation and specialisation of cells. They will study the human digestive system as an organ system in which organs work together to digest and absorb food, breaking down large insoluble molecules so they can be absorbed into the bloodstream. In studying chemical digestion, Pupils will recognise carbohydrates, proteins, and lipids as large molecules that need to be digested and be able to name the molecules they are broken down into.</p> <p><b>Organising Animals and Plants</b></p> <p>Pupils will learn about the organisation of animals and plants. They</p>	<p><b>Communicable Diseases</b></p> <p>Pupils will see how the concept of health (as a state of physical and mental well-being) is affected by communicable (infectious) diseases. They will look at the different pathogens that can cause communicable disease, including bacteria, viruses, and protists, and how these can be spread between organisms – both animals and plants. As part of this, they will look at the development of simple hygiene methods to prevent the spread of pathogens as well as the isolation of individuals who are infected, the destruction of or control of vectors, and the use of vaccination. They should also complete the required practical to grow bacteria in the laboratory to investigate the effect of disinfectants and</p>	<p><b>Molecules and Matter</b></p> <p>Pupils will increase their understanding of the concept of density as a property of a material or object by measuring and calculating the density of solids and liquids. This leads to a discussion of the states of matter, solid liquid and gas, the properties of matter which is in these states and the changes which occur as a material changes from one state to another. The changes in the properties of matter were used to introduce the kinetic theory and to analyse the changes in temperature occurring during heating and the concept of latent heat. The Pupils move on to discuss the concept of internal energy in more detail; analysing the behaviour of particles in a solid, liquid or gas as the temperature changed. Pupils will describe latent heat of</p>	

		<p><b>Cell Division</b></p> <p>Pupils will learn about the process of cell division. Pupils will develop an understanding of mitosis as a stage within the cell cycle. Pupils will study cell differentiation and make connections between cell differentiation and the specialised cells and adaptations they studied previously. Pupils will also learn that stem cells are undifferentiated cells that have the potential to become a specialised cell within an organism.</p> <p><b>Atomic Structure</b></p> <p>Pupils will develop their understanding of atoms as fundamental chemical building blocks. They will see how to interpret chemical formulae and extend their KS3 knowledge of the law of the conservation of mass, leading them to balance chemical equations. Pupils will also develop their understanding of the differences between compounds and mixtures, and how</p>	<p>dissipation of energy during transfers such as those caused by friction or electrical heating, leading to the idea of efficiency during different energy changes and its calculation. The concept of efficiency will then be applied to the selection of electrical devices. Finally, the Pupils will learn about the rate of energy transfer in different systems through the concept of power and how this power rating can be used to determine total energy change over time.</p> <p><b>Energy Transfer by Heating</b></p> <p>Pupils will develop their understanding of the heating and cooling processes, which transfer energy within a material or from one object to another. They will investigate thermal conductivity and the differences in the processes of thermal conduction in metals and non-metals. Pupils will analyse the changes in temperature when a material is heated,</p>	<p>respiration. Pupils will study the response of humans to exercise, including changes in heart rate, breathing rate, and breakdown of glycogen, all to increase the rate of respiration in muscle cells. In studying anaerobic respiration, Pupils should be aware of this process in mammalian muscles and be able to write the word equation. Pupils should be aware that anaerobic respiration occurs in yeast cells and some plant cells. They should know that fermentation is an economically important reaction and be able to write the word equation.</p> <p><b>Electric Circuits</b></p> <p>Pupils will describe the structure of an atom in terms of charged particles and the process of charging by friction resulting in ions and the transfer of electrons. This leads to the concept of an electric field surrounding charged objects causing attractive or repulsive forces between them. The Pupils will then describe electric circuits,</p>	<p>should recognise the three main types of blood vessel, link their structures with their functions, and understand the importance of a double circulatory system. Pupils will be able to describe the main structures of the human heart and their functions. They should be aware of problems that can develop in the blood vessels and their treatments. Pupils will compare different treatments of heart problems. Pupils will study breathing and gas exchange and should recognise the main structures of the gas exchange system along with their functions. In studying plant tissues and organs, Pupils should be familiar with the different plant tissues and their functions. They should recognise plant organs such as a leaf. They should understand that the roots, stem, and leaves form a plant organ system for transport of substances around the plant. They should be able to state the functions of xylem</p>	<p>antibiotics.</p> <p><b>Preventing and Treating Diseases</b></p> <p>Pupils will study the prevention of disease by vaccination. Pupils will study the treatment of disease by drugs including painkillers and antibiotics. They should understand that painkillers such as aspirin and paracetamol treat the symptoms and not the cause of disease. They should be aware that antibiotics are drugs used to cure bacterial infections. They should know how they work and be aware of the current crisis of antibiotic-resistant strains of bacteria. They should be aware of how drugs are made today to be effective and safe and be able to outline the processes of clinical trials including double blind trials and using placebos.</p> <p><b>Non-Communicable Diseases</b></p> <p>Pupils will study non-communicable diseases and should understand what is meant by risk</p>	<p>fusion and vaporisation mathematically, calculating energy changes during the appropriate phase changes and attempted to measure the latent heat of fusion for ice using electrical heating. The Pupils will analyse the relationships between the pressure and temperature of a fixed mass of gas, determining that the pressure is proportional to the absolute temperature. They described the cause of pressure in terms of random particle behaviour and impact between the particles and the container, explaining the changes in pressure in terms of changes in the motion of the gas particles as the temperature decreases.</p> <p><b>Radioactivity</b></p> <p>Pupils will describe how the structure of the nucleus was discovered by the radiation emitted during nuclear decay and how experimentation and developments in our understanding of subatomic particles have driven to changes in the</p>
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		<p>mixtures can be separated using techniques such as filtration, crystallisation, distillation, and chromatography. Finally, Pupils will learn about the development of the atomic model, providing ample opportunity to foster their Working scientifically skills – specifically around the development and use of models within science. Pupils will be able to describe the evidence that led to each new stage in the development of the atomic model.</p> <p><b>Periodic Table</b></p> <p>Pupils will learn about the development of the periodic table, including the work of Dalton, Newlands, and Mendeleev. Pupils should understand how each stage in the development of the periodic table was facilitated by new evidence becoming available. They should also be able to identify the importance of an inherent pattern to the elements and how this guided Mendeleev’s</p>	<p>leading to the experimental determination of specific heat capacity along with corresponding calculations. The concept of specific heat capacity will then be used to explain the choice of materials used in heating systems. Finally, the reduction of energy transfers to the surroundings by insulation, such as loft or cavity wall insulation, will be studied and applied to the context of reducing energy loss in buildings to reduce heating costs including the idea prioritising home improvements in line with payback time.</p> <p><b>Energy Resources</b></p> <p>Pupils will examine the different sources of energy that are used to generate electricity or provide heating for homes. They will consider the effect of the production and use of biofuels on the environment along with the concept of carbon-neutrality before outlining the use of nuclear power in comparison to fossil</p>	<p>and the components used to construct them using the concept of current as the rate of charge flow through components due to a potential difference between points in the circuit. Resistance was introduced and the cause of a heating effect and corresponding energy transfer. Pupils will investigate the factors affecting the resistance of a wire and the corresponding current-potential difference graphs. Further investigations of the components and analysis of the current-potential difference graphs will show ohmic and non-ohmic behaviours for wires, filaments, and diodes. The relationship between the resistance of a thermistor and its temperature along with the relationship between the resistance of a light-dependent resistor and light level have been investigated. Finally, the Pupils investigate and analyse a range of series and parallel circuits describing the path of current at junctions, the potential difference</p>	<p>and phloem tissue. In studying transpiration, they should understand the function of stomata and recognise factors that affect transpiration rate.</p> <p><b>Chemical Changes</b></p> <p>Pupils will revise and develop their understanding of the reactivity series from KS3. They will study the reactions of the metal’s potassium, sodium, lithium, calcium, magnesium, zinc, iron, and copper with water and acids and should be able to recall and describe these reactions. They will apply their understanding of the reactivity series to displacement reactions and the extraction of metals. Pupils will also learn about salts and how they are prepared, including from metals and acids, acids and bases, and acids and carbonates. Pupils should be able to prepare a pure, dry sample of a salt from an insoluble metal oxide or carbonate as part of the required practical. Finally, Pupils will learn</p>	<p>factors for a disease. They will analyse the impact of disease at several different levels. Pupils should recognise correlations between data sets and the need for evidence to secure a causal mechanism. They should understand the difference between correlated data and causal mechanisms and be able to read graphs and quote data to support correlations and causations. Pupils will study cancer and the different types of tumours, along with the general causes and treatment of cancer. They should recall the roles of nicotine, carbon monoxide, and tar, and understand how each specifically affects health, as well as recalling the dangers of smoking whilst pregnant. They should have applied the concept of a causal mechanism to data on smoking and developing lung cancer. Pupils should understand the impact of smoking on the heart. In considering the effect of diet and exercise on disease, Pupils should appreciate the</p>	<p>model used to describe the atom from the plum pudding model, through to the Rutherford model and then Bohr model. The Pupils will describe the changes in the nucleus which occur during alpha, beta, and gamma decay along with neutron emission in terms of atomic (proton) number and mass number using the appropriate nuclear notation for isotopes. The properties of alpha, beta, and gamma radiation have been demonstrated leading to a discussion of their use in thickness monitoring and then the safety measures required when using radioactive materials. Pupils will then move on to discuss the concepts of activity, count rate, and the patterns in radioactive decay that explain half-life and the associated graphs despite the random nature of individual decays. Higher tier Pupils will perform calculations involving the relationship between the initial activity, current activity, and half-life.</p> <p><b>Adaptation,</b></p>
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			<p><b>Structure and Bonding</b></p> <p>Pupils have developed their understanding of the states of matter from KS3. They have built upon their understanding of the particle model, using this to explain the energy transfers involved when substances change state. Pupils have also learnt about the different types of bonding in substances. They should know that covalent bonding is the sharing of one or more pairs of electrons between nonmetal atoms; ionic bonding involves a metal and non-metal atom, with the metal atom losing one or more electrons and the non-metal atom gaining one or more electron; and metallic bonding involves a delocalised sea of electrons surrounding the positive metal ions. Pupils should have also learnt how the bonding of a substance affects its bulk properties. They should be able to describe the difference in bonding and properties of giant ionic structures, simple covalent molecules, and</p>	<p>from short circuits. Pupils will mathematically analyse circuits to determine the power supplied by a current and the relationship between power and the resistance of components. This will be linked back to the charge transfer in a circuit and the concept of electrical heating as charges move within or through components. Finally, Pupils will consider the importance of efficiency within mains powered electrical devices linking this concept back to energy transfer by a current and to the simplified system of energy efficiency ratings used when considering the purchase of an appliance</p>		<p>Pupils will further develop their qualitative understanding of the energy transfers in a reaction into a quantitative understanding. They should be confident with sketching and interpreting reaction profile diagrams and higher-tier Pupils should be able to use bond energies to calculate overall energy changes for a reaction, identifying if it is exothermic or endothermic. Pupils will also apply their understanding of the reactivity series and electrolysis to chemical cells and fuel cells</p>	<p>factors they compete for and how they compete, and how they become successful in their environments. Pupils should understand how organisms are adapted to survive in many different conditions. They should be able to give examples of the ways in which animals and plants are adapted to their environments.</p> <p><b>Organising and Ecosystem</b></p> <p>Pupils have studied how feeding relationships are represented in food chains. They should understand the importance of photosynthesis in feeding relationships. They should recall the main feeding relationships within a community and understand how the numbers of predators and prey are inter-related, including interpreting predator-prey population graphs. Pupils have looked at mineral cycling and the microbes involved. They should understand how materials are recycled through the abiotic and</p>
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			<p>giant covalent structures (including different arrangements of carbon). Pupils should understand that covalent, metallic, and ionic bonding is strong, but that it is how the particles interact (intermolecular forces) that determines properties such as melting point, boiling point, and electrical conductivity. Finally, Pupils should have learnt about nanoparticles, their properties, and be able to explain how the surface area to volume ratio of nanoparticles is different to bulk material, and how this affects their uses.</p> <p><b>Chemical Calculations</b></p> <p>Pupils will build upon their understanding of the structure of atoms and sub-atomic particles to understand relative atomic mass and relative formula mass. Pupils should be able to use relative atomic masses to calculate relative formula masses of compounds. Pupils should be able to use the equation number of moles = mass (g) / Ar</p>				<p>biotic components of an ecosystem, and the importance of decay. Pupils have studied the water cycle and should recall the main stages of condensation, precipitation, evaporation, transpiration, and respiration. They should understand what the carbon cycle is and recall the processes that remove carbon dioxide from the atmosphere and return it again. They should understand the role of microbes in the carbon cycle as carrying out respiration to release carbon dioxide.</p> <p><b>Biodiversity and Ecosystems</b></p> <p>Pupils have studied biodiversity and ecosystems, starting with the reasons for and the effects of the human population explosion. Pupils should understand the effect of different types of pollution including land, water, and air pollution. Pupils should be able to outline the processes of deforestation and peat destruction. Pupils should understand what</p>
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			and use moles to balance symbol equations and calculate reacting masses.				is meant by the greenhouse effect, global warming, and its predicted effects. Pupils should be able to distinguish greenhouse gases from those that cause acid rain.
Enrichment Opportunities							
<b>Pupils in Year 11 will be building on their existing knowledge and applying their learnt skills and knowledge to the topics that they will be focusing on during this academic year. Pupils will be given time to conduct required practical's and spend time revising for their GCSE exams.</b>							
Year 11 Content AQA GCSE (Skills and knowledge)  NC Year: 10/11 PA Stage: 3-10	<b>Rates of Equilibrium</b>  Pupils have learnt about the factors that affect the rate of a reaction, including temperature, surface area, concentration, and pressure. Pupils should be able to explain the effect of each factor on the rate of reaction using collision theory – understanding that each factor increases the frequency of effective collisions, not just the number of collisions. They should also be able to explain the effect of catalysts on the rate of a reaction in terms of providing an alternative reaction pathway with a lower activation energy. Pupils have also learnt about reversible reactions and dynamic equilibrium. Pupils should apply their	<b>Forces in Balance</b>  Pupils have compared vectors and scalars using the examples of distance and displacement along with the nature of forces. Representations of vectors using scale diagrams led to descriptions of the forces acting in a wide variety of situations and the identification of Newton's third law. The concept of balanced and unbalanced forces was used to determine the behaviour of objects and the application of Newton's first law of motion.  <b>Motion</b>  Pupils have analysed the motion of objects in depth starting from a recap of the concept of speed and this	<b>The Earth's Resources</b>  Pupils have learnt about the difference between finite and renewable resources. It is important that Pupils understand that renewable resources are not an infinite supply but are replaceable at a rate similar to the rate they are used up, whereas finite resources are used up faster than they can be replenished. Pupils understanding of finite and renewable resources should be applied to the need to reuse and recycle, and they should be able to describe and evaluate ways of reducing the use of finite resources and carry out life cycle assessments on products. Pupils then looked at specific resources that we use, including water and	<b>Wave Properties</b>  Pupils have observed and described the properties of mechanical and electromagnetic waves in terms of energy transfer with or without the need for a transfer medium. They have compared transverse waves and longitudinal waves by examining the relationship between the direction of propagation and the direction of the oscillations. The Pupils have analysed wave properties such as wavelength, amplitude, and period leading to the relationships between period, frequency and wave speed, frequency, and wavelength. They have also measured the speed of sound in air and the speed of ripples on water.	<b>Space</b>  Pupils have examined the formation of the solar system from a nebula, particularly the formation of the Sun from hydrogen gas into a protostar until it reaches the main sequence. The source of materials for formation of the planets has also been described. Pupils moved on from the main sequence to describe the pathways for small stars from main sequence through red giants, white dwarfs, and finally black dwarfs along with the pathway for larger stars through red supergiant, supernova and neutron star/black holes has been described. The Pupils noted the role of supernovae in the production of heavy elements. They have also	<b>GCSE Revision and Exams</b>	

		<p>knowledge on endothermic and exothermic reactions to equilibrium reactions to be able to predict the effect of temperature changes on the reversible reactions and the position of the equilibrium.</p> <p><b>Crude Oil and Fuels</b></p> <p>Pupils have learnt about hydrocarbons and been introduced to the alkanes. They should now be able to identify alkanes from their formulae and be able to name and draw the displayed formula of the first four alkanes. Pupils have also learnt about some of the reactions of hydrocarbons, including combustion (both complete and incomplete) and cracking. All Pupils should be able to write balanced symbol equations for the complete combustion of hydrocarbons and to describe the conditions of cracking. All Pupils should be able to describe the test for alkenes (a product of cracking). Pupils have also learnt about crude</p>	<p>relationship to distance travelled and time taken. The representation of motion using distance-time graphs representing single and multiple objects has been analysed to give detailed descriptions of the movement of the objects. The Pupils have defined acceleration in terms of changes in velocity before analysing it graphically and mathematically. Pupils have then investigated acceleration caused by an unbalanced force on ramp, linking acceleration to the gradient of a line on a velocity-time graph. Pupils have continued to analyse graphs representing motion by looking at the area beneath the line on a velocity-time graph and its relationship to the distance travelled by an object. Pupils have used the gradient of a distance-time graph to determine the speed of an object. In addition, higher tier Pupils have used the tangent of a line on a distance-time graph to determine the speed. All Pupils have then applied these</p>	<p>metals (in particular copper). Pupils should be able to describe the different ways that water is treated, both to create potable water and to remove waste products so it is safe to release into the environment. Pupils have already met metal-ore extraction and electrolysis.</p> <p><b>Using Resources</b></p> <p>Pupils have developed their understanding of rusting from KS3 to understand how both water and air are required for iron to corrode. They should be able to explain how the two methods for preventing rusting – barrier methods and sacrificial methods – disrupt the oxidation of iron and prevent corrosion. Pupils have also studied a series of different material types – alloys, polymers, ceramics, glass, and composites. For each material, Pupils should be able to identify key properties and link these to their common uses. Pupils also studied the Haber process and how</p>	<p><b>The Electromagnetic Spectrum</b></p> <p>Pupils have described the electromagnetic spectrum in terms of different regions related to wavelength. The speed of electromagnetic waves in a vacuum has been described as constant allowing the use of the wave equation to link wavelength and frequency which as then been tied to the energy carried by the wave. Each of the regions of the electromagnetic spectrum has been described along with associated uses and Pupils have investigated the relationship between surface colour, temperature, and the rate of emission of infra-red radiation. The use of radio waves in communications for television and mobile phones has been described along with outlining transmissions of signals through optical fibres. Pupils have described the application of ultraviolet waves in phosphorescence and</p>	<p>examined the orbits of planets.</p> <p><b>GCSE Revision and Exams</b></p>	
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		<p>oil as a source of hydrocarbons and the fractional distillation of crude oil. They should be able to describe how the size of the hydrocarbon molecule affects its properties, including viscosity, boiling point, and flammability.</p> <p><b>Organic reactions</b></p> <p>Pupils have learnt about more organic functional groups – alkenes, alcohols, carboxylic acids, and esters. Pupils should be able to identify, name, and draw the structural formula of the first four alkenes, alcohols, and carboxylic acids, and should be able to identify, name, and draw the ester ethyl ethanoate. Pupils have also learnt about the reactions of these four functional groups. They should be able to describe the reactions and conditions of alkenes (with halogens, water, and hydrogen), alcohols (combustion, oxidation, and reaction with sodium), and carboxylic acids (to make esters). Pupils should also be able to explain why carboxylic acids are</p>	<p>techniques to analyse a range of graphs to extract all of the possible information from them.</p> <p><b>Forces and Motion</b></p> <p>Pupils began this chapter by experimentally determining the relationships between a force acting on an object and the acceleration, and the mass of the object and the acceleration. The results led to the formulation of Newton’s second law of motion and its application. Pupils have investigated the effect of forces on the stretching of a range of materials identifying both linear and non-linear relationships between the force and extension. Pupils have applied Hook’s law as appropriate and.</p> <p><b>Forces and Pressure</b></p> <p>Pupils have defined pressure as a force acting over a surface before measuring pressure and describing its effects on materials and calculating the pressure acting on a surface.</p>	<p>it is carried out economically on an industrial scale. Pupils should also be able to recognise the importance of the Haber process in the production of ammonia, being able to explain how ammonia is an important feedstock in the production of fertilisers, both in the laboratory and industrially alongside potassium and phosphorus fertilisers.</p> <p><b>Reproduction</b></p> <p>Pupils should recall that fungi, plants, and malaria parasites are able to use both types of reproduction. Pupils have studied DNA and its role in inheritance. They should be aware of the genetic code and genomes, including how the data produced by genome research can be used. Pupils should be able to outline DNA structure, with higher-tier Pupils recalling the detailed structure of DNA and also studying protein synthesis, including how the genetic code is used to assemble amino acids</p>	<p>the damage these waves can cause to skin and eyes before describing the uses of X-rays and gamma rays in medical applications. The process of ionisation has been outlined and the cause of tissue damage and as a useful technique in killing bacteria or cancerous cells. Further details of the use of X-rays have been described including contrast media and detection devices such as the CCD and the concept of radiation dose.</p> <p><b>Light</b></p> <p>Pupils began this chapter by looking at the reflection of light by plane mirrors using both a wave front and ray model. This led to descriptions of real and virtual images and their properties and why images are not formed by ‘rough’ surfaces. Then they move on to investigate and describe refraction of light in more detail – analysing the change in direction of rays at boundaries between surfaces. The Pupils also describe the</p>		
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		<p>called weak acids.</p> <p><b>The Human Nervous System</b></p> <p>Pupils have studied the principles of homeostasis and should be able to give some examples and outline the control system involved. Pupils should recall details of the human nervous system and its structure and function. They should be able to describe a reflex arc, with detail of synaptic transmission. Pupils should appreciate that receptors detect a change in a stimulus and not the stimulus itself. They should be able to describe an electrical impulse accurately. Pupils have also studied the structure and function of the human eye and the process of accommodation. They should understand that the ciliary muscles contract in accommodation. These Pupils should be able to describe common defects of the eye including myopia, hyperopia, and the role of new technology in the treatment of these</p>	<p><b>Polymers</b></p> <p>Pupils have learnt about different types of manufactured polymers, including addition polymers and condensation polymers. Pupils should be able to identify an addition polymer from polymer and monomer diagrams – drawing the monomer from the polymer and the polymer from the monomer. Pupils have been introduced explicitly to poly(ethene), but it is important that they can identify and draw other addition polymers and associated monomers.</p> <p><b>Chemical Analysis</b></p> <p>Pupils have learnt about various techniques for analysing substances. All Pupils should now understand the difference between a pure substance, a mixture, and a formulation, and what is meant by purity. Pupils should also have built upon their understanding of chromatography experiments Pupils</p>	<p>into proteins. Pupils have studied inheritance and should be able to use genetic terms and set out a genetic cross with the use of a Punnett square. They should be able to predict ratios of different phenotypes and apply this to sex determination and family trees. Pupils should be able to describe the inheritance of genetic disorders as applied to polydactyly and cystic fibrosis. They should be aware of developments in genetic engineering with the aim of curing genetic disorders. Finally, Pupils should be able to discuss screening for genetic disorders and the implications of using this technology.</p> <p><b>Variation and Evolution</b></p> <p>Pupils should understand the role of mutation in variation, understand the theory of evolution by survival of the fittest and natural selection, and be able to give examples. Pupils have studied the process of selective breeding. They should understand this as an example of</p>	<p>relationship between colour and wavelength for visible light investigating the reflection of both white and coloured light from coloured or white surfaces along with the additive nature of coloured light. They described the differences between translucent and transparent media. Pupils also describe the action of lenses using the ray model of light and a range of ray diagrams. This includes the behaviour of converging and diverging lenses with an investigation of image formation for a converging lens. The image properties have been described along with the concept of magnification and its calculation from image and object height. Methods used to construct ray diagrams for the convex lens for objects at a range of positions have been described alongside image formation for a concave lens.</p> <p><b>Electromagnetism</b></p>		
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		<p>conditions.</p> <p><b>Hormonal Coordination</b></p> <p>Pupils have studied the principles of hormonal control and the endocrine system. They should be able to identify the main parts of the endocrine system and recall the hormones they produce. Pupils should recall how blood-glucose concentration is controlled, including the role of insulin. Pupils should be aware of the causes and treatments of both type 1 and type 2 diabetes. They should link this with work in B2.3 Stem cells and with the effect of lifestyle on type 2 diabetes. Pupils have studied hormones in human reproduction. They should recall the action of hormones in bringing about puberty. They should be aware of the role of oestrogen in the menstrual cycle in females, and of testosterone in males. Pupils have studied the role of hormones in plants, and the tropism responses they cause.</p> <p><b>Homeostasis</b></p>	<p>should also be able to describe the different experimental tests for gases, including both the procedure and positive result. Pupils studying AQA GCSE Chemistry should also be able to describe experimental tests for positive and negative ions and be able to write balanced symbol equations for them. They should be able to apply their knowledge of all of the tests they have learnt to be able to plan and investigation to identify positive and negative ions. Pupils have also studied flame emission spectroscopy, and should be able to interpret instrumental results.</p> <p><b>The Earth's Atmosphere</b></p> <p>Pupils have learnt about the Earth's atmosphere. Pupils only need to be able to describe the volcanic activity theory of the origin of the atmosphere, but they should be able to interpret evidence concerning other theories and be able to evaluate them. To describe the history of</p>	<p>artificial selection and be aware of its limitations. In studying genetic engineering, all Pupils should understand what is meant by the term and be able to give examples of its use and consider the potential benefits and problems. Pupils have studied cloning as applied to both plants and animals. They should recall different ways of creating clones and be able to describe why they are useful. They should understand the processes of embryo transplants and adult cell cloning in animals and be able to discuss the choices that need to be made about all genetic technologies.</p> <p><b>Genetics and Evolution</b></p> <p>Pupils should also be able to outline the reasons why Darwin's ideas were not accepted for some time. They should be familiar with Wallace's ideas on evolution and how he established our current theory of speciation. Pupils should understand that each part of a divided population undergoes</p>	<p>Pupils began by reinforcing their knowledge of magnetism by looking at the magnetic fields around permanent magnets and the concept of induced magnetism in some materials. The Pupils have been reminded of the techniques used to plot a magnetic field and the shape of the Earth's field. Pupils moved on to examine the magnetic field produced by a current and investigate the factors that affect the direction and strength of this field. They compared the field shape of a solenoid to that produced by a simple bar magnet.</p>		
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		<p>Science. Pupils have studied homeostasis, starting with why and how the body controls its temperature. They should recall the role of the thermoregulatory centre in the brain and be able to describe the body's responses if the body temperature starts to become too high or too low. Finally, Pupils have studied treatments for kidney failure. They should understand how dialysis works, and link this with earlier work on diffusion. They should recall the process of kidney transplantation including the problems of rejection. Pupils should have compared dialysis with transplantation and be able to analyse the advantages and disadvantages of both treatment options.</p>	<p>the atmosphere Pupils will need to have a sense of the timescales involved. Along with an understanding of the origins of the atmosphere, Pupils should also understand how it has evolved over time. This includes both how the general composition of the atmosphere has changed and how the atmosphere is currently being affected by human activity. Pupils should be able to describe the human activities that are thought to cause global warming and be able to explain some of the effects this has on the climate of the Earth. Pupils should also be able to explain the effect of other pollutants on the Earth, including carbon monoxide, sulphur dioxide, nitrogen oxides, and particulates. Throughout this chapter, Pupils have had many opportunities to develop their working scientifically skills, including evaluating models and interpreting and evaluating evidence for scientific theories.</p>	<p>natural selection separately and therefore differently, and over a long period of time can end up being very different from each other. All Pupils should be aware of evidence for evolution, including the fossil record and reasons for extinction. They should be able to describe antibiotic resistant bacteria and their fast evolution, in particular the problem of MRSA. Finally, pupils should understand how living organisms are classified. They should recall the natural system designed by Linnaeus and be able to give the rules of the binomial system of naming living things. They should be familiar with the three-domain system developed in the light of recent technological advances.</p>			
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