St Leonard's Church of England Primary School

Science Policy

Date written:	September 2023 Reviewed September 2024
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Ratified by Governors	
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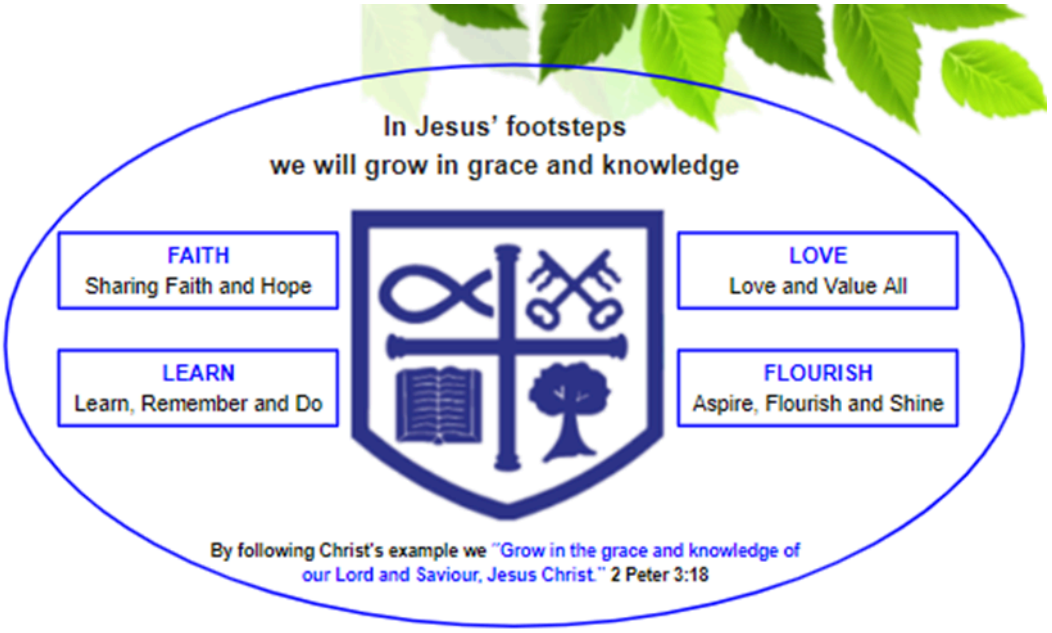
St Leonard's Church of England Primary School
Science Policy

This policy is intended to develop a commonly agreed and clearly understood approach to teaching Science. This will enhance the quality of teaching and learning throughout school and will ensure the participation of all our children. This teaching and learning policy is underpinned by our school's vision and values:



Intent

The importance of Science :

At St Leonard's CE Primary School, all of our teaching and learning builds on our vision and values; Faith, Love, Learn and Flourish.

Sharing Faith and Hope : exploration, questioning and first-hand experiences of natural phenomena are at the heart of Science lessons. These stimulate children's natural awe and wonder and help them to challenge and deepen their beliefs whilst understanding those of others. Children ask big questions to develop their critical and creative thinking skills as they study and experience first-hand the world around them.

Love and Value All : science is an explorative subject and encourages a Growth Mindset for children with opportunities to ask big questions, problem solve and try different ideas. Children learn about a range of significant scientists and their impact on the world. Children learn to appreciate the impact Science has on the natural world and on the lives of humans.

Learn, Remember and Do : children learn to apply the skills and knowledge taught in school to the world around them, recognising the everyday applicability of substantive and disciplinary knowledge. The cumulative substantive

content gives children the building blocks to make sense of the world around them in an increasingly sophisticated manner and to make links between concepts. The methodical approach of scientific enquiry gives children a structure to explore the world around them.

Aspire, Flourish and Shine : with a strong foundation of asking questions, scientific knowledge and understanding, as well as examples of a range of successful scientists, children are able to shine in Science. This is encouraged throughout the year but particularly focussed on Science Week in Spring Term.

We recognise the importance of Science in every aspect of daily life; we encourage children to be inquisitive throughout their time at our school and beyond. The Science curriculum fosters a natural curiosity of the child, encourages respect for living organisms and the physical environment and provides opportunities for critical evaluation of evidence. We believe that science encompasses the acquisition of knowledge, concept, skills and positive attitudes.

Aims of the Science Curriculum

The national curriculum for science aims to ensure that all pupils:

- 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.
- develop the essential scientific enquiry skills to deepen their scientific knowledge.
- use a range of methods to communicate their scientific information and present it in a systematic, scientific manner, including I.C.T., diagrams, graphs and charts.
- develop a respect for the materials and equipment they handle regarding their own, and other children's safety.
- develop an enthusiasm and enjoyment of scientific learning and discovery.

Our ambitious Science curriculum precisely follows the units outlined in the National Curriculum and is knowledge and vocabulary rich, ensuring children gain a deep understanding of fundamental scientific knowledge and concepts as well as embedding key science specific vocabulary and terminology (Tier 3 vocabulary). In addition, children are encouraged to develop their scientific curiosity and understanding by working scientifically.

Science learning is encompassed around the five scientific enquiry types:

- Identifying, classifying and grouping
- Observing over time
- Pattern seeking
- Comparative and fair testing
- Research using secondary sources

Children are reminded of these enquiry types with visual aids that are displayed on science working walls in every classroom.

Working Scientifically

At St Leonard's CE Primary School children will gradually build on their scientific skills throughout the Key Stages based on National Curriculum expectations.

Key Stage 1:

• Asking simple questions and recognising that they can be answered in different ways.
• Observing closely, using simple equipment..
• Performing simple tests.
• Identifying and classifying.
• Using their observations and ideas to suggest answers to questions.
• Gathering and recording data to help in answering questions.

Lower Key Stage 2:

• Asking relevant questions and using different types of scientific enquiries to answer them
• Setting up simple practical enquiries, comparative and fair tests
• Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
• Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
• Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
• Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
• Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
• Identifying differences, similarities or changes related to simple scientific ideas and processes
• Using straightforward scientific evidence to answer questions or to support their findings.

Upper Key Stage 2:

• Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
• Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
• Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
• Using test results to make predictions to set up further comparative and fair tests
• Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations
• Identifying scientific evidence that has been used to support or refute ideas or arguments

Science in the Early Years

In Early Years, Science is taught through Knowledge and Understanding of the World. The children learn about the scientific world around them in their play and adult led activities. Our curriculum is designed to enable children to make sense of their physical world and community. Children are encouraged to be scientists by:

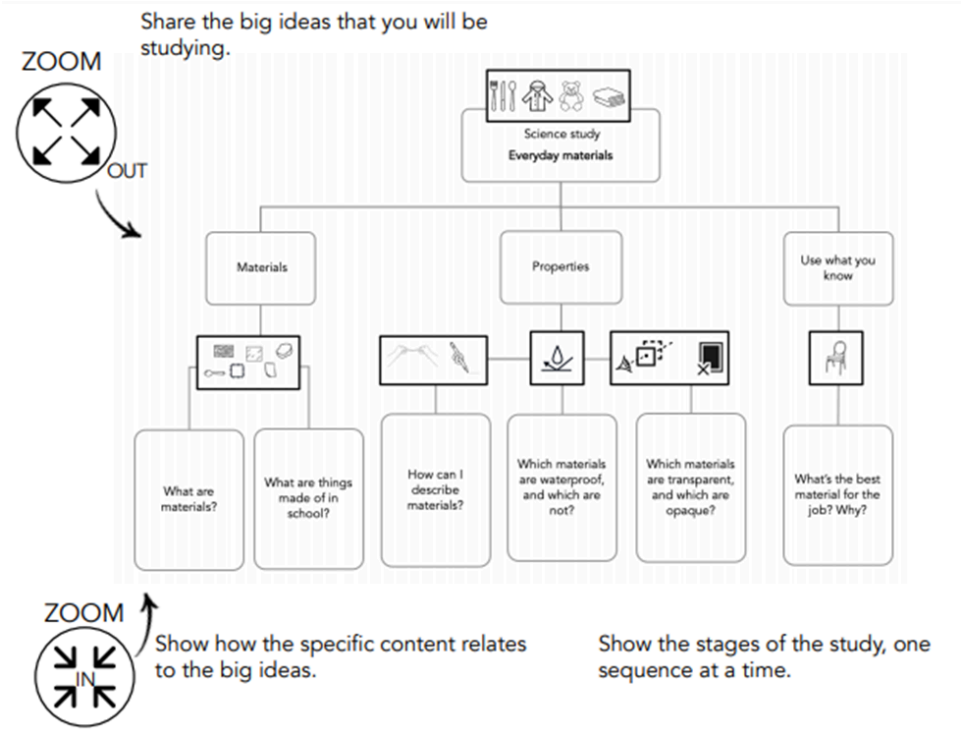
- Finding out about and showing curiosity and interest in features of objects, events and living things
- Describing and talking about what they see, including noticing similarities and differences
- Showing curiosity and asking questions about why things happen and how things work
- Showing understanding of cause-effect relations
- Noticing and commenting on patterns
- Showing an awareness of change
- Explaining their own knowledge and understanding, and asking appropriate questions of others
- Investigating objects and materials by using all of their senses as appropriate

Implementation

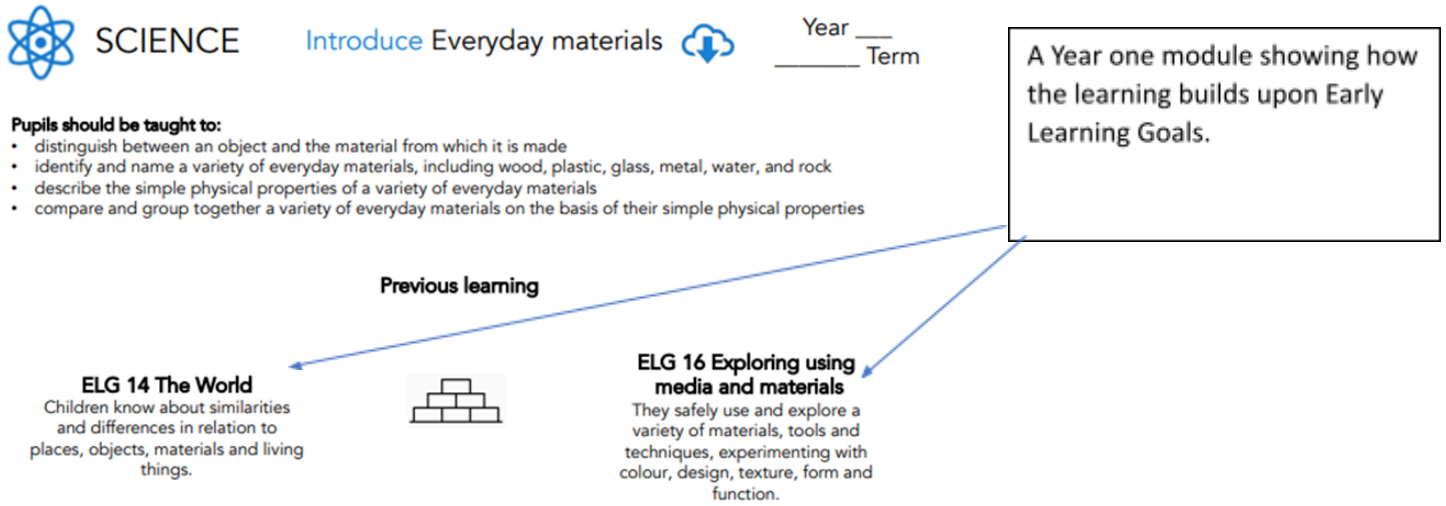
At St Leonard's CE Primary School, Science is taught using the CUSP Curriculum materials across each year group in modules that enable pupils to study in depth key scientific understanding, skills and vocabulary. Each module aims to activate and build upon prior learning, including EYFS, to ensure better cognition and retention. Each module is carefully sequenced to enable pupils to purposefully layer learning from previous sessions to facilitate the acquisition and retention of key scientific knowledge. Each module is revisited either later in the year or in the following year as part of a spaced retrieval practice method to ensure pupils retain key knowledge and information.

The Big Ideas

At St Leonard's we put an emphasis on sharing the big ideas with the children at the beginning of every module.



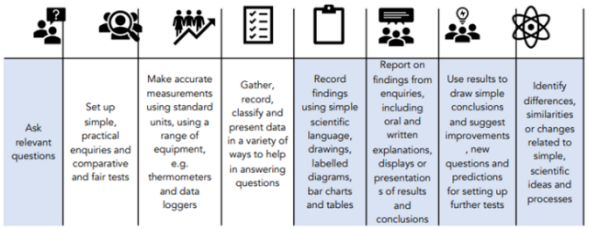
National Curriculum objectives and how these links to prior learning are evident at the beginning of every module.



Development of Scientific skills

As well as ensuring pupils are taught key knowledge, each module is designed to offer pupils the opportunity to undertake scientific enquiries and develop their skills as a Scientist in asking questions, planning and carrying out experiments, collecting and analysing information and drawing conclusions. At St Leonard's CE Primary School, the working scientifically objectives are clearly displayed on each of our science modules for both Key Stage 1 and Key Stage 2. It is clear which of the objectives are being taught throughout a specific module which ensures full coverage and allows for skills to be built upon.

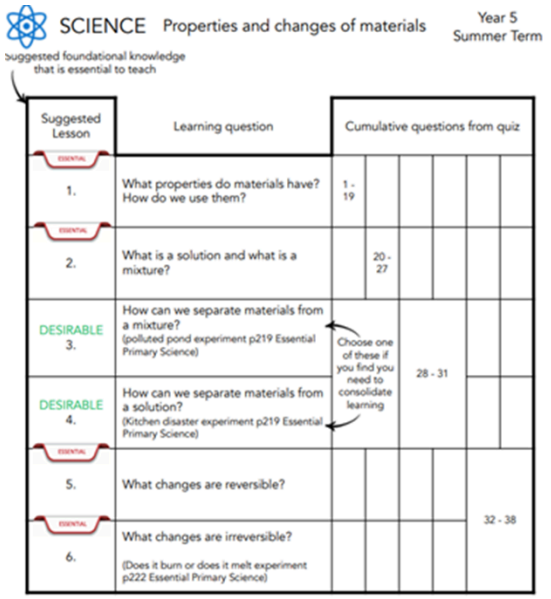
Example of a Year 4 – Animals including humans – Teeth, digestion and food chains.



Cumulative Quizzing Model (Supporting Cognitive Load)

Pupils are given opportunities to retrieve their knowledge at regular intervals throughout the unit through a 'teach – test – teach – test' model. The aim of this model is to reinforce and revisit previously taught knowledge and vocabulary. Tests may be paper based or delivered electronically.

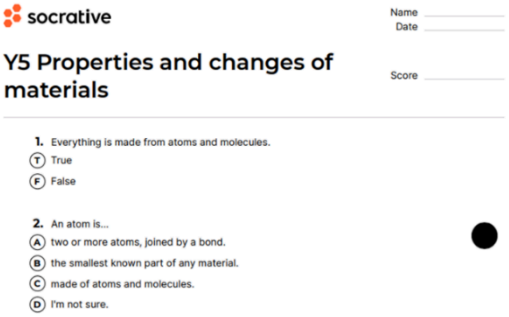
Sample of module sequence and cumulative quizzing overview



SCIENCE Properties and changes of materials Year 5 Summer Term

Suggested foundational knowledge that is essential to teach

Suggested Lesson	Learning question	Cumulative questions from quiz					
ESSENTIAL 1.	What properties do materials have? How do we use them?	1 - 19					
ESSENTIAL 2.	What is a solution and what is a mixture?		20 - 27				
DESIRABLE 3.	How can we separate materials from a mixture? (polluted pond experiment p219 Essential Primary Science)	Choose one of these if you find you need to consolidate learning		28 - 31			
DESIRABLE 4.	How can we separate materials from a solution? (Kitchen disaster experiment p219 Essential Primary Science)						
ESSENTIAL 5.	What changes are reversible?					32 - 38	
ESSENTIAL 6.	What changes are irreversible? (Does it burn or does it melt experiment p222 Essential Primary Science)						



socrative

Name
Date
Score

Y5 Properties and changes of materials

1. Everything is made from atoms and molecules.
   (T) True
   (F) False

2. An atom is...
   (A) two or more atoms, joined by a bond.
   (B) the smallest known part of any material.
   (C) made of atoms and molecules.
   (D) I'm not sure.

Example Questions from Year 5 Cumulative quiz

Minimum lesson expectations

All science lessons will incorporate the following elements:

- Explicit teaching of vocabulary
- Revisiting of prior learning
- Use of scientific vocabulary in learning
- Reading
- Working scientifically
- Evidence of learning in pupil's books

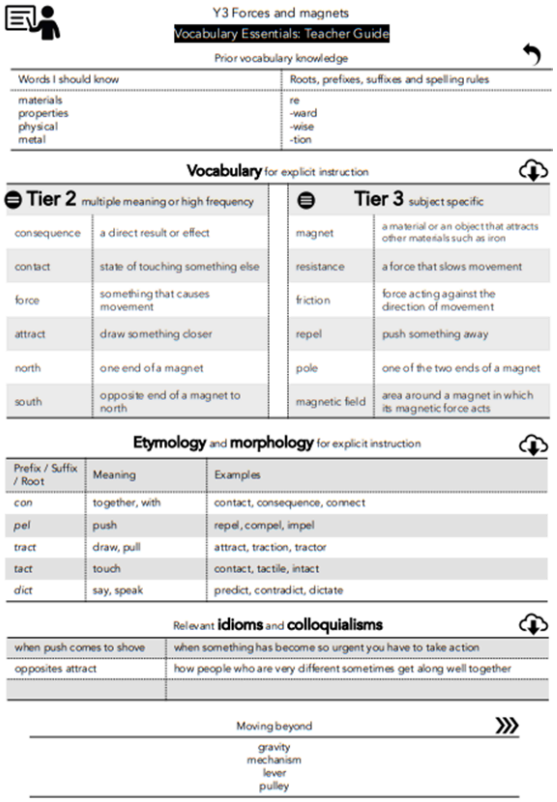
<u>Discrete and explicit teaching of vocabulary</u>

EYFS

At St Leonard's, we want our children to have an expansive vocabulary and through teacher modelling and planning, children are given opportunity to use and apply appropriate vocabulary. Scientific language is taught and built upon with vocabulary being a focus.

Vocabulary modules in Years 1 - 6

Vocabulary instruction is at the heart of the curriculum and subject specific words are incorporated in each module. Children are given the opportunity to use and apply the learned vocabulary and it is taught using dual coding methods to embed the new knowledge.



Y3 Forces and magnets

Vocabulary Essentials: Teacher Guide

Prior vocabulary knowledge

Words I should know	Roots, prefixes, suffixes and spelling rules
materials properties physical metal	re -ward -wise -tion

Vocabulary for explicit instruction

Tier 2 multiple meaning or high frequency		Tier 3 subject specific	
consequence	a direct result or effect	magnet	a material or an object that attracts other materials such as iron
contact	state of touching something else	resistance	a force that slows movement
force	something that causes movement	friction	force acting against the direction of movement
attract	draw something closer	repel	push something away
north	one end of a magnet	pole	one of the two ends of a magnet
south	opposite end of a magnet to north	magnetic field	area around a magnet in which its magnetic force acts

Etymology and **morphology** for explicit instruction

Prefix / Suffix / Root	Meaning	Examples
con	together, with	contact, consequence, connect
pel	push	repel, compel, impel
tract	draw, pull	attract, traction, tractor
tact	touch	contact, tactile, intact
dict	say, speak	predict, contradict, dictate

Relevant **idioms** and **colloquialisms**

when push comes to shove	when something has become so urgent you have to take action
opposites attract	how people who are very different sometimes get along well together

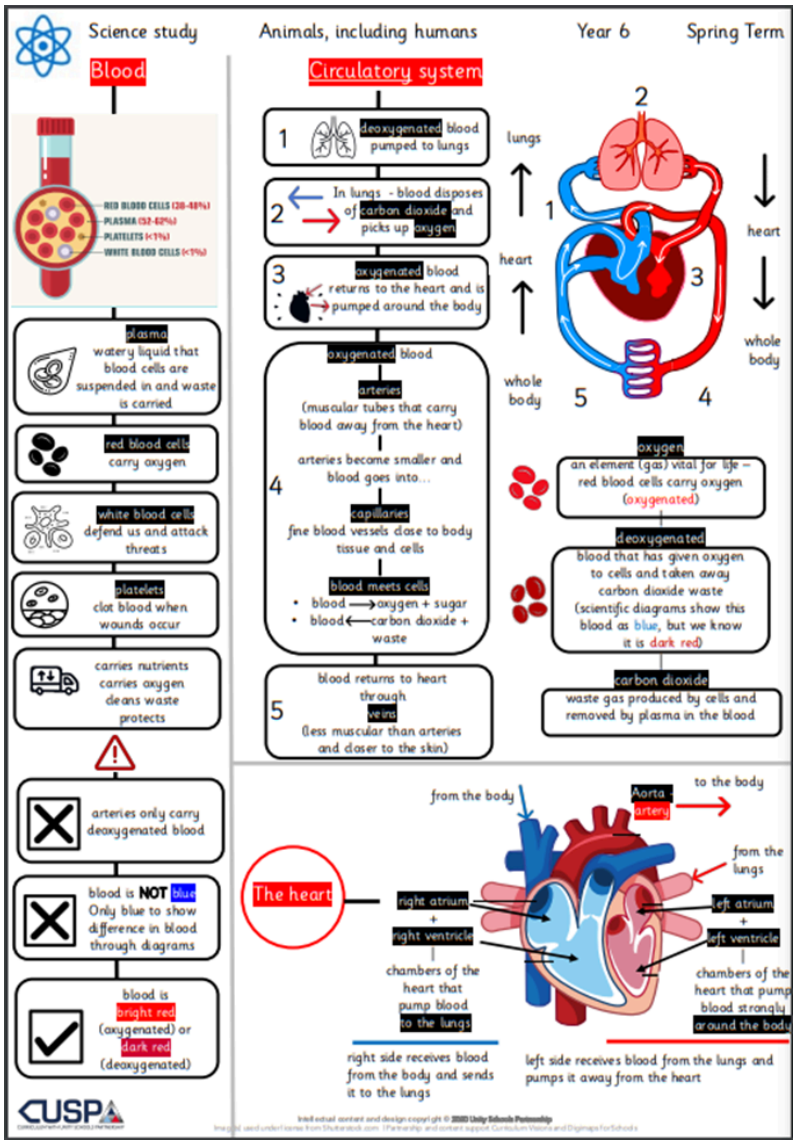
Moving beyond

gravity
mechanism
lever
pulley

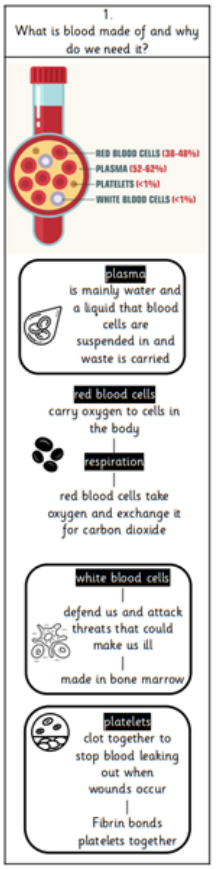
Vocabulary overview for a Year 3 Forces and Magnets module, including Tier 2 and 3 language as well as prefixes and suffixes.

Knowledge organisers and Knowledge Notes

Accompanying each module is a Knowledge Organiser which contains key vocabulary, information and concepts which all pupils are expected to understand and retain. Knowledge notes are the elaboration and detail which help pupils acquire the content of each module. They support vocabulary and concept acquisition through a well-structured sequence that is cumulative. Each Knowledge Note begins with questions that link back to the cumulative quizzing, focussing on key content to be learnt and understood. Knowledge Organisers and Knowledge Notes are dual coded to provide pupils with visual calls to aid understanding and recall. Knowledge Organisers and Knowledge Notes are referenced throughout each module.



Year 6 knowledge organiser and accompanying knowledge notes



SEND and Science

At St Leonard's we aim for all science lessons and learning questions to be accessible to all pupils. Pre-teaching of scientific vocabulary provides all children with the opportunity to demonstrate an understanding of subject specific language. The use of dual coded Knowledge Notes and Organisers provide visuals to aid understanding and recall. In addition, knowledge notes are utilised in all lessons to minimise cognitive overload, so children can use and apply their knowledge more easily. Sentence stems can be used where necessary to aid with written evidence.

Reading

Our Science curriculum is supported by a wealth of high quality texts which support pupil's learning and develop their skills in accessing information from a range of sources.

Oracy
When discussing their findings or presenting information, pupils are encouraged to speak using full sentences and incorporating key scientific vocabulary. This is modelled by teachers e.g. using my turn, your turn.

Writing
Pupils are expected to write across all areas of the curriculum with teachers modelling how to write purposefully in science.

Impact

In ensuring high standards of teaching and learning in Science, we implement a curriculum that is progressive throughout the whole school. Planning for Science is a process in which all teachers are involved to ensure that the school gives full coverage of "The National Curriculum programmes of study for Science 2014" through the CUSP curriculum. Science teaching at St Leonard's CE Primary School involves adapting and extending the curriculum to match all pupils needs.
Science is taught as discrete units and lessons to ensure coverage in KS1 and UKS2. In LKS2, there is a rolling 2-year programme in place due to the mixed year class teaching. The structure of the curriculum ensures progression between year groups and guarantees topics are covered.

How do we document learning, monitor progress and achievement?

Children are expected to record learning in their exercise books in almost all lessons. This may take the form of writing, mind maps, pictures etc and will involve students answering specific questions. This work in students' books should take into account the school's presentation rules and minimum expectations.

During lessons, teachers may use discussion to support students in self-assessing their work and they may be asked to edit and improve their work during this time.

In the Early Years, assessment is made by teacher questioning and observation on a continuous basis.

During each individual lesson, teachers will use the school's marking policy in order that they can assess students' progress against the lessons objectives. This also takes into account how far students have used the minimum expectations set out in this policy. By the end of the lesson, staff are expected to know whether students have achieved the objective and teaching in the next lesson will be adapted if needed to ensure that understanding is complete, and any misconceptions have been addressed.

Pupil Book Studies
Pupil Book Study includes groups of children discussing their work and understanding. It provides an opportunity for children to share their knowledge by talking through the journey of their learning. This in turn enables leaders to assess the effectiveness of teaching.