



# Hillbourne Primary School

## Science Progression of Knowledge



### Intent

We want children leaving Hillbourne Primary school to be able to:

- Foster the joy of discovery
- Develop a natural curiosity for the world around them
- Have a deep respect for living things and the environment

At Hillbourne Primary School, we define Science as the ‘way to understand our world by carefully thinking about it and testing our guesses with observations and experiments.’ At Hillbourne, our children are scientists! Our intent is to give every child a broad and balanced Science curriculum which enables them to confidently explore and discover what is around them, so that they have a deeper understanding of the world we live in. We want our children to love science. We want them to have no limits to what their ambitions are and grow up wanting to be astronauts, forensic scientists, toxicologists or microbiologists. We want our children to remember their science lessons in our school, to cherish these memories and embrace the scientific opportunities they are presented with! To achieve this, it involves exciting, practical hands-on experiences that encourage curiosity and questioning. Our aim is that these stimulating and challenging experiences help every child secure and extend their scientific knowledge and vocabulary, as well as promoting a love and thirst for learning. At Hillbourne, we have a coherently planned and sequenced curriculum which has been carefully designed and developed with the need of every child at the centre of what we do. We want to equip our children with not only the minimum statutory requirements of the science National Curriculum but to prepare them for the opportunities, responsibilities and experiences of later life.

### Implementation

Our Hillbourne Science curriculum allows children to know and remember more, ensuring that the children not only know ‘the science’; they also know the evidence for it and can use this knowledge to work scientifically. Our curriculum is clearly organised and is progressive, both within substantive and disciplinary knowledge. We focus on 5 key enquiry skills, which allows the children to learn how scientific knowledge becomes established and gets revised. Knowledge is carefully sequenced to reveal the interplay between substantive and disciplinary knowledge. Disciplinary knowledge is taught explicitly throughout all year groups and comprises knowledge of concepts as well as procedures. When pupils develop their disciplinary knowledge, they learn about the diverse ways that science generates and grows knowledge through scientific enquiry. The curriculum outlines how disciplinary knowledge advances over time and teaches pupils about the similarities and differences between each science. We have developed our ‘Big Ideas’ of science, to ensure children develop a well-rounded understanding of what science looks like in the world around them, right from the start of EYFS. Each unit of work involves in the children discovering the work of famous scientists from history, uncovering the impact their work has on modern life. We see science as a cross-curricular subject and therefore progression takes account of what is taught in other subjects.

### Key Skills

At Hillbourne, we have key scientific skills that run through and across year groups. These will continually be revisited and explored across the academic journey of a child at Hillbourne. Each skill is underpinned by key vocabulary and knowledge that will be explicitly taught in Science. The key threads are:

Asking questions	Making predictions	Setting up investigations	Observing and measuring	Recording data	Interpreting and communicating results	Evaluating
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## Curriculum Organisation

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<b>Foundation</b>	<i>Knowledge and skills taught and recapped throughout the year</i>					
<b>Year 1</b>	<u>Animals, including humans</u> <ul style="list-style-type: none"> <li>identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense</li> </ul>	<u>Animals, including humans</u> <ul style="list-style-type: none"> <li>identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals</li> <li>identify and name a variety of common animals that are carnivores, herbivores and omnivores</li> <li>describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)</li> </ul>	<u>Everyday Materials</u> <ul style="list-style-type: none"> <li>distinguish between an object and the material from which it is made</li> <li>identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock</li> <li>describe the simple physical properties of a variety of everyday materials</li> <li>compare and group together a variety of everyday materials on the basis of their simple physical properties</li> </ul>	<u>Seasonal Changes</u> <ul style="list-style-type: none"> <li>observe changes across the four seasons</li> <li>observe and describe weather associated with the seasons and how day length varies</li> </ul>	<u>Plants</u> <ul style="list-style-type: none"> <li>identify and name a variety of common wild and garden plants, including deciduous and evergreen trees</li> <li>identify and describe the basic structure of a variety of common flowering plants, including trees</li> </ul>	
	<u>Longitudinal Learning:</u> <ul style="list-style-type: none"> <li>observe changes across the four seasons; observe and describe weather associated with the seasons and how day length varies</li> </ul>					
<b>Year 2</b>	<u>Animals, including humans</u> <ul style="list-style-type: none"> <li>describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene</li> </ul>	<u>Animals, including humans</u> <ul style="list-style-type: none"> <li>notice that animals, including humans, have offspring which grow into adults</li> <li>find out about and describe the basic needs of animals, including humans, for survival (water, food and air)</li> </ul>	<u>Uses of Everyday Materials</u> <ul style="list-style-type: none"> <li>identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses</li> <li>find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching</li> </ul>	<u>Living things and their habitats</u> <ul style="list-style-type: none"> <li>explore and compare the differences between things that are living, dead, and things that have never been alive</li> <li>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 microhabitats</li> <li>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</li> </ul>	<u>Plants</u> <ul style="list-style-type: none"> <li>observe and describe how seeds and bulbs grow into mature plants</li> <li>find out and describe how plants need water, light and a suitable temperature to grow and stay healthy</li> </ul>	
	<u>Longitudinal Learning:</u> <ul style="list-style-type: none"> <li>observe and describe how seeds and bulbs grow into mature plants</li> </ul>					
<b>Year 3</b>	<u>Animals, including humans</u> <ul style="list-style-type: none"> <li>identify that animals, 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</li> <li>identify that humans and some other animals have skeletons and muscles for support, protection and movement</li> </ul>	<u>Forces and magnets</u> <ul style="list-style-type: none"> <li>compare how things move on different surfaces</li> <li>notice that some forces need contact between two objects, but magnetic forces can act at a distance</li> <li>observe how magnets attract or repel each other and attract some materials and not others</li> <li>compare and group together a variety of</li> </ul>	<u>Plants</u> <ul style="list-style-type: none"> <li>identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers</li> <li>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</li> <li>investigate the way in which water is transported within plants</li> <li>explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal</li> </ul>	<u>Light</u> <ul style="list-style-type: none"> <li>recognise that they need light in order to see things and that dark is the absence of light</li> <li>notice that light is reflected from surfaces</li> <li>recognise that light from the sun can be dangerous and that there are ways to protect their eyes</li> <li>recognise that shadows are formed when the light</li> </ul>	<u>Rocks</u> <ul style="list-style-type: none"> <li>compare and group together different kinds of rocks on the basis of their appearance and simple physical properties</li> <li>describe in simple terms how fossils are formed when things that have lived are trapped within rock</li> </ul>	

		<p>everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials</p> <ul style="list-style-type: none"> <li>describe magnets as having two poles</li> <li>predict whether two magnets will attract or repel each other, depending on which poles are facing</li> </ul>		<p>from a light source is blocked by an opaque object</p> <ul style="list-style-type: none"> <li>find patterns in the way that the size of shadows change</li> </ul>	<ul style="list-style-type: none"> <li>recognise that soils are made from rocks and organic matter</li> </ul>
Year 4	<p><u>Electricity</u></p> <ul style="list-style-type: none"> <li>identify common appliances that run on electricity</li> <li>construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers</li> <li>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</li> <li>recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit</li> <li>recognise some common conductors and insulators, and associate metals with being good conductors</li> </ul>	<p><u>States of Matter</u></p> <ul style="list-style-type: none"> <li>compare and group materials together, according to whether they are solids, liquids or gases</li> <li>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 (°C)</li> <li>identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature</li> </ul>	<p><u>Sound</u></p> <ul style="list-style-type: none"> <li>identify how sounds are made, associating some of them with something vibrating</li> <li>recognise that vibrations from sounds travel through a medium to the ear</li> <li>find patterns between the pitch of a sound and features of the object that produced it</li> <li>find patterns between the volume of a sound and the strength of the vibrations that produced it</li> <li>recognise that sounds get fainter as the distance from the sound source increases</li> </ul>	<p><u>Living things and their habitats</u></p> <ul style="list-style-type: none"> <li>recognise that living things can be grouped in a variety of ways</li> <li>explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment</li> <li>recognise that environments can change and that this can sometimes pose dangers to living things</li> </ul>	<p><u>Animals, including humans</u></p> <ul style="list-style-type: none"> <li>describe the simple functions of the basic parts of the digestive system in humans</li> <li>identify the different types of teeth in humans and their simple functions</li> <li>construct and interpret a variety of food chains, identifying producers, predators and prey</li> </ul>
Year 5	<p><u>Living things and their habitats</u></p> <ul style="list-style-type: none"> <li>Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird</li> <li>Describe the life process of reproduction in some plants and animals</li> </ul>	<p><u>Forces</u></p> <ul style="list-style-type: none"> <li>Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object</li> <li>Identify the effects of air resistance, water resistance and friction, that act between moving surfaces.</li> <li>Recognise that some mechanisms, including</li> </ul>	<p><u>Properties and changes of materials</u></p> <ul style="list-style-type: none"> <li>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</li> <li>Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution</li> <li>Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating</li> <li>Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic</li> </ul>	<p><u>Earth and Space</u></p> <ul style="list-style-type: none"> <li>Describe the movement of the Earth, and other planets, relative to the Sun in the solar system.</li> <li>Describe the movement of the Moon relative to the Earth.</li> <li>Describe the Sun, Earth and Moon as approximately spherical bodies.</li> <li>Use the idea of the Earth's rotation to explain day and</li> </ul>	<p><u>Animals, including humans</u></p> <ul style="list-style-type: none"> <li>Describe the changes as humans develop to old age</li> </ul>


		levers, pulleys and gears, allow a smaller force to have a greater effect.	<ul style="list-style-type: none"> <li>• Demonstrate that dissolving, mixing and changes of state are reversible changes</li> <li>• 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</li> </ul>	night and the apparent movement of the sun across the sky	
Year 6	<u>Living things and their habitats</u> <ul style="list-style-type: none"> <li>• 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</li> <li>• Give reasons for classifying plants and animals based on specific characteristics</li> </ul>	<u>Animals, including humans</u> <ul style="list-style-type: none"> <li>• Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood</li> <li>• Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function</li> <li>• Describe the ways in which nutrients and water are transported within animals, including humans</li> </ul>	<u>Evolution and Inheritance</u> <ul style="list-style-type: none"> <li>• Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago</li> <li>• Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents</li> <li>• Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution</li> </ul>	<u>Light</u> <ul style="list-style-type: none"> <li>• Recognise that light appears to travel in straight lines</li> <li>• 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</li> <li>• 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</li> <li>• Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them</li> </ul>	<u>Electricity</u> <ul style="list-style-type: none"> <li>• Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit</li> <li>• Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches</li> <li>• Use recognised symbols when representing a simple circuit in a diagram</li> </ul>





## EYFS






The Early Years Foundation Stage Curriculum supports children's understanding of science through the planning and teaching of 'Understanding the World'. Children find out about objects, materials and living things using all their senses looking at similarities, differences, patterns and change. Both the environment and skilled practitioners foster curiosity and encourage explorative play, children are motivated to ask questions about why things happen and how things work. Our children are encouraged to use their natural environment around them to explore. Children enjoy spending time outdoors exploring mini-beasts and their habitats, observing the changing seasons, plants and animals. Children regularly participate in cookery and baking sessions which allows them to experience changes in state as ingredients are mixed, heated and cooled. In the early years, pupils are introduced to a wide-ranging vocabulary that categorises and describes the natural world. These words are not too technical but provide the 'seeds' for developing scientific concepts that will be built on in later years.

## Working Scientifically







The table below highlights the progression in scientific disciplinary knowledge within working scientifically. We have identified 10 working scientifically skills that we think are essential for children's continued development as scientists. We have also ensured that these are all covered multiple times each year within different contexts:





	Foundation	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	
<b>Curriculum Objectives</b>	Taken from EYFS (Statutory Framework 2021 & Development Matters 2020)- <i>all text in italics indicates ELG</i>	<ul style="list-style-type: none"> <li>asking simple questions and recognising that they can be answered in different ways</li> <li>observing closely, using simple equipment</li> <li>performing simple tests</li> <li>identifying and classifying</li> <li>using their observations and ideas to suggest answers to questions</li> <li>gathering and recording data to help in answering questions</li> </ul>		<ul style="list-style-type: none"> <li>asking relevant questions and using different types of scientific enquiries to answer them</li> <li>setting up simple practical enquiries, comparative and fair tests</li> <li>making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers</li> <li>gathering, recording, classifying and presenting data in a variety of ways to help in answering questions</li> <li>recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables</li> <li>reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</li> <li>using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions</li> <li>identifying differences, similarities or changes related to simple scientific ideas and processes</li> <li>using straightforward scientific evidence to answer questions or to support their findings</li> </ul>		<ul style="list-style-type: none"> <li>planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</li> <li>taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate</li> <li>recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs</li> <li>using test results to make predictions to set up further comparative and fair tests</li> <li>reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations</li> <li>identifying scientific evidence that has been used to support or refute ideas or arguments</li> </ul>		
 <p><b>Ask and Answer Questions</b></p>	<ul style="list-style-type: none"> <li>Explore the natural world around them (Understanding the World: reception)</li> <li>Notice and ask questions about differences (Personal, Social &amp; Emotional Dev: birth-3)</li> <li>Understand simple questions about 'who', 'what' and 'where' (Communication &amp; Language: 2 years)/understand 'why' questions (3-4 years)/ask questions to find out more (reception)</li> <li>Know more, so feel confident about coming up with their own ideas (Creating &amp; Thinking Critically)</li> </ul> <p><i>Listen attentively and respond to what they hear with relevant questions (ELG: Listening, Attention &amp; Understanding)</i></p>	<ul style="list-style-type: none"> <li>Raise questions about the world around them and begin to recognise that they can be answered in different ways</li> </ul>	<ul style="list-style-type: none"> <li>Ask people questions that include scientific language and recognise that they can be answered in different ways</li> <li>Begin to use secondary sources to answer questions</li> </ul>	<ul style="list-style-type: none"> <li>Ask questions related to their scientific experiences and use different types of enquiry to answer them</li> </ul>	<ul style="list-style-type: none"> <li>Ask relevant scientific questions and use different types of scientific enquiry to answer them</li> <li>Recognise how and when secondary sources might help answer questions that cannot be answered through practical investigation</li> </ul>	<ul style="list-style-type: none"> <li>Use scientific experiences to explore ideas and raise different types of questions</li> </ul>	<ul style="list-style-type: none"> <li>Recognise which secondary sources will be most useful to research their ideas and begin to separate fact from opinion.</li> </ul>	

 <p><b>Plan and set up enquires</b></p>	<ul style="list-style-type: none"> <li>• Make choices and explore different resources and materials (Playing &amp; Exploring)</li> <li>• <i>Be confident to try new activities and show independence, resilience and perseverance in the face of challenge (ELG: Managing Self)</i></li> </ul>	<ul style="list-style-type: none"> <li>• Perform simple tests</li> </ul>	<ul style="list-style-type: none"> <li>• Perform simple tests</li> </ul>	<ul style="list-style-type: none"> <li>• Set up simple practical enquiries, comparative and fair tests</li> </ul>	<ul style="list-style-type: none"> <li>• Set up simple practical enquiries, comparative and fair tests</li> </ul>	<ul style="list-style-type: none"> <li>• Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</li> </ul>	<ul style="list-style-type: none"> <li>• Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</li> </ul>
 <p><b>Observe</b></p>	<ul style="list-style-type: none"> <li>• Use a wider range of vocabulary (Communication &amp; Language: 3-4 years) / learn new vocabulary &amp; use new vocabulary through the day and in different contexts (reception)</li> <li>• Talk about what they see, using a wide vocabulary (Understanding The World: 3-4 years)</li> <li>• <i>Offer their own ideas, using recently introduced vocabulary (ELG: Speaking)</i></li> </ul>	<ul style="list-style-type: none"> <li>• Use simple equipment to observe closely</li> </ul>	<ul style="list-style-type: none"> <li>• Use simple equipment to observe closely including changes over time</li> </ul>	<ul style="list-style-type: none"> <li>• Make systematic and careful observations</li> </ul>	<ul style="list-style-type: none"> <li>• Make systematic and careful observations</li> </ul>	<ul style="list-style-type: none"> <li>• Make systematic and careful observations and link these to scientific ideas</li> </ul>	<ul style="list-style-type: none"> <li>• Make systematic and careful observations and link these to scientific ideas</li> </ul>
 <p><b>Measure</b></p>	<ul style="list-style-type: none"> <li>• Make comparisons between objects relating to size, length, weight and capacity (Mathematics: 3-4 years)/compare length, weight and capacity (reception)</li> <li>• Choose the right resources to carry out their own plan (Physical Dev 3-4 years) / develop their small motor skills so that they can use a range of tools competently, safely and confidently (reception)</li> <li>• <i>Use a range of small tools, including scissors, paint brushes and cutlery (ELG: Fine Motor Skills)</i></li> </ul>			<ul style="list-style-type: none"> <li>• Where appropriate, take accurate measurement using standard units, using a range of equipment, including thermometers and data loggers</li> </ul>	<ul style="list-style-type: none"> <li>• Where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers</li> </ul>	<ul style="list-style-type: none"> <li>• Take measurements using scientific equipment such as force metres, measuring cylinders, stop watches with increasing accuracy and precision, taking repeat findings when appropriate</li> </ul>	<ul style="list-style-type: none"> <li>• Take measurements using scientific equipment such as force metres, measuring cylinders, stop watches with increasing accuracy and precision, taking repeat findings when appropriate</li> </ul>
 <p><b>Gather and Record Results</b></p>	<ul style="list-style-type: none"> <li>• Sort materials (Creating &amp; Thinking Critically)</li> <li>• Explore collections of materials with similar and/or different properties (Understanding the World: 3-4 years)</li> <li>• <i>Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class (ELG: The Natural World)</i></li> <li>• <i>Explore the natural world around them, making observations and drawing pictures of animals and plants (ELG: The Natural World)</i></li> </ul>	<ul style="list-style-type: none"> <li>• Gather and record data to help in answering questions</li> <li>• Identify and classify</li> </ul>	<ul style="list-style-type: none"> <li>• Gather and record data to help in answering questions including from secondary sources of information</li> <li>• Identify, group and classify data</li> </ul>	<ul style="list-style-type: none"> <li>• Gather, record, classify and present data in a variety of ways to help in answering questions</li> <li>• Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables</li> </ul>	<ul style="list-style-type: none"> <li>• Gather, record, classify and present data in a variety of ways to help in answering questions</li> <li>• Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables</li> </ul>	<ul style="list-style-type: none"> <li>• Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs</li> </ul>	<ul style="list-style-type: none"> <li>• Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs</li> </ul>

 <p><b>Interpret results</b></p>	<ul style="list-style-type: none"> <li>Realise that their actions have an effect on the world (Playing &amp; Exploring)</li> <li>Notice patterns and arrange things in patterns (Mathematics: birth-3)/talk about and identifies the patterns around them (3-4 years) / continue, copy and create repeating patterns (reception)</li> </ul> <p><i>Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter (ELG: The Natural World)</i></p>	<ul style="list-style-type: none"> <li>Use his/her observations and ideas to suggest answers to questions</li> </ul>	<ul style="list-style-type: none"> <li>Use his/her observations and ideas to suggest answers to questions noticing similarities, differences and patterns</li> <li>Compare simple comparative tests</li> </ul>	<ul style="list-style-type: none"> <li>Use straightforward scientific evidence to answer questions or to support his/her findings</li> <li>Identify differences, similarities or changes related to simple scientific ideas and processes</li> </ul>	<ul style="list-style-type: none"> <li>Use straightforward scientific evidence to answer questions or to support his/her findings</li> <li>Identify differences, similarities or changes related to simple scientific ideas and processes</li> </ul>	<ul style="list-style-type: none"> <li>Identify scientific evidence that has been used to support or refute ideas or arguments</li> </ul>	<ul style="list-style-type: none"> <li>Identify scientific evidence that has been used to support or refute ideas or arguments</li> </ul>
 <p><b>Present Results</b></p>	<ul style="list-style-type: none"> <li>Use drawing to represent ideas (Expressive Arts &amp; Design: 3-4 years)/return to and build on their previous learning, refining ideas and developing their ability to represent them (reception)</li> </ul>		<ul style="list-style-type: none"> <li>Communicate ideas what he/she does and what he/she finds out in a variety of ways</li> </ul>	<ul style="list-style-type: none"> <li>Report on findings from, including oral and written explanations, displays or presentations of results and conclusions</li> </ul>	<ul style="list-style-type: none"> <li>Report on findings from, including oral and written explanations, displays or presentations of results and conclusions</li> </ul>	<ul style="list-style-type: none"> <li>Report and present findings from enquiries including conclusions, casual relationships and explanations of, and degree of trust in results, in oral and written forms such as displays and other presentations</li> </ul>	<ul style="list-style-type: none"> <li>Report and present findings from enquiries including conclusions, casual relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations</li> </ul>
 <p><b>Make Predictions</b></p>	<ul style="list-style-type: none"> <li>Respond to new experiences that you bring to their attention (Playing &amp; Exploring)</li> </ul> <p>Solve real problems (Creating and Thinking Critically)</p>	<ul style="list-style-type: none"> <li>Children consider in advance, what might happen or what they might find</li> </ul>	<ul style="list-style-type: none"> <li>Children consider in advance, what might happen or what they might find and know this as a prediction</li> </ul>	<ul style="list-style-type: none"> <li>Use results to make predictions and suggest new values</li> </ul>	<ul style="list-style-type: none"> <li>Use results to make predictions and suggest new values</li> </ul>	<ul style="list-style-type: none"> <li>Use test result to make predictions to set up further enquires</li> </ul>	<ul style="list-style-type: none"> <li>Use test result to make predictions to set up further enquires</li> </ul>
 <p><b>Draw Conclusions</b></p>	<p><i>Offer explanations for why things might happen, making use of recently introduced vocabulary from stories, non-fiction, rhymes and poems when appropriate; (ELG: Speaking)</i></p>	<ul style="list-style-type: none"> <li>Tell others what you did and what you found out</li> </ul>	<ul style="list-style-type: none"> <li>Explain what happened, what you found out and why this is the case</li> </ul>	<ul style="list-style-type: none"> <li>Use evidence to explain what happened and why it happened (simple conclusions)</li> </ul>	<ul style="list-style-type: none"> <li>Use evidence to draw conclusions, explaining what you have found out why you believe it to be true</li> </ul>	<ul style="list-style-type: none"> <li>Draw conclusions, explaining what you have learned from the enquiry referring to evidence and data from your enquiry</li> </ul>	<ul style="list-style-type: none"> <li>Draw conclusions, explaining what you have learned from the enquiry referring to evidence and data from your enquiry</li> </ul>
 <p><b>Evaluate</b></p>	<p><i>Offer explanations for why things might happen, making use of recently introduced vocabulary from stories, non-fiction, rhymes and poems when appropriate; (ELG: Speaking)</i></p>	<ul style="list-style-type: none"> <li>Recall what went wrong and why</li> <li>Recall the work of scientists and discuss the impact of their work</li> </ul>	<ul style="list-style-type: none"> <li>Recall what went wrong, why and how you could avoid this</li> <li>Recall the work of scientists and discuss the impact of their work</li> </ul>	<ul style="list-style-type: none"> <li>Reflect on the enquiry, suggest improvements and raise further questions</li> <li>Reflect on the work of scientists and evaluate the significance of their findings on modern life</li> </ul>	<ul style="list-style-type: none"> <li>Reflect on the enquiry, suggest improvements and raise further questions</li> <li>Reflect on the work of scientists and evaluate the significance of their findings on modern life</li> </ul>	<ul style="list-style-type: none"> <li>Reflect on the enquiry, suggest improvements and raise further questions</li> <li>Reflect on the work of scientists and evaluate the significance of their findings on modern life</li> </ul>	<ul style="list-style-type: none"> <li>Reflect on the enquiry, suggest improvements and raise further questions</li> <li>Reflect on the work of scientists and evaluate the significance of their findings on modern life</li> </ul>

We have ensured that the full range of working scientifically skills are present in each year group and repeated in different contexts across each year group and key stage. This ensures that our children have multiple opportunities to securely grasp each area of working scientifically and explore how this makes them scientists:

		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	Year 1		✓	✓	✓	✓	✓
	Year 2	✓			✓	✓	✓
	Year 3		✓	✓		✓	✓
	Year 4	✓	✓	✓			✓
	Year 5	✓		✓		✓	✓
	Year 6	✓	✓		✓		
	Year 1			✓	✓		
	Year 2	✓	✓	✓			✓
	Year 3			✓		✓	✓
	Year 4	✓				✓	
	Year 5	✓	✓	✓		✓	
	Year 6		✓			✓	
	Year 1		✓	✓	✓		✓
	Year 2			✓	✓	✓	✓
	Year 3			✓	✓		✓
	Year 4		✓				✓
	Year 5	✓		✓	✓	✓	
	Year 6	✓	✓		✓		
	Year 1		----	----	----	----	----
	Year 2	----	✓	----	----	----	----
	Year 3	✓	✓			✓	
	Year 4	✓	✓	✓			✓
	Year 5		✓		✓		
	Year 6					✓	✓
	Year 1		✓			✓	✓
	Year 2	✓		✓	✓		
	Year 3		✓	✓	✓		
	Year 4		✓	✓	✓		
	Year 5		✓				✓
	Year 6					✓	✓
	Year 1		✓			✓	✓
	Year 2	✓			✓	✓	
	Year 3	✓		✓	✓		
	Year 4			✓	✓	✓	
	Year 5			✓	✓	✓	
	Year 6	✓	✓		✓		✓

	Year 1		----		----		----		----
	Year 2		✓		✓			✓	✓
	Year 3	✓						✓	✓
	Year 4	✓				✓		✓	✓
	Year 5	✓				✓		✓	
	Year 6	✓	✓					✓	✓
	Year 1				✓		✓	✓	
	Year 2	✓	✓					✓	✓
	Year 3	✓	✓			✓		✓	
	Year 4	✓						✓	
	Year 5		✓		✓	✓			✓
	Year 6					✓		✓	✓
	Year 1		✓		✓		✓		
	Year 2		✓		✓			✓	✓
	Year 3	✓	✓			✓			✓
	Year 4		✓		✓	✓		✓	✓
	Year 5	✓			✓	✓			✓
	Year 6	✓	✓			✓		✓	
	Year 1		✓		✓		✓	✓	
	Year 2	✓	✓			✓			
	Year 3	✓	✓		✓	✓		✓	✓
	Year 4	✓	✓		✓	✓			✓
	Year 5	✓	✓		✓				
	Year 6	✓				✓			✓

## Scientific Enquiry

Within our science curriculum, we aim to develop the children's scientific enquiry. Each enquiry skill helps children to work scientifically and is clearly mapped below in our knowledge progressions through the use of enquiry questions. The 5 key enquiry skills that we look at are:



**Comparative and Fair testing**- Helps pupils explore relationship between variables. Comparative tests children compare one event with another (e.g. does the red car go faster than the green car?) A fair test identifies the causal relationship between two variables (e.g. does the height of the ramp affect how quickly the toy car rolls down the ramp and everything else remains the same)






**Identifying, classifying and grouping**- Pupils make sense of how the world is organised. Identification is the process of using differences to name something and classification is organising things into groups. Opportunities to identify arise when pupils recognise not all birds are the same for example and can identify and name them. They can then use observable and behavioural similarities to group them and add new things

**Pattern seeking**- Pupils observe, measure and record events and systems when carrying out pattern seeking enquires. They also collect and interpret data from secondary sources. They make observations and conduct surveys where the variables can't easily be controlled for practical or ethical reasons

**Observing Over Time**- Pupils identify and measure events and changes in living things, materials and physical process or events. These observations may take place over time spans of minutes or hours (e.g. puddles evaporating) up to several weeks or months (e.g. rearing young chicks)

**Research using secondary sources**- Where the answer is found using secondary sources. This is usually where it is impossible or unsafe for pupils to answer with first hand enquiries. This enquiry helps them evaluate sources, distinguish between fact and opinion and recognise conflicting evidence and bias

We have mapped out enquiry skills carefully to ensure children experience each of these multiple times each academic year within different contexts. Although each area of scientific enquiry might be covered in each unit, we have identified in the table below the enquiry areas that are most prominent within each unit:

		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	Year 1			✓	✓		
	Year 2	✓	✓	✓			✓
	Year 3		✓	✓		✓	
	Year 4	✓		✓			
	Year 5			✓	✓		
	Year 6		✓				✓
	Year 1		✓		✓	✓	
	Year 2	✓	✓	✓	✓		
	Year 3	✓	✓		✓	✓	✓
	Year 4		✓		✓	✓	✓
	Year 5		✓	✓	✓		
	Year 6	✓				✓	
	Year 1			✓	✓		
	Year 2				✓	✓	
	Year 3	✓		✓		✓	✓
	Year 4	✓		✓	✓	✓	✓
	Year 5	✓				✓	✓
	Year 6				✓		✓
	Year 1		✓	✓			✓
	Year 2			✓		✓	✓
	Year 3	✓		✓	✓		
	Year 4		✓			✓	✓
	Year 5	✓		✓	✓	✓	✓
	Year 6		✓		✓		
	Year 1		✓			✓	✓
	Year 2	✓	✓		✓		✓
	Year 3		✓		✓		✓
	Year 4		✓		✓		
	Year 5	✓	✓			✓	✓
	Year 6	✓	✓		✓		

## Plants

	Foundation	Year 1	Year 2	Year 3
<b>Curriculum Objectives</b>	<p><u>The Natural World (ELG)</u></p> <ul style="list-style-type: none"> <li>Explore the natural world around them, making observations and drawing pictures of animals and plants</li> <li>Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class</li> <li>Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter</li> </ul>	<ul style="list-style-type: none"> <li>identify and name a variety of common wild and garden plants, including deciduous and evergreen trees</li> <li>identify and describe the basic structure of a variety of common flowering plants, including trees</li> </ul>	<ul style="list-style-type: none"> <li>observe and describe how seeds and bulbs grow into mature plants</li> <li>find out and describe how plants need water, light and a suitable temperature to grow and stay healthy</li> </ul>	<ul style="list-style-type: none"> <li>identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers</li> <li>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</li> <li>investigate the way in which water is transported within plants</li> <li>explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal</li> </ul>
<b>Vocabulary</b>	Tree, leaf, flower, stem, seed, petal	Leaves, trunk, branch, root, seed, bulb, flower, stem, wild, garden, deciduous, evergreen	Leaves, trunk, branch, root, seed, bulb, flower, stem, wild, garden, deciduous, evergreen, observe, grow, compare, record, temperature, predict, measure, diagram, germinate, warmth, sunlight	Air, light, water, nutrients, soil, support, anchor, reproduction, pollination, dispersal, transportation, flower, energy, growth, seedling, carbon dioxide, oxygen, sugar, material, photosynthesis, chlorophyll
<b>Knowledge</b>	<p>I know and can gather the equipment I need to plant a seed</p> <p>I know how to plant seeds so that they will grow well</p> <p>I know how to take care of growing plants</p> <p>I know the key features of the life cycle of a plant</p> <p>I know how to compare plants and group them based on their appearance</p> <p>I know how to describe the parts of a flowering plant</p>	<p>I know that evergreen trees maintain their leaves throughout the year and that deciduous trees shed their leaves in autumn</p> <p>I know that a flowering plant consists of roots, stem, leaves and flowers, and that a tree's stem is called a trunk</p> <p>I know by name a variety of common wild and garden plants</p> <p>I know by name a variety of deciduous and evergreen trees</p>	<p>I know that seeds and bulbs need to be buried underground in soil and that they will grow into adult plants under the right conditions (water, warmth)</p> <p>I know that plants that are deprived of light, food or air will not grow and will die</p> <p>I know that plants produce offspring that grow into adults</p>	<p>I know that different parts of plants have one or more functions (jobs)</p> <p>I know that the roots collect water and minerals from the soil, and hold the plant firmly in the ground</p> <p>I know that the stem holds up the leaves so that they can gather light to make food and holds up the flowers so that they can receive pollen and disperse their fruits; know that the stem also transports water and minerals from the roots to the other parts of the plant</p> <p>I know that the leaves make food by absorbing light and using its energy to turn carbon dioxide and water into carbohydrates</p> <p>I know that the function of a flower is reproduction, and can explain the processes of pollination, seed formation and seed dispersal</p>
<b>Big Ideas</b>	B1, B2	B2	B1	B3
<b>Key Scientists</b>	Beatrix Potter (Author/Botanist)		Agnes Arber (Botanist), Alan Titchmarsh (Botanist/Gardener)	Jan Ingenhousz (Photosynthesis), Joseph Banks (Botanist)

## Rocks

<b>Year 3</b>	
<b>Curriculum Objectives</b>	<ul style="list-style-type: none"> <li>compare and group together different kinds of rocks on the basis of their appearance and simple physical properties</li> <li>describe in simple terms how fossils are formed when things that have lived are trapped within rock</li> <li>recognise that soils are made from rocks and organic matter</li> </ul>
<b>Vocabulary</b>	Rocks, igneous, metamorphic, sedimentary, anthropic, permeable, impermeable, chemical fossil, body fossil, trace fossil, Mary Anning, cast fossil, mould fossil, replacement fossil, extinct, organic matter, topsoil, sub soil, base rock
<b>Knowledge</b>	<p>I know that the Earth has a solid crust made up of tectonic plates with molten rock beneath</p> <p>I know that there are three kinds of rocks: igneous, sedimentary and metamorphic</p> <p>I know some examples of the different types of rock and can explain how they are made</p> <p>I know how to compare and group together rocks based on their appearance and properties</p> <p>I know how fossils are formed and that fossils help us to learn things about things that lived a long time ago</p> <p>I know that soil is made from tiny particles of rock broken down by the action of weather (weathering)</p>
<b>Big Ideas</b>	C1, C2
<b>Key Scientists</b>	Mary Anning (Discovery of Fossils), Inge Lehmann (Earth's Mantle)

## Sound

<b>Year 4</b>	
<b>Curriculum Objectives</b>	<ul style="list-style-type: none"> <li>identify how sounds are made, associating some of them with something vibrating</li> <li>recognise that vibrations from sounds travel through a medium to the ear</li> <li>find patterns between the pitch of a sound and features of the object that produced it</li> <li>find patterns between the volume of a sound and the strength of the vibrations that produced it</li> <li>recognise that sounds get fainter as the distance from the sound source increases</li> </ul>
<b>Vocabulary</b>	Amplitude, volume, quiet, loud, ear, pitch, high, low, particles, instruments, wave
<b>Knowledge</b>	<p>I know that sound is generated when an object vibrates; some of the energy from the vibrating object is transferred to the air, making the air particles move</p> <p>I know that sound is a form of energy</p> <p>I know that sound travels through a medium</p> <p>I know that longitudinal sound waves are detected in the ear by humans and that the brain interprets this as the sounds we hear</p> <p>I know that pitch is how high or low a sound is and that this is determined by how many vibrations per second are being made by the vibrating object</p> <p>I know that volume is how loud or quiet a sound is and that this is determined by the amount of energy in the wave</p> <p>I know that the volume of a sound is quieter if the listener is further away from the object</p>
<b>Big Ideas</b>	P3
<b>Key Scientists</b>	Aristotle (Sound Waves), Galileo Galilei (Frequency and Pitch of Sound Waves), Alexander Graham Bell (Invented the Telephone)

## Animals, including humans

	Foundation	Year 1	Year 2	Year 3
<b>Curriculum Objectives</b>	<p><u>The Natural World (ELG)</u></p> <ul style="list-style-type: none"> <li>Explore the natural world around them, making observations and drawing pictures of animals and plants</li> <li>Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class</li> <li>Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter</li> </ul> <p><u>Managing Self (ELG)</u></p> <ul style="list-style-type: none"> <li>Manage their own basic hygiene and personal needs, including dressing, going to the toilet and understanding the importance of healthy food choices</li> </ul>	<ul style="list-style-type: none"> <li>identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense</li> <li>identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals</li> <li>identify and name a variety of common animals that are carnivores, herbivores and omnivores</li> <li>describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)</li> </ul>	<ul style="list-style-type: none"> <li>notice that animals, including humans, have offspring which grow into adults</li> <li>find out about and describe the basic needs of animals, including humans, for survival (water, food and air)</li> <li>describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene</li> </ul>	<ul style="list-style-type: none"> <li>identify that animals, 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</li> <li>identify that humans and some other animals have skeletons and muscles for support, protection and movement</li> </ul>
<b>Vocabulary</b>	Head, eyes, nose, mouth, ears, hands, fingers, feet, toes, arm, leg, animal, see, hear, touch, taste, smell	Amphibians, birds, fish, mammals, reptiles, carnivores, herbivore, omnivore, sight, hearing, touch, taste, smell, head, neck, ear, mouth, shoulder, hand, fingers, leg, foot, thumb, eye, nose, knee, toes, teeth	Living, dead, never alive, habitats, micro-habitats, food, food chain, leaf litter, shelter, seashore, woodland, ocean, rainforest, conditions, desert, damp, shade	Nutrients, nutrition, carbohydrates, protein, fats, vitamins, minerals, water, fibre, skeleton, bones, joints, endoskeleton, exoskeleton, hydrostatic skeleton, vertebrates, invertebrates, muscles, contract, relax
<b>Knowledge</b>	<p>I know the name of different animals and can describe them based on their appearance and characteristics</p> <p>I know how to compare and group animals in different ways</p> <p>I know about different environments and what animals might live there</p> <p>I know that there are similarities and differences between others and myself</p> <p>I know how to name some parts of the body that can be seen</p> <p>I know that I grow from a baby to a child and then to an adult</p> <p>I know the 5 senses and can describe things based on these criteria</p> <p>I know some food that will keep my body healthy and some that won't keep my body healthy</p> <p>I know features of a healthy lifestyle (e.g. exercise) and can describe why this is important</p>	<p>I know that feet, legs, arms, hands, torso, head, skin, ears, eyes, nose, mouth and tongue are parts of the body and identify them</p> <p>I know that eyes are associated with sight, ears with sound, nose with smell, tongue with taste and skin with touch</p> <p>I know how to identify and can name examples of fish, amphibians, reptiles, birds and mammals</p> <p>I know that herbivorous animals eat plants; carnivorous animals eat other animals; omnivorous animals eat both animals and plants</p> <p>I know how to identify and can name examples of carnivores, herbivores and omnivores</p> <p>I know that fish, amphibians, reptiles, birds and mammals are similar in that they are vertebrates, which means they are animals that have a backbone</p> <p>I know that fish are different to other animals in having gills so that they can breathe underwater and scaly skin</p>	<p>I know that animals, including humans, need food, water and air to survive</p> <p>I know the basic food groups: fruit and vegetables, carbohydrates, protein, dairy, fat and sugary foods</p> <p>I know that proteins are good for growth, carbohydrates for energy and fruit and vegetables provide vitamins and minerals which help keep us healthy (e.g. calcium for healthy bones and teeth)</p> <p>I know that more than half of our diet should be made up of carbohydrates, fruit and vegetables and that fats and sugary foods should be eaten rarely and in small amounts</p> <p>I know that people need to exercise often to help their body stay strong and fit</p> <p>I know that keeping clean is an important part of staying healthy</p>	<p>I know that getting the right amount of each food group is called a balanced diet</p> <p>I know why it is important for my body to receive each type of food group</p> <p>I know that lack of a nutrient can cause ill health</p> <p>I know that animals, including humans, have a skeleton made up of solid objects</p> <p>I know that some animals (such as insects) have an exoskeleton – a solid covering on the outside of their body</p> <p>I know that many invertebrates (such as earthworms and slugs) have water held inside by muscles which acts like a skeleton</p> <p>I know that skeletons provide support for muscles and protect the body; for example, the rib cage protects the vital organs in the human body</p> <p>I know that muscles can only contract, so they must be arranged in pairs in the body so that as one contracts the other loosens</p>

	I know basic hygiene (e.g. washing hands) and can describe why this is important	<p>I know that amphibians are different to other animals in that they begin their lives with gills but then develop lungs and breathe on land</p> <p>I know that reptiles are different to other animals in that they breathe air and have scaly skin</p> <p>I know that birds are different to other animals in that they have feathers and wings</p> <p>I know that mammals are different to other animals in that they have fur/hair and they feed milk to their young</p>		
<b>Big Ideas</b>	B1, B2	B1, B2	B1	B3
<b>Key Scientists</b>	Chris Packham (Animal Conservationist)	Steve Irwin (Crocodile Hunter), Robert Winston (Human Scientist), Joe Wicks (Personal Trainer)		Adelle Davis (20th Century Nutritionist), Marie Curie (Radiation/X-Rays)

	Year 4	Year 5	Year 6
<b>Curriculum Objectives</b>	<ul style="list-style-type: none"> <li>describe the simple functions of the basic parts of the digestive system in humans</li> <li>identify the different types of teeth in humans and their simple functions</li> <li>construct and interpret a variety of food chains, identifying producers, predators and prey</li> </ul>	<ul style="list-style-type: none"> <li>describe the changes as humans develop to old age</li> </ul>	<ul style="list-style-type: none"> <li>identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood</li> <li>recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function</li> <li>describe the ways in which nutrients and water are transported within animals, including humans</li> </ul>
<b>Vocabulary</b>	Herbivore, Carnivore, Digestive system, tongue, mouth, teeth, oesophagus, stomach, gall bladder, small intestine, pancreas, large intestine, liver, tooth, canine, incisor, molar, premolar, producer, consumer	Embryo, foetus, gestation, baby, child, adolescent, puberty,, reproduction, adult	Artery, aorta, atrium, blood vessels capillary, circulatory system, vein, pulse, ventricle, replenished, resting heart rate, body
<b>Knowledge</b>	<p>I know that food passes through the body with the nutrients being extracted and the waste products excreted, and that this process is called digestion</p> <p>I know that the process of digestion involves breaking complex foodstuffs into simpler building blocks that can be absorbed by the body</p> <p>I know, can order and can describe the stages of the digestive system</p> <p>I know that a human has three types of teeth- incisors, canines and molars- and that these each perform different functions</p> <p>I know that a food chain traces the path of energy through a habitat</p> <p>I know that the arrows in a food chain show the direction that energy is travelling through a habitat</p> <p>I know that all energy for a food chain initially comes from the Sun which is absorbed and turned into energy by plants which are called producers</p> <p>I know that an animal that is eaten by another is called prey, and that an animal that eats other animals is called a predator</p>	<p>I know humans are mammals. All mammals have the same life cycles. However the length of each stage varies depending on the type of mammal it is.</p> <p>I know the gestation period for humans us usually 9 months.</p> <p>I know the years between 6 and 14 -middle childhood and early adolescence - are a time of important developmental advances that establish children's sense of identity.</p> <p>I know the early years, especially the first three years of life, are very important for building the baby's brain. A child's brain develops rapidly during the first five years of life, especially the first three years. It is a time of rapid cognitive, linguistic, social, emotional and motor development</p> <p>I know a mammal is an animal that breathes air, has a backbone, and grows hair at some point during its life. All female mammals give birth to live young and have glands that can produce milk to feed their young.</p>	<p>I know that the heart and lungs are organs protected by the ribcage</p> <p>I know that blood travels around the body transporting nutrients that have been absorbed into the blood stream from digestion; blood also carries oxygen around the body which is used to power the body; this use of oxygen to create energy is called respiration</p> <p>I know that the heart beats, pumping blood around the body and that blood vessels carry the blood; arteries carry blood away from the heart; veins carry blood towards the heart; capillaries are tiny blood vessels that connect arteries and veins</p> <p>I know that the heart is composed of four chambers: two atria and two ventricles; the aorta is the largest artery in the body and most major arteries branch off from it</p> <p>I know that when we exercise, our heart beats more frequently so that the oxygen that is used around the body can be replenished; it returns to a resting heart rate afterwards; fitter people tend to have lower resting heart rates</p> <p>I know that drugs are chemicals that have an impact on the natural chemicals in a person's; know that drugs can be harmful or helpful, depending on what they are and how they are used; know that all drugs can be harmful if overused</p> <p>I know that paracetamol and aspirin are examples of drugs that can be helpful as a painkiller</p> <p>I know that alcohol and tobacco are examples of drugs that are legal to adults but that can have serious negative effects, such as liver disease and lung disease, respectively</p>
<b>Big Ideas</b>	B3	B1	B1
<b>Key Scientists</b>	Ivan Pavlov (Digestive System Mechanisms), Joseph Lister (Discovered Antiseptics)	Dr Steve Jones (Geneticist), Robert Winston (Human Scientist)	Justus von Liebig (Theories of Nutrition and Metabolism), Sir Richard Doll (Linking Smoking and Health Problems), Leonardo Da Vinci (Anatomy)

## Forces and Magnets

	Year 3	Year 5
<b>Curriculum Objectives</b>	<ul style="list-style-type: none"> <li>compare how things move on different surfaces</li> <li>notice that some forces need contact between two objects, but magnetic forces can act at a distance</li> <li>observe how magnets attract or repel each other and attract some materials and not others</li> <li>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</li> <li>describe magnets as having two poles</li> <li>predict whether two magnets will attract or repel each other, depending on which poles are facing</li> </ul>	<ul style="list-style-type: none"> <li>explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object</li> <li>identify the effects of air resistance, water resistance and friction, that act between moving surfaces</li> <li>recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect</li> </ul>
<b>Vocabulary</b>	Force, push, pull, friction, surface, magnet, magnetic, magnetic field, pole, north, south, attract, repel, compass	Acceleration, air resistance, buoyancy, effort, force meter, fulcrum, gravity, load, mass, mesh, Newton, pivot, rigid, streamlined, terminal velocity, unsupported, water resistance, weight
<b>Knowledge</b>	<p>I know that a force can be thought of as a push or a pull</p> <p>I know that there are different types of contact force: impact forces (when two surfaces collide), frictional forces (when two surfaces are already in contact) and strain forces (when an elastic material is stretched or squashed)</p> <p>I know that as objects move across a surface there is friction when they rub against each other and that sometimes this friction is larger or smaller</p> <p>I know that there are also non-contact forces that can act between objects without them touching and that magnetism is an example of a non-contact force</p> <p>I know that magnets have two poles called north and south</p> <p>I know that like poles (south-south and north-north) of two magnets repel each other and that opposite poles of two magnets (north-south) attract each other</p> <p>I know that some materials are magnetic, meaning that they are attracted to a magnet, while other materials are non-magnetic</p>	<p>I know that a force is measured in a unit called Newtons, named after a British scientist called Sir Isaac Newton who discovered lots about gravity and how planets move</p> <p>I know that the amount of matter (stuff) in an object is its mass</p> <p>I know that gravity is a force that acts between all objects in the universe, but that it acts much more strongly between objects that have more mass and that are close together</p> <p>I know that unsupported objects are pulled towards the Earth by the force of gravity</p> <p>I know that acceleration is a change in speed and that unbalanced forces acting on an object cause it to accelerate</p> <p>I know that air resistance is a force felt by an object as it moves through the air; it is caused by the object bumping into the gas particles that make up air; the quicker an object moves, the more gas particles it bumps into and the more air resistance it experiences. Know that a falling object will accelerate until its air resistance matches the gravitational force pulling it down; at this point, the object will continue to move at this speed (called its terminal velocity) without getting any quicker or slowing down</p> <p>I know that a parachute's shape increases the air resistance that a falling object experiences, giving it a much lower terminal velocity</p> <p>I know that water resistance is a force felt by an object as it moves through water; it is caused by the object bumping into the water particles</p> <p>I know that the shape of an object determines how much air resistance or water resistance it experiences; shapes of object that experience little air resistance or water resistance are described as streamlined</p> <p>I know how to draw a force diagram with arrows representing the different forces acting on an object</p> <p>I know that gears, levers and pulleys are simple machines that used to allow a smaller force to have a greater effect; they do this by moving a smaller force over a longer distance at one end of the machine, which the machine turns into a larger force over a small distance at the other end</p>
<b>Big Ideas</b>	P2	P1, P2
<b>Key Scientists</b>	William Gilbert (Theories on Magnetism), Andre Marie Ampere (Founder of Electro-Magnetism)	Galileo Galilei (Gravity and Acceleration), Isaac Newton (Gravitation)

## Materials and their properties

	Foundation	Year 1	Year 2	Year 5
<b>Curriculum Objectives</b>	<p><u>The Natural World (ELG)</u></p> <ul style="list-style-type: none"> <li>Explore the natural world around them, making observations and drawing pictures of animals and plants</li> <li>Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class</li> <li>Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter</li> </ul>	<ul style="list-style-type: none"> <li>distinguish between an object and the material from which it is made</li> <li>identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock</li> <li>describe the simple physical properties of a variety of everyday materials</li> <li>compare and group together a variety of everyday materials on the basis of their simple physical properties</li> </ul>	<ul style="list-style-type: none"> <li>identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses</li> <li>find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching</li> </ul>	<ul style="list-style-type: none"> <li>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</li> <li>know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution</li> <li>use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating</li> <li>give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic</li> <li>demonstrate that dissolving, mixing and changes of state are reversible changes</li> <li>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</li> </ul>
<b>Vocabulary</b>	Material, wood, glass, paper, hard, soft, smooth, rough, heavy, light	Hard, soft, stretchy, stiff, shiny, dull, rough, smooth, bendy/not bendy, waterproof/not waterproof, absorbent, opaque	Waterproof, fabric, rubber, cars, rock, paper, cardboard, wood, metal, plastic, glass, brick, twisting, squashing, bending	Irreversible, dissolve, soluble, insoluble, solvent, solute, solution, filter, sieve, saturation, crystallization, thermal, chemistry
<b>Knowledge</b>	<p>I know the name of some materials</p> <p>I know how to describe materials based on their appearance</p> <p>I know materials that are hard and materials that are soft</p> <p>I know materials that are smooth and materials that are rough</p> <p>I know materials that are heavy and materials that are light</p> <p>I know how to compare materials and can talk about changes I notice</p> <p>I know how to compare the suitability of materials for a particular purpose</p>	<p>I know that an object is made from/of a material and know some examples of materials in the real world</p> <p>I know from observation how to distinguish between materials made of wood, plastic, glass, metal, water, rock</p> <p>I know that materials can be hard, soft, strong, weak, absorbent, heavy, light, solid and runny, smooth and rough; these descriptions denote the properties of a material</p> <p>I know how to compare and group together a variety of everyday materials on the basis of their simple physical properties</p> <p>I know that matter (stuff) is made from tiny building blocks</p>	<p>I know that materials can have useful properties for a given job (including being waterproof, strong, hard, soft, flexible, rigid, light or heavy)</p> <p>I know that many types of plastic are waterproof, that steel (a type of metal) is strong, that rock is hard, that cotton wool is soft, that rubber is flexible, that rock is rigid, that polystyrene (a type of plastic) is light and that iron (a type of metal) is heavy</p> <p>I know that when objects move across a surface there is friction when they rub against each other and that sometimes this friction is larger or smaller</p> <p>I know that applying forces to objects can change their shape, by squeezing, stretching, bending and twisting</p>	<p>I know that materials can be sorted in a variety to ways based on their properties</p> <p>I know that in some solid materials the bonds between particles break when surrounded by a liquid; this allows the liquid to absorb the solid; when this happens, the solid is called a solute, the liquid is called a solvent and the result is a solution; when a solid does dissolve in a liquid it is described as being soluble in that solvent (e.g. sugar in water); when it cannot it is insoluble (e.g. sand in water)</p> <p>I know that a given amount of solvent can only absorb a certain amount of solid before no more will dissolve; when this happens the liquid is said to be saturated</p> <p>I know that when a solvent is evaporated from a solution, the original solute is left behind; the remaining solid will often form crystals – the slower the solvent evaporates, the larger the crystals that will be formed</p> <p>I know how to dissolve and a solute in a solvent and then how to evaporate the solvent to recover the solute</p> <p>I know that a reversible change is one that can be reversed and that examples of this are mixing, dissolving and changes of state where no chemical reaction takes place</p> <p>I know that an irreversible change is one that cannot be reversed and that examples of this often involve a chemical change where a new material is made, often a gas (e.g. burning, boiling an egg, the reaction of bicarbonate of soda and acid)</p> <p>I know that filtering allows solids and liquids to be separated and that sieving allows solids made up of different sizes parts to be separated</p>

				<p>I know how to separate a mixture of sand, salt and small stones by sieving (to remove the small stones), followed by dissolving in water (so the salt is absorbed), followed by filtering to remove the sand from the mixture, followed finally by evaporation of the water to recover the salt</p> <p>I know that materials' different properties can be tested through acting upon them, including testing to find whether materials are magnetic, thermally conductive and electrically conductive; know that the various properties of different materials make them suitable for a given function</p> <p>I know how to explain orally and in writing the reasons why various materials are suited or unsuited to a function</p>
<b>Big Ideas</b>	C1, C2	C1, C2	C1, C2	C2, C3
<b>Key Scientists</b>	William Addis (Toothbrush Inventor), Charles Mackintosh (Waterproof coat), John McAdam (roads)		William Addis (Toothbrush Inventor), Charles Mackintosh (Waterproof coat), John McAdam (roads)	Spencer Silver, Arthur Fry and Alan Amron (Post-It Notes), Ruth Benerito (Wrinkle-Free Cotton)

## States of Matter

	Foundation	Year 4
<b>Curriculum Objectives</b>	<p><u>The Natural World (ELG)</u></p> <ul style="list-style-type: none"> <li>Explore the natural world around them, making observations and drawing pictures of animals and plants</li> <li>Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class</li> <li>Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter</li> </ul>	<ul style="list-style-type: none"> <li>compare and group materials together, according to whether they are solids, liquids or gases</li> <li>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 (°C)</li> <li>identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature</li> </ul>
<b>Vocabulary</b>	solid, liquid, freeze, melt, heat, cool, ice, water	Solid, liquid, gas, particles, state, materials, properties, matter, melt, freeze, water, ice, temperature, process, condensation, evaporation, water vapour, energy, precipitation, collection
<b>Knowledge</b>	<p>I know how to describe materials that are solids</p> <p>I know how to describe materials that are liquids</p> <p>I know what freezing is and can describe materials that are frozen</p> <p>I know what heating is and can describe materials that have been heated</p>	<p>I know that things are composed of a matter commonly in one of three states of matter: solid, liquid or gas</p> <p>I know that things are made of particles (tiny building blocks) and that these are organized differently in different states</p> <p>I know that materials can change state when temperature changes</p> <p>I know that when solids turn into liquids, this is called melting and that the reverse process is called freezing</p> <p>I know that when liquids turn into gases, this is called evaporation and that the reverse process is called condensation</p> <p>I know that the melting point of water is 0° C and that the boiling point of water is 100° C</p> <p>I know that water flows around our world in a continuous process called the water cycle, and explain the part evaporation and condensation play</p>
<b>Big Ideas</b>	C2, C3	C3
<b>Key Scientists</b>		Anders Celsius (Celsius Temperature Scale), Daniel Fahrenheit (Fahrenheit Temperature Scale/Invention of the Thermometer)

## Seasonal Changes

	Foundation	Year 1
<b>Curriculum Objectives</b>	<p>The Natural World (ELG)</p> <ul style="list-style-type: none"> <li>Explore the natural world around them, making observations and drawing pictures of animals and plants</li> <li>Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class</li> <li>Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter</li> </ul>	<ul style="list-style-type: none"> <li>observe changes across the four seasons</li> <li>observe and describe weather associated with the seasons and how day length varies</li> </ul>
<b>Vocabulary</b>	Summer, day, Spring, dark, Autumn, light, Winter, night, Season, Moon, Sun	Seasons, spring, summer, autumn, winter, windy, sunny, overcast, snow, rain, temperature
<b>Knowledge</b>	<p>I know that weather changes through the year, getting hotter in the summer and colder in the winter</p> <p>I know that the winter is likely to bring ice on the ground when water freezes due to the cold</p> <p>I know that the four seasons are spring, summer, autumn and winter and know the order of the cycle</p> <p>I know the basic characteristics of each season</p> <p>I know what season it currently is</p>	<p>I know the names of the 4 seasons, can order them and can describe characteristics of each</p> <p>I know key days and events that occur during each season, including celebrations relating to the time of year</p> <p>I know the likely weather that occurs in each season, and can reason the season that it currently is based on this</p> <p>I know that days are longer in the summer and shorter in winter</p> <p>I know how to observe changes across the 4 seasons, describing similarities and differences</p> <p>I know that the Earth orbits the Sun with one orbit constituting a year of roughly 365 days</p>
<b>Big Ideas</b>	E2	E2
<b>Key Scientists</b>	Dr Steve Lyons (Extreme Weather), Holly Green (Meteorologist)	

## Evolution and Inheritance

	Year 6
<b>Curriculum Objectives</b>	<ul style="list-style-type: none"> <li>recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago</li> <li>recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents</li> <li>identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution</li> </ul>
<b>Vocabulary</b>	Fossils, Adaptation, Evolution, Characteristics, Reproduction, Genetics, Variation, Inherited, Environmental, Mutation, Competition, Survival of the Fittest, Evidence,
<b>Knowledge</b>	<p>I know that all life on Earth began from a single point around 4.5 billion years ago</p> <p>I know that living things changes over time and that this gradual change is called evolution</p> <p>I know that natural selection is the cause of this change; natural selection works as across a species there is natural variation within a species; there is also competition to survive and reproduce and that members of a species with advantageous characteristics survive and reproduce - these characteristics are passed down to their offspring; members of a species with less advantageous characteristics do not survive and reproduce – these characteristics are not passed down to offspring</p> <p>I know that offspring are vary and are not identical to their parents Know that Charles Darwin posited this theory of evolution by natural selection</p> <p>I know that the gradual change of species over millions of years can be observed by looking at examples of fossil</p>
<b>Big Ideas</b>	B3
<b>Key Scientists</b>	Charles Darwin and Alfred Russel Wallace (Theory of Evolution by Natural Selection), Jane Goodall (Chimpanzees)

## Electricity

	Year 4	Year 6
<b>Curriculum Objectives</b>	<ul style="list-style-type: none"> <li>identify common appliances that run on electricity</li> <li>construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers</li> <li>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</li> <li>recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit</li> <li>recognise some common conductors and insulators, and associate metals with being good conductors</li> </ul>	<ul style="list-style-type: none"> <li>associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit</li> <li>compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches</li> <li>use recognised symbols when representing a simple circuit in a diagram</li> </ul>
<b>Vocabulary</b>	Electricity, electric current, appliances, mains, crocodile clips, wires, bulb, battery cell, battery holder, motor, buzzer, switch, conductor, electrical insulator, component	Circuit, component, conductor, energy, insulator, particle, property, series circuit, parallel circuit, resistance, voltage
<b>Knowledge</b>	<p>I know that electrical energy is one of many forms of energy</p> <p>I know and can name common appliances that use electricity</p> <p>I know how to construct a simple circuit, identifying its parts</p> <p>I can identify and reason why a circuit will or will not work</p> <p>I know that a switch functions by completing or breaking a complete circuit</p> <p>I know that electrical current flows well through some materials, called electrical conductors, and poorly through other materials, called electrical insulators</p> <p>I know that exposure to high levels of electrical current can be dangerous</p>	<p>I know that voltage is a measure of the power of a cell to produce electricity; it is a measure of the 'push' of electric current, not the size of the electric current</p> <p>I know that as the number and voltage of cells in a circuit increases, the brightness of a bulb or the volume of a buzzer will increase (though too high a voltage may 'blow' the bulb or buzzer)</p> <p>I know how to draw simple circuit diagrams</p> <p>I know the recognized symbols for a battery, bulb, motor, buzzer and wire</p> <p>I know how to predict whether components will function in a given circuit, depending on whether or not the circuit is complete; whether or not a switch is in an on or off position; and whether or not there is a cell to provide electrical current to the circuit</p> <p>I know that two bulbs in a circuit can be wired up to create a series circuit or a parallel circuit; if one bulb blows in a series circuit the other will not shine as the circuit has been broken; in contrast, if one bulb blows in a parallel circuit, there will still be a complete circuit for the other bulb so it will continue to shine; use this knowledge to explain the advantages of using parallel circuits (e.g. in the lighting in homes)</p>
<b>Big Ideas</b>	P3	P1, P3
<b>Key Scientists</b>	Thomas Edison (First Working Lightbulb), Joseph Swan (Incandescent Light Bulb)	Alessandro Volta (Electrical Battery), Nicola Tesla (Alternating Currents)

## Living things and their habitats

	Foundation	Year 2	Year 4	Year 5	Year 6
<b>Curriculum Objectives</b>	<p><u>The Natural World (ELG)</u></p> <ul style="list-style-type: none"> <li>Explore the natural world around them, making observations and drawing pictures of animals and plants</li> <li>Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class</li> <li>Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter</li> </ul>	<ul style="list-style-type: none"> <li>explore and compare the differences between things that are living, dead, and things that have never been alive</li> <li>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</li> <li>identify and name a variety of plants and animals in their habitats, including microhabitats</li> <li>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</li> </ul>	<ul style="list-style-type: none"> <li>recognise that living things can be grouped in a variety of ways</li> <li>explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment</li> <li>recognise that environments can change and that this can sometimes pose dangers to living things</li> </ul>	<ul style="list-style-type: none"> <li>describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird</li> <li>describe the life process of reproduction in some plants and animals</li> </ul>	<ul style="list-style-type: none"> <li>describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals</li> <li>give reasons for classifying plants and animals based on specific characteristics</li> </ul>
<b>Vocabulary</b>	See 'Plants' and 'Animals, including humans' sections	Living, dead, never alive, habitats, micro-habitats, food, food chain, leaf litter, shelter, seashore, woodland, ocean, rainforest, conditions, desert, damp, shade	Environment, flowering, nonflowering, plants, animals, vertebrates, fish, amphibians, reptiles, mammals, invertebrate, human impact, nature reserves, deforestation	Life cycle, life span, embryo, womb, weaned, adolescence, metamorphosis, pupa, larva, chrysalis, caterpillar, tadpole, hatchling, fledgling, insect	Micro-organism, virus, thorax, arthropod, abdomen, arachnid, antenna, jointed limbs
<b>Knowledge</b>	See 'Plants' and 'Animals, including humans' sections	<p>I know that living things move, grow, consume nutrients and reproduce; that dead things use to do these things, but no longer do; and that things that never lived have never done these things</p> <p>I know that herbivorous animals eat plants; a carnivorous animal eats other animals; omnivorous animals eat both animals and plants</p> <p>I know that plants absorb energy from the Sun; that this energy is consumed by herbivorous animals; and that carnivorous animals eat other animals</p> <p>I know that the arrows on a food chain show the direction that the energy travels</p> <p>I know examples of animals that have adapted to their habitat and can give reasons why</p>	<p>I know that animals can be grouped based on their physical characteristics and based on their behaviour</p> <p>I know that living things are divided into kingdoms: the animal kingdom, plants, fungi, bacteria, and single-celled organisms</p> <p>I know that a species is a group of living things have many similarities that can reproduce together produce offspring</p> <p>I know that a classification key uses questions to sort and identify different living things</p> <p>I know how to use a classification key to identify living things</p> <p>I know that changes to the environment can make it more difficult for living things to survive and reproduce; in extreme cases this leads to extinction</p>	<p>I know and can describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird</p> <p>I know and can describe the life processes of reproduction in some plants (including the pollination process) and animals</p> <p>I know that bulbs, tubers, runners and plantlets are examples of plant reproduction involving only one parent</p>	<p>I know that there are three types of micro-organism: viruses, fungi and bacteria; of these three, viruses are often not really considered to be alive by many scientists mainly because they don't have the 'machinery' to reproduce inside them</p> <p>I know that germs are disease-causing bacteria</p> <p>I know that an arthropod is an invertebrate with a hard, external skeleton and jointed limbs</p> <p>I know that insects are a type of arthropod; their bodies consist of six legs, a head, a thorax and an abdomen; most insects also have a pair of antennae and a pair of wings</p> <p>I know that an arachnid (e.g. spider) is a type of arthropod with eight legs and no antennae or wings</p>

			I know that human activity- such as climate change caused by pollution- can change the environment for many living things, endangering their existence		I know that a crustacean is a type of arthropod with two pairs of antennae  I know that a myriapod is an arthropod with a flat and long or cylindrical body and many legs (e.g. centipede)
<b>Big Ideas</b>	B1, B2	B1	B2	B1	B2
<b>Key Scientists</b>	Terry Nutkins (TV Presenter)	Liz Bonnin (Conservationist)	Jaques Cousteau (Marine Biologist)	James Brodie of Brodie (Reproduction of Plants by Spores), David Attenborough (Naturalist and Nature Documentary Broadcaster)	Carl Linnaeus (classification)

## Light

	Year 3	Year 6
<b>Curriculum Objectives</b>	<ul style="list-style-type: none"> <li>recognise that they need light in order to see things and that dark is the absence of light</li> <li>notice that light is reflected from surfaces</li> <li>recognise that light from the sun can be dangerous and that there are ways to protect their eyes</li> <li>recognise that shadows are formed when the light from a light source is blocked by an opaque object</li> <li>find patterns in the way that the size of shadows change</li> </ul>	<ul style="list-style-type: none"> <li>recognise that light appears to travel in straight lines</li> <li>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</li> <li>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</li> <li>use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them</li> </ul>
<b>Vocabulary</b>	Light source, dark, reflect, ray, mirror, bounce, visible, beam, sun, glare, travel, straight, opaque, shadow, block, transparent, translucent	Angle of incidence, angle of reflection, refraction, spectrum, translucent, medium, periscope
<b>Knowledge</b>	<p>I know that light is a form of energy</p> <p>I know that we need light to see things and that darkness is the absence of light</p> <p>I know that light travels in straight lines</p> <p>I know that light is reflected when it travels from a light source and then 'bounces' off an object</p> <p>I know that everything that we can see is either a light source or something that is reflecting light from a light source into our eyes</p> <p>I know that opaque objects block light creating shadows and that light passes easily through transparent objects</p> <p>I know that sunglasses can protect eyes from sunlight but looking at the Sun directly – even with sunglasses – can damage the eyes</p> <p>I know that as objects move towards a light source, the size of the shadow increases</p>	<p>I know that translucent objects allow some light to pass through, but some of the light changes direction as it passes through the object; this means that an something seen through a translucent object is not clearly defined</p> <p>I know that when light passes from one medium to another (e.g. from air to water), it changes direction; this is called refraction; this happens because light travels at different speeds in different media</p> <p>I know that white light comprises all the colours of light</p> <p>I know that white light refracted by two surfaces in a prism will spread out so that all of its constituent colours can be seen; this array of colours is called a spectrum; it happens because the different colours of that constitute white light travel at different speeds</p> <p>I know how to draw a diagram to show why the shape of a shadow will match the shape of an object</p> <p>I know that when light reflects off an object, the angle of incidence is equal to the angle of reflection</p> <p>I know that a periscope takes advantage of the predictable angles of incidence and reflection to allow an image to be shown to a viewer</p>
<b>Big Ideas</b>	P3, E2	P1, P3
<b>Key Scientists</b>	Louis Braille (Braille communication system)	Thomas Young (Wave Theory of Light), Ibn al-Haytham (Alhazen) (Light and our Eyes), Percy Shaw (The Cats Eye)

## Earth and Space

<b>Year 5</b>	
<b>Curriculum Objectives</b>	<ul style="list-style-type: none"> <li>describe the movement of the Earth and other planets relative to the sun in the solar system</li> <li>describe the movement of the moon relative to the Earth</li> <li>describe the sun, Earth and moon as approximately spherical bodies</li> <li>use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky</li> </ul>
<b>Vocabulary</b>	Planet, satellite, sphere, solar system, eclipse, star, universe, constellation, axis, celestial body, Moon, rotating, lunar, solar, telescope, rotation
<b>Knowledge</b>	<p>I know that the universe comprises all matter and space in existence Know that a celestial body is a large object in the universe</p> <p>I know that a star is an exceptionally hot ball of gas, originally made from hydrogen and helium</p> <p>I know that the Sun is a star</p> <p>I know that a planet (e.g. Earth) is defined as a spherical celestial body that orbits a star and that has cleared the neighbourhood of its orbit of other objects, some of which crash into the planet and others that become moons of that planet</p> <p>I know it was once thought that everything orbited the Earth, but that scientists like Copernicus and Galileo used telescopes and measurement to show that the Earth orbited the Sun</p> <p>I know that there are eight major planets in our solar system: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune</p> <p>I know that the universe is utterly vast and that our solar system makes up a tiny fraction of the universe</p> <p>I know that a satellite orbits a planet and that moons are natural satellites</p> <p>I know that the Moon orbits the Earth roughly every 28 days</p> <p>I know that as the Moon orbits the Sun, different parts of it are lit up by the Sun, which is why we see a different shape lit up on the Moon as the lunar cycle progresses</p> <p>I know that humans have sent man-made satellites into orbit that assist with telecommunication</p> <p>I know that all the planets in the solar system orbit the Sun and that the further away they are from the Sun, the longer their orbit</p> <p>I know that the Earth spins around an imaginary line through its centre called an axis and that this axis is tilted relative to the Earth's orbit</p> <p>I know that night and day are the result of the Earth rotating on its axis Know that the tilt of the Earth towards and away from the Sun's light as the Earth orbits the Sun leads to the seasons as during winter the light is spread over a wider area</p> <p>I know that a solar eclipse occurs when the Moon is between the Sun and the Earth, casting a shadow on the Earth; a lunar eclipse occurs when the Earth is between the Sun and the Moon, casting a shadow on the Moon</p>
<b>Big Ideas</b>	E1, E2
<b>Key Scientists</b>	Claudius Ptolemy and Nicolaus Copernicus (Heliocentric vs Geocentric Universe), Neil Armstrong (First man on the Moon), Helen Sharman (First British astronaut), Tim Peake (First British ESA astronaut)