

## St Joseph's Catholic Primary School



### Science Rationale

At St. Joseph's Catholic Primary School, our children are SCIENTISTS!

#### Intent

Our intent is to give every child a broad and balanced Science curriculum which enables them to confidently explore and discover what is around them, so that they have a deeper understanding of the world we live in.

We want our children to love science. We want them to have no limits to what their ambitions are and grow up wanting to be astronauts, forensic scientists, toxicologists or microbiologists.

To achieve this, it involves exciting, practical hands on experiences that encourage curiosity and questioning. Our aim is that these stimulating and challenging experiences help every child secure and extend their scientific knowledge and vocabulary, as well as promoting a love and thirst for learning.

We want our children to remember their science lessons in our school, to cherish these memories and embrace the scientific opportunities they are presented with!

At St. Joseph's we are studying CUSP science. Through this pupils become more expert as they progress through the curriculum, accumulating, connecting and making sense of the rich substantive and disciplinary knowledge.

1. **Substantive knowledge** - this is the subject knowledge and explicit vocabulary used to learn about the content. Common misconceptions are explicitly revealed as non-examples and positioned against known and accurate content. In CUSP science, an extensive and connected knowledge base is constructed so that pupils can use these foundations and integrate it with what they already know. Misconceptions are challenged carefully and in the context of the substantive and disciplinary knowledge. In CUSP Science, it is recommended that misconceptions are not introduced too early, as pupils need to construct a mental model in which to position that new knowledge.
2. **Disciplinary knowledge** – this is knowing how to collect, use, interpret, understand and evaluate the evidence from scientific processes. This is taught.

**Scientific analysis** is developed through IPROF criteria. We call it '**Thinking Scientifically.**'

2.
  - identifying and classifying
  - pattern seeking
  - research
  - observing over time
  - fair and comparative testing

*'The scientist is not a person who gives the right answers; they are the one who asks the right questions.'*

*Claude Levi-Strauss*

## IMPLEMENTATION

CUSP Science is built around the principles of cumulative knowledge. The effect of this cumulative model supports opportunities for children to associate and connect with significant periods of time, people, places and events.

What do we teach?

### EARLY YEARS

The Early Years Foundation Stage Curriculum supports children's understanding of Science through the planning and teaching of '**Understanding the World.**' Children find out about objects, materials and living things using all of their senses looking at similarities, differences, patterns and change. Both the environment and skilled practitioners foster curiosity and encourage explorative play, children are motivated to ask questions about why things happen and how things work. Our children are encouraged to use their natural environment around them to explore. Children enjoy spending time outdoors exploring mini-beasts and their habitats, observing the changing seasons, plants and animals. During the spring term children have the unique first hand experience of hatching and caring for live chicks. Children regularly participate in cookery and baking sessions which allows them to experience changes in state as ingredients are mixed, heated and cooled.

### KEY STAGE 1

Pupils study the **Seasons** and develop an early conceptual understanding of how day becomes night. An understanding of change over time connects to the study of **Plants**, including trees. This focus enables children to associate trees as belonging to the plant kingdom and notice the changes deciduous trees go through connected to the seasons.

Contrasting that study, pupils learn about **Animals, including humans**. Non-examples of plants are used to contrast the features of an animal.

Pupils are introduced to **identifying and classifying materials**. Scientific terms, such as transparent, translucent and opaque are taught explicitly through vocabulary instruction.

and pupils make further sense by applying it to what they know and then to working and thinking scientifically tasks. This substantive knowledge is enriched by pupils' use of disciplinary knowledge through scientific enquiry.

Within the **study of Living things and their habitats** and **Uses of everyday materials** new substantive knowledge is constructed and made sense of through Working and Thinking scientifically tasks.

## LOWER KEY STAGE 2

The unit on **Rocks** is studied and connected with prior knowledge from 'Everyday materials' in KS1. A study of **Animals, including humans** is built upon from KS1 and contrasts the physical features with the functions they perform, including the skeleton and muscles.

**Rocks** is revisited again to sophisticate and deepen pupils' knowledge, advancing their understanding.

**Forces and magnets** are introduced and connect with KS1 materials, including twisting, bending and squashing. Contact and non-contact forces are taught and understanding applied through Working and Thinking Scientifically. The abstract concept of **Light** is made concrete through knowing about light sources and shadows. **Plants** are studied to develop a more sophisticated understanding of their parts and functions, including pollination.

A study of **Living things and their habitats** pays close attention to classification and is directly taught using prior knowledge to ensure conceptual frameworks are secure. Animals, plants and environments are connected in this study with a summary focusing on positive and negative change.

**Electricity** is introduced and pupils acquire understanding about electrical sources, safety and components of a single loop circuit.

**Animals, including humans** focuses on the sequence of digestion, from the mouth to excretion.

**States of matter and Sound** are taught using knowledge of the particle theory. Practical scientific tasks and tests help pupils build a coherent understanding of the particle theory by applying what they know through structured scientific enquiry.

## UPPER KEY STAGE 2

Pupils reuse and draw upon their understanding of states of matter in the study of **Properties and changes of materials**.

Change is also studied within **Animals**, including humans, focusing on growth and development of humans and animals.

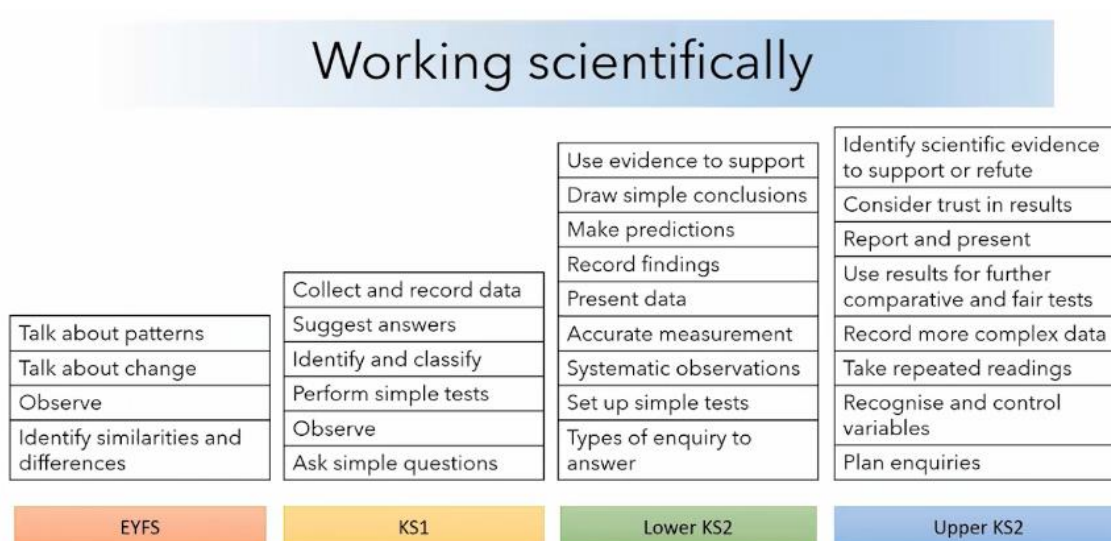
**Earth in Space** develops the conceptual understanding of our place in the universe.

A study of Forces sophisticates the substantive knowledge acquired in KS1 and LKS2. Enhancing this study of Forces, pupils learn about Galileo Galilei 1564 - 1642 (considered the father of modern science).

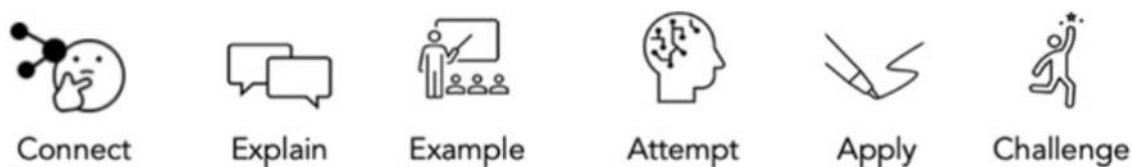
**Living things and their habitats** focuses on differences in life cycles of living things and how they reproduce. This study also contrasts previous scientific thinking.

A further study of **Living things and their habitats** enables pupils in UKS2 to revisit and add to their understanding of classification through the taxonomy created by Carl Linnaeus. More complex animals are studied.

**Light** is revisited and taught with advanced substantive knowledge. This is physics study with a focus on the properties of light, not the biology of the eye.

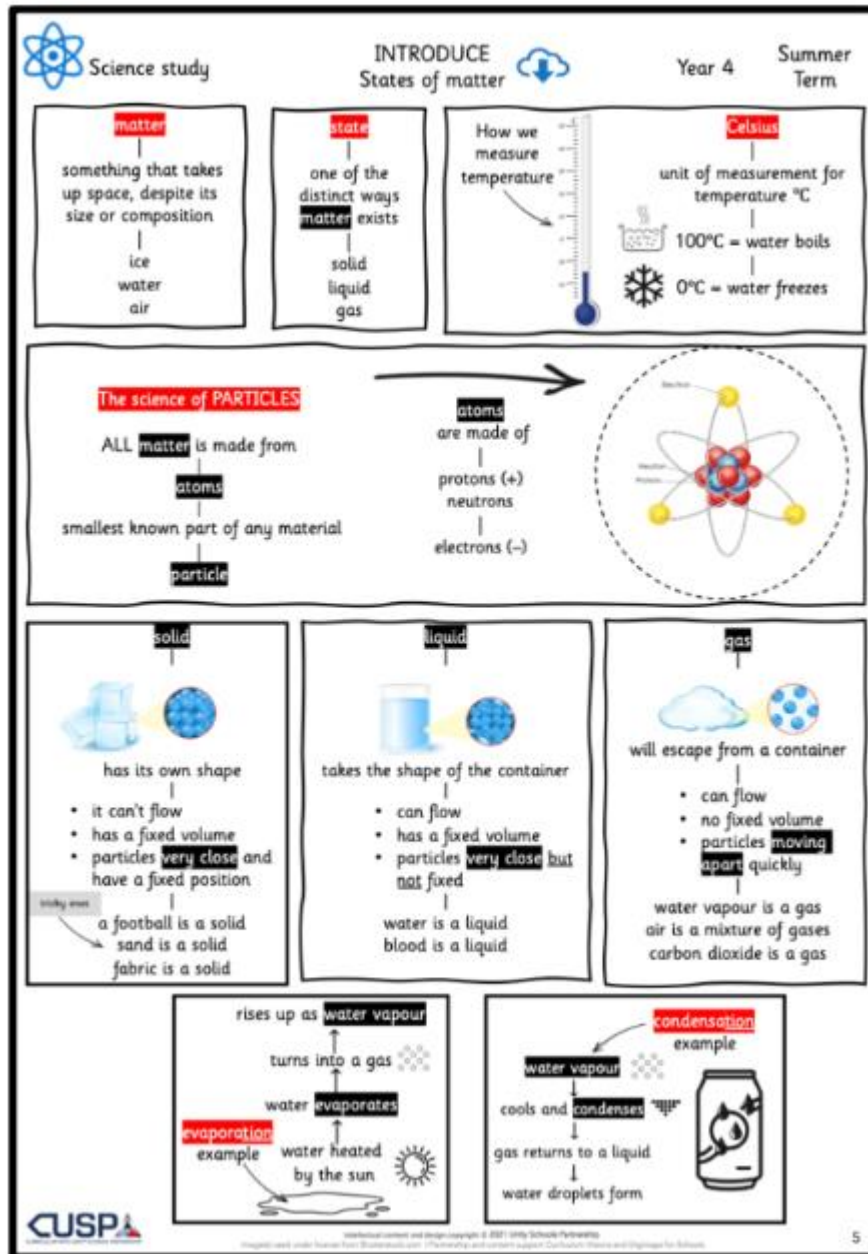


An essential component to CUSP lessons is the systematic and coherent approach that we embed focusing on the six phases of a lesson.



## KNOWLEDGE ORGANISERS

**Dual coded knowledge organisers** contain core information for children to easily access and use as a point of reference and as a means of retrieval practise.



## KNOWLEDGE NOTES

**Knowledge notes** are an elaboration in the core knowledge found in knowledge organisers. Knowledge notes focus pupils' working memory to the key question that will be asked at the end of the lesson. It reduces cognitive load and avoids the split-attention effect.

## IMPACT

The impact of this curriculum design will lead to outstanding progress over time across key stages relative to a child's individual starting point and their progression of skills.

Children will therefore be expected to leave St Joseph's reaching at least age related

expectations for Science. Our Science curriculum will also lead pupils to be enthusiastic learners, evidenced in a range of ways, including pupil voice and their work.

#### HOW DO WE KNOW WHAT THE CHILDREN HAVE LEARNED

- Questioning
- Pupil Book Study talking about learning with the children
- Talking to teachers
- Low stakes 'Drop-in' observations
- Quizzing and retrieval practise
- Feedback and marking
- Progress in book matches the curriculum intent