

St Paul's C of E Primary School

Science Curriculum (Fornight)

This unit of work will focus on Science predominately. Pupils will learn about and understand materials and their properties and understand states of matter. Pupils will have the opportunity to work scientifically and develop their Scientist skills, as well as learning key information with the opportunity to revisit past information and interleave their Design Technology knowledge too.

Phase 1

Ask simple questions and make basic observations by testing using simple equipment.

Through investigation of their environment, pupils begin to ask questions to aid their understanding of the world around them. (e.g. What is it?, What makes it work?, How is it like/different from other things?, how has it changed?, What makes it change?)

Pupils are guided by the teacher to plan, investigate and trial different scenarios to help answer their questions. Pupils should begin to recognise that these questions can be answered in different ways.

Pupils make observations by exploring their environment and begin to take measurements. This could be by simple comparisons (larger, smaller, lighter, heavier, best, worst) or by measuring in non-standard units.

Use the equipment and apparatus in their environment to be inquisitive.

Pupils use the resources in their environment or provided by the teacher to gather evidence to answer questions generated by themselves or the teacher. They carry out tests to classify and compare, looking for patterns and making basic observations over time. (Verbal or pictorial)

Pupils 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 begin to describe the characteristics they used to identify a living thing.

Begin to use scientific language to identify and classify, explaining their findings orally or by using simple annotated drawings.

[Speaking ELG](#) Offer explanations for why things might happen, making use of recently introduced vocabulary from non-fiction.

Phase 2

Ask relevant questions using prior knowledge.

Pupils refer to prior knowledge when asking questions using a range of questions stems that lead them to resolve them independently. Using straightforward scientific reasoning, pupils begin to answer questions from the teacher and begin to make their own decisions about the most appropriate type of scientific enquiry they might use to confirm or negate these answers; They should begin to recognise when a simple fair test is necessary and help to decide how to set it up. Pupils make systematic and careful observations and begin to measure parameters such as time, temperature and capacity using a range of equipment and recording in standard units.

Use scientific equipment and apparatus to be inquisitive.

Given a greater range of resources, pupils decide for themselves how to gather evidence. They begin to use other evidence (e.g. Textbook or Internet search) to back up their practical work. They carry out tests to classify and compare, looking for patterns and making detailed observations over time. (Verbal, pictorial and written)

Pupils predict outcomes before gathering, recording, classifying and presenting data in different ways to help answer questions. They make accurate measurements using a range of equipment and use evidence to draw simple conclusions and suggest improvements or indicate where further testing may be necessary.

Use scientific language to explain their findings either orally or in written form, using labelled drawings and diagrams, bar charts and tables for clarity.

Phase 3

Ask detailed and relevant questions. Plan enquires, recognising how to control certain variables and choose appropriate techniques and apparatus during fieldwork and laboratory work.

Pupils begin to ask scientific questions based on prior knowledge or their findings. Using a greater range of apparatus and resources, pupils independently decide on procedures for answering questions, justifying their choices with scientific reasoning. They use prior knowledge to make scientific predictions, explaining their reasoning before presenting their findings using more complex scientifically accurate recording methods.

Pupils select the most appropriate equipment for precisely measuring their results and decide whether to repeat testing or adjust parameters to obtain the most accurate data.

Use more complex equipment and apparatus to be inquisitive.

Pupils select from a greater range of practical resources to gather evidence to answer their questions. They begin to take precise and accurate measurements, deciding for themselves which data is relevant to the investigation and why. They use their findings to explain causal relationships and to draw scientific conclusions.

They use prior knowledge to discuss and describe scientific ideas, identifying scientific evidence that can be used to support or refute ideas or arguments. 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.

Use scientific language to explain, in a greater variety of scientific formats, their results and findings

Science Subject Pathway

	Phase 1	Phase 2	Phase 3
Materials – PROPERTIES & STATES OF MATTER	<p>Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock. (Yr1) Verbally identify materials as plastics, metals, woods, textiles, building materials and organic matter. (DT - KP1)</p> <p>Distinguish between an object and the material from which it is made. (Yr1) <i>(may include but not limited to: table-wooden; window-glass)</i> Pupils learn that all objects are made from one or more materials. Introduce solid as vocab. <u>Creating with Materials ELG</u> Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function</p> <p><u>Fine Motor Skills ELG</u> Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Yr2) Pupils investigate using material such as clay, dough and paper how some objects can be remoulded into different shapes.</p> <p>Describe the simple physical properties of a variety of everyday materials. (Yr1) Pupils learn that materials can be described by their properties and that some materials e.g. plastic can be in different forms with very different properties. <i>(may include but not limited to: rough, smooth, bumpy, scrunch, shiny, dull)</i> Describe the functional properties of wood, plastics, textiles, building materials and organic matter to include but not limited to hard, soft, stretchy, stiff, shiny/dull, rough/smooth, waterproof, opaque/transparent (DT - KP1)</p>	<p>Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Yr2) Pupils learn that specific materials are chosen for an object depending on the use of that object. Drawing on prior knowledge, pupils investigate the reasons and suitability of materials used in objects that can be found around home and school and begin to ask why. Why is it waterproof? Why is it opaque/transparent? (e.g. water bottle) Why is it smooth? (e.g. table) Start to understand within known groups of materials, there can be differences e.g. lighter, shinier etc., some metals are stronger than other metals, plastics can exist in different forms e.g. flexible or set (DT - KP1)</p> <p>Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Yr2) Pupils investigate using material such as clay, dough and paper how some objects can be remoulded into different shapes. Apply their knowledge of materials (including wood, metal, plastic, glass, brick, rock, paper and cardboard) to choose an appropriate material for an appropriate task e.g. a soft textile is better for a blanket than a roll of foil (DT - KP1) Apply their knowledge of above to combine properties e.g. a deck chair needs to be comfortable to sit on but also have a firm support. (DT - KP1) Consider function when combining materials at the point of making.</p>	<p>Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic (Yr5) Pupils investigate properties of everyday materials using tests that they devise mostly independently. Relate the properties of materials to their different uses within leisure, industry and environmental effects e.g. single use plastic is a fantastic versatile material in hospitals and hospitality but is having a disastrous effect on the planet and our oceans. What materials could have similar properties but are more environmentally friendly e.g. bamboo instead of plastics. (DT - KP1) Consider cost, function and aesthetics when combining materials at the point of design as well as making and CAM. (DT - KP1)</p> <p>Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal) and responses to magnets (Yr5) Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution (Yr5)</p>

Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Yr1) *(may include but not limited to: waterproof, see-through, absorbent)*
Relate these different materials to their immediate environment: home/school/ garden. (DT - KP1)

The Natural World ELG Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter

Pupils understand that it is cold/wet in winter and hot/dry in summer. Link to rain/water/warm/sunny
Observe that some materials change state when they are heated or cooled, ie snow to water to steam. Why doesn't it snow in summer?
Introduce solid, liquid, gas (pupils are aware that the air around them is a gas)

Compare and group materials together, according to whether they are solids, liquids or gases (Yr4)
Pupils learn that materials can be mostly found in one of three states, solid, liquid or gas. The properties of these states is dependent on the energy and freedom of their particles (atoms or molecules). Pupils will learn the properties of these states and be able to classify everyday materials into 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) (Yr4)
Pupils investigate that heating or cooling a material can change the state it is in. Some materials will revert back to their stable state once the heat/cold is removed such as water/ice/steam. (Reversible reaction).

Understand the life cycle of materials e.g. that wood also comes from recycling old materials, fabric comes from a range of sources such as silk worms, oil, plants and metal come from ore, most often found in rocks.

Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating(Yr5)

Demonstrate that dissolving, mixing and changes of state are reversible changes (Yr5)
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. (Yr5)

Pupils use prior knowledge of physical properties and states of matter to compare and classify materials noting that some materials will dissolve in water to form a solution while others will form a sediment. Pupils learn how a dissolved material can be separated from a solution (evaporation) and investigate separation techniques for insoluble solids. (filtration, sieving, magnets). They understand that these processes are reversible whereas other processes, such as the reactions that take place during baking, are irreversible.

Begin to understand the processes involved in extracting materials from this planet e.g. Wood is debarked, rough sawn, dried, cut, planed. Metal ore is mined, crushed, separated (magnets), smelted, mixed (alloy), casted/welded/formed. Plastics from crude oil are distilled, separated and then joined. (DT - KP1)

KS3: Chemical reactions as the rearrangement of atoms. Representing chemical reactions using formulae and using equations.
Combustion, thermal decomposition, oxidation and displacement reactions.
Defining acids and alkalis in terms of neutralisation reactions.
The pH scale for measuring acidity/alkalinity; and indicators..

Vocabulary

Phase 1	Phase 2	Phase 3
<p><u>Materials (Chemistry)</u> hot, cold, wet, dry, object, material, wood, plastic, glass, metal, water, soil, rock, brick, paper, fabric, elastic, foil, card, rubber, wool, clay, hard, soft, smooth, bumpy, stretchy, stiff, scrunch, bendy, shiny, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, transparent (see-through), solid, liquid, gas,</p>	<p><u>Materials (Chemistry)</u>as for Phase 1 plus: chemistry, opaque, flexible, floppy, rigid, boulder, pebble, stone, crystals, fossils, marble, limestone, granite, slate, limestone, chalk, sedimentary, viscosity, states of matter, particles, atoms, molecules, Celsius, melting, freezing, evaporation, condensation, precipitation, collection</p>	<p><u>Materials (Chemistry)</u>as for Phase 1&2 plus: Solution, dissolve, filter, sieving, reversible, irreversible, polymer, solution, soluble, insoluble, filtration, rusting, permanence, impermanence,</p>
<p><u>Working Scientifically</u> Tables, compare, contrast, chart, natural, observations, equipment, pattern, testing, identify, group, record, results, materials,</p>	<p><u>Working Scientifically</u> as for phase1 plus: Method, investigation, predict, conclusion, apparatus, data, describe, measure, diagram, Comparative, fair, controlled, systematic, practical, measurement, thermometer, data logger, bar chart, graph, values function, microscope</p>	<p><u>Working Scientifically</u> as for phase 1&2 plus: Calibration, analyse, variables, precision, scatter graph, causal, illustrate, theory</p>