



South Gosforth First School
Science - Subject Overview

‘Science is a way of understanding the universe and ourselves better than we ever thought possible’ – Michio Kaku

Science at South Gosforth First School

At South Gosforth First School, we aim to give all of our pupils a strong understanding of the world around them. Pupils are able to discover ‘how the world works’ and our place, impact, roles and responsibilities within this world. Our pupils are encouraged to ask questions, think deeply and apply their growing scientific knowledge to investigate and learn more about the different branches of Science: Biology, Chemistry and Physics. Our skilled staff teach our children to develop a systematic and logical way of working and provide opportunities for them to reflect on investigations and apply their growing knowledge in a range of different contexts.

As part of the planning process for Science at SGFS, teaching staff give careful consideration to the delivery of ‘substantive knowledge’ (what we learn) running alongside ‘procedural knowledge’ (how we learn). The sequence of learning dictates what should be taught, when it should be taught and how it should be taught, anticipating common misconceptions and providing a rich background of detailed subject knowledge for teachers in order that all children can reach beyond core concepts.

Understanding of each key block of substantive knowledge is revisited across the years to ensure genuine progression, while the curriculum details the specialist vocabulary children should be able to use to articulate their understanding accurately and precisely at each stage. Working in this way in the classroom is described as ‘Working as a Scientist’ to pupils – This includes the following key skills: Observing Over Time; Pattern Seeking; Identifying, Grouping and Classifying; Carrying out Research Using a Range of Sources; Comparative Testing and Fair Testing. Practical tasks are carefully considered to ensure that they promote the children’s best work, are relevant to the unit studied and make the learning journey assured.

Intent			
How our key drivers are lived through our Science curriculum			
Character	Culture	Creativity	Challenge
Children are provided with opportunities to reflect upon their learning and refine and adapt their ideas, as well as celebrating the success of their discoveries. Teachers clearly demonstrate how to work scientifically, use equipment effectively and can model systematic and logical ways of investigating scientific questions – ‘Working as a Scientist’	Children are given the knowledge required to understand the uses and implications of science in the modern world, both today and in the future. School staff promote a real passion for science as a subject and can clearly demonstrate its importance for the advancement of our world.	Children are able to discuss and draw upon their prior scientific knowledge and apply this confidently and creatively to new contexts. We will encourage children to ask important questions about how things work and why things happen in a certain way. Ultimately, this will help all children to understand the world which they are growing up in and provide them with life skills to better access it as well as becoming creative thinkers	Pupils access high quality and carefully considered resources which provoke deep thinking and stimulate rich scientific discussions. Pupils use rich scientific vocabulary to enable them to articulate their understanding accurately and precisely. Pupils are given opportunities to deepen their scientific knowledge through a range of questioning techniques.

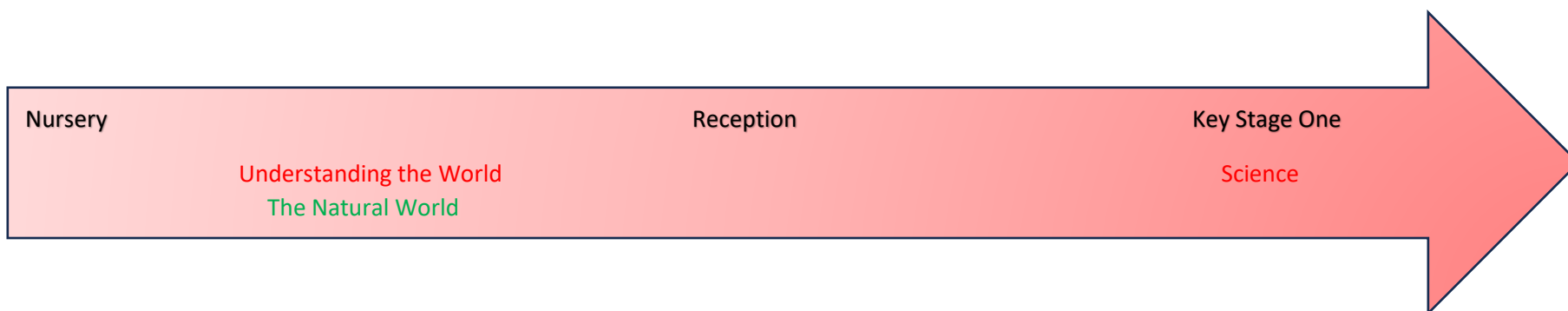


		who strive to seek solutions to problems and answers to life's questions.	Teachers carefully plan a progressive and sequential series of lessons within each science unit, which builds upon prior learning and uses various assessment techniques to address misconceptions and ensure that learners have a solid understanding of scientific concepts before moving on.
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Implementation

EYFS

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 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.



Through the long-term plan themes, adult interactions, continuous provision and enhancements in the classroom our children will:



Nursery	
Working Scientifically	• To show curiosity and ask questions. • To make observations using their senses. • To use their observations to help them answer their questions.
Biology	• To use all their senses in hands-on exploration of natural materials. • To explore collections of materials with similar and/or different properties. • To talk about what they see, using a wide vocabulary. • To plant seeds and care for growing plants. • To understand the key features of the life cycle of a plant and an animal. • To begin to understand the need to respect and care for the natural environment and all living things.
Chemistry	• To talk about the differences between materials and changes they notice.
Physics	• To explore how things work. • To explore and talk about different forces they can feel.
Reception	
Working Scientifically	• To show curiosity and ask questions. • To make observations using their senses and simple equipment. • To make direct comparisons and identify, sort and group. • To record their observations by drawing, taking photographs, using sorting rings or boxes on simple tick sheets. • To use their observations to help them to answer their questions.
Biology	• To describe what they see, hear and feel whilst outside. • To recognise some environments that are different from the one in which they live. • To understand the effect of changing seasons on the natural world around them. • To explore the natural world around them (e.g. discussing how we care for the natural world around us).
Chemistry	• To explore the natural world around them (e.g. as ice melting).
Physics	• To explore the natural world around them (e.g. floating and sinking, magnets).



Year 1- 4						
	Autumn		Spring		Summer	
Year 1	Seasonal Changes Substantive Knowledge: The features and characteristics of British Autumn. Procedural Knowledge: <u>Pattern Seeking:</u> Do trees with bigger leaves lose their leaves first in Autumn? <u>Identifying & Classifying:</u> How can we sort the leaves that we collected on our walk? <u>Comparative Test:</u> In which season does it rain the most?	Everyday Materials Substantive Knowledge: The properties of materials. Procedural Knowledge: <u>Observing Over Time:</u> What happens to materials over time if we bury them in the ground? <u>Research:</u> Which materials can be recycled? <u>Identifying & Classifying:</u> Making an umbrella – which materials are waterproof? <u>Comparative Test:</u> Which materials are the most absorbent?	Seasonal Changes Substantive Knowledge: The features and characteristics of British Winter. Procedural Knowledge: <u>Pattern Seeking:</u> Does the wind always blow the same way? <u>Comparative Test:</u> In which season does it rain the most?	Plants Substantive Knowledge: Identifying common wild garden plants and trees and their basic structure. Procedural Knowledge: <u>Observing Over Time:</u> How does my mustard seed change each week? <u>Pattern Seeking:</u> Is there a pattern in where we find weeds growing in the school grounds? <u>Comparative Test:</u> Which type of compost grows the tallest mustard plant?	Animals Including Humans Substantive Knowledge: Common animals that are carnivores, herbivores and omnivores. The basic parts of the human body. Procedural Knowledge: <u>Observing Over Time:</u> Does my height change over the year? <u>Identifying & Classifying:</u> How can we organise all the zoo animals? <u>Comparative Test:</u> Is our sense of smell better when we can't see?	Seasonal Changes Substantive Knowledge: The features and characteristics of British Spring and Summer. Procedural Knowledge: <u>Identifying & Classifying:</u> How would you group these things based on which season you are most likely to see them in? <u>Comparative Test:</u> In which season does it rain the most?



Year 2	Living Things and their Habitats Scientist – Charles Darwin	Animals Including Humans	Everyday Materials	Plants Scientist – Learn about a Botanist
	Substantive Knowledge: Differences between things that are living, dead and never been alive. Living things live in habitats to which they are suited and animals obtain food from plants and other animals. Procedural Knowledge: <u>Observing Over Time:</u> What conditions do minibeasts prefer to live in? <u>Research:</u> How does the habitat of the Arctic compare to the habitat of the rainforest? <u>Identifying & Classifying:</u> How would you group things to show which are living, dead or have never been alive? <u>Comparative Test:</u> Is there the same level of light in the evergreen wood compared with the deciduous wood?	Substantive Knowledge: Animals including humans have offspring and basic needs for survival. The role of exercise, food and hygiene. Procedural Knowledge: <u>Observing Over Time:</u> How does a tadpole change over time? <u>Pattern Seeking:</u> Which age group of children wash their hands the most in a day? <u>Identifying & Classifying:</u> Which offspring belongs to which animal? <u>Comparative Test:</u> Do bananas make us run faster?	Substantive Knowledge: Suitability of everyday materials and how some materials can be changed. Procedural Knowledge: <u>Observing Over Time:</u> Would a paper boat float forever? <u>Research:</u> What properties make plastics a problem for the environment? <u>Identifying & Classifying:</u> Which material is the stretchiest? <u>Comparative Test:</u> Which paper would be the strongest for a paper bridge?	Substantive Knowledge: Seeds and bulbs grow into mature plants. Features of what plants need to grow and stay healthy. Procedural Knowledge: <u>Observing Over Time:</u> What happens to my sunflower seed after I planted it? <u>Pattern Seeking:</u> Do bigger seeds grow into bigger plants? <u>Research:</u> What does a botanist do? <u>Comparative Test:</u> Do cress seeds grow quicker inside or outside?



Year 3	Forces and Motion	Animals Including Humans	Light	Plants	Rocks
	Substantive Knowledge: The role of forces and magnets. Procedural Knowledge: <u>Observing Over Time:</u> If we magnetise a pin, how long does it stay magnetised for? <u>Pattern Seeking:</u> Does the size and shape of a magnet affect how strong it is? <u>Identifying & Classifying:</u> Which materials are magnetic? <u>Comparative Test:</u> Which magnet is the strongest?	Substantive Knowledge: The importance of nutrition. The role of skeletons and muscles for support, protection and movement. Procedural Knowledge: <u>Pattern Seeking:</u> Do male humans have larger skulls than female humans? <u>Identifying & Classifying:</u> How do skeletons of different animals compare? <u>Fair Test:</u> How does the angle that your elbow is bent affect the circumference of your upper arm?	Substantive Knowledge: The importance of light and how it is reflected from surfaces. The formation of shadows. Procedural Knowledge: <u>Observing Over Time:</u> When is our classroom the darkest? <u>Research:</u> How does the Sun make light? <u>Fair Test:</u> How does the distance between the shadow puppet and the screen affect the size of the shadow?	Substantive Knowledge: Functions of flowering plants and the requirements for life and growth. Procedural Knowledge: <u>Observing Over Time:</u> How do flowers in a vase change over time? <u>Research:</u> What are all the different ways that seeds disperse? <u>Identifying & Comparative Test:</u> Which conditions help seeds germinate faster? <u>Fair Test:</u> How does the length of the carnation stem affect how long it takes for the food colouring to dye the petals?	Substantive Knowledge: Formation of fossils and soils. Procedural Knowledge: <u>Research:</u> Who was Mary Anning and what did she discover? <u>Identifying & Classifying:</u> Can you use the identification key to find out the name of each of the rocks in your collection? <u>Comparative Test:</u> Which soil absorbs the most water? <u>Fair Test:</u> How does adding different amounts of sand to soil affect how quickly water drains through it?



Year 4	States of Matter	Electricity	Animals Including Humans	Sound	Living Things and their Habitats
	Substantive Knowledge: Materials as solids, liquids and gases. How materials can change state when heated or cooled. The role of evaporation and condensation in the water cycle. Procedural Knowledge: <u>Observing Over Time:</u> How does the level of water in a glass change when left on the windowsill? <u>Pattern Seeking:</u> Is there a pattern in how long it takes different sized ice lollies to melt? <u>Identifying & Classifying:</u> Group materials into solids, liquids and gases. <u>Comparative Test:</u> Does seawater evaporate quicker than freshwater?	Substantive Knowledge: Construction of a simple series circuit. Procedural Knowledge: <u>Pattern Seeking:</u> Which room has the most electrical sockets in a house? <u>Identifying & Classifying:</u> How would you group these electrical devices based on where the electricity comes from? <u>Comparative Test:</u> Which material is the best conductor of electricity? <u>Fair Test:</u> How does the thickness of a conducting material affect how bright the lamp is?	Substantive Knowledge: Functions of the basic parts of the digestive system in humans and functions of the different types of teeth. The role of producers, predators and prey in a food chain. Procedural Knowledge: <u>Observing Over Time:</u> How does an egg shell change when it is left in cola? <u>Research:</u> How do dentists fix broken teeth? <u>Identifying & Classifying:</u> What are the names for all organs involved in the digestive system? How can we organise our teeth into groups?	Substantive Knowledge: How sounds can be made and changed. Procedural Knowledge: <u>Pattern Seeking:</u> Is there a link between how loud it is in school and time of day? <u>Comparative Test:</u> Which material is best to use for muffling sound in ear defenders? <u>Fair Test:</u> How does the volume of a drum change as you move further away from it?	Substantive Knowledge: Use of classification keys to group, identify and name living things. How environments can change and can sometimes pose dangers to living things. Procedural Knowledge: <u>Observing Over Time:</u> How does the variety of invertebrates change over the year on the school field? (record in September, January, April and June) <u>Research:</u> Can we find other animals to add complexity to our classification key? How do changes in the local environment affect the species that live there?



Learning Links Across the Curriculum				
	English	Maths	Geography	Computing
Year 1	Information Texts (Animals Including Humans) 'The Robot and the Bluebird' – using senses to describe (Animals Including Humans) Labelling (Animals Including Humans)	Length and height (Plants) Mass and Volume (Seasonal Changes) Time (Observing over Time) Grouping (Seasonal Changes, Everyday Materials, Living Things and their Habitats)	My Local Area (Plants) UK (Seasonal Changes) Hot and Cold Places (Seasonal Changes)	Make and record a weather forecast (Seasonal Changes) Research recycling (Everyday Materials)
Year 2	Information Texts (Living Things and their Habitats) Explanation about how plants grow (Plants)	Grouping (Living Things and their Habitats, Uses of Everyday Materials) Length and Height (Plants) Time (Observing over Time)	Coastal Regions (Living Things and their Habitats) Continents and Oceans (Living Things and their Habitats)	Book Creator (Living Things and their Habitats) Research the role of a botanist (Plants)
Year 3	Summarising (Animals Including Humans, Plants) Diet and exercise poster (Animals Including Humans)	Length (Forces and Motion, Animals including Humans, Plants) Statistics (Forces and Motion, Rocks) Geometry (Forces and Motion, Animals including Humans) Grouping (Rocks) Time (Observing Over Time)	Human and Physical features (Plants) Earthquakes and Volcanoes (Rocks)	Present how fossils are formed (Rocks) Research Mary Anning (Rocks)



Year 4	Drama (States of Matter, Animals Including Humans) Following instructions (Electricity) Labelling diagrams (Electricity, Sound) Persuasion Text (Climate Change)	Grouping (States of Matter, Electricity, Animals including Humans) Measurement (States of Matter) Length (States of Matter, Electricity) Statistics (States of Matter, Electricity, Living Things and their Habitats) Time (Observing over Time)	Climate and Biomes (States of Matter, Weather, Animals including Humans) Climate Change (States of Matter, Living Things and their Habitats)	Data Loggers (States of Matter, Sound) Campaign Video (Living Things and their Habitats)
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What does a Science lesson look like at South Gosforth First School?					
					
Clarity of Learning Exemplified The 'big learning' is explained and the small steps are highlighted. Children know what they are learning, why they are learning it and how it links to previous learning.	Vocabulary New vocabulary is introduced, explained and modelled. Children have time to rehearse new words in context.	Links to Prior Learning and Retrieval Practice There are opportunities for children to practise what they have already learned through low stakes strategies.	New Learning Explained and Modelled Teachers provide clear explanations of new knowledge. Images, authentic sources and high quality texts are used to exemplify and illustrate the new learning.	Independent Practice and Group Work Children have opportunities to practise the new learning through carefully considered tasks. Learning is broken down to minimise cognitive overload, with the use of 'teach-do' approach.	Assessment for Learning and Feedback Strategies Assessment for learning opportunities are woven in throughout the lesson through careful questioning that makes the pupils think hard. Errors and misconceptions are picked up and addressed as the lesson progresses.



What makes Science special at South Gosforth First School?	
Year 1	<u>Mantle of the Expert:</u> Animals <u>Visits:</u> Trip to a garden to look at a variety of plants Animal Workshop <u>Enhancements:</u> Make and record a weather forecast Create different weather stations Investigate making an umbrella Investigate the growth of mustard plants British Science Week
Year 2	<u>Mantle of the Expert:</u> Animals, Materials <u>Visits:</u> Comparing light in an evergreen wood with a deciduous wood Trip to Centre for Life Sunderland Winter Gardens <u>Enhancements:</u> Parent workshop making a shoebox habitat Build own bug hotel Make healthy food Make a paper bridge and boat Investigate growing plants British Science Week
Year 3	<u>Mantle of the Expert:</u> Rocks <u>Visits:</u> Botanical Gardens Durham <u>Enhancements:</u> Design and make a magnetic game Create shadow puppets Become a soil detective British Science Week
Year 4	<u>Mantle of the Expert:</u> Living Things and their Habitats <u>Visits:</u> Climate and Biomes field trip Visit from a dentist <u>Enhancements:</u> Drama acting out the states of matter Make own electrical circuits Make own musical instruments Deforestation debate British Science Week



CPD			
Strategy	Who	When	Impact
Subject Leadership Time	Nicola Renwick	Autumn and Spring Term	Review the science curriculum and progression document. Worked with Catherine Burnett to include EYFS in the progression document.
Staff Meeting	Robert Adams Nicola Renwick	Spring Term	Time to plan for British Science Week. Science Book Look Scrutiny.
GST Subject Leader Networks	Nicola Renwick	2 sessions throughout the year.	Subject leader has access to examples of best practice across the Gosforth Trust. Subject leaders can share planning and resources that can be disseminated in school.
SNE Curriculum Conference	Rachael Blackburn Rob Adams	Spring Term	SLT reviewed aims of curriculum and looked at provision of high quality, authentic sources used in school. SLT worked with subject leader to review provision and plan next steps.
Eat Smart (Bind)	Nicola Renwick	Ongoing	Led the project in school with a team of Waste Warriors to reduced food waste.



Impact	
Strategy	Evidence and Findings
Pupil Voice	Key findings from this monitoring in school can be found on internal school documents and is collated by Nicola Renwick (Science Subject Leader). This monitoring informs the current 'Science Subject Action Plan' which identifies key strengths and areas for development in Science, as well as actions taken to improve the subject curriculum and delivery across school.
Book Looks	
Planning Scrutiny	
Lesson Observations	
External Reports eg. SIP/Governors	