

# Science

‘Science is part of the reality of living; it is the *what*, the *how* and the *why* of everything in our experience.’

Rachel Carson

We believe that science is vital to our understanding of the world around us - everything we know about the universe is the result of scientific research and experiment. We aim to instil in our children a sense of awe, wonder and curiosity about the world, whilst enabling them to understand and apply the fundamental principles and concepts of science through the disciplines of biology, chemistry and physics.

In line with the National Curriculum, we ensure that our children:

- 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

Our curriculum is underpinned by the following ‘Big ideas’ of science:\*

## Physics:

- The universe follows unbreakable rules that are all about forces, matter and energy.
- Forces are different kinds of pushes and pulls that act on all the matter that is in the universe. Matter is all the stuff, or mass, in the universe.
- Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it.

## Chemistry:

- All matter (stuff) in the universe is made up of tiny building blocks.
- The arrangement, movement and type of the building blocks of matter and the forces that hold them together or push them apart explain all the properties of matter (e.g. hot/cold, soft/hard, light/heavy, etc).
- Matter can change if the arrangement of these building blocks changes.

## **Biology:**

- Living things are special collections of matter that make copies of themselves, use energy and grow.
- Living things on Earth come in a huge variety of different forms that are all related because they all came from the same starting point 4.5 billion years ago.
- The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live.

## **Earth science:**

- The Earth is one of eight planets that orbit the sun.
- The Earth is tilted and spins on its axis leading to day and night, the seasons and the climate.
- The Earth is made up of several layers, including a relatively thin rocky surface which is divided into tectonic plates, and the movement of these plates leads to many geologic events (such as earthquakes and volcanoes) and geographical features (such as mountains.)

These Big Ideas are introduced, revisited and referenced in different year groups as the children move through school to enable them to make connections with prior learning, and to help them understand how their current learning relates to a specific scientific discipline.

## **Curriculum Progression:**

Our Science curriculum comprises of two strands of knowledge:

### **Procedural knowledge:**

Working scientifically is represented as procedural knowledge. This knowledge is vertically integrated so that the children revisit and deepen their knowledge and understanding in each year group as they progress through school. In planning, this knowledge is presented as our broad 'learning aims'. This process is supported by the use of SOLO taxonomy, which enables the children to deepen their knowledge and understanding within year groups ensuring a mastery approach to curriculum. As the children move through school, they apply these broad learning aims to the focused programmes of study from the National Curriculum. As a result, we are able to plan detailed and specific learning outcomes.

### **Substantive knowledge:**

Substantive knowledge represents the science content that is taught in each year group – in planning, this knowledge is presented as specific 'learning outcomes' – the content we want the children to know and remember. In creating the learning outcomes, we ensure that the

National Curriculum programmes of study are broken down into smaller building blocks of knowledge and are sequenced logically.

### **Repetition and retrieval:**

Our Science curriculum is built upon high levels of repetition to ensure that our children can do more and remember more as they progress through school. Procedural knowledge is revisited and developed in every class from year one to year six. This repetition ensures that our children reach the end of Key Stage Two with the ability to work scientifically firmly embedded.

Substantive knowledge is developed and repeated through school in line with the National Curriculum programmes of study.

During the course of their science topics, we share significant amounts of substantive knowledge with our children. In planning, our specific learning outcomes detail the substantive knowledge that we want the children to know and remember. Retrieval practice is used during the course of the project to ensure that key knowledge is revisited and remembered.

### **Assessment:**

We believe that assessment in Science should be based on more than just knowing facts. We assess the children's ability to apply their knowledge with a final assessment piece at the end of each project. This provides information on the children's ability to use a combination of procedural and substantive knowledge.

The end of unit assessment comprises of an unseen scientific source that is related to the aspect of science that has been studied. The children analyse the source, using the knowledge and skills they have developed during the project. This is used by teachers to provide information on how well the children are learning the curriculum.