

Science Rationale

National Curriculum Aims for Science

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
- develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them
- are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future

National Curriculum Purpose for Science

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

Scientifically Literate

The journey to becoming scientifically literate begins in Early Years through high quality provision in the prime area of Knowledge and Understanding of the World. This is implemented through activities that encourage the children to explore, problem solve, observe, predict, think, make decisions and talk about the world around them.

Early Years science also helps children with skills in other Foundation Stage areas of the national curriculum, such as physical development and creative development. Children explore creatures, people, plants and objects in their natural environments. They observe and manipulate objects and materials to identify differences and similarities. For example, they may look at an egg whisk, sand, paper and water to learn about things that are natural and manmade and their different functions. Children also learn to use their senses, feeling dough or listening to sounds in the environment, such as sirens or farm animals. The children are encouraged to ask questions about why things happen and how things work. They might do activities such as increasing the incline of a slope to observe how fast a vehicle travels, or opening a mechanical toy to see how it works.

By the time children reach the end of Year Six they will be securely scientifically literate and working in line with age related expectations. They will be able to plan their own scientific enquiries to answer questions, identifying and controlling variables where necessary. During their enquiries, they will demonstrate the ability to take measurements, using a range of scientific equipment. Children will understand the importance of accuracy and precision, taking repeat readings when appropriate. Children are able to clearly record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. They use test results to make predictions to set up further comparative and fair tests. They are able to report and present 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. Children are able to identify scientific evidence that has been used to support or refute ideas or arguments.

Science Rationale

Science is a body of knowledge built up through experimental testing of ideas. Science is also methodology, a practical way of finding reliable answers to questions we may ask about the world around us.

Science in our federation is about developing children's ideas and ways of working that enable them to make sense of the world in which they live through investigation, as well as using and applying process skills. We believe that a broad and balanced science education is the entitlement of all children, regardless of ethnic origin, gender, class, aptitude or disability.

Our aims in teaching science include the following:

- Preparing our children for life in an increasingly scientific and technological world.
- Fostering concern about, and active care for, our environment.
- Helping our children acquire a growing understanding of scientific ideas.
- Helping develop and extend our children's scientific concept of their world.
- Developing our children's understanding of the international and collaborative nature of science.

Attitudes

- Encouraging the development of positive attitudes to science.
- Building on our children's natural curiosity and developing a scientific approach to problems.
- Encouraging open-mindedness, self-assessment, perseverance and responsibility.
- Building our children's self-confidence to enable them to work independently.
- Developing our children's social skills to work cooperatively with others.
- Providing our children with an enjoyable experience of science, so that they will develop a deep and lasting interest and may be motivated to study science further.

Skills

- Giving our children an understanding of scientific processes.
- Helping our children to acquire practical scientific skills.
- Developing the skills of investigation - including observing, measuring, predicting, hypothesising, experimenting, communicating, interpreting, explaining and evaluating.
- Developing the use of scientific language, recording and techniques.
- Developing the use of ICT in investigating and recording.
- Enabling our children to become effective communicators of scientific ideas, facts and data.

Primary Science helps children to:

- Build knowledge of the world around them and key scientific concepts
- Have an understanding of scientific enquiry

Intent	Implementation	Impact: to be reviewed at the end of each academic year
<p>Science teaching at Follifoot and Spofforth Schools aims to give all children a strong understanding of the world around them whilst acquiring specific skills and knowledge to help them to think scientifically, to gain an understanding of scientific processes and the uses and implications of Science today and for the future. At Follifoot and Spofforth Schools, scientific enquiry skills are embedded in each topic the children study and these are revisited and developed throughout their time at school. Topics, such as Plants, are taught in KS1 and studied again</p>	<p>As part of the planning process, teachers need to plan the following:</p> <ul style="list-style-type: none"> • A knowledge organiser which outlines knowledge (including vocabulary) all children must master; • A cycle of lessons for each topic, which carefully plans for progression and depth; • Challenge questions for pupils to apply their learning in a philosophical/open manner; • Where appropriate, organise trips and visits from 	

<p>in further detail throughout KS2. This model allows children to build upon their prior knowledge and increases their enthusiasm for the topics whilst embedding this procedural knowledge into the long-term memory. All children are encouraged to develop and use a range of skills including observations, planning and investigations, as well as being encouraged to question the world around them and become independent learners in exploring possible answers for their scientific based questions. Specialist vocabulary for topics is taught and built up, and effective questioning to communicate ideas is encouraged. Concepts taught should be reinforced by focusing on the key features of scientific enquiry, so that pupils learn to use a variety of approaches to answer relevant scientific questions.</p>	<p>experts who will enhance the learning experience;</p>	
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Knowledge and Enquiry in Science *Substantive knowledge concerns the key facts, concepts, principles and explanatory frameworks in a subject. Disciplinary knowledge is needed in order to think, process and understand the subject.*

At Follifoot and Spofforth Schools, we take every opportunity to explore our locality and make natural links to the curriculum.

Knowledge refers to the theories and concepts making up science, the method of posing questions and carrying out investigations. Although there is no fixed way in which scientists work, all investigations tend to have aspects of common processes such as observation, classification, hypothesising, data collection, interpretation of data and evaluation. Children will progressively build up this knowledge as they move up through school.

Scientific knowledge should:

- be based on children's existing concepts in science
- arouse curiosity about natural phenomena which stimulates the posing of questions about such phenomena
- be a systematic means of enabling the children to ask and attempt to answer questions arising from observations
- provide models of scientists who have contributed to the field of science
- expose students to the various strands of specialisation, but which are still related
- recognise that different students experience science differently

In science, knowledge is needed to collect, understand and evaluate scientific evidence. It's the scientific method, i.e. changing one variable whilst keeping everything else the same – and seeing what happens. It is the ability to develop cognitive skills related to science such as acquiring scientific language, making observations, taking measurements, gathering, analysing and interpreting data, making generalisations, creating models, communicating and carrying out investigations. We use this knowledge every day.

For example, when children have an understanding of the impact of an investigation into air resistance during a topic on forces, they would develop their disciplinary knowledge by suggesting, discussing and interpreting other possible outcomes if some of the other variables were altered.

Enquiry in Science

As children build their knowledge within their studies they will have ongoing opportunities for scientific enquiry. Children must understand the methods of scientific enquiry including how evidence is gathered and used to make scientific claims and how to ask perceptive questions. Skills that underpin scientific enquiry such as thinking critically, evaluating and examining results from investigations allows for further opportunity for children to apply their knowledge meaningfully.

Creativity in Science

Creativity and knowledge work closely as creativity can involve making connections using prior knowledge to create new. At Follifoot & Spofforth Schools, curriculum planning encourages and supports achieving of natural links between Science and other subject disciplines such as English, art and mathematics. These links are deliberate and purposeful. They are created naturally and never forced.



Example: Year 5 children at Follifoot made papier-mâché planets during their topic on Earth and Space.

Assessment in Science

Tracking children's progress throughout their school life is vital in order to establish their acquisition of knowledge and skills. At the Federation of Follifoot & Spofforth, learning always starts with the children's prior knowledge and any misconceptions they may have. Class teachers decide upon the most appropriate age related way of obtaining the children's prior knowledge. Units of work are then personalised to the children.

Misconceptions that arise throughout the unit are identified and addressed appropriately by the teacher. As a Federation we are currently exploring and trialing approaches to assessing children's recall of their learning to assess how effectively knowledge and skills have been embedded and mastered.

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