

Grayswood CE Primary School Knowledge and Skills Progression Map



Subject: Science

Intent

The aim of Science teaching at Grayswood is to provide a high-quality education for all pupils to understand the world in which they live. The spine of teaching science is via practical avenues, where children embed and develop their substantive knowledge through disciplinary knowledge, thereby learning to engage as scientists. This ensures that an inspiring curriculum is provided, encouraging children to succeed and excel in science. Teachers foster curiosity, encouraging children at Grayswood to pose questions which provide the stimulus and rationale for systematic investigations, equipping them to think as scientists.

Substantive key objectives are explicitly embedded in each topic studied and revisited and stretched throughout the children's time at Grayswood. Topics, such as Plants, are taught in Key Stage One and studied again in further detail throughout Key Stage Two. This model allows children to build upon their prior knowledge and increases their enthusiasm for the topics. Previous learning is revised and misconceptions built into planning. Using Plan documentation, teachers are able to deliver a progressive and practical curriculum. Key vocabulary is built in, ensuring that pupils are able to describe associated processes and key characteristics. Cross-curricular links are made with maths when collecting, presenting and analysing data.

Much of this substantive knowledge is explored and drawn through practical, disciplinary avenues, using 'working scientifically' skills to enable the children at Grayswood to engage and learn as scientists. These skills include asking questions, planning investigations, gathering and recording results, drawing conclusions. At Grayswood, teachers ensure that children develop these practical skills via five lines of scientific enquiry which include: Comparative tests, Identify and Classify, Observation over Time, Pattern Seeking and Research. Detailed documentation supports teachers to ensure that both substantive and disciplinary knowledge dovetail and build progressively whilst covering the areas of enquiry. Children will thereby have the opportunity to learn specifically about the scientific enquiry process but importantly support them to understand how scientific knowledge becomes established through scientific enquiry.

At Grayswood teachers use the following documents to ensure coverage of knowledge:

1. Practical work: supporting scientific enquiry (Primary Science Education Consultancy 2019)
2. Knowledge matrices (PLAN 2020)
3. Working scientifically skills (PLAN)
4. Primary Science Curriculum Progression (Why & How Primary Science Teaching Trust)

Enrichment

In addition to the curriculum outlined below, we offer the following enrichment opportunities in Science for children at Grayswood CE Primary School:

- Science Week
- Links to secondary schools, inviting more expert demonstrations to inspire and teach our children at Grayswood
- Trips to Kew Gardens, Winchester Science Museum, Gilbert White Museum

Substantive Knowledge:	EYFS	Key Stage 1		Key Stage 2			
	Year R	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Plants	<p>Harvest festival, food from the farm.</p> <p>Discuss how we can care for our environment and living things.</p> <p>What do plants need?</p> <p>Name and describe some plants.</p> <p>Make observational drawings of the natural world.</p> <p>Planting – observing living things growing.</p> <p>Life cycle of a plant</p>	<p>Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees.</p> <p>Identify and describe the basic structure of a variety of common flowering plants, including trees.</p>	<p>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>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.</p>			
Animals, Including Humans	<p>Understand that exercise, healthy eating, drinking water, sleeping and hygiene can contribute to good health.</p> <p>Name parts of the body and understand what a skeleton is.</p>	<p>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,</p>	<p>Notice that animals, including humans, have offspring which grow into adults.</p> <p>Find out about and describe the basic needs of animals, including humans, for survival (water, food and air).</p>	<p>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.</p>	<p>Describe the simple functions of the basic parts of the digestive system in humans.</p> <p>Identify the different types of teeth in humans and their simple functions.</p> <p>Construct and interpret a variety of</p>	<p>Describe the changes as humans develop to old age.</p>	<p>Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.</p> <p>Recognise the impact of diet, exercise, drugs and lifestyle on</p>

	<p>Explore the 5 senses. Recognise how they have changed over time – life cycle of a human</p> <p>Nocturnal animals Bird watching Insects and microhabitats Farm animals and their young Endangered animals, threat to habitats Life cycle of a butterfly – observing over time Dinosaur Diets – meat/plant eaters</p>	<p>herbivores and omnivores. Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.</p>	<p>Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.</p>	<p>Identify that humans and some other animals have skeletons and muscles for support, protection and movement.</p>	<p>food chains, identifying producers, predators and prey.</p>		<p>the way their bodies function. Describe the ways in which nutrients and water are transported within animals, including humans.</p>
<p>Evolution and Inheritance</p>							<p>Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.</p>

<p>Living Things and their Habitats</p>			<p>Explore and compare the differences between things that are living, dead, and things that have never been alive. Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. Identify and name a variety of plants and animals in their habitats, including micro-habitats. 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.</p>		<p>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>describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird Describe the life process of reproduction in some plants and animals.</p>	<p>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. Give reasons for classifying plants and animals based on specific characteristics.</p>
<p>Electricity</p>					<p>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.</p>		<p>Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. Compare and give reasons for variations in how</p>

					<p>Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery.</p> <p>Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.</p> <p>Recognise some common conductors and insulators, and associate metals with being good conductors.</p>		<p>components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.</p> <p>Use recognised symbols when representing a simple circuit in a diagram.</p>
Forces (and Magnetism)				<p>Compare how things move on different surfaces.</p> <p>Notice that some forces need contact between two objects, but magnetic forces can act at a distance.</p> <p>Observe how magnets attract or repel each other and attract some materials and not others.</p> <p>Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify</p>		<p>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>some magnetic materials. Describe magnets as having two poles. Predict whether two magnets will attract or repel each other, depending on which poles are facing.</p>			
Earth and Space						<p>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. Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.</p>	
Energy (Seasons, Light and Sound)	<p>Daily weather discussions. Exploring Signs of autumn. Discuss how animals behave in different seasons e.g. hibernation. Identify signs of winter. Identify signs of spring.</p>	<p>Seasonal Changes: Observe changes across the four seasons. Observe and describe weather associated with the seasons and how day length varies.</p>		<p>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</p>	<p>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. Find patterns between the pitch of a sound and features</p>		<p>Light: 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>

	Compare UK weather. Identify signs of summer.			there are ways to protect their eyes. Recognise that shadows are formed when the light from a light source is blocked by a solid object. Find patterns in the way that the size of shadows change.	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.		Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.
Materials	Floating and sinking Experiment with changing materials e.g. melting chocolate Experiment with changing materials e.g. freezing water and observing ice melt. Magnets attracting and repelling An object casting a shadow (shadow drawing)	Everyday 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. Compare and group together a variety of everyday materials on the basis of their simple physical properties.	Uses of Everyday Materials: Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	Rocks: 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.	States of Matter: Compare and group materials together, according to whether they are solids, liquids or gases. 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). Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	Properties and Changes of Materials: 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	

						<p>through filtering, sieving and evaporating.</p> <p>Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.</p> <p>Demonstrate that dissolving, mixing and changes of state are reversible changes.</p> <p>Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.</p>	
<p>Disiplinary Knowledge:</p> <p>Working Scientifically</p>	<p>Asking simple questions.</p> <p>Observing closely.</p> <p>Performing simple tests.</p> <p>Using their observations and ideas to suggest answers to questions.</p> <p>Gathering data to help answer questions.</p>	<p>Asking simple questions and recognising that they can be answered in different ways.</p> <p>Observing closely, using simple equipment.</p> <p>Performing simple tests.</p> <p>Identifying and classifying.</p> <p>Using their observations and ideas to suggest</p>	<p>Asking simple questions and recognising that they can be answered in different ways.</p> <p>Observing closely, using simple equipment.</p> <p>Performing simple tests.</p> <p>Identifying and classifying.</p> <p>Using their observations and ideas to suggest</p>	<p>Asking relevant questions and using different types of scientific enquiries to answer them.</p> <p>Setting up simple practical enquiries, comparative and fair tests.</p> <p>Making systematic & careful observations and, where appropriate, taking accurate measurements using</p>	<p>Asking relevant questions and using different types of scientific enquiries to answer them.</p> <p>Setting up simple practical enquiries, comparative and fair tests.</p> <p>Making systematic and careful observations and, where appropriate, taking accurate measurements using</p>	<p>Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.</p> <p>Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.</p>	<p>Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.</p> <p>Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.</p>

		<p>answers to questions. Gathering and recording data to help in answering questions.</p>	<p>answers to questions. Gathering and recording data to help in answering questions.</p>	<p>standard units, using a range of equipment, including thermometers and data loggers. Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions. Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables. Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results & conclusions. Using results to draw simple conclusions, make predictions for new values, suggest improvements & raise further questions. Identifying differences, similarities or changes related to simple scientific ideas and processes. Using straight-forward scientific evidence to answer questions or to support findings.</p>	<p>standard units, using a range of equipment, including thermometers and data loggers. gathering, recording, classifying and presenting data in a variety of ways to help in answering questions Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables. Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results & conclusions. Using results to draw simple conclusions, make predictions for new values, suggest improvements & raise further questions. Identifying differences, similarities or changes related to simple scientific ideas and processes. Using straight-forward scientific evidence to answer questions or to support findings.</p>	<p>recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. Using test results to make predictions to set up further comparative and fair tests. Reporting and presenting 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. Identifying scientific evidence that has been used to support or refute ideas or arguments.</p>	<p>recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. Using test results to make predictions to set up further comparative and fair tests. Reporting and presenting 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. Identifying scientific evidence that has been used to support or refute ideas or arguments.</p>
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