

# SLS Primary Science Curriculum Overview

The KS1/2 Science National Curriculum identifies teaching expectations in the sequence of scientific **knowledge & concepts** and **Working Scientifically**.

## Knowledge & Concepts

Knowledge is built upon conceptual understanding. Concepts in science are called Science Models. These science conceptual models are the thread which links topic knowledge together, allow deeper independent connections to be made and supports long-term recall. There are four models in the primary curriculum.

Particle Model 

Force Arrow Model 

Energy Transfer Model 

Big Picture Model 

## Working Scientifically

SLS Science recognises that **Scientific Enquiry** (curiosity; independence) and **Working Scientifically** (procedural fluency in skill development) are mutually supportive. Working Scientifically is described separately in the Programme of Study, but 'must always be taught through and clearly related to the teaching of substantive science content'. This can be best achieved using the teaching strategy where planning focusses on both content and skill development (**dual objectives**) within each lesson. This builds fluency in skills over time that can then support independent enquiry.

Working Scientifically is the expected development area in the National Curriculum and so should be the focus of assessment and progress over time. Pupils should develop their own questions and increasingly investigate them independently through Enquiry but this supports depth (Enquiry Learning) rather than assessment. As a result, different types of Enquiry should be used but should not detract from, and become more important than, the required progressive skill development that underpins them.

Explaining Science

Classification

Designing Experiments

Data, Tables & Graphs

Making Conclusions

The table below identifies key skills from the Working Scientifically end of Key Stage expectations. These skills are given more detail as year group expectations in the **SLS Primary Science Assessment Board**. They also link into, and overlap, with expectations in the SLS Secondary Science Assessment Board to give effective progression and ensure pupils are secondary ready by the time they leave year 6.

Key Stage	Year	National Curriculum Programme of Study
KS1	1-2	<ul style="list-style-type: none"> <li>Asking simple questions &amp; recognise they can be answered in different ways (use science experience to explore; ask how things are similar, different or change; ask how they happen; support types of Enquiry; develops curiosity; suggests ideas to investigate)</li> <li>Identifying &amp; classifying (compare simple/obvious features; sort &amp; group using difference, similarity &amp; change; link properties to an application)</li> <li>Observing closely using simple equipment (observe patterns; use simple measurement &amp; range of equipment correctly; notice risk &amp; common dangers)</li> <li>Performing simple tests (experience different types of Enquiry; carry out simple tests (follows spoken &amp; written instructions); identifies variable to change; suggest what might happen)</li> <li>Gathering &amp; recording data to help in answering (record in a range of ways; begin to use simple scientific language, record data, measure using number lines &amp; standard units)</li> <li>Recording findings as drawings, diagrams, photographs, simple prepared formats such as tables and charts (block), tally charts and displays</li> <li>Using observations &amp; ideas to suggest answers to questions (talk about what has happened (change); describe simple features, patterns &amp; relationships)</li> </ul>
Lower KS2	3-4	<ul style="list-style-type: none"> <li>Asking relevant questions &amp; using different types of scientific enquiry to answer them (use practical science to raise own questions; supports increasing independence in Enquiry)</li> <li>Setting up simple practical, comparative and fair tests (increasing focus on fair test; design fair test; predict relationships between variables; select &amp; use equipment safely)</li> <li>Using a range of equipment (including thermometers &amp; data-loggers) (collect data from own observations &amp; measurements; work safely &amp; select/use suitable equipment for the task)</li> <li>Making systematic, careful observations &amp; take accurate measurements using standard units (use number lines (unlabelled fine divisions))</li> <li>Gathering, recording, classifying (create criteria for grouping, sorting &amp; classifying, use spider keys) &amp; presenting data in a variety of ways to help in answering questions</li> <li>Recording findings using simple scientific language, drawings, labelled diagrams, bar charts, and tables (construct simple tables &amp; bar charts)</li> <li>Reporting on findings from enquiries, including oral &amp; written explanations, displays or presentations of results and conclusions (decide how to record data)</li> <li>Identifying differences, similarities or changes related to simple scientific ideas &amp; processes (describe patterns &amp; relationships in data; use science concepts to explain)</li> <li>Using results to draw simple conclusions, make predictions for new values, suggest improvements &amp; raise further questions (predict using data; predict new values; suggest improvements)</li> <li>Using straightforward scientific evidence to answer questions or support their findings (use collected data to support conclusions, perhaps communicate for different audiences)</li> </ul>

Upper KS2	5-6	<ul style="list-style-type: none"> <li>Identifying scientific evidence that has been used to support or refute ideas or arguments (separate opinion from fact, explore ideas &amp; raise different kinds of questions; discuss, communicate &amp; justify their scientific ideas; talk about how science ideas have developed over time)</li> <li>Planning different types of enquiry to answer questions, including, recognising and controlling variables where necessary (select &amp; plan most appropriate type of enquiry with increasing independence; control variables in comparative &amp; fair tests effectively (reliable); explain which variables need to be controlled &amp; how; make a hypothesis to test)</li> <li>Taking measurements using a range of scientific equipment with increasing accuracy and precision, taking repeat readings when necessary (select most appropriate equipment (correct scale); explain how to use equipment precisely &amp; safely, repeat readings for reliability)</li> <li>Recording data and results of increasing complexity (repeated (mean plotted); linear/non-linear) using scientific diagrams (labels &amp; annotations; complex science language), classification keys (create spider/number; group &amp; sub-group) tables, scatter graphs, bar and line graphs (complex tables for repeated data; trend lines; appropriate scale)</li> <li>Reporting &amp; presenting findings from enquiries, including conclusions, causal relationships and explanations of &amp; degree of trust in results, in oral &amp; written forms such as displays &amp; other presentations (identify causal relationships, use secondary data for validity; identify &amp; explain anomalous data)</li> <li>Using test results to make predictions to set up further comparative and fair tests (identify when further test are needed, suggest data limitations &amp; suggest practical improvements)</li> </ul>
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The table below identifies where these models should be taught, which model provides the main focus (bold) and the knowledge outcomes for each topic. Information in italics gives additional content within the SLS Scheme to provide firm foundations in conceptual understanding. Each topic in the SLS Scheme develops two skills so that progress can be made and tracked over a half term. These skills are identified and taught through dual objectives in each lesson. The Scheme colour codes the topic by the WS skill developed. It should be noted that skills can be changed to fit the needs of the class as long as progression can be seen through re-visiting and all skills are developed over the course of a Key Stage.

### KS1 – Teaching Expectations:

- Experience** & closely observe phenomena (natural/humanly-constructed) – through first-hand practical experience; experience all phenomena prior to KS2; active exploration; descriptive / comparative
- Begin to use simple **scientific language** & communicate their ideas – focus on increased recall and confidence in using science words; support increasingly extended/sequenced talk
- Encouraged to be curious & **ask questions** about what they observe – encourage talk/discussion as they are doing leading to increased recall; use variable terminology; use pupil questions to guide learning.
- Know where they are heading – begin to **build conceptual understanding** through targeted activity; focus on big-picture model; multi-structural factual knowledge (recalled) with limited connections

Key Stage 1	1	<b>Plants</b> <ul style="list-style-type: none"> <li>Identify (garden, wild, trees)</li> <li>Deciduous, evergreen</li> <li>Basic structure of a variety of common flowering plants, inc trees (roots, stem, leaves, flower)</li> </ul>	<b>Animals Including Humans</b> <ul style="list-style-type: none"> <li>Identify (birds, fish, amphibians, reptiles, mammals), describe &amp; compare structure</li> <li>Identify carnivores, herbivores, omnivores</li> <li>Label human body parts, link to senses</li> </ul>	<b>Everyday Materials</b> <ul style="list-style-type: none"> <li>Distinguish between object &amp; material it is made of</li> <li>Identify everyday materials</li> <li>Describe simple physical properties of materials</li> <li>Compare / group materials by physical properties</li> </ul>	<b>Light &amp; Shadows</b> <ul style="list-style-type: none"> <li>Observe sun in sky</li> <li>Observe light coming from a source</li> <li>Observe light blocked to form shadow</li> <li>Investigate how to make a place darker/lighter</li> <li>Know light/dark safety</li> </ul>	<b>Pushes &amp; Pulls</b> <ul style="list-style-type: none"> <li>Recognise push/pull as a force to move an object</li> <li>Recognise that force can be bigger/smaller &amp; direction</li> <li>Investigate push/pulls with more or less force. Heavier objects</li> </ul>	<b>Seasonal Changes</b> <ul style="list-style-type: none"> <li>Observe changes across seasons</li> <li>Observe &amp; describe weather / day length changes with seasons</li> <li>Focus on heat (temperature and light changes related to the sun as the source)</li> </ul>
	2	<b>Living Things &amp; Habitats</b> <ul style="list-style-type: none"> <li>Explain difference between living, dead &amp; non living (7 processes of life)</li> <li>Live in habitats (suited)</li> <li>Habitats provide basic needs. Depend on each other. Study habitats/microhabitats</li> <li>Food chains (feeding only)</li> </ul>	<b>Plants</b> <ul style="list-style-type: none"> <li>Growth from seed/bulb</li> <li>Requirements for growth (water, light &amp; suitable temperature)</li> </ul>	<b>Animals Including Humans</b> <ul style="list-style-type: none"> <li>Offspring into adults</li> <li>Explain basic needs for survival (water, food &amp; air)</li> <li>Need for exercise / nutrition / hygiene</li> <li>Life cycle of insect &amp; amphibian</li> </ul>	<b>Uses of Everyday Materials</b> <ul style="list-style-type: none"> <li>Identify/compare uses of everyday materials</li> <li>Find out how shapes of solids can be changed by squashing, bending, twisting &amp; stretching</li> </ul>	<b>Building Circuits</b> <ul style="list-style-type: none"> <li>Identify appliances that run on electricity</li> <li>Recognise need for power source &amp; closed circuit to make an appliance work</li> <li>Identify components/symbols</li> <li>Build simple closed circuits</li> </ul>	

### LKS2 – Teaching Expectations:

- **Broaden** scientific view of the world – explore, talk, test, develop ideas about functions, relationships & interactions; support conceptual and connected knowledge
- **Recall & use appropriate science terminology** (including WS) – recalled vocabulary; support correct use during extended / sequenced talk; confident use
- Ask their own questions and **plan ways to test** – increasingly asking testable questions; increasingly quantitative (data) focus; some procedural fluency; use pupil questions to extend learning
- Begin to use abstract ideas, knowledge & understanding to describe – **use all four conceptual models to describe** observations and phenomena; **conceptual knowledge** & relational connections supported.

Lower Key Stage 2	3	<b>Plants</b> <ul style="list-style-type: none"> <li>• Identify/describe functions of parts (root, stem, leaf, flower)</li> <li>• Explore requirements for growth (air, light, nutrients, room) &amp; how they vary</li> <li>• Investigate transport of water</li> <li>• Role of flowers in life cycle (pollination, seed formation / dispersal)</li> </ul> 	<b>Animals Including Humans</b> <ul style="list-style-type: none"> <li>• Get nutrition from food</li> <li>• Skeletal/muscular system (simple names) &amp; functions</li> <li>• <i>Life cycle of bird &amp; mammal</i></li> </ul> 	<b>Rocks</b> <ul style="list-style-type: none"> <li>• Compare/group on physical properties</li> <li>• Fossil formation (trapped in rock)</li> <li>• Recognise soils are made from rocks &amp; organic matter</li> </ul> 	<b>Light</b> <ul style="list-style-type: none"> <li>• Recognise need light to see things; dark is absence of light</li> <li>• Light can be reflected</li> <li>• Sun can be dangerous to eyes</li> <li>• Shadows (light blocked)</li> <li>• Patterns in the size of shadow</li> </ul> 	<b>Forces and Magnets</b> <ul style="list-style-type: none"> <li>• Compare how things move on different surfaces</li> <li>• Explore push/pull</li> <li>• Contact forces &amp; 'distance' forces (gravity/magnetism)</li> <li>• Magnets attract / repel; two poles</li> <li>• Compare/group materials with magnets</li> </ul> 
	4	<b>Living Things &amp; Habitats</b> <ul style="list-style-type: none"> <li>• Recognise living things can be grouped in different ways</li> <li>• Explore &amp; use keys. Identify / name variety of living things in environment</li> <li>• Recognise environments change &amp; pose dangers to living things</li> </ul> 	<b>Animals Including Humans</b> <ul style="list-style-type: none"> <li>• Digestive system (simple)</li> <li>• Teeth (inc structure/function)</li> <li>• Construct food chains (producers, consumers, predators &amp; prey)</li> </ul> 	<b>States of Matter</b> <ul style="list-style-type: none"> <li>• Groups as solids, liquids, gases. Compare</li> <li>• Explain change state with heating &amp; cooling (°C)</li> </ul> 	<b>Electricity</b> <ul style="list-style-type: none"> <li>• Identify common appliances</li> <li>• Construct simple circuit</li> <li>• Series circuit. Switches</li> <li>• Common conductors (metals) &amp; insulators</li> </ul> 	<b>Sound</b> <ul style="list-style-type: none"> <li>• Identify how sounds are made</li> <li>• How sounds travel through medium to ear</li> <li>• Explain sound travels away from source. Gets fainter.</li> <li>• Patterns in pitch &amp; object,</li> <li>• Patterns in volume &amp; vibration</li> </ul> 

### UKS2 – Teaching Expectations:

- **Deeper understanding** of a wide range of scientific ideas – systematically explore, talk, test, develop ideas about functions, relationships & interactions; support conceptual and connected knowledge
- **Recall & use complex science terminology** (including WS) – complex vocabulary; support correct use during extended / sequenced / reasoned talk; confident fluency of use
- Ask their own questions and **plan ways to reliably test** – ask testable questions; quantitative (data) focus; procedural fluency; justify findings & use conceptual understanding to explain
- Use abstract ideas, knowledge & understanding to explain - **use all four conceptual models to explain** observations and phenomena; **secure conceptual knowledge** & wider extended connections supported.

Upper Key Stage 2	5	<b>Animals Including Humans</b> <ul style="list-style-type: none"> <li>• Changes as humans develop to old age (inc puberty)</li> </ul> 	<b>All Living Things</b> <ul style="list-style-type: none"> <li>• Life cycles of mammal, amphibian, an insect &amp; a bird</li> <li>• Describe reproduction in some plants &amp; animals (inc sexual /asexual)</li> </ul> 	<b>Properties &amp; Changes of Materials</b> <ul style="list-style-type: none"> <li>• Compare/group materials based upon properties</li> <li>• Explain dissolving to form a solution. Recovery. Separating mixtures</li> <li>• Reasons for material uses based upon testing evidence</li> <li>• Dissolving, mixing, changes in state are reversible. Irreversible changes</li> <li>• <i>Evaporation/condensation - water cycle</i></li> </ul> 	<b>Earth &amp; Space</b> <ul style="list-style-type: none"> <li>• Describe movement of earth relative to sun &amp; planets (solar system)</li> <li>• Describe movement of moon relative to earth</li> <li>• Sun, earth, moon are spherical</li> <li>• Explain day / night &amp; movement of sun across sky</li> </ul> 	<b>Forces</b> <ul style="list-style-type: none"> <li>• Explain objects fall towards earth due to force of gravity</li> <li>• Effects of air / water resistance &amp; friction</li> <li>• Some mechanisms, inc levers, pulleys &amp; gears, allow a smaller force to have greater effect</li> </ul> 
	6	<b>Living Things &amp; Habitats</b> <ul style="list-style-type: none"> <li>• Describe classification into broad groups (animals, plants, microbes) based on observable features</li> <li>• Reasons for classifying plants &amp; animals based on specific characteristics</li> </ul> 	<b>Animals Including Humans</b> <ul style="list-style-type: none"> <li>• <b>Identify / name parts of human circulatory system. Functions of heart, vessels &amp; blood</b></li> <li>• <b>Impact of diet, exercise, drugs &amp; lifestyle on body function</b></li> <li>• <b>Transport of water/nutrients in animals</b></li> </ul> 	<b>Evolution and Inheritance</b> <ul style="list-style-type: none"> <li>• Living things change over time (fossil evidence)</li> <li>• Recognise offspring may vary / non-identical to parents</li> <li>• Explain how adaptation leads to evolution</li> </ul> 	<b>Electricity</b> <ul style="list-style-type: none"> <li>• Explain variation in brightness, loudness with number &amp; voltage of cells used.</li> <li>• Explain variations in component function (brightness, loudness, on/off)</li> <li>• Recognise symbols in circuit diagram</li> </ul> 	<b>Light</b> <ul style="list-style-type: none"> <li>• Light travels in straight lines from a light source or reflected into the eye</li> <li>• Ray model to explain size of shadows (prediction)</li> </ul> 