

How we teach core subjects

Science

At St Peter's, Cowfold we aim to give our children a science curriculum which enables them to become confident, creative and independent learners who can explore the use of different knowledge and skills.

We believe that becoming a good scientist is not only about depth of scientific knowledge, but also being able to use a range of scientific skills. These skills enable children to confidently, inquisitively, independently and passionately learn more and gain more from the world around them.

Subject Concepts

The outcomes of the national curriculum are achieved through our concept-based curriculum. Our subject concepts are a helpful way to organise a curriculum as they provide learners with a disciplined way of thinking about curriculum content. Subject concepts come up repeatedly in each subject within our curriculum, supporting learners to assimilate new knowledge into growing schema.

Subject Concepts for Science

The following have been selected as the subject concepts for Science:

- **Working Scientifically**
- **Biology**
- **Chemistry**
- **Physics**

Vision Concepts:

Our vision concepts spiral throughout our curriculum so St Peter's children have a range of opportunities to apply what they have learnt in meaningful contexts and live out our school values, develop spiritually and explore their own beliefs

Our children apply their knowledge and skills that are set out in our small-steps progression documents to become 'agents of change' and explore 'courageous advocacy' through our vision concepts.

Community

The concept that we have a responsibility as a Christian community to learn about, understand and love others in our school, village, nation and the world

Christian Values

The concept that if we live by our distinctively Christian values and can demonstrate the qualities of our learning friends we will be equipped as lifelong learners

Ambition

The concept that we should use our knowledge and skills to improve the lives of ourselves and others

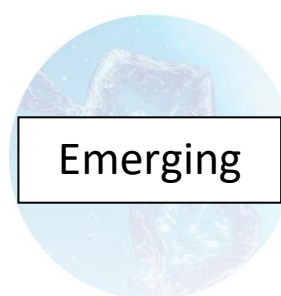
Small Steps Progression

Each subject concept has progression indicators called small-steps. The small-steps outline what intended knowledge pupils should attain during each milestone. We refer to the substantive knowledge as 'I know' knowledge and disciplinary knowledge as 'I can' knowledge. The small step documents, that describe this progression, are organised into 4 milestones. These are:

- ❖ Early Years Foundation Stage
- ❖ Milestone 1 – Year 1 and 2
- ❖ Milestone 2 – Year 3 and 4
- ❖ Milestone 3 – Year 5 and 6

Assessment

We assess the 'I know' knowledge and 'I can' knowledge each term. Within a particular milestone, a teacher assessment is made for each learner's level of knowledge: emerging, advancing and deepening. These levels of knowledge represent 3 cognitive domains.



Emerging

Low-level cognitive demand. Involves following instructions.



Advancing

Higher level of cognitive demand. Involves mental processing beyond recall. Requires some degree of decision making.



Deepening

Cognitive demands are complex and abstract. Involves problems with multiple steps or more than one possible answer. Requires justification of answers.

At the end of a science unit of work, teachers will use concept cartoons and Kahoot quizzes to assess the children's level of understanding.

Scientific Enquiry

A pedagogy employed in science is termed 'Scientific Enquiry', which naturally lends itself to teamwork, the development of growth mind-sets and Christian Values.

Central to the study of science is the chance for children to investigate 'Their Own Questions'. At St Peter's we spark their interest in an area of science, give them the background knowledge to ask good historical questions. Teachers then facilitate enquiry into those questions, to hold the pupils' interest. This does not happen in every lesson, as some lessons may focus on substantive knowledge.

Where it does enhance teaching and learning, pupils will undertake scientific enquiry, which not only develops their substantive knowledge but also aids the development of their disciplinary knowledge and skills. This disciplinary knowledge is summarised by our 'Working Scientifically' Subject Concept (see next page).

Working Scientifically

Years 1-2

Milestone 1

- Ask simple questions
- Observe closely, using simple equipment.
- Perform simple tests.
- Identify and classify.
- Use observations and ideas to suggest answers to questions.
- Gather and record data to help in answering questions.

Years 3-4

Milestone 2

- Ask relevant questions.
- Set up simple, practical enquiries and comparative and fair tests.
- Make accurate measurements using standard units, using a range of equipment, e.g. thermometers and data loggers.
- Gather, record, classify and present data in a variety of ways to help in answering questions.
- Record findings using simple scientific language, drawings, labelled diagrams, bar charts and tables.
- Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.
- Use results to draw simple conclusions and suggest improvements, new questions and predictions for setting up further tests.
- Identify differences, similarities or changes related to simple, scientific ideas and processes.
- Use straightforward, scientific evidence to answer questions or to support their findings.

Years 5-6

Milestone 3

- Plan enquiries, including recognising and controlling variables where necessary.
- Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work.
- Take measurements, using a range of scientific equipment, with increasing accuracy and precision.
- Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs, and models
- Report findings from enquiries, including oral and written explanations of results, explanations involving causal relationships, and conclusions.
- Present findings in written form, displays and other presentations
- Use test results to make predictions to set up further comparative and fair tests.
- Use simple models to describe scientific ideas, identifying scientific evidence that has been used to support or refute ideas or arguments.

Working Scientifically

National Curriculum Coverage

A Discrete Approach

Science lends itself to being taught discretely in its own right. We ensure we have cross-curricular links but we have taken the decision that coverage is more robustly met, by having discrete science lessons. The cross curricular nature of EYFS & KS1 means pupils 'bump into science' where it fits in appropriately in their learning journeys. In Key Stage 2, our topic of Darwin's Dragons is specifically chosen to link with study on 'Investigate Animals, Including Humans'. There are also many areas where cross-curricular links are made, e.g. Brazil with rainforests, Mountains with plate tectonics / rock types.

Overall, though, coverage of substantive knowledge follows the discrete cycle of teaching units outlined below. The starting resources and materials for each of the units below come from The Kent Primary Scheme of Work for Science (2014).

Cycle A

Year Group	Autumn	Spring		Summer
KS1	CHEM: Yr1 Investigate Materials <i>Best coat for a rainy day</i>	PHYS: Yr1 Seasonal changes <i>Observe environmental changes</i>	BIO: Yr2 Investigate Plants <i>Can seeds grow in the dark?</i>	BIO: Yr2 Investigate Living Things & Habitats <i>I can ask questions to research habitats</i>
LKS2	PHYS: Yr3&5 Forces and Magnets <i>How do things move on different surfaces?</i>	BIO: Yr4 Investigate Living Things and Habitats <i>How can change endanger the living?</i>	BIO: Yr3 Animals Inc. Humans <i>Do people with the longest legs jump farthest?</i>	PHYS: Yr3&4 Investigate Light & Sound <i>Changing shadows</i>
UKS2	PHYS: Yr5&6 Light <i>How can you see over a wall? Periscopes</i>	BIO: Yr5&6 Animals Inc. Humans <i>Survey- Height of children as they grow older</i>		CHEM: Yr5 Investigate Materials <i>How can I make my sugar dissolve faster?</i>

Cycle B

Year Group	Autumn		Spring		Summer
KS1	CHEM: Yr2 Investigate Materials <i>What makes the best windscreen?</i>		PHYS: Y1 Seasonal weather <i>How much rain have we had?</i>	BIO: Yr1&2 Investigate Animals Inc. Humans <i>Observe caterpillars</i>	BIO: Yr1 Investigate Plants <i>Are trees plants?</i>
LKS2	CHEM: Yr3 Investigate Materials: Rocks <i>How are rocks formed?</i> <i>Chocolate Rocks</i>		BIO: Yr3 Investigate Plants <i>Can a plant survive without nutrients?</i>	BIO: Yr4 Animals Inc. Humans <i>The journey of a banana sandwich</i>	PHYS: Yr4 Investigate Electricity <i>Design and make a book torch</i>
UKS2	CHEM: Yr4 Investigate Materials <i>Evaporation and the water cycle</i>	PHYS: Yr5 Earth and Space Yr5 <i>How can we use the sun to tell the time?</i>	BIO: Yr5&6 Living Things Inc. Habitats <i>Observe the Life Cycle of a Ladybird.</i> <i>How can we classify trees?</i>		PHYS: Yr6 Understand Electricity <i>How can I affect the brightness of a bulb?</i>