

## Progression of science

<b>Subject content</b>	<p><b>Year 3</b> pupils should be taught to:</p> <p>Plants</p> <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> <p>Animals, including humans</p> <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> <p>Rocks</p> <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> <p>Light</p> <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> <p>Forces and magnets</p> <ul style="list-style-type: none"> <li>compare how things move on different surfaces</li> <li>notice that some forces need contact between 2 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 2 poles</li> <li>predict whether 2 magnets will attract or repel each other, depending on which poles are facing</li> </ul>	<p><b>Year 4</b> pupils should be taught to:</p> <p>Living things and their habitats</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>Animals, including humans</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 pre</li> </ul> <p>States of matter</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>Sound</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 increase</li> </ul> <p>Electricity</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>
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The National Curriculum programmes of study for science are set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. **Within each key stage, schools therefore have the flexibility to introduce content earlier or later than set out in the programme of study. In addition, schools can introduce key stage content during an earlier key stage if appropriate.** All schools are also required to set out their school curriculum for science on a year-by-year basis and make this information available online.

**LKS2**

**Substantive Knowledge**

	<b>Plants</b>	<b>Animals, including humans</b>	<b>Rocks</b>	<b>Light</b>	<b>Living things and their habitats</b>	<b>Forces and Magnets</b>	<b>States of Matter</b>	<b>Sounds</b>	<b>Electricity</b>
<b>Cycle A</b>		Nutrition [Spring] Digestive system and foods chains [Summer]	Stones, rocks and fossils	Shadows and reflections	Group and classify, identify living things in local/wider UK habitats, food chains [Autumn building on Y2]		Solids, liquids and gases and water cycle [evaporation and condensation]		
<b>Cycle B</b>	Parts of flowering plants and requirements for plant life and growth [Autumn] Water transport withing plants and life cycle of a flowering plant [Summer]					Forces and magnets	Changing state – heating and cooling.	Sound	Electricity

**Disciplinary Knowledge**

<b>Skills</b>	<b>Year 3</b>	<b>Year 4</b>
<b>Questioning</b>	<p>To ask some relevant questions and use different types of scientific enquiries to answer them.</p> <p>To begin to explore everyday phenomena.</p> <p>To begin to develop their ideas about functions, relationships and interactions.</p> <p>To begin to raise their own questions about the world around them.</p> <p>To begin to make some decisions about which types of enquiry will be the best way of answering questions.</p>	<p>To ask relevant questions and use different types of scientific enquiries to answer them.</p> <p>To explore everyday phenomena and the relationships between living things and familiar environments.</p> <p>To begin to develop their ideas about functions, relationships and interactions.</p> <p>To raise their own questions about the world around them.</p> <p>To make some decisions about which types of enquiry will be the best way of answering questions.</p>
<b>Testing</b>	<p>To set up some simple practical enquiries, comparative and fair tests.</p> <p>To begin to recognise when a simple fair test is necessary and help to decide how to set it up.</p> <p>To begin to think of more than one variable factor.</p>	<p>To set up simple practical enquiries, comparative and fair tests.</p> <p>To recognise when a simple fair test is necessary and help to decide how to set it up.</p> <p>To confidently think of more than one variable factor.</p>
<b>Observing and measuring</b>	<p>To make observations and, where appropriate take accurate measurements using standard units, using a range of equipment.</p> <p>To begin to look for naturally occurring patterns and relationships.</p>	<p>To make systematic and careful observations and take accurate measurements using standard units, using a range of equipment, including thermometers.</p> <p>To look for naturally occurring patterns and relationships and decide what data to collect to identify them.</p>

	<p>With support make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used.</p> <p>To learn to use some new equipment appropriately.</p> <p>To begin to see a pattern in my results.</p> <p>To begin to choose from a selection of equipment.</p> <p>To begin to observe and measure accurately using standard units including time in minutes and seconds.</p>	<p>To collaboratively make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used.</p> <p>To learn to use new equipment appropriately.</p> <p>To see a pattern in my results.</p> <p>To choose from a selection of equipment.</p> <p>To observe and measure accurately using standard units including time in minutes and seconds.</p>
<b>Gathering and recording data</b>	<p>To gather, record, and begin to classify and present data in a variety of ways to help in answering questions.</p> <p>To begin to record findings using simple scientific language, drawings, labelled diagrams and simple keys.</p> <p>To use a bar charts, tables, single criteria Venn diagram and Carroll diagrams.</p> <p>To begin to report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.</p> <p>To begin to use simple tables provided by the teacher and standard units and help to decide how to record and analyse their data.</p> <p>To begin to record results in tables and bar charts.</p>	<p>To gather, record, classify and present data in a variety of ways to help in answering questions.</p> <p>To record findings using scientific language, drawings, labelled diagrams and more complex keys..</p> <p>To use bar charts, tables, Venn diagrams and Carroll diagrams.</p> <p>To report on findings from enquiries, including oral and written explanations , displays or presentations of results and conclusions.</p> <p>To use notes, simple tables and standard units and help to decide how to record and analyse their data.</p> <p>To record results in tables and bar charts.</p>
<b>Identifying and classifying</b>	<p>To begin to identify differences, similarities or changes related to simple scientific ideas and processes.</p> <p>To begin to talk about criteria for grouping, sorting and classifying and use simple keys.</p> <p>To begin to compare and group according to behaviour or properties, based on testing.</p>	<p>To identify differences, similarities or changes related to simple scientific ideas and processes.</p> <p>To talk about criteria for grouping, sorting and classifying and use more complex keys.</p> <p>To create my own classification keys.</p> <p>To compare and group according to behaviour or properties, based on testing.</p>
<b>Suggesting answers to questions</b>	<p>To begin to use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.</p> <p>To begin to use straightforward scientific evidence to answer questions or to support their findings.</p> <p>To begin to look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer simple questions.</p> <p>With support, to begin to identify new questions arising from the data, make new predictions and find ways of improving what they have already done.</p> <p>To begin to see a pattern in my results and say what I found out, linking cause and effect.</p> <p>To begin to think about how I could make it better.</p>	<p>To use results to draw simple conclusions , make predictions for new values, suggest improvements and raise further questions.</p> <p>To use scientific evidence to answer questions or to support their findings.</p> <p>To notice changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions.</p> <p>To identify new questions arising from the data, make new predictions and find ways of improving.</p> <p>To see a pattern in my results and record what I found out, linking cause and effect.</p> <p>To say and record how I could make it better.</p> <p>To answer questions from what I have found out.</p>

	To answer some simple questions from what I have found out.									
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<b>UKS2</b>										
<b>Subject content</b>	<p><b>Year 5</b> pupils should be taught to:</p> <p>Living things and their habitats</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>Animals, including humans</p> <ul style="list-style-type: none"> <li>describe the changes as humans develop to old age</li> </ul> <p>Properties and changes of materials</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> <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> <p>Earth and space</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 night and the apparent movement of the sun across the sky</li> </ul> <p>Forces</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 levers, pulleys and gears allow a smaller force to have a greater effect</li> </ul>					<p><b>Year 6</b> pupils should be taught to:</p> <p>Living things and their habitats</p> <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 characteristic</li> </ul> <p>Animals, including humans</p> <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> <p>Evolution and inheritance</p> <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> <p>Light</p> <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> <p>Electricity</p> <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>Substantive Knowledge</b>									
	<b>Properties and changes of materials</b>	<b>Animals, including humans</b>	<b>Earth and space</b>	<b>Living things and their habitats</b>	<b>Forces</b>	<b>Evolution and inheritance</b>	<b>Light</b>	<b>Electricity</b>	<b>Transition to secondary science</b>	

<b>Cycle A</b>	Properties of materials [Autumn] Changes to materials [Spring]			Life cycles of a mammal, amphibian etc. and life process of reproduction in some plants and animals [Autumn] Classifying based on specific characteristics [Summer]	Air resistance, water resistance and friction. Mechanisms, including levers and pulleys.		Year 5 only – How does the way light travels, help us to see?		Year 6 only
<b>Cycle B</b>		Changes as humans develop to old age [Autumn] Human circulatory system, diet and exercise, nutrients and water transport within animals [Summer]	How and why to spherical bodies move in our solar system?			What is evolution and how does it help survival?	Year 5 only – How does the way light travels, help us to see?	Associate the brightness of a lamp or volume of a buzzer to voltage	Year 6 only

**Disciplinary Knowledge**

<b>Skills</b>	<b>Year 5</b>	<b>Year 6</b>
<b>Questioning</b>	<p>To begin to plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.</p> <p>To talk about ideas, ask their own questions about scientific phenomena, analyse functions, relationships and interactions.</p> <p>To begin to recognise some more abstract ideas and begin to recognise how these ideas help them to understand how the world operates.</p> <p>To begin to recognise scientific ideas change and develop over time.</p> <p>To begin to select the most appropriate ways to answer science questions using different types of scientific enquiry</p>	<p>To plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.</p> <p>To explore and talk about ideas, ask their own questions about scientific phenomena, analyse functions, relationships and interactions more systematically.</p> <p>To recognise more abstract ideas and recognise how these ideas help them to understand how the world operates.</p> <p>To recognise scientific ideas change and develop over time.</p> <p>To select the most appropriate ways to answer science questions using different types of scientific enquiry.</p>
<b>Testing</b>	<p>To begin to use test results to make predictions to set up further comparative and fair tests.</p> <p>To begin to recognise when and how to set up comparative and fair tests.</p> <p>To begin to suggest improvements to my method and give reasons.</p> <p>To begin to decide when it is appropriate to do a fair test.</p>	<p>To use test results to make predictions to set up further comparative and fair tests.</p> <p>To recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why.</p> <p>To suggest improvements to my method and give reasons.</p> <p>To decide when it is appropriate to do a fair test.</p>
<b>Observing and measuring</b>	To begin to take measurements, using a range of scientific equipment, taking repeat readings where appropriate.	To take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings where appropriate.

	<p>To begin to identify patterns that might be found in the natural environment.</p> <p>To begin to make their own decisions about what observations to make, what measurements to use and how long to make them for.</p> <p>To choose the most appropriate equipment.</p> <p>To begin to interpret data and find patterns.</p> <p>To select equipment.</p> <p>To make a set of observations and say what the interval and range are.</p> <p>To take measurements – N, g, kg, mm, cm, mins, seconds, cm<sup>2</sup>V, km/h, m per sec, m/ sec Graphs – pie, line.</p>	<p>To identify patterns that might be found in the natural environment.</p> <p>To make their own decisions about what observations to make, what measurements to use and how long to make them for and whether to repeat them.</p> <p>To choose the most appropriate equipment and explain how to use it accurately.</p> <p>To interpret data and find patterns.</p> <p>To select equipment independently.</p> <p>To make a set of observations and say what the interval and range are.</p> <p>To take accurate and precise measurements – N, g, kg, mm, cm, mins, seconds, cm<sup>2</sup>V, km/h, m per sec, m/ sec Graphs – pie, line, bar (Year 6)</p>
<b>Gathering and recording data</b>	<p>To record data and results using scientific diagrams and labels, classification keys, tables and bar and line graphs.</p> <p>To begin to report and present findings from enquiries.</p> <p>To begin to decide how to record data from a choice of familiar approaches.</p>	<p>To record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables and bar and line graphs.</p> <p>To report and present findings from enquiries.</p> <p>To decide how to record data from a choice of familiar approaches.</p> <p>To choose how best to present data</p>
<b>Identifying and classifying</b>	<p>To begin to use and develop keys and other information records to identify, classify and describe living things and materials.</p>	<p>To use and develop keys and other information records to identify, classify and describe living things and materials.</p>
<b>Suggesting answers to questions</b>	<p>To begin to report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.</p> <p>To begin to identify scientific evidence that has been used to support or refute ideas or arguments.</p> <p>To begin to draw conclusions based on their data and observations and use scientific knowledge and understanding to explain their findings.</p> <p>To begin to use test results to make predictions to set up further comparatives and fair tests.</p> <p>To use their results to identify when further tests and observations are needed.</p> <p>To begin to draw conclusions and identify scientific evidence.</p> <p>To use simple models.</p> <p>To know which evidence proves a scientific point.</p> <p>To begin to use test results to make predictions to set up further comparative and fair tests.</p>	<p>To report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.</p> <p>To identify scientific evidence that has been used to support or refute ideas or arguments.</p> <p>To draw conclusions based on their data and observations, use evidence to justify their ideas, use scientific knowledge and understanding to explain their findings.</p> <p>To use test results to make predictions to set up further comparatives and fair tests.</p> <p>To look for different causal relationships in their data and identify evidence that refutes or supports their ideas.</p> <p>To use their results to identify when further tests and observations are needed.</p> <p>To separate opinion from fact.</p> <p>To draw conclusions and identify scientific evidence.</p> <p>To use simple models.</p> <p>To know which evidence proves a scientific point.</p>

To use test results to make predictions to set up further comparative and fair tests.

### How will we implement science in our school?

- We planned the teaching of science each **half term** through enquiry lessons, which is progressive, and provide purpose and meaning for children. For KS2 this is a weekly discrete science lesson.
- Our termly '**sparky starts**' provide opportunity to explore the natural world, our local community and focus on natural curiosity and questioning. It allows opportunity to learn through first hand experiences and practical tasks.
- Our children will use science in their **classrooms** as part of their daily life at school to apply skills taught as applicable due to cross curricular enquiry approach curriculum e.g data handling
- We will ensure **evidence** of science can be seen in individual pupil science books on Seesaw, class learning journey displays and on enquiry medium term planning and enquiry organisers.
- Each half term, children have opportunity to develop their working scientifically skills. This is usually in the form of a **science investigation** and fair testing, but also provides opportunity to observe over time, research, sort/classify and noticing patterns.
- Our children are encouraged regularly to ask and answer their own questions through **investigations** designed by their class/teacher/group.
- Our school **library**, including IT and books, is also used as secondary sources of information.
- Our whole school annual **healthy week** also provide opportunity to embed knowledge and skills linked to the human body.