

Working Scientifically - Progression of Skills

Throughout primary school, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content.

Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
<ul style="list-style-type: none"> • <i>asking simple questions and recognising that they can be answered in different ways</i> • <i>observing closely, using simple equipment</i> • <i>performing simple tests</i> • <i>identifying and classifying</i> • <i>using their observations and ideas to suggest answers to questions</i> • <i>gathering and recording data to help in answering questions.</i> 	<ul style="list-style-type: none"> • asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative and fair tests • making systematic and careful observations and, where appropriate, taking accurate measurements using 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 and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings 	<ul style="list-style-type: none"> • planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • 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

Animals including Humans

Year 3 AiH: Nutrition, Skeletons and Muscles	Year 4 AiH: Digestion, Teeth and Food Chains	Year 5 AiH: Human Growth and Puberty	Year 6 AiH: Circulation, Diet and Health
<p><u>Pupils will be taught to:</u></p> <ul style="list-style-type: none"> • Understand that animals cannot make their own food; they get nutrition from what they eat • Identify that animals need the right types and amount of nutrition depending on their species • Describe and explain the function of the skeletal system in humans and some other animals • Describe and explain the function of the muscular system in humans and some other animals 	<p><u>Pupils will be taught to:</u></p> <ul style="list-style-type: none"> • Identify and name the basic parts of the digestive system in humans and describe their function • Identify the different types of teeth in humans and their simple functions • Identify carnivores, herbivores and omnivores and compare their teeth • Construct and interpret a variety of food chains • Identifying producers, predators and prey 	<p><u>Pupils will be taught to:</u></p> <ul style="list-style-type: none"> • Describe the life cycle of humans and general changes from stage to stage • Compare the life cycle of a human to other animals • Identify parts of the reproductive system and identify, in simple terms, their functions • Identify and describe what happens to humans during puberty 	<p><u>Pupils will be taught to:</u></p> <ul style="list-style-type: none"> • Identify and name the main parts of the human circulatory system • Describe the functions of the heart, blood vessels and blood • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function • Describe the ways in which nutrients and water are transported within animals, including humans
<p><u>Coverage of Scientific methods, processes and skills:</u></p> <ul style="list-style-type: none"> • To be able to set up a comparative test • To be able to record using drawings. • To be able to report on findings from enquiries. • To be able to use evidence to answer questions. • To be able to record data in a table. 	<p><u>Coverage of Scientific methods, processes and skills:</u></p> <ul style="list-style-type: none"> • To be able to record findings using labelled diagrams. • To be able to use written explanations to report on findings from an enquiry. • To be able to identify the correct type of enquiry to answer a question. • To be able to use evidence to support findings. 	<p><u>Coverage of Scientific methods, processes and skills:</u></p> <ul style="list-style-type: none"> • To be able to communicate data using a scatter graph. • To be able to present conclusions. • To be able to use evidence to refute or support an idea. • To be able to record data within tables and line graphs. 	<p><u>Coverage of Scientific methods, processes and skills:</u></p> <ul style="list-style-type: none"> • To be able to plan pattern-seeking enquiry. • To be able to report causal relationships. • To be able to record results using a line graph.

Earth and Space

Year 3	Year 4	Year 5 Earth and Space	Year 6
		<p><u>Pupils will be taught to:</u></p> <ul style="list-style-type: none">• Name all the planets and describe their position relative to the Sun• 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><u>Coverage of Scientific methods, processes and skills:</u></p> <ul style="list-style-type: none">• To be able to plan a scientific enquiry to answer a question• To be able to report a presentation of an explanation• To be able to identify scientific evidence that has been used to support ideas	

Electricity

Year 3	Year 4 Electricity	Year 5	Year 6 Electricity
	<p><u>Pupils will be taught to:</u></p> <ul style="list-style-type: none"> • 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 • Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit • Recognise some common conductors and insulators, and associate metals with being good conductors 		<p><u>Pupils will be taught to:</u></p> <ul style="list-style-type: none"> • Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit • Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches • Use recognised symbols when representing a simple circuit in a diagram
	<p><u>Coverage of Scientific methods, processes and skills:</u></p> <ul style="list-style-type: none"> • To be able to set up a simple practical enquiry • To be able to record findings using drawings • To be able to use results to make predictions 		<p><u>Coverage of Scientific methods, processes and skills:</u></p> <ul style="list-style-type: none"> • To be able to plan a fair-test by recognising the control variables • To be able to use predictions to set up fair tests • To be able to take repeat measurements of data with precision using a data-logger • To be able to explain the degree of trust can be had in results

Evolution and Inheritance

Year 3	Year 4	Year 5	Year 6 Evolution and Inheritance
			<p><u>Pupils will be taught to:</u></p> <ul style="list-style-type: none"> • Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago • Understand that living things produce offspring of the same kind and why • Recognise that normally offspring vary and are not identical to their parents • Identify how animals and plants are adapted to suit their environment in different ways • Understand how adaptations may lead to evolution due to being more or less able to survive
			<p><u>Coverage of Scientific methods, processes and skills:</u></p> <ul style="list-style-type: none"> • To be able to identify scientific evidence that has been used to support or refute ideas or arguments • To be able to plan an enquiry that will answer a question • To be able to record data in a table • To be able to measure with a data logger • To be able to present findings from an enquiry • To be able to recognise which secondary sources will be most useful to research ideas (non-statutory)

Forces and Magnets

Year 3 Forces and Magnets	Year 4	Year 5 Forces	Year 6
<p><u>Pupils will be taught to:</u></p> <ul style="list-style-type: none"> • Compare how things move on different surfaces • Notice that some forces need contact between two objects, but magnetic forces can act at a distance • Observe how magnets attract or repel each other and attract some materials and not others • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials • Predict whether two magnets will attract or repel each other, depending on which poles are facing • Observe how magnets attract or repel each other and attract some materials and not others • Describe magnets as having two poles 		<p><u>Pupils will be taught to:</u></p> <ul style="list-style-type: none"> • Explain that unsupported objects fall towards the Earth because of the force of Gravity acting between the Earth and the falling object • Identify the effects of air resistance and water resistance and how these are utilised or tackled in real-world circumstances • Identify and explore the effects of friction on movement and find out how it slows or stops moving objects • Recognise that some mechanisms including levers, pulleys and gears, allow a smaller force to have a greater effect 	
<p><u>Coverage of Scientific methods, processes and skills:</u></p> <ul style="list-style-type: none"> • To be able to set up a simple fair test • To be able to make systematic and careful observations • To be able to provide an oral explanation of findings • To be able to record findings in a bar chart • To be able to identify changes related to scientific ideas • To be able to use results to draw simple conclusions 		<p><u>Coverage of Scientific methods, processes and skills:</u></p> <ul style="list-style-type: none"> • To be able to plan a fair test, identifying the control variables • To be able to take repeated, accurate measurements using a stopwatch • To be able to identify scientific evidence that has been used to support or refute ideas or arguments • To be able to explain the degree of trust in results • To be able to use test results to make predictions to set up further fair tests 	

Light

Year 3 Light	Year 4	Year 5	Year 6 Light
<p><u>Pupils will be taught to:</u></p> <ul style="list-style-type: none"> • Recognise that they need light in order to see things • Understand that dark is the absence of light • Notice that light is reflected from surfaces, not just those which are shiny • 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 			<p><u>Pupils will be taught to:</u></p> <ul style="list-style-type: none"> • 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 • 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
<p><u>Coverage of Scientific methods, processes and skills:</u></p> <ul style="list-style-type: none"> • To be able to set up a simple fair test • To be able to make systematic and careful observations and measurements • To be able to record findings as drawings • To be able to record findings as a bar chart • To be able to make predictions for further values 			<p><u>Coverage of Scientific methods, processes and skills:</u></p> <ul style="list-style-type: none"> • To be able to plan a fair-test; recognising and controlling variables • To be able to plan a scientific enquiry to answer a question • To be able to use test results to make predictions to set up further comparative tests • To be able to use scientific evidence to support or refute on idea • To be able to report as to the degrees of trust in results

Living Things and their Habitats

Year 3	Year 4	Year 5	Year 6
	<p><u>Pupils will be taught to:</u></p> <ul style="list-style-type: none"> • 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><u>Pupils will be taught to:</u></p> <ul style="list-style-type: none"> • 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><u>Pupils will be taught to:</u></p> <ul style="list-style-type: none"> • 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><u>Coverage of Scientific methods, processes and skills:</u></p> <ul style="list-style-type: none"> • To be able to gather, record, classify and present data in a variety of ways to help in answering questions. • To be able to report on findings from enquiries including written and oral explanations. 	<p><u>Coverage of Scientific methods, processes and skills:</u></p> <ul style="list-style-type: none"> • To be able to raise different types of questions (non-statutory). • To be able to communicate data using a scatter graph or line graph. • To be able to present conclusions. • To be able to use evidence to refute or support an idea. • To be able to record data within tables. 	<p><u>Coverage of Scientific methods, processes and skills:</u></p> <ul style="list-style-type: none"> • To be able to plan pattern-seeking enquiry. • To be able to report causal relationships. • To be able to record results using a line graph. • To be able to present findings from enquiries.

Materials and their Properties

Year 3	Year 4 States of Matter	Year 5 Properties and Changes of Materials	Year 6
	<p><u>Pupils will be taught to:</u></p> <ul style="list-style-type: none"> • 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 • Measure or research the temperature at which changes of state happens in degrees Celsius (°C) • Identify the part played by evaporation and condensation in the water cycle • Associate the rate of evaporation with temperature. 	<p><u>Pupils will be taught to:</u></p> <ul style="list-style-type: none"> • 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 scientific evidence, for the particular uses of everyday materials, including metals, wood and plastic • Demonstrate that dissolving, mixing and changes of state are reversible changes • Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible (<i>irreversible</i>) 	
	<p><u>Coverage of Scientific methods, processes and skills:</u></p> <ul style="list-style-type: none"> • To be able to set up a simple, fair test. • To be able to use results to draw conclusions. • To be able to use a data logger or thermometer to take accurate measurements. • To be able to provide a written explanation. • To be able to use straightforward scientific evidence to answer questions or to support findings. 	<p><u>Coverage of Scientific methods, processes and skills:</u></p> <ul style="list-style-type: none"> • To be able to plan a scientific enquiry that will answer a question. • To be able to recognise control variables when planning a fair-test. • To be able to record data in a line graph • To be able to report and present findings from enquiries • To be able to use test results to make predictions to set up further comparative and fair tests • To be able to evaluate an enquiry in terms of the amount of trust one can have in it. 	

Plants

<i>Relevant previous learning at KS1: Year 2 Plants</i>	Year 3 Plants	Year 4	Year 5	Year 6
<p><u>Pupils will be taught to:</u></p> <ul style="list-style-type: none"> • <i>observe and describe how seeds and bulbs grow into mature plants</i> • <i>find out and describe how plants need water, light and a suitable temperature to grow and stay healthy</i> 	<p><u>Pupils will be taught to:</u></p> <ul style="list-style-type: none"> • identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers • explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant • investigate the way in which water is transported within plants • explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal 			
<p><u>Coverage of Scientific methods, processes and skills:</u></p> <ul style="list-style-type: none"> • <i>To be able to observe closely, using simple equipment</i> • <i>identifying and classifying</i> • <i>using their observations and ideas to suggest answers to questions</i> 	<p><u>Coverage of Scientific methods, processes and skills:</u></p> <ul style="list-style-type: none"> • To be able to set up a simple practical enquiry. • To be able to make systematic and careful observations. • To be able to gather and record data. • To be able to use results to draw simple conclusions. • To be able to use straightforward scientific evidence to answer questions or to support findings. 			

Rocks

Year 3 Rocks	Year 4	Year 5	Year 6
<p><u>Pupils will be taught to:</u></p> <ul style="list-style-type: none">• Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties• Understand and explain the difference between natural and manmade rocks• Explain in simple terms the way sedimentary, igneous and metamorphic rocks are formed• Describe in simple terms how fossils are formed when things that have lived are trapped within (sedimentary) rock• Recognise that soils are made from rocks and organic matter.			
<p><u>Coverage of Scientific methods, processes and skills:</u></p> <ul style="list-style-type: none">• To be able to make careful observations• To be able to set up simple comparative tests• To be able to measure using beakers and syringes• To be able to present information in a branching key			

Sound

Year 3	Year 4 Sound	Year 5	Year 6
	<p><u>Pupils will be taught to:</u></p> <ul style="list-style-type: none">• 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 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><u>Coverage of Scientific methods, processes and skills:</u></p> <ul style="list-style-type: none">• To be able to use a scientific enquiry to answer a question• To be able to set up a simple practical enquiry• To be able to set up simple fair tests• To be able to make systematic and careful measurements• To be able to report on findings from an enquiry• To be able to identify differences, similarities or changes related to simple scientific ideas		

