



# Pensford Primary School



Science Curriculum

## Our Intent for Science at Pensford Primary School

At Pensford Primary School we believe that a high-quality science curriculum provides the building blocks for understanding the world through the specific disciplines of biology, chemistry and physics. This curriculum is built upon both pillars Language and Reasoning. Through the exploration of key knowledge and concepts, the children should be encouraged to recognise the power of explanation and reasoning, and develop a sense of excitement and curiosity about science. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave and analyse causes. Science in our school is about developing children's knowledge and skills that enable them to make sense of the world in which they live through investigation, as well as using and applying process and reasoning skills. They are immersed in scientific vocabulary, which aids children's knowledge and understanding of the topic they are studying.

Our Science teaching supports the Four Pillars of the Pensford Curriculum as follow

**Wellbeing** –Our lessons will help children realise the importance of living a healthy lifestyle and the impact it has on our bodies.

**Language** – We must ensure children have a bank of scientific words which will aid them when they are predicting, experimenting, investigating, discussing and evaluating.

**Reasoning** - Scientific method as a logical way of deducing facts is taught across Key Stages 1 and 2, leading to children increasing their ability to reason as they carry out scientific tests

**Technology** – We give opportunities to use software such as simple spreadsheets and MicroBit thermometers to collect and present scientific data in age-appropriate ways. They also are taught how to effectively research scientific topics, such as evolution, and to identify plants and animals.

# Science Curriculum Overview

Key	Incidental knowledge gained through topics that are not Science-based	Science study, skills and locational knowledge (We use the <a href="#">PLAN Science Curriculum</a> and the units are listed below)				Investigative Skills
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1 & Summer 2	
EFYS	Teaching of science is not discreet in the Early Years but children will be encouraged to think critically, (having their own ideas; making links; planning, doing, reviewing) and will learn about 'Understanding the World' (including people, living things and the environment, weather and the natural world) through exploration, observations, and other first-hand experiences and conversations					
KS1 Year A	<b>Who's Coming to Tea?</b>  PLAN, Year 1: animals including humans	<b>Fire!</b>	<b>How do I get to...?</b>  PLAN Year 2 Uses of everyday materials	<b>Where are all the wild things?</b>  PLAN, Year 2: animals including humans	<b>Once upon a time...</b>  PLAN, Year 1 plants	
KS1 Year B	<b>Our Amazing World</b>  PLAN: Year 2 living things and their habitats	<b>Toy Story</b>  PLAN: Year 1 Everyday materials	<b>We Are Artists</b>	<b>Maps and Routes</b>	<b>Weather and Seaside</b>  PLAN: Year 1 Seasonal changes	
LKS2 Year A	<b>North, East, South, West</b>  PLAN: Year 3 Forces & Magnets	<b>Rise of the Robots</b>  PLAN: Year 4 Electricity	<b>Extreme Survival</b>  PLAN: Year 4 Living things and their habitats – Take part in Eels in the Classroom Project with BART	<b>Dig for Victory</b>  PLAN: Year 3 Light	<b>Escape from Pompeii</b>  PLAN: Year 3 Rocks	
LKS2 Year B	<b>Going Global</b>  PLAN: Year 3 Animals including humans	<b>Raiders and Traders</b>  PLAN: Year 4 States of Matter	<b>Ancient Egypt</b>  PLAN: Year 4 Animals including humans	<b>Rainforest</b>  PLAN: Year 3 Plants	<b>Down in the Valley</b>  PLAN: Year 4 Sound	
UKS2 Year A	<b>Chocolate</b>  PLAN: Year 5 Properties and changes of materials	<b>Why aorta keep fit</b>  PLAN: Year 5 & 6 units on Animals including humans	<b>Marvellous Maya</b>  PLAN: Year 5 Living things and their habitats (also: study of micro-organisms – mould on bread)	<b>Were we a fish?</b>  PLAN: Year 6 Evolution and Inheritance	<b>Dragons' Den</b>	
UKS2 Year B	<b>What's out there?</b>  PLAN: Year 5 Earth and Space	<b>Who Let the Gods Out?</b>  PLAN: Year 5 Forces	<b>Is it me or is it hot in here?</b>  PLAN: Year 6 Living things and their habitats	<b>Victorious Victorians</b>	<b>How steady is your hand?</b>  T5: Build on T3 work by completing 'Mayfly in the Classroom' project  PLAN: Year 6 Light and Electricity	

# Progression Matrix

	EYFS	KS1		Lower KS2		Upper KS2	
		Year A	Year B	Year A	Year B	Year A	Year B
Working Scientifically		Please see the PLAN progression document, which is copied below.					
Living things and their habitats: Animals AND plants, including classification			<ul style="list-style-type: none"> <li>• Class things as living, dead, or never having lived</li> <li>• Identify that most living things live in habitats to which they are suited and give examples of how animals and plants depend on each other within habitats and micro-habitats</li> <li>• Use the idea of a simple food chain to identify and name different sources of food</li> </ul>	<ul style="list-style-type: none"> <li>• Recognise that living things can be groups in a variety of ways</li> <li>• Explore and use classification keys to identify and name living things in the local (and wider) environment</li> <li>• Recognise that environments can change and that this can sometimes pose dangers to living things</li> </ul>	<ul style="list-style-type: none"> <li>• Construct and interpret a variety of food chains, identifying producers, predators and prey</li> </ul>	<ul style="list-style-type: none"> <li>• Describe the life process of reproduction in some plants and animals (including mayfly)</li> <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> </ul>	<ul style="list-style-type: none"> <li>• Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals.</li> <li>• Give reasons for classifying plants and animals based on specific characteristics</li> </ul>
Living things and their habitats: Plant-specific knowledge, and Seasonal Changes		<ul style="list-style-type: none"> <li>• Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees.</li> <li>• Identify and describe the basic structure of a variety of common flowering plants, including trees.</li> </ul>	<ul style="list-style-type: none"> <li>• Observe changes across the four seasons</li> <li>• Observe and describe weather associated with the seasons and how day length varies</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• Identify and describe the functions of roots, stem/trunk, leaves, flowers</li> <li>• Explore what plants need for life and growth and how this varies between plants</li> <li>• Investigate how water is transported within plants</li> <li>• Explore the function of flowers in the life cycle of flowering plants: pollination, seed formation &amp; dispersal</li> </ul>	<ul style="list-style-type: none"> <li>• Know that micro-organisms are neither plants nor animals</li> <li>• Plan and carryout experiment to discover conditions mould needs for growth on bread.</li> </ul>	<ul style="list-style-type: none"> <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>
Living things and their habitats: Knowledge relating		<ul style="list-style-type: none"> <li>• Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals;</li> </ul>		<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• Identify that animals &amp; humans need the right types of nutrition, which they get from what they</li> </ul>	<ul style="list-style-type: none"> <li>• Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify and name the main parts of the human circulatory system, and describe the functions of</li> </ul>

<p>to animals, including humans</p>		<p>describe &amp; compare their structure</p> <ul style="list-style-type: none"> <li>• Know about carnivores, herbivores and omnivores and be able to give some examples</li> <li>• Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.</li> <li>• Notice that animals &amp; humans have offspring which grow into adults</li> <li>• Find out about the basic needs of animals &amp; humans for survival (water, food, air)</li> <li>• Describe the importance for humans of exercise, eating the right amounts of different types of food (eg vegetables, meat, fish, dairy, bread, rice, pasta), and of hygiene</li> </ul>			<p>eat because they can't make their own food</p> <ul style="list-style-type: none"> <li>• Introduce vocabulary for nutrients: carbohydrates, protein, vitamins, minerals, fats, sugars, fibre</li> <li>• Know that humans and some other animals have skeletons and muscles for support, protection and movement.</li> <li>• Describe 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> </ul>	<ul style="list-style-type: none"> <li>• Describe the changes as humans develop to old age</li> <li>• Describe the ways in which nutrients and water are transported within animals/ humans</li> </ul>	<p>the hear, blood vessels and blood</p> <ul style="list-style-type: none"> <li>• Recognise the impact of diet, exercise, drugs and lifestyle on the way the human body functions</li> </ul>
<p>Materials and States of Matter</p>		<ul style="list-style-type: none"> <li>• Identify and compare the suitability of a variety of everyday materials for particular uses</li> <li>• Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching</li> </ul>	<ul style="list-style-type: none"> <li>• Distinguish between objects and materials</li> <li>• Identify and name materials including wood, plastic, glass, metal, water and rock and describe their simple physical properties</li> <li>• Group materials on the basis of these properties</li> </ul>	<ul style="list-style-type: none"> <li>• Compare and group together different kinds of rocks based on their appearance and simple characteristics</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>	<ul style="list-style-type: none"> <li>• Compare and group materials according to whether they are solids, liquids or gases</li> <li>• Observe that some materials, including water, change state when they are heated or cooled; measure or research the temperature at which this happens in degrees Celsius</li> <li>• Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature</li> </ul>	<ul style="list-style-type: none"> <li>• Compare and group everyday materials on the basis of their properties: 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</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>

						<ul style="list-style-type: none"> <li>• Demonstrate that dissolving, mixing and changes of state are reversible changes</li> <li>• Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda</li> </ul>	
Light and Sound				<ul style="list-style-type: none"> <li>• Recognise that we need light to see things and that dark is the absence of light</li> <li>• Notice that light is reflected from surfaces</li> <li>• Know that light from the sun can be dangerous and that there are ways to protect our eyes</li> <li>• Recognise that shadows are formed when light from a light source is blocked by an opaque object.</li> <li>• Find patters in the way that the size of shadows change</li> </ul>	<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 an features of the object that produced it, and between the volume of a sound and the strength of the vibrations that made it</li> <li>• Recognise that sounds get fainter as the distance from the sound source increases</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• Recognise that light appears to travel in straight lines and use this to explain that objects are seen because they give out or reflect t=light into the eye</li> <li>• Explain that we see things because light travels from light sources to our eyes, either directly or by reflecting off objects</li> <li>• Use the diea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.</li> </ul>
Forces, Magnets and Electricity, including Space and the Solar System				<ul style="list-style-type: none"> <li>• Compare how things move on different surfaces</li> <li>• Notice that some forces need contact between two objects, but magnetic forces can act at a distance</li> <li>• Observe how magnets attract &amp; repel and attract some materials but not others</li> <li>• Group everyday materials according to whether or not they are attracted by a magnet</li> <li>• Describe magnets as having two poles and know how these poles attract or repel</li> </ul>	<ul style="list-style-type: none"> <li>• Identify common appliances that run on electricity</li> <li>• Construct simple series circuits, identifying a nd naming the basic parts: 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 cell</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> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>	<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> <li>• Explain that unsupported objects fall toward the Earth because of the force of gravity acting</li> </ul>

				<ul style="list-style-type: none"><li>•</li></ul>	<ul style="list-style-type: none"><li>• Recognise some common conductors and insulators, and associate some metals with being good conductors.</li></ul>		<p>between the Earth and the falling object</p> <ul style="list-style-type: none"><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><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 variation 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>
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Year 1 & 2	Year 3 & 4	Year 5 & 6
<b>Asking questions and recognising that they can be answered in different ways</b>		
<p><b>Asking simple questions and recognising that they can be answered in different ways</b></p> <ul style="list-style-type: none"> <li>• While exploring the world, the children develop their ability to ask questions (such as what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen). Where appropriate, they answer these questions.</li> <li>• The children answer questions developed with the teacher often through a scenario.</li> <li>• The children are involved in planning how to use resources provided to answer the questions using different types of enquiry, helping them to recognise that there are different ways in which questions can be answered.</li> </ul>	<p><b>Asking relevant questions and using different types of scientific enquiries to answer them</b></p> <ul style="list-style-type: none"> <li>• The children consider their prior knowledge when asking questions. They independently use a range of question stems. Where appropriate, they answer these questions.</li> <li>• The children answer questions posed by the teacher.</li> <li>• Given a range of resources, the children decide for themselves how to gather evidence to answer the question. They recognise when secondary sources can be used to answer questions that cannot be answered through practical work. They identify the type of enquiry that they have chosen to answer their question.</li> </ul>	<p><b><i>Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</i></b></p> <ul style="list-style-type: none"> <li>• Children independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry.</li> <li>• Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources can be used to answer questions that cannot be answered through practical work.</li> </ul>



**Making observations and taking measurements**

**Observing closely, using simple equipment**

- Children explore the world around them. They make careful observations to support identification, comparison and noticing change. They use appropriate senses, aided by equipment such as magnifying glasses or digital microscopes, to make their observations.
- They begin to take measurements, initially by comparisons, then using non-standard units.

**Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers**

- The children make systematic and careful observations.
- They use a range of equipment for measuring length, time, temperature and capacity. They use standard units for their measurements.

**Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate**

- The children select measuring equipment to give the most precise results e.g. ruler, tape measure or trundle wheel, force meter with a suitable scale.
- During an enquiry, they make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value).

## Engaging in practical enquiry to answer questions

**Performing simple tests**

- The children use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. They carry out: tests to classify; comparative tests; pattern seeking enquiries; and make observations over time.

**Identifying and classifying**

- Children use their observations and testing to compare objects, materials and living things. They sort and group these things, identifying their own criteria for sorting.
- They use simple secondary sources (such as identification sheets) to name living things. They describe the characteristics they used to identify a living thing.

**Setting up simple practical enquiries, comparative and fair tests**

- The children select from a range of practical resources to gather evidence to answer questions generated by themselves or the teacher.
- They follow their plan to carry out: observations and tests to classify; comparative and simple fair tests; observations over time; and pattern seeking.

**Explanatory note**

A comparative test is performed by changing a variable that is qualitative e.g. the type of material, shape of the parachute. This leads to a ranked outcome.

A fair test is performed by changing a variable that is quantitative e.g. the thickness of the material or the area of the canopy. This leads to establishing a causative relationship.

***Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary***

- The children select from a range of practical resources to gather evidence to answer their questions. They carry out fair tests, recognising and controlling variables. They decide what observations or measurements to make over time and for how long. They look for patterns and relationships using a suitable sample.

Recording and presenting evidence		
<p><b>Gathering and recording data to help in answering questions</b></p> <ul style="list-style-type: none"> <li>• The children record their observations e.g. using photographs, videos, drawings, labelled diagrams or in writing.</li> <li>• They record their measurements e.g. using prepared tables, pictograms, tally charts and block graphs.</li> <li>• They classify using simple prepared tables and sorting rings.</li> </ul>	<p><b>Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions</b></p> <p><b>Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables</b></p> <ul style="list-style-type: none"> <li>• The children sometimes decide how to record and present evidence. They record their observation e.g. using photographs, videos, pictures, labelled diagrams or writing. They record their measurements e.g. using tables, tally charts and bar charts (given templates, if required, to which they can add headings). They record classifications e.g. using tables, Venn diagrams, Carroll diagrams.</li> <li>• Children are supported to present the same data in different ways in order to help with answering the question.</li> </ul>	<p><b>Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs</b></p> <ul style="list-style-type: none"> <li>• The children decide how to record and present evidence. They record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing. They record measurements e.g. using tables, tally charts, bar charts, line graphs and scatter graphs. They record classifications e.g. using tables, Venn diagrams, Carroll diagrams and classification keys.</li> <li>• Children present the same data in different ways in order to help with answering the question.</li> </ul>

Answering questions and concluding		
<p><b>Using their observations and ideas to suggest answers to questions</b></p> <ul style="list-style-type: none"> <li>Children use their experiences of the world around them to suggest appropriate answers to questions. They are supported to relate these to their evidence e.g. observations they have made, measurements they have taken or information they have gained from secondary sources.</li> </ul>	<p><b>Using straightforward scientific evidence to answer questions or to support their findings</b></p> <ul style="list-style-type: none"> <li>Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. The answers are consistent with the evidence.</li> </ul>	<p><b>Identifying scientific evidence that has been used to support or refute ideas or arguments</b></p> <ul style="list-style-type: none"> <li>Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. When doing this, they discuss whether other evidence e.g. from other groups, secondary sources and their scientific understanding, supports or refutes their answer.</li> <li>They talk about how their scientific ideas change due to new evidence that they have gathered.</li> <li>They talk about how new discoveries change scientific understanding.</li> </ul>
<p><b>Using their observations and ideas to suggest answers to questions</b></p> <ul style="list-style-type: none"> <li>The children recognise 'biggest and smallest', 'best and worst' etc. from their data.</li> </ul>	<p><b>Identifying differences, similarities or changes related to simple scientific ideas and processes</b></p> <ul style="list-style-type: none"> <li>Children interpret their data to generate simple comparative statements based on their evidence. They begin to identify naturally occurring patterns and causal relationships.</li> </ul> <p><b>Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions</b></p> <ul style="list-style-type: none"> <li>They draw conclusions based on their evidence and current subject knowledge.</li> </ul>	<p><b>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</b></p> <ul style="list-style-type: none"> <li>In their conclusions, children: identify causal relationships and patterns in the natural world from their evidence; identify results that do not fit the overall pattern; and explain their findings using their subject knowledge.</li> </ul>

Year 1/2

Year 3/4

Year 5/6

Evaluating and raising further questions and predictions		
	<p><b><i>Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions</i></b></p> <ul style="list-style-type: none"><li>• They identify ways in which they adapted their method as they progressed or how they would do it differently if they repeated the enquiry.</li></ul>	<p><b><i>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</i></b></p> <ul style="list-style-type: none"><li>• They evaluate, for example, the choice of method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used.</li><li>• They identify any limitations that reduce the trust they have in their data.</li></ul>
	<p><b><i>Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions</i></b></p> <ul style="list-style-type: none"><li>• Children use their evidence to suggest values for different items tested using the same method e.g. the distance travelled by a car on an additional surface.</li><li>• Following a scientific experience, the children ask further questions which can be answered by extending the same enquiry.</li></ul>	<p><b><i>Using test results to make predictions to set up further comparative and fair tests</i></b></p> <ul style="list-style-type: none"><li>• Children use the scientific knowledge gained from enquiry work to make predictions they can investigate using comparative and fair tests.</li></ul>

Year 1/2

Year 3/4

Year 5/6

Communicating their findings		
	<p><b>Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</b></p> <ul style="list-style-type: none"><li>• They communicate their findings to an audience both orally and in writing, using appropriate scientific vocabulary.</li></ul>	<p><b><i>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</i></b></p> <ul style="list-style-type: none"><li>• They communicate their findings to an audience using relevant scientific language and illustrations.</li></ul>