

Science

Areas of study KS1:

- Plants
- Animals including humans
- Everyday materials
- Seasonal changes
- Living things and their habitats

Areas of study Lower KS2:

- Plants
- Animals including humans
- Rocks
- Light
- Forces and magnets
- Living things and their habitats
- States of matter
- Sound
- Electricity

Areas of study Upper KS2:

- Properties and changes of materials
- Animals including humans
- Earth and Space
- Light
- Forces
- All living things and their habitats
- Evolution and inheritance
- Electricity

Primary science helps pupils to:

- Investigate problems
- Learn how science works
- Discover why science matters in the world

Substantive knowledge - the products of science

This is referred to as scientific knowledge and conceptual understanding

Disciplinary knowledge – the practices of science.

Disciplinary knowledge is knowledge of how scientific enquiry generates and grows substantive knowledge.

This is knowing how to collect, use, interpret, understand and evaluate the evidence from scientific processes. This is taught. It is not assumed that pupils will acquire these skills by luck or hope. Pupils construct understanding by applying substantive knowledge to questioning and planning, observing, performing a range of tests, accurately measuring, comparing through identifying and classifying, using observations and gathering data to help answer questions, explaining and reporting, predicting, concluding, improving, and seeking patterns. We call it 'Working Scientifically' or 'Working as a Scientist'.

These scientific enquiry types are mapped throughout the curriculum.

- identifying and classifying
- pattern seeking
- research
- observing over time
- fair and comparative testing.

Scientific analysis is developed through 'Working Scientifically' from the curriculum grids. They include:

1. **Methods to answer scientific questions** - this should reflect the diversity of scientific methods, not just 'fair testing' e.g. identifying, experimentation (fair testing), classification and grouping, pattern seeking, observing over time.
2. **Apparatus and techniques, including measurement** - knowledge of how to carry out specific procedures safely and with proficiency. This includes the accurate measurement and recording of data.

3. Analysis, presentation and evaluation of scientific data to draw valid conclusions - knowledge of how to present and process scientific data in a variety of ways e.g. using specific graphs and tables, which are used, alongside substantive theory, to draw tentative conclusions. Pupils should recognise that explanation is distinct from data and does simply emerge from it.

4. Development of scientific knowledge over time - this involves knowledge of how scientific laws and theories develop over time.

Table 2: Disciplinary knowledge

	Methods to answer scientific questions	Apparatus and techniques, including measurement	Analysis, presentation and evaluation of scientific data to draw valid conclusions	Development of scientific knowledge over time and its implications
KS1	Asking simple questions. Identifying and classifying.	Gathering and recording data. Observing closely using simple equipment e.g. hand lens.	Using their observations and ideas to suggest answers to questions.	
Lower KS2	Using different types of scientific enquiries to answer questions. Setting up fair tests, make predictions.	Taking accurate measurements using standard units, use a range of equipment incl. thermometers.	Recording findings using bar charts, keys, tables, labelled diagrams. Draw conclusions. Make predictions for new values, suggest improvements.	Using scientific evidence to support findings.
Upper KS2	Planning different types of scientific enquiries. Recognising and controlling variables.	Taking measurements with increasing accuracy and precision. Taking repeat readings.	Scatter graphs, line graphs, causal relationships. Degree of trust in results.	Identifying scientific evidence used to support or refute ideas or arguments.