



Why do Scientists read?	
To situate their research	
To interpret others' data and critique their findings	
To find specific information to support their own investigations	
	To learn about others' procedures and experiments
	Helps them understand what has already been discovered

Write like a scientist
Avoid using the first person in your writing (third person is usually used)
Be clear when stating scientific observations
Be succinct and precise
Use labelled diagrams to help explain your points
Helps them understand what has already been discovered
Correctly use scientific vocabulary



Threshold Concepts	
<b>B</b>	Animals, humans and plants are made up of complex interacting systems in order to function.
<b>B</b>	Organisms require a supply of energy for organisms to carry out the basic functions of life and to grow.
<b>C</b>	The Earth is a complex of interacting rock, water, air and life.
<b>C</b>	The particle theory of matter is the abstract idea that helps us develop an understanding of why materials behave as they do.
<b>P</b>	Energy is a powerful and unifying abstract idea which is difficult to define
<b>P</b>	Forces change the state of rest or motion of a body. They hold matter together and interplay between all objects.

Science is key to providing the foundation for understanding of the changing world. Pupils can develop a sense of excitement and curiosity about natural phenomena. In the EYFS, science is included within “Understanding of the World”, where pupils learn about science by undertaking activities that help children to develop working scientifically skills and critical thinking. It is introduced, often indirectly, through activities that encourage every child to explore, problem solve, observe, predict, think, make decisions and talk about the world around them. At KS1 and KS2 the curriculum is underpinned by 6 threshold concepts which are regularly revisited and developed over time. The units are taught in a carefully sequenced manner; ensuring that pupils build knowledge, understanding and enquiry skills, which offer them the firm foundation as they make the transition to secondary school to continue their studies further. The topics studied are hierarchical, increasing in challenge as pupils progress from Y1-6.

In response to our mixed-aged classes, our science Curriculum is implemented on a two-yearly programme (Cycle A and Cycle B). This ensures complete curriculum coverage for our pupils. As children progress throughout the school, they develop their knowledge, scientific skills and understanding through a range of topics and practical investigations. By Year 6, all children will have followed our progressive curriculum narrative pathway.

In response to our classes which have 3-year groups, teachers adapt the curriculum to ensure all pupils follow progression of threshold concepts and scientific skills relevant to their age.

### **The journey begins ....**

In every topic studied throughout a pupil’s time in Primary school, there are aspects of Mathematics and English that underpin the science curriculum; we believe this is key to pupils’ success in science. The quality and variety of language pupils hear and speak are key factors in developing their scientific vocabulary and presenting scientific justifications, evaluations, conclusions or arguments. Pupils are assisted in making their thinking clear, both to themselves and others, ensuring secure foundations are built by using discussion to probe and remedy misconceptions.

### **Biology**

- Animals, humans and plants are made up of complex interacting systems to function.
- Organisms require a supply of energy for organisms to carry out the basic functions of life and to grow.

The two threshold concepts in **Biology** are taught across the following 3 topics: *Plants, Animals & Humans and Living things & their habitats*. The concepts stem from the idea that all living organisms are made from cells. Most organisms are multicellular - the organism needs to contain sophisticated systems to carry out the various life processes, which require energy. Pupils start by identifying a variety of common animals, describing and comparing their structure. This then leads to pupils grouping common animals into carnivores, herbivores and omnivores as well as identifying the major parts of the human body. Over time, pupils will explore in more depth the major body systems in humans, linked also to the concept of organism requiring energy. We take the opportunity to study the human digestive, circulatory, respiratory and skeletal systems as well as the importance of nutrition, a balanced diet and the impact of lifestyle choices to build on this concept in humans. It is also explored using food chains, habitats, competition as well as in plants, whereby plant structure, transport of materials, substances required for growth and the life cycle of a flowering plant are studied. We take the opportunity to study flowers, trees and plant growth in the spring and summer months, when use of the outdoor area in school can be maximised to support learning. Organisms also require energy to reproduce; this is explored in plants and animals whereby lifecycles, sexual and asexual reproduction are studied. We teach evolution and inheritance towards the end of Year 6. This is due to the topic being more conceptually difficult and students can use the knowledge they have gained in the other aspects of Biology to help build on the idea that plants and animals are classified which links to evolution. A good grounding in reproduction also aids pupil understanding of inheritance.

### **Chemistry**

- The Earth is a complex of interacting rock, water, air and life.
- The particle theory of matter is the abstract idea that helps us develop an understanding of why materials behave as they do

The two threshold concepts in **Chemistry** are taught across the *Materials* topic. The concepts stem from the idea that all materials are made from atoms/particles and everyday materials behave in different ways, which can relate to simple physical properties and the arrangement of particles. The concept is more complex and increasingly abstract over the course of the curriculum, which prepares students for Chemistry at secondary school. Other aspects of chemistry that are developed using the concept that earth’s resources can occur because of natural phenomena. Pupils start by distinguishing between an object and the materials from which it is made, identifying everyday materials, describing their physical properties, being able to group materials based their properties and comparing the suitability of everyday materials for uses. The opportunity is then taken to look at the physical properties of rocks and rock, fossil and soil formation which links with the concept that earth is a complex of interacting rock water, air and life. As the topic progresses pupils look at the particle model of solids, liquids and gases and what happens to materials when heated or

cooled and how evaporation and condensation are related to the water cycle. In Year 5 pupils begin to explore the nature of physical and chemical reactions as well as separating simple mixtures.

### Physics

- Energy is a powerful and unifying abstract idea which is difficult to define
- Forces change the state of rest or motion of a body. They hold matter together and interplay between all objects

The two concepts in **Physics** are taught across a range of topics including *Light, Sound, Electricity, Earth & Space and Forces & Magnets*. Energy is a fundamental concept of physics that enables the explanation and prediction of many phenomena and contributes to the unification of the various branches of physics. Energy is a difficult concept to understand and master, which is why physics is usually taught from Year 3 onwards. The curriculum explores different forms of energy stores including electricity, sound and hearing and light and seeing. Pupils explore light, reflections and shadows before then being able to explain how we see things using ideas about light and its properties. Pupils in Year 4 learn how sounds are made, features of sound waves including pitch, amplitude, and dissipation. Electricity includes common electrical appliances, constructing simple series circuits, common conductors and insulators, recognising components from circuit diagrams and investigating components in series circuits.

Force is a useful idea because it is the key to explaining changes in the motion of an object or in its shape. Understanding forces help us to predict and control the physical world around us. The idea of forces stem from the idea that essentially a force is a push or pull acting upon an object because of its interaction with another object. Pupils study contact and non-contact forces including magnetism and magnetic materials. Contact forces are explored through air and water resistance. Levers, gears and pulleys also look how forces can be useful in everyday contexts.

Earth and Space adopts both concepts, since it involves the force of gravity, which influences many dynamic processes within the earth's interior, on and above its surface. Energy is transferred from the sun to Earth via electromagnetic waves, or radiation. Most of the energy that passes through the upper atmosphere and reaches Earth's surface. The topics studied include the movement of the earth and other planets relative to the sun and its solar system, movement of the moon and explaining day and night.

When pupils move onto KS3 they explore the link between forces and energy and learn when objects collide, contact forces transfer energy to change the objects' motions. When two objects interact, each one exerts a force on the other, and these forces can transfer energy between them.