



Red Hall Primary School Science Planning Overview Document

Science Curriculum Intent:

- We believe that pupils should be engaged as learners at many levels through linking ideas with practical experience which develops the skills of enquiry, observation, research, experimentation, use of apparatus, measuring and checking results, making comparisons and communicating results and findings.
- We aim to foster open minded thinking and encourage children to make links in their knowledge and understanding. This promotes discussion and allows children to express their reasoning to the rest of the class.
- In science, we aim to stimulate and excite pupils' curiosity about changes and events in the world, and to enable them to satisfy this curiosity with understanding. We link pupils' understanding with scientific thought and allow them to develop a greater understanding of the world in which we live and their responsibility to ensure its sustainability.

Implementation:

The acquisition of key scientific knowledge is an integral part of our science lessons. Science is taught throughout school for up to two hours per week. Other opportunities are also taken advantage of in other curriculum areas where possible, such as creative curriculum and maths. A cycle of lessons for each science topic is carefully planned and the progression of skills is mapped out in the science progression map. Scientific knowledge and enquiry skills are developed with increasing depth and challenge as the children move through year groups.

Impact:

- Children will become resilient, independent and curious scientists who ask questions and find things out for themselves.
- Children who feel confident in their science knowledge and enquiry skills will be excited about science, making links between what they learn in school to real-life situations and the importance of science in the real world.
- Children will be enthusiastic and motivated scientific learners.
- Children will have an awareness of the full range of scientific careers and pathways available to them and will be keen to pursue STEM subjects at secondary school.
- Children will leave for secondary school equipped with the scientific knowledge and skills needed to succeed in their further education.

Working scientifically:

In line with the National Curriculum, pupils are taught to ‘work scientifically’. The National Curriculum document defines this as:

‘Working scientifically’ specifies the understanding of the nature, processes and methods of science for each year group. It should not be taught as a separate strand. The notes and guidance give examples of how ‘working scientifically’ might be embedded within the content of biology, chemistry and physics, focusing on the key features of scientific enquiry so that pupils learn to use a variety of approaches to answer relevant scientific questions. These types of scientific enquiry should include: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources. Pupils should seek answers to questions through collecting, analysing and presenting data.

To support the well-structured and progressive curriculum, we make use of a range of engaging resources such as those provided by Science, Technology, Engineering and Mathematics (STEM). In order to encourage an investigative approach, the school has a store of equipment to allow investigations, observations and measurements.

Progression of Working Scientifically from Key Stage One to Key Stage One

Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
Explore the world around them and raise their own simple questions	Raise their own relevant questions about the world around them	Use their science experiences to explore ideas and raise different kinds of questions
Experience different types of science enquiries, including practical activities	Should be given a range of scientific experiences including different types of science enquiries to answer questions	Talk about how scientific ideas have developed over time
Begin to recognise different ways in which they might answer scientific questions	Start to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions	Select and plan the most appropriate type of scientific enquiry to use to answer scientific questions
Carry out simple tests	Set up simple practical enquiries, comparative and fair tests recognise when a simple fair test is necessary and help to decide how to set it up	Recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why
Use simple features to compare objects, materials and living things and, with help, decide how to sort and group them (identifying and classifying)	Talk about criteria for grouping, sorting and classifying; and use simple keys	Use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment
Ask people questions and use simple secondary sources to find answers	Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations	Recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact

Observe closely using simple equipment with help, observe changes over time	Make systematic and careful observations help to make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used	Make their own decisions about what observations to make, what measurements to use and how long to make them for
With guidance, they should begin to notice patterns and relationships	Begin to look for naturally occurring patterns and relationships and decide what data to collect to identify them	Look for different causal relationships in their data and identify evidence that refutes or supports their ideas
Use simple measurements and equipment (e.g. hand lenses, egg timers) to gather data	Take accurate measurements using standard units learn how to use a range of (new) equipment, such as data loggers / thermometers appropriately	Choose the most appropriate equipment to make measurements with increasing precision and explain how to use it accurately. Take repeat measurements where appropriate.
Record simple data	Collect and record data from their own observations and measurements in a variety of ways: notes, bar charts and tables, standard units, drawings, labelled diagrams, keys and help to make decisions about how to analyse this data	Decide how to record data and results of increasing complexity from a choice of familiar approaches: scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
Use their observations and ideas to suggest answers to questions talk about what they have found out and how they found it out	With help, pupils should look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions.	Identify scientific evidence that has been used to support or refute ideas or arguments
With help, they should record and communicate their findings in a range of ways and begin to use simple scientific language	Use relevant simple scientific language to discuss their ideas and communicate their findings in ways that are appropriate for different audiences, including oral and written explanations, displays or presentations of results and conclusions	Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas, Use oral and written forms such as displays and other presentations to report conclusions, causal relationships and explanations of degree of trust in results
	With support, they should identify new questions arising from the data, making predictions for new values within or beyond the data they have collected and finding ways of improving what they have already done.	Use their results to make predictions and identify when further observations, comparative and fair tests might be needed

Progression of Science Skills linked to planning term by term Key Stage One to Key Stage Two

Possible links to fiction texts in green text taken from <https://www.stem.org.uk/teaching-science-through-stories>

(Key Stage Two Science is taught as a two year rolling programme due to mixed age classes)

	Year 1	Year 2	Years 3/4	Years 5/6
Autumn	<p>Seasonal Changes- Observe changes across the four seasons. Observe and describe weather associated with the seasons. Explore the world around them and raise their own simple questions. One Year with Kipper provides a link into work on Seasonal Change as children work to observe changes across the four seasons.</p> <p>Animals, including humans – Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. Record simple data.</p>	<p>Materials – Can we change materials? Properties of materials and how some materials can change shape by squashing, bending, twisting and stretching. Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. Use simple features to compare objects, materials and living things and, with help, decide how to sort and group them (identifying and classifying). Use their observations and ideas to suggest answers to questions. talk about what they have found out and how they found it out.</p> <p>Seasonal Changes – The weather within the four seasons and how the length of day changes. Explore the world around them and raise their own simple questions. Observe closely using simple equipment with help, observe changes over time.</p>	<p>Cycle 1 Teeth and Eating – Identify the different types of teeth in humans and their simple functions. The food groups and eating a balanced diet. Identifying that animals, including humans, need the right types and amount of nutrition. Raise their own relevant questions about the world around them. Talk about criteria for grouping, sorting and classifying; and use simple keys. Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations. The Little Mole Who Knew It Was None Of His Business creates a great setting through which children can explore simple functions of the basic parts of the digestive system in humans.</p> <p>Healthy Bones – Labelling a skeleton, understanding the functions of a skeleton and muscled for support. Understanding how joints work. Should be given a range of scientific experiences including different types of science enquiries to answer questions.</p>	<p>Cycle 1 The Circle of Life- Life cycles of a mammal, an amphibian, an insect and a bird. Use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment. Charlotte’s Web story to compare the lifecycles of different animals and plants.</p> <p>Staying Alive – Identify and name the main parts of the human circulatory system, function of the heart, blood vessels and blood. Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.</p>

	<p>With guidance, they should begin to notice patterns and relationships. Use their observations and ideas to suggest answers to questions Talk about what they have found out and how they found it out.</p> <p>Handa's Surprise would make a great starting point about the needs of living things linked to diet and the specific needs of humans.</p>		<p>Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations.</p>	<p>Describe the ways in which nutrients and water are transported within animals, including humans.</p> <p>Choose the most appropriate equipment to make measurements with increasing precision and explain how to use it accurately. Take repeat measurements where appropriate. Pig Heart Boy provides a good setting for learning about the heart and circulation.</p>
			<p>Cycle 2 Plants - Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers.</p> <p>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.</p> <p>Investigate the way in which water is transported within plants.</p> <p>Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. Start to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions. Set up simple practical enquiries, comparative and fair tests. Recognise when a simple fair test is necessary and help to decide how to set it up.</p>	<p>Cycle 2 Growing Up and Growing Old- Describe the changes as humans develop to old age. Use their science experiences to explore ideas and raise different kinds of questions.</p> <p>Evolution and Inheritance- Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.</p> <p>Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.</p> <p>Identify how animals and plants are adapted to suit their environment in</p>

			<p>Make systematic and careful observations, help to 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>The story of Frog Belly Rat Bone provides a good setting for investigating plants and their benefits to our environment.</p> <p>Living Things - Recognise that living things can be grouped in a variety of ways. Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. Recognise that environments can change and that this can sometimes pose dangers to living things.</p> <p>Raise their own relevant questions about the world around them.</p> <p>Talk about criteria for grouping, sorting and classifying; and use simple keys</p> <p>The Vanishing Rainforest by Richard Platt is a good book for looking at the human impact on the environment, in particular deforestation.</p>	<p>different ways and that adaptation may lead to evolution.</p> <p>Identify scientific evidence that has been used to support or refute ideas or arguments.</p> <p>Talk about how scientific ideas have developed over time.</p> <p>Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas, Use oral and written forms such as displays and other presentations to report conclusions, causal relationships and explanations of degree of trust in results.</p> <p>One Smart Fish by Christopher Wormell provides a meaningful context for learning about adaptations and evolution.</p>
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<p>Spring</p>	<p>Seasonal Changes –observe and describe weather associated with the season of spring and how day length varies. Explore the world around them and raise their own simple questions. Use their observations and ideas to suggest answers to questions. Talk about what they have found out and how they found it out.</p> <p>Everyday Materials – the properties of materials. Distinguish between an object and the material from which it is made. Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. Describe the simple physical properties of a variety of everyday materials.</p>	<p>Animals and Other Living Things – Differences between living and dead things and things that have never been alive. Understanding that babies have offspring. Use simple features to compare objects, materials and living things and, with help, decide how to sort and group them (identifying and classifying)</p> <p>Plants – Observe and describe how seeds and bulbs grow into mature plants</p> <p>Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.</p> <p>Observe closely using simple equipment with help, observe changes over time. Use simple measurements and equipment (e.g. hand lenses, egg timers) to gather data.</p>	<p>Cycle 1 Reversible and irreversible changes – States of Matter – compare and group materials together, according to whether they are solids, liquids or gases.</p> <p>Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)</p> <p>Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. Make systematic and careful observations. Help to make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used. Take accurate measurements using standard units learn how to use a range of (new) equipment, such as thermometers appropriately. Charlie and the Chocolate Factory by Roald Dahl provides a good context to learn about states of matter.</p> <p>Rocks and Soils – Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. Describe in simple terms how fossils are formed when things that have lived are trapped within rock. Recognise that soils are made from rocks and organic matter.</p>	<p>Cycle 1 Let it Shine – Recognise that light appears to travel in straight lines. Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye.</p> <p>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.</p> <p>Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.</p> <p>Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas, Use oral and written forms such as displays and other presentations to report conclusions, causal relationships and explanations of degree of trust in results</p> <p>Out of This World – Describe the movement of the Earth, and other planets, relative to the Sun in the solar system. Describe the movement of the Moon relative to the Earth. Describe the Sun, Earth and Moon as approximately spherical bodies</p>
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	<p>Compare and group together a variety of everyday materials on the basis of their simple physical properties. Use simple features to compare objects, materials and living things and, with help, decide how to sort and group them (identifying and classifying)</p> <p>With help, they should record and communicate their findings in a range of ways and begin to use simple scientific language. The Three Little Pigs can be used to help children to think about identifying different materials and considering what properties they have and how this suits them for different purposes.</p> <p>Animals, including humans- Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals.</p> <p>Identify and name a variety of common animals that are carnivores, herbivores and omnivores.</p> <p>Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets)</p> <p>Use simple features to compare objects, materials and living things and, with help, decide how to sort and group them (identifying and classifying)</p> <p>Ask people questions and use simple secondary sources to find answers.</p>	<p>Jack and the Beanstalk makes a great starting point for teaching the topic of plants.</p>	<p>Talk about criteria for grouping, sorting and classifying; and use simple keys. Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations. Pebble In My Pocket tells the dynamic story of rock formation; showing the reader the processes that the pebble goes through from its beginnings in a fiery volcano 480 million years ago.</p>	<p>Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. Identify scientific evidence that has been used to support or refute ideas or arguments. Recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact. George's Secret Key to the Universe contains lots of factual sections for help with teaching about the solar system.</p>
			<p>Cycle 2 Electricity - Identify common appliances that run on electricity. Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. 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. Start to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions. Set up simple practical enquiries, comparative and fair tests. Recognise when a simple fair test is necessary and help to decide how to set it up.</p>	<p>Cycle 2 Forces- Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.</p> <p>Identify the effects of air resistance, water resistance and friction, that act between moving surfaces.</p> <p>Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.</p> <p>Select and plan the most appropriate type of scientific enquiry to use to answer scientific questions.</p>

				<p>Recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why.</p> <p>The Tin Snail by Cameron McAllister provides a context for learning about forces and mechanisms, including levers, pulleys and gears.</p> <p>Sound- Find patterns between the pitch of a sound and features of the object that produced it. Find patterns between the volume of a sound and the strength of the vibrations that produced it. Recognise that sounds get fainter as the distance from the sound source increases.</p> <p>Set up simple practical enquiries, comparative and fair tests. Recognise when a simple fair test is necessary and help to decide how to set it up. Collect and record data from their own observations and measurements in a variety of ways: notes, bar charts and tables, standard units, drawings, labelled diagrams, keys and help to make decisions about how to analyse this data.</p>
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<p>Summer</p>	<p>Seasonal Changes – Exploring the season of summer and the changes that occur. Explore the world around them and raise their own simple questions. Use their observations and ideas to suggest answers to questions. Talk about what they have found out and how they found it out.</p> <p>Plants – naming and classifying a variety of common plants. Plant seeds and observe growth.</p>	<p>Human Life Cycle – Life cycle of humans, the basic needs of humans for survival. With guidance, they should begin to notice patterns and relationships. Ask people questions and use simple secondary sources to find answers.</p> <p>Animals and Other Living Things – animals and plants that live in a beach habitat. Identify that most living things live in habitats to which they are suited and describe how</p>	<p>Cycle 1 Light – Recognise that they need light in order to see things and that dark is the absence of light. Notice that light is reflected from surfaces. Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. Recognise that shadows are formed when the light from a light source is blocked by an opaque object. Find patterns in the way that the size of shadows change. With help, pupils should look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions.</p> <p>The Firework Maker’s Daughter by Philip Pullman is a good starting point for teaching about light.</p>	<p>Cycle 1 Material World – 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. Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. Demonstrate that dissolving, mixing and changes of state are reversible changes.</p> <p>Use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment. Itch is an action-backed story in which is great for finding out more about changes of state.</p> <p>Kensuke’s Kingdom is full of opportunities to explore properties of materials, you can even use the</p>
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	<p>Identify and describe the basic structure of a variety of common flowering plants, including trees. <i>Use simple features to compare objects, materials and living things and, with help, decide how to sort and group them (identifying and classifying)</i> Record simple data.</p> <p>Life Cycles- Notice that animals, including humans, have offspring which grow into adults.</p> <p><i>With guidance, they should begin to notice patterns and relationships.</i></p> <p><i>Once There Were Giants</i> Supports children to understand that all animals, including humans, have offspring which grow into adults.</p>	<p>different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other</p> <p>Identify and name a variety of plants and animals in their habitats, including microhabitats. <i>Use simple features to compare objects, materials and living things and, with help, decide how to sort and group them (identifying and classifying)</i></p> <p><i>As Little Red Riding Hood is set in a wood, it makes a starting point for finding out about habitats.</i></p> <p><i>The Gruffalo can support children to learn more about habitats and to identify and name a variety of plants and animals in different habitats, including micro-habitats.</i></p>	<p>Forces and Magnets – Compare how things move on different surfaces. Notice that some forces need contact between two objects, but magnetic forces can act at a distance. Predict whether magnets will attract or repel, depending on which way the poles are facing. <i>Set up simple practical enquiries, comparative and fair tests.</i> <i>Recognise when a simple fair test is necessary and help to decide how to set it up.</i> Collect and record data from their own observations and measurements in a variety of ways: notes, bar charts and tables, standard units, drawings, labelled diagrams, keys and help to make decisions about how to analyse this data.</p> <p><i>The Iron Man is the perfect story to explain how magnets attract or repel each other and attract some material and not others.</i></p>	<p><i>context of survival scenarios linked to the book.</i></p> <p>We are Dinosaur Hunters – Recognising which type of enquiry is best to answer a question. Plan scientific enquiries. <i>Use their science experiences to explore ideas and raise different kinds of questions.</i> Select and plan the most appropriate type of scientific enquiry to use to answer scientific questions. Recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why. Make their own decisions about what observations to make, what measurements to use and how long to make them for. Decide how to record data and results of increasing complexity from a choice of familiar approaches: scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.</p> <p>Identify scientific evidence that has been used to support or refute ideas or arguments.</p>
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			<p>Cycle 2 Sound - Identify how sounds are made, associating some of them with something vibrating. Recognise that vibrations from sounds travel through a medium to the ear. Set up simple practical enquiries, comparative and fair tests. Recognise when a simple fair test is necessary and help to decide how to set it up. Collect and record data from their own observations and measurements in a variety of ways: notes, bar charts and tables, standard units, drawings, labelled diagrams, keys and help to make decisions about how to analyse this data.</p> <p>Horrid Henry Rocks is a great book to start teaching about sound and exploring how sounds are made.</p>	<p>Cycle 2 Classifying Critters- 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</p> <p>Give reasons for classifying plants and animals based on specific characteristics. Use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment. Decide how to record data and results of increasing complexity from a choice of familiar approaches: scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. Beetle Boy provides a way to link to work on classification of invertebrates.</p>
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