



SCIENCE INTENT - to what do we aspire for our children?

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. Now more than ever, we recognise the role that science plays in everyday life and it is imperative for children to have a rich understanding of the world they live in and to develop the skills to be able to ask questions and solve problems as they become young adults in an ever changing landscape. (National Curriculum 2014)

At Stoke Park Primary School, the science curriculum supports the school's three core values in the following ways:

At Stoke Park Primary School, we believe that children should '**Be Kind**' '**Be Proud**' and '**Strive for Success**' and these core values underpin our science teaching and learning. Through this approach, we believe children should leave Stoke Park Primary as inquisitive, articulate, and knowledgeable young scientists.

Be kind – Through our science curriculum, children are encouraged to understand the need to be kind to the environment and develop a knowledge rich understanding of the world around them which they will take with them beyond their time in the primary setting.

Be proud – As the children explore different elements of scientific enquiry, we believe that they should take pride in explaining and sharing their own achievements and those of their peers as they acquire knowledge and develop their scientific skills.

Strive for Success – We aim to provide children with access to a science curriculum where they will develop as young scientists who can communicate their understanding both verbally and in written form through a rich vocabulary and the necessary oracy skills.

At Stoke Park we want to develop a culture of scientific values and skills where asking questions, working collaboratively, testing hypotheses and reflecting on lines of enquiry is part of the everyday life of the classroom. We aim to develop students who feel empowered and passionate to engage with science beyond their time in primary school and take the fundamental skills and knowledge into the next stage of their lives as young scientists.

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



Long Term Sequence:

At Stoke Park, our science curriculum ensures that children acquire rich and broad scientific knowledge from EYFS through to Year 6. They do this through lessons which also develop the core 'working scientifically skills' as outlined below:

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								
	Ask relevant questions	Set up simple, practical enquiries and comparative and fair tests	Make accurate measurements using standard units, using a range of equipment, e.g. thermometers and data loggers	Gather, record, classify and present data in a variety of ways to help in answering questions	Record findings using simple scientific language, drawings, labelled diagrams, bar charts and tables	Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions	Use results to draw simple conclusions and suggest improvements, new questions and predictions for setting up further tests	Identify differences, similarities or changes related to simple, scientific ideas and processes
Upper Key Stage 2	Plan enquiries, including recognising and controlling variables where necessary	Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work	Take measurements, using a range of scientific equipment, with increasing accuracy and precision	Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs, and models	Report findings from enquiries, including oral and written explanations of results, explanations involving causal relationships, and conclusions	Present findings in written form, displays and other presentations	Use test results to make predictions to set up further comparative and fair tests	Use simple models to describe scientific ideas, identifying scientific evidence that has been used to support or refute ideas or arguments

In EYFS, children begin their journey as young scientists through a child-led curriculum based around their interests and needs as outlined below:



Understanding the World

Understanding the world involves guiding children to make sense of their physical world and their community. The frequency and range of children's personal experiences increases their knowledge and sense of the world around them – from visiting parks, libraries and museums to meeting important members of society such as police officers, nurses and firefighters. In addition, listening to a broad selection of stories, non-fiction, rhymes and poems will foster their understanding of our culturally, socially, technologically and ecologically diverse world. As well as building important knowledge, this extends their familiarity with words that support understanding across domains. Enriching and widening children's vocabulary will support later reading comprehension

Science is covered in Understanding the world	Nursery – how is this achieved?	Reception – how is this achieved?	Key vocabulary	Core Books that link to foundational experiences & knowledge
<p><u>Understanding the World</u></p> <p>Past and Present Talk about the lives of the people around them and their roles in society. Know some similarities and differences between things in the past and now, drawing on their experiences and what has been read in class. Understand the past through settings, characters and events encountered in books read in class and storytelling. People, Culture and Communities Describe their immediate environment using knowledge from observation, discussion, stories, non-fiction texts and maps.</p>	<ul style="list-style-type: none"> - Children explore the natural world by participating in weekly Forest School sessions. - Exploration of the physical world around them allows children to begin to explore material properties. Simple experiments help children develop their scientific skills by observing, discussing similarities and differences and talking about change. - Adults introduce children to simple scientific language through scaffolding, narrations and simple explanations. - Daily routines such as discussions on the weather ensure that children understand the importance of the natural world and <u>being</u> to observe changes in it. 	<ul style="list-style-type: none"> - Children explore the natural world by participating in weekly Forest School sessions. In these sessions, children might set different challenges to explore their natural environment which include basic research/data gathering and observation tasks. - Exploration of the physical world around them allows children to begin to explore material properties. Simple experiments help children develop their scientific skills by observing, discussing similarities and differences and talking about change. Language expectations and more specific vocabulary linked to patterns and observations follows on from Nursery. - Adults introduce children to simple scientific language through scaffolding, narrations and simple explanations. - Daily routines such as discussions on the weather ensure that children 	<p>Hard, soft, cold, warm, big, small, short, tall, frozen, melting, bumpy, smooth,</p> <p>see hear feel taste smell</p>	<ul style="list-style-type: none"> - A selection classic nursery rhymes and children's stories create opportunities for simple experiments and thematic learning in the natural world. <p>Examples include:</p> <ul style="list-style-type: none"> - Humpty Dumpty - The Very Hungry Caterpillar - Where the <u>Wild</u> Things Are - Rumble in the Jungle.



Know some similarities and differences between different religious and cultural communities in this country, drawing on their experiences and what has been read in class. Explain some similarities and differences between life in this country and life in other countries, drawing on knowledge from stories, non-fiction texts and – when appropriate – maps.

The Natural World

Explore the natural world around them, making observations and drawing pictures of animals and plants. Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

- Thematic topics in EYFS include 'Wild Animals', 'Farm Animals', 'Seasons' and 'Minibeasts'.

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Continuous Provision Play experiences with provocations for science based thinking and talk

- Water and sand tray
- Sensory play e.g. gloop, cornflour, play dough,
- Small world
- Book corner
- Outdoor environment (binoculars, magnifying glasses, ID sheets)

Once into KS1 and KS2, science is taught discreetly through weekly sessions which build on prior knowledge and provide children with both the knowledge and skills required to continue their journey as young scientists.



	EYFS Understanding the world	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Biology (53% of Science content)	The Natural World Explore the natural world around them, making observations and drawing pictures of animals and plants.		Living things and their habitats (+ revisit modules) (AT)		Living things and their habitats (AT)	Living things and their habitats (ST)	Living things and their habitats (AT)
		Plants (AT / ST))	Plants (ST)	Plants (ST)			
		Animals, including humans (AT) (+ revisit modules) (SpT / ST))	Animals, including humans (AT) (+ revisit modules) (SpT / ST))	Animals, including humans (AT)	Animals, including humans (SprT)	Animals, including humans (AT)	Animals, including humans (SpT)
							Evolution and inheritance (ST)
Physics (29% of Science content)	Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.	Seasonal changes (+ revisit module) (AT)		Light (SpT)			Light (AT)
				Forces and magnets (SpT)		Forces (SpT / ST)	
					Electricity (ST)		Electricity (ST)
					Sound (ST)		
						Earth and space (SpT)	
Chemistry (18% of Science content)		Everyday materials (SpT)	Use of everyday materials (SpT)			Properties and change of materials (AT)	
				Rocks (AT) (+ revisit module) (AT)			
					States of matter (AT)		

Disciplinary knowledge is mapped out across the curriculum to ensure full coverage and repeated exposure to not only the working scientifically skills, but also the scientific enquiry elements, which are Identifying, Pattern Seeking, Research, Observing and Fair Testing (IPROF).

A KS1 example of this is outlined below:



Year 1 Science Provision Map – Working Scientifically

						
	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.
Plants	Lesson 2 (plants) - What are wild plants and where do you find them? IPR:Q (Questioning)	Lesson 4 (Trees) What makes a tree? IPR:O (observing) Lesson 5 (Trees) What types of trees are there? IPR:O (comparing & observing)		Lesson 1 (plants) What are the parts of a plant? IPR:O (Grouping) Lesson 3 (Plants) - What are garden plants and where do you find them? IPR:O (Identifying and classifying)	Lesson 4 (trees) What makes a tree? Lesson 6 (trees) What's the difference between trees? IPR:O (Suggesting)	
Animals, including humans		Lesson 5 - What does food tell us about an animal? IPR:O (Observing)	Lesson 6 - What makes me an animal? What senses do I have? IPR:O (Investigating)	Q2 Lesson 2 - What types of animals are there? IPR:O (Justifying) Lesson 4 - What is similar and what is different? IPR:O (Matching)	Lesson 1 - What is an animal? IPR:O (Justifying)	
Everyday materials	Q5 Which materials are transparent and which are opaque? IPR:O (grouping) Note: This will cover a number of different WS skills		Q4 Which materials are waterproof and which are not? IPR:O (Connecting)	Q1 What are materials? IPR:O (Deciding) Q2 What are things made of in school? IPR:O (Classifying) Q3 How can I describe materials? IPR:O (Deciding/classifying/grouping)	Q6 What's the best material for a job? Why? (Evaluating or deciding)	Q2 What are things made of in school? IPR:O (Classifying) Note: Discuss which is the most common material
Seasonal changes				Q1 What are the four seasons? IPR:O (Sorting/Matching/Identifying)	Q2 What's the weather like in Autumn, Winter, Spring and Summer? (Sorting/Reasoning) Q3 Why does day become night? IPR:O (Observing/describing)	

'Golden Thread': Oracy: At Stoke Park Primary, we recognise the vital role that oracy plays in the lives of our children, both during their time in primary school and for the rest of their lives. Research shows that oracy not only acts as a powerful tool for learning but is a key skill in itself which employers actively seek. By ensuring that children have explicit opportunities to develop their oracy skills as well as opportunities to learn through oracy across the curriculum, we aspire to create young adults who are able to work confidently, articulately and collaboratively.

In science, children are given regular opportunities to ask questions, use discussion as a tool to explore new concepts and are often asked to justify, explain or present their understanding of a concept or set of knowledge. By embedding rich oracy opportunities into the teaching of science, children not only become more confident and competent orators and listeners but will also explore scientific concepts and knowledge more deeply and organically

IMPLEMENTATION - how will we deliver the curriculum?

Linking curriculum and pedagogy:

At Stoke Park, Science is taught weekly as we recognise its place as a core subject. Class teachers deliver sessions where skills progress cumulatively through the academic year and across the year groups. Content is revisited regularly so that all children have the opportunity to embed and deepen the substantive and disciplinary knowledge required.



Science study
INTRODUCE Living things and their habitats
Year ____ Term ____

vertebrates
animals with backbones

classification
sort into groups action of
to divide or sort into groups

invertebrates
animals without backbones

Warm-blooded: Mammals, Birds
Cold-blooded: Fish, Reptiles, Amphibians

There are more invertebrate groups, but we're studying these four: slugs and snails, worms, spiders, insects

Arthropoda: Arachnida (spiders), Insects

flowering plants
plants that reproduce using flowers to make seeds
daffodil, hyacinth, grass, oak tree

non-flowering plants
plants that reproduce using spores and seed cones
ferns, moss, conifers, Scots Pine

biodiversity
Latin: life variety
enormous variety of life on Earth

habitat
Latin: habitare
to live, inhabit, dwell

ecosystem
how living things interact with their habitat and environment

AFFECTED BY
biotic living things: plants, animals
abiotic non-living: rain or sun, soil

1. What are the characteristics of living things?
MRS GREEN
Movement, Respiration, Sensitivity, Growth, Reproduction, Excretion, Nutrition

biodiversity
Latin: life variety
enormous variety of life on Earth

organism
a single living thing

vertebrates
backbone

invertebrates
without backbone

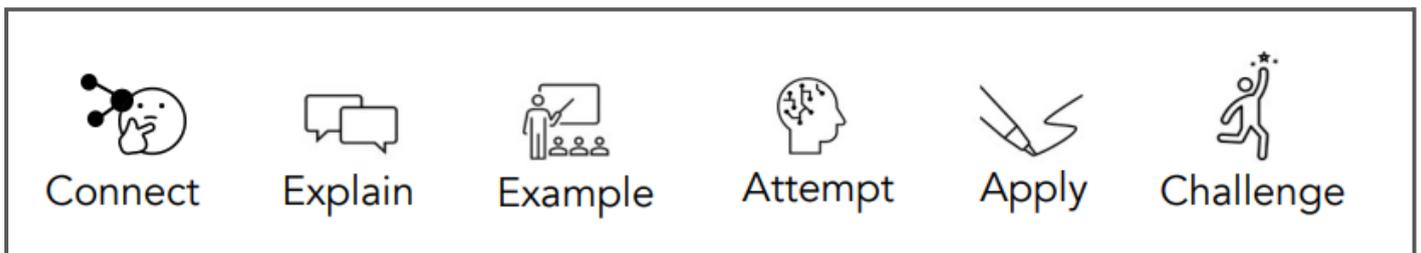
sentence stems
I know...
I think...
I wonder...

OBSERVE THE DIFFERENCE BETWEEN LIVING THINGS

CUSPA

Within each unit, children are provided a unit specific 'knowledge organiser' which provides them with key vocabulary and imagery to support their retention and embedding of knowledge. These are supplemented by a knowledge note to support each lesson which contains key vocabulary and information laid out using the principles of dual coding to support all children to access the content of each lesson. Each lesson is framed by a question which can be adapted but builds on the progression of knowledge across the unit of work. Each activity is carefully chosen to ensure that outcomes reflect both working scientifically requirements and IRPOF skills. The cumulative quizzes give teachers regular and immediate feedback on which to respond to learning gaps.

Lesson design: Each lesson follows the principles of CEEAAC:



Connect - this ensures that children are reminded of their prior learning (whether this be from a previous session, unit or year group.)

Explain - This introduces children to the new material being covered in the session.

Example - An example follows the 'Explain' using a model or practical example.

Attempt - Children will have a go at the desired skill with support from the teacher.

Apply - They will then apply this in a similar context independently.



Challenge - This element should deepen or extend the learning.

In every science lesson you would expect to see;

- Vocabulary explicitly taught and used by the pupils
- Knowledge notes and organisers used to scaffold the learning
- What success looks like; made clear

SEND

We recognise some pupils need provision 'additional to' quality first teaching in order to reach their potential as scientists. This could include:

- Carefully considered scaffolding
- Pre and post-teaching
- Pre-planned management of cognitive load
- Explicit instruction and modelling
- Structured challenge, without ceilings
- Alternative ways of recording
- Additional targeted adult support

In some instances, specialist adaptations are made to support the specific barriers of individual pupils.

Curriculum enrichment will include:

- building links with science departments in our partner secondaries
- inviting scientists in from Bristol and the surrounding area for talks/demonstrations/presentations
- Science Week
- Trust-wide collaboration with other primaries

Reading across the curriculum:

- A rich and diverse range of reading texts across the curriculum ensure that science is often taught with links to other areas of the curriculum e.g. Y5 Space - biographies of Mae Jemerson, Y6 Circulatory system explanations linked to Pig Heart Boy Nursery - Minibeasts linked with The Very Hungry Caterpillar.

IMPACT - how do we know our curriculum is effective?

Assessment

Our curriculum is designed and built on the premise that 'learning equals a persistent change in the long term memory.' Therefore, the assessment structures are designed to evaluate the effectiveness of the curriculum after some time has elapsed.

Summative Assessment

The curriculum is a progression model. Teachers will know whether students are making progress if they are learning more of the curriculum.

Our curriculum is designed to ensure sequencing of core knowledge, vocabulary, substantive concepts and disciplinary knowledge. They will know more, and remember more with the taught curriculum content. Essentially they will be able to do more with this knowledge in carefully designed learning tasks.



This will be assessed using the Pupil Book Study approach- talking with pupils and looking at their books systematically to reveal:

- Content and knowledge
- Vocabulary
- How the pedagogy and taught curriculum helps/hinders their learning

Formative Assessment

Pupils will be assessed formatively as each lesson progresses. Pupils will be given tasks from which the teachers will draw conclusions. Adaptations will then be made as a result of that evidence.

Strategies that might be used are:

- Making explicit the learning intention and success criteria
- Eliciting evidence of pupils' prior knowledge
- Feeding back at the point of learning
- Inclusive questioning i.e. cold call, mini whiteboards
- Retrieval practice i.e. connect and cumulative quizzing

Pupil Voice

- use scientific vocabulary
- talk about scientific specific concepts & knowledge
- talk about the importance of science and what it is
- explain how learning builds on previous knowledge
- talk about their progress regardless of starting points

High quality outcomes: Books demonstrate

- pride and effort
- captures increasing understanding of scientific concepts and knowledge
- demonstrates a clear sequence of learning
- vocabulary used correctly where appropriate
- demonstrates that learners are thinking scientifically