



# St Mary's Church of England Primary School



## Science Curriculum Progression Document

*“Through the loving example of Jesus Christ we strive to provide opportunities for all members of our **diverse** school community to **flourish** within a **caring, aspirational, spiritual** and **inclusive** environment. We aim to create **successful** learners, **confident** individuals and **responsible citizens** ready to take the next steps in life”*

Peace



Friendship



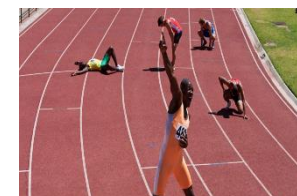
Respect



Trust



Perseverance



## Science Curriculum Intent, Implementation and Impact

### Intent

At St Mary's Primary School, our vision is to give children an **INCLUSIVE** and **diverse** science curriculum which enables them to explore and discover the world around them, **confidently**, so that they have a deeper and **caring** understanding of the world we live in, be **responsible citizens**, and **flourish**.

Children are naturally curious and passionate about learning; we provide a stimulating **aspirational** science curriculum that nurtures children's natural curiosity and their on-going successful **intellectual** development. Through a hands-on, inquiry-based curriculum, children will experience the joy of having wonderful ideas, exploration and investigation – that is, the joy of finding out. Our aim is that these stimulating and challenging experiences help children secure and extend their scientific knowledge and vocabulary.

### Implementation

At St Mary's, we strive to provide a wide variety of teaching approaches, through our topic-based curriculum, to ensure children make good progress. Science lessons will follow a clear and consistent teaching sequence, allowing children to develop into confident and successful Scientists.

- Scheme of work: We use the Education People - Primary Science Scheme of Work as a guide for planning, which is in line with the National Curriculum.
- 'In science, pupils need their knowledge to be organised around the most important scientific concepts, which predict and explain the largest number of phenomena' (Ofsted research review series: science). Therefore, within this scheme, ten big ideas have been identified, underpinned by key concepts. As they move through this scheme of work, pupils will build comprehensive schemata for each of these big ideas so that new knowledge connects with prior knowledge and can be committed to the long-term memory.
- Science Display: Each class has a display/'Working Wall' which includes key knowledge/vocabulary linked to the Science topic.
- Subject specific vocabulary: Vocabulary is included at the beginning of lessons, on a title page at the front of books and displayed somewhere the children can easily access.
- Provision in EYFS: Children are given a secure grounding in the Prime Areas of learning, ensuring they have a good foundation on which to build through the specific areas, including Understanding the World. Areas of provision are enhanced to ensure vocabulary understanding and extension, and develop understanding of the world around them.

- Library: In our library there are a range of non-fiction books that relate to all Science topics covered throughout the school. Children can access these throughout the day and during Science lessons to develop independence in their learning.
- Teaching and Learning will show progression across all key stages within the strands of Science.
- Children will access resources to acquire learning through Science equipment, digital technology, practical experiences and photographs.

### **Impact**

- All children will achieve age related expectations in Science, with exception of some linked personalised plans.
- Children will retain scientific knowledge that relates to real life context.
- Children will develop their enquiry skills and reflect on knowledge learnt.
- Children will work collaboratively and practically to investigate and experiment.
- Children will be able to confidently explain the steps they have taken during an investigation and be able to reason scientifically.

Subject Leader – Mrs Louisa Wallis



## The 10 Big Ideas

- 1 There is a relationship between structure and function
- 2 Living and non-living things can be grouped in a variety of ways
- 3 Humans move through different stages of growth and development
- 4 All matter on earth exists in one of three states: solid, liquid, gas and the state of matter can change
- 5 Living things have characteristics and requirements for life, growth and health
- 6 Changing the movement of an object requires a net force (push or pull) to be acting on it
- 7 Living things depend on each other and on the environment; humans can have both a positive and negative impact
- 8 The diversity of organisms, living and extinct, is the result of evolution
- 9 Energy makes things happen and can be seen by its effects; it can be transferred (but is not used up)
- 10 The movement of the Earth affects the seasons and times of day

## Long-term plan

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Year 1	Everyday materials		Animals, including humans		Plants	Revisit and review
	Seasonal changes 1		Seasonal changes 2		Seasonal changes 3	
💡	1, 2		1, 2		1, 2	
Year 2	Living things and their habitats		Uses of everyday materials	Animals, including humans	Plants	Revisit and review
	5, 7		1, 4	2, 3, 5	1, 2	
Year 3	Forces and magnets	Light	Rocks	Plants	Animals, including humans	Revisit and review
	2, 6	1, 9, 10	2, 8	1, 2	3, 5	
Year 4	States of matter	Sound	Electricity	Animals, including humans	Living things and their habitats	Revisit and review
	1, 2, 4, 9	9	2, 9	1, 2, 5, 7	2, 7	
Year 5	Living things and their habitats	Earth and space	Animals, including humans	Forces	Properties and changes of materials	Revisit and review
	3, 5	10	3	6, 10	1, 2, 4, 9	
Year 6	Living things and their habitats	Evolution and inheritance	Electricity	Light	Animals including humans	Introduction to KS3
	2	8	9	9	1, 5	

## Science Skills Progression through Year Groups

Topic	EYFS
My Body and Senses	<ul style="list-style-type: none"> <li>• Identify and name the basic parts of the human body and say which part of the body is associated with each sense.</li> <li>• Use all their senses in hands on exploration of natural materials.</li> <li>• Describe what they see, hear and feel whilst outside.</li> </ul>
Seasonal Changes (Autumn)/ Light and Dark	<ul style="list-style-type: none"> <li>• Understand some important processes and changes in the natural world around them including the seasons and weather.</li> <li>• Observe and interact with natural processes, such as, an object casting a shadow.</li> </ul>
Seasonal Changes (Winter)/ Freezing and Melting	<ul style="list-style-type: none"> <li>• Understand some important processes and changes in the natural world around them including the seasons and weather.</li> <li>• Understand some important processes and changes in the natural world around them including changes states of matter.</li> </ul>
Seasonal Changes (Spring)/ Animals	<ul style="list-style-type: none"> <li>• Understand some important processes and changes in the natural world around them including the seasons and weather.</li> <li>• Explore the natural world around them, making observations and drawing pictures of animals.</li> <li>• Understand the key features of the life cycle of an animal.</li> <li>• Begin to understand the need to respect and care for the natural environment and all living things.</li> </ul>
Floating and Sinking	<ul style="list-style-type: none"> <li>• Observe and interact with natural processes, such as, a boat floating on water.</li> </ul>
Seasonal Changes (Summer)/ Plants	<ul style="list-style-type: none"> <li>• Understand some important processes and changes in the natural world around them including the seasons and weather.</li> <li>• Explore the natural world around them, making observations and drawing pictures of plants.</li> <li>• Understand the key features of the life cycle of a plant.</li> <li>• Begin to understand the need to respect and care for the natural environment and all living things.</li> </ul>

		Knowledge of scientific methods  Models Classification Pattern-seeking Fair tests Observation over time	Knowledge of apparatus and techniques, including measurement  Apparatus Safety Procedures Taking measurement	Knowledge of data analysis and presentation  Graphs Tables Drawings	Knowledge of how science uses evidence to develop explanations  Evidence Validity Conclusions Peer review	Learning from scientists
	Year R	Add the disciplinary elements which will form the foundation (from your own school curriculum) of these pillars. For example: close observation, counting minibeasts and grouping, drawing plants in the environment over time.				
YEAR ONE	Unit 1 Materials	<p>Know how to sort objects (classify) according to the material they are made from.</p> <p>Using <b>observation</b> of the different materials, suggest answers.</p> <p>Use <b>observation</b> to suggest which material is best at absorbing water.</p> <p>Guided simple <b>test</b> to answer the question, Which material is best at absorbing water?</p>	Use a <b>sand timer</b> to time one minute.		Ask and suggest answers to one <b>key question</b> : What properties does the material have?	Explore the invention of the modern waterproof raincoat by Charles Macintosh. Consider its significance.

	Guided <b>Simple Test</b> to answer the question, Which material is best at absorbing water?				
<b>Unit 2</b> <b>Animals</b>	Use <b>observation</b> to suggest what things are the <b>same</b> and what things are <b>different</b> .  Using knowledge of animals and their diets, <b>classify (group)</b> accurately into herbivores, carnivores and omnivores.  Use a <b>simple test</b> to find out which body part is used to see, hear, smell, taste and touch.				Explore what a naturalist is, for example Steve Backshall. Know that scientists are still discovering new species.
<b>Unit 3</b> <b>Plants</b>	<b>Identify and classify</b> plants as garden plants, wild plants, trees or weeds.  <b>Identify and classify</b> common trees according to their leaves.  Know that by <b>observing</b> living things over time, we can monitor changes.	Identify and describe parts of plant by <b>observing</b> closely using <b>simple equipment</b> – magnifying glasses/hand lenses.  Use string to <b>measure</b> trunks and then order them according to size.			Scientists who work with plants are called horticulturalists, for example Alan Titchmarsh. They are experts at gardening.
<b>Ongoing Unit 4</b> <b>Seasons</b>	Make <b>close observations</b> about living things in the local area in each season. <b>Observe changes</b> and link to seasons.		Together, make class <b>tables</b> and <b>charts</b> to record sunset, sunrise and the weather over a period of time.		Know that the Met Office makes accurate weather predictions. We see these as a weather forecast.

		Knowledge of scientific methods	Knowledge of apparatus and techniques, including measurement	Knowledge of data analysis and presentation	Knowledge of how science uses evidence to develop explanations	Learning from scientists
		Models Classification Pattern-seeking Fair tests Observation	Apparatus Safety Procedures Taking measurement	Graphs Tables Drawings	Evidence Validity Conclusions Peer review	
YEAR TWO	Unit 1  Habitats	Identify and classify living and non-living things according to whether they are alive or dead or have never been alive.  Observe the light, plants and dryness of the soil in different habitats.  Sort animals and plants into food chains.	Use simple equipment (magnifying glasses) to observe closely the animals we find in local microhabitats.		Observe the conditions in different microhabitats and <b>together draw conclusions</b> about what minibeasts need to survive.  With support, draw <b>conclusions</b> about what different plants need to survive.	Use books and the internet to learn about different, unfamiliar habitats around the world and the animals that live there.  Explore the impact and legacy of Jacques Cousteau's work.
	Unit 2  Materials	Identify and classify the variety of uses of different materials based on their properties.  With support, make a prediction about which	Gather data by <b>measuring using informal methods.</b>	<b>Record in a table, present in a bar chart.</b>	Use <b>observations</b> to suggest answers to questions – can solid objects change shape?	Know that engineers work with machines and other mechanical equipment. Understand Caroline Haslett's importance in leading the way for women

	<p>fabric they think will be most stretchy.</p> <p>Know that when scientists plan experiments, they try to <b>keep some things the same</b>.</p>				to work successfully in technical jobs.
<p><b>Unit 3</b></p> <p><b>Animals</b></p>	<p>Understand that scientists <b>observe</b> closely – they look for change and they look for growth to help them understand.</p> <p>Use knowledge of animal <b>groups</b> and <b>observations</b> of change to order life cycles correctly.</p> <p>Sort foods into healthy and unhealthy groups .</p> <p>With support, perform a <b>simple test</b> to identify which activity makes our bodies work harder.</p>	<p>With support, use measuring tape to <b>measure</b> accurately in metres and centimetres.</p>	<p><b>Gather and record data in a table.</b></p>		<p>Understand the importance of Florence Nightingale in highlighting the importance of hospital cleanliness. Consider why this was significant and how this saved lives.</p>
<p><b>Unit 4</b></p> <p><b>Plants</b></p>	<p><b>Observe</b> seed germination closely.</p> <p>With support, make <b>predictions</b>.</p> <p>Develop the idea that we should <b>keep some things the same</b> when planning an experiment.</p>			<p>Use <b>observations</b> and ideas (about seeds and bulbs) to <b>suggest answers to questions</b>.</p>	<p>Ask <b>simple questions</b> (and find answers from secondary sources such as books).</p>

		Knowledge of scientific methods  Models Classification Pattern-seeking Fair tests Observation	Knowledge of apparatus and techniques, including measurement  Apparatus Safety Procedures Taking measurement	Knowledge of data analysis and presentation  Graphs Tables Drawings	Knowledge of how science uses evidence to develop explanations  Evidence Validity Conclusions Peer review	Learning from scientists
YEAR THREE	<p><b>Unit 1</b></p> <p><b>Forces and magnets</b></p>	<p>Use <b>observation</b> to identify forces being used.</p> <p>Understand why <b>tests should be fair</b> and control all but one <b>variable</b> (the surface the car travels on).</p> <p><b>Sort</b> into groups objects that are attracted to magnets and those that are not.</p>	<p>Use a measuring tape to <b>measure</b> the distance a car travels (in cm).</p> <p>Make <b>systematic observations</b>, testing the strength of magnetism from different distances.</p>	<p>Record results in a simple <b>table</b> and use these to <b>draw conclusions</b> about which surface slowed down the moving object the most.</p> <p>Carry out a simple investigation, record results in a table and use these to <b>present data</b> in a bar chart.</p>	<p>Identify and <b>report on</b> the effect of a push or pull force on an object.</p> <p><b>Predict</b> whether two magnets will attract or repel each other, depending on which poles are facing.</p> <p><b>Compare results</b>, identifying similarities and differences, from a simple investigation (bringing a range of materials near a magnet to test magnetism).</p>	<p><i>Understand that science has been studied for a long time and many of these discoveries still help us to understand scientific ideas and process, such as the work of <b>Leonardo Da Vinci</b>.</i></p> <p><i>Understand that scientific ideas continue to be developed, for example like the invention of the world's strongest permanent magnet by <b>Masato Sagawa</b>.</i></p>

				Discuss (and <b>report on</b> ) the factors that might influence magnet strength, such as the size, shape, and material of the magnet.	
<b>Unit 2</b>  <b>Light</b>	<p>Set up a <b>simple comparative test</b> to see which materials can be seen in low light.</p> <p>Make <b>systematic and careful observations</b> to identify which objects can be seen in different lighting conditions and <b>record</b> findings using simple <b>scientific language</b> and a <b>table</b>.</p> <p>Collectively set up a simple <b>comparative and fair test</b> to see how shadows change over the course of the day.</p>	<p>Take <b>measurements</b> of length with a standard ruler (cm) to measure how shadows change in size.</p> <p>Make <b>careful observations</b> when using <b>mirrors</b>, to learn how light behaves when it is reflected.</p> <p>Take <b>accurate measurements</b> of how position and size of shadows changes using equipment that records standard units of length (cm, m).</p>	<p><b>Record findings</b> using simple <b>scientific language</b> and <b>labelled diagrams</b> of the learning about light and reflection.</p> <p>Use a <b>bar chart</b> to show how shadows change across a day.</p>	<p><b>Report on findings</b> and draw a conclusion about which materials are more visible in low light.</p> <p>Use <b>straightforward scientific evidence</b> to <b>answer questions</b> or <b>support findings</b> about why distance and height changes the size of shadows.</p> <p>Use <b>evidence – observation</b>: how does the height of light change shadows/<b>tables of data</b>: how does distance affect shadow size/<b>comparison</b>: which objects create darker shadows – to <b>answer questions</b>.</p> <p><b>Report findings</b>, using oral and written explanations, about how to keep our eyes safe in the Sun.</p>	<p><i>Understand how breakthrough inventions such as the lightbulb by <b>Thomas Edison</b> shape how we live today.</i></p> <p><i>Compare the development of scientific discoveries and inventions and see how ideas are refined and improved over time, for example, the evolution of the lightbulb by <b>Isamu Akasaki</b>.</i></p>
<b>Unit 3</b>  <b>Rocks</b>	<p><b>Classify</b> rocks according to whether they have grains, crystals or layers.</p> <p>Use a <b>physical model</b> to represent the process of</p>	<p>Make <b>careful observations</b> to <b>identify</b> rocks using a <b>hand lens</b> or <b>magnifying glass</b>.</p>	<p><b>Record</b> the process of fossilisation using a <b>storyboard</b> which includes simple <b>scientific language</b> and <b>drawings</b>.</p>	<p>Make <b>careful observations</b> on the properties of different rocks to <b>draw conclusions</b> about which is best suited for a given purpose.</p>	<p><i><b>Scientists</b>, such as <b>Sanjeev Gupta</b>, use their knowledge of rocks to understand how landscapes are formed on Earth and other planets.</i></p>

	<p>rock formation for the three different rock types.</p> <p>With support, carry out a <b>comparative test</b> to find out which rocks are durable and/or permeable (absorb water) or impermeable (do not absorb water).</p> <p>Create a <b>model</b> of a fossil to help understand the <b>process</b> of fossilisation.</p> <p>Set up a simple, <b>comparative test</b> and use a <b>simple yes/no classification key</b> to identify soil samples.</p>	<p>Use a <b>stopwatch</b> to time the length the rocks are in the water.</p> <p>Make detailed <b>observations to compare</b> soil types using <b>hand lenses or magnifying glasses</b>.</p>	<p><b>Record findings</b> from 'The chocolate rock cycle' using simple <b>scientific language</b> and <b>labelled diagrams</b>.</p>		<p><i><b>Palaeontologists study fossils. Scientists continue to build on the work by early fossil hunters, such as Mary Anning.</b></i></p>
<p><b>Unit 4</b></p> <p><b>Plants</b></p>	<p>Make systematic and careful observations of seeds to look for <b>properties</b> that will help us to <b>sort into groups</b> according to dispersal method.</p> <p>Set up a <b>simple fair test</b> to find out how quickly the roots of a seed grow.</p> <p>Set up a <b>simple practical enquiry</b> to show water transport through a stem, marking the changes on a jar.</p> <p>Set up a <b>comparative test</b> to see how plants in different situations grow.</p>	<p>With support, use equipment to make systematic and careful observations of flowering plants (eg <b>magnifiers, digital microscope</b>).</p> <p>Take accurate <b>measurements</b> using <b>standard units</b> (eg a ruler measuring in cm).</p>	<p>Make <b>systematic and careful observations</b> of the plants each week for changes in condition, <b>measuring</b> different changes (eg height and number of leaves over time) and <b>record this in a table</b>.</p> <p>Make systematic and careful observations of flowers, <b>gathering, recording and presenting data in a graph</b> that shows the frequency of different colours in the plants.</p>	<p><b>Report findings</b> from the enquiry, calculating the growth rate, and answer questions about it.</p> <p>Report on their findings, making <b>comparisons</b> over time, and <b>draw simple conclusions</b>.</p> <p>Use results to <b>draw simple conclusions</b> and <b>make predictions</b> eg which colours are most common and why might that be?</p>	<p><i>Know that simple scientific ideas, such as the principles of crop rotation by <b>George Washington Carver</b>, can have a big impact on the lives of ordinary people.</i></p> <p><i>Learn more about the important role of scientific research, such as the work of <b>Luciano Scandian</b> in finding ways to keep honeybees healthy.</i></p>

	<p><b>Unit 5</b></p> <p><b>Animals, including humans</b></p>	<p><b>Identify differences and similarities</b> of different food groups and categorise them by type to demonstrate a balanced and healthy diet.</p> <p>Make <b>systematic and careful observations</b> of the movement of animals with and without skeletons to <b>identify similarities and differences</b>.</p> <p>With support, set up a simple, <b>comparative practical enquiry</b> which is a <b>fair test</b>.</p>		<p><b>Create a model</b> of muscles to develop scientific understanding of how muscles contract and relax.</p>	<p>Use straightforward <b>scientific evidence</b> (including known websites or other secondary sources) to <b>research and answer questions</b> about the diets of pets.</p> <p>Make <b>predictions and test</b> whether these are true by <b>collecting and analysing data</b>.</p>	<p><i>Find out about the scientific idea of pasteurisation and how this discovery by <b>Louis Pasteur</b> changed medicine and food hygiene.</i></p> <p><i>Understand the simple scientific ideas and process are continuously developed by scientists such as <b>Charlotte Armah</b> who tests different foods to see how they can be used to help prevent disease.</i></p>
--	--	--	--	--	--	--



		<p>Knowledge of scientific methods</p> <p>Models Classification Pattern-seeking Fair tests Observation</p>	<p>Knowledge of apparatus and techniques, including measurement</p> <p>Apparatus Safety Procedures Taking measurement</p>	<p>Knowledge of data analysis and presentation</p> <p>Graphs Tables Drawings</p>	<p>Knowledge of how science uses evidence to develop explanations</p> <p>Evidence Validity Conclusions Peer review</p>	<p>Learning from scientists</p>
YEAR FOUR	<p><b>Unit 1</b></p> <p><b>Sound</b></p>	<p>Make <b>careful observations</b> about how we see, hear and feel sound (vibrations) and use these to <b>draw simple conclusions</b>.</p> <p>Set up a <b>comparative test</b> to identify how the strength of vibrations affect the volume of a sound.</p> <p>Conduct a <b>fair test</b> with <b>control variables</b> to test what happens to sound as the distance from the sound increases.</p> <p>Create <b>models</b> of headphones to identify materials which act as the best insulators for sound. Scientists may create <b>prototypes</b> like these</p>	<p>Use <b>data loggers</b> with teacher support to measure sound.</p> <p>Make <b>systematic</b> and careful measurements of sound at different distances using a <b>data logger</b>.</p>	<p><b>Independently</b> plan the <b>method</b> and create a <b>results table</b> for a comparative test to find out what material is the best insulator.</p> <p><b>Record findings</b> using <b>scientific language</b> about pitch and sound waves to explain how to change the pitch of a sound.</p>	<p>Use results to <b>draw simple conclusions, make links and identify patterns</b>.</p> <p>Conduct a fair test and repeat three times to increase the <b>reliability of results</b>.</p> <p><b>Draw conclusions</b> about what affects the pitch of a sound.</p>	<p><i>Understand that some scientific ideas and processes start from humble beginnings, for example, <b>Alexander Graham Bell</b> and his invention of the telephone.</i></p> <p><i>Understand the simple scientific ideas and processes are continuously developed by scientists and inventors, such as <b>Jaap Haartsen</b> and his invention of Bluetooth.</i></p>

	<p>before creating a final product.</p> <p><b>Set up simple practical enquiries</b> to find patterns between the pitch of a sound and features of the object that produced it.</p>				
Unit 2	<p>Make systematic and careful observations to <b>group and classify</b> a variety of different materials according to whether they are a solid, liquid or gas.</p> <p>Set up <b>simple comparative tests</b> to explore the effect of temperature on some substances by investigating the temperature at which a range of solids change state and become liquids.</p> <p>Set up a simple practical enquiry, ensuring it is a <b>fair test</b>, to find out the answer to whether all liquids can change state to become a solid.</p> <p>Set up <b>comparative and fair tests</b> to determine the effect of temperature on rates of evaporation.</p>	<p>Take accurate <b>measurements using standard units</b> and a range of equipment: <b>thermometers</b> or <b>data loggers</b> to measure the temperature of melting points.</p> <p>Make systematic and careful observations to take <b>accurate measurements using standard units</b> by measuring the amount of water in ml or the space taken up by the water in cm.</p>	<p>Gather and record data in a <b>table</b>, using the correct unit of measure.</p> <p>Choose an appropriate way to <b>gather and record data</b> to help in answering questions and <b>draw simple conclusions</b>.</p> <p><b>Create a model</b> of the water cycle to understand how condensation forms.</p> <p>Gather and record data in a <b>table</b> and <b>line graph</b> (with support) to show changes over time.</p>	<p><b>Report</b> on findings about the properties of gas using <b>simple scientific definitions</b>.</p> <p>Report on findings in the form of a <b>written conclusion</b>; use this to <b>raise further questions</b> eg What further experiments could be done to explore the changing state of these items?</p> <p>Use results to <b>draw simple conclusions</b> about the rates of evaporation and <b>present their findings</b> to the class.</p>	<p><i>Know that astronomer <b>Anders Celsius</b> created a temperature scale divided into small parts called <b>degrees</b>.</i></p> <p><i>Understand how scientific ideas and processes are used across different industries, such as <b>cookery (Heston Blumenthal)</b>.</i></p>
Unit 3	<p><b>Sort and classify</b> devices according to whether they</p>	<p>Use a <b>range of equipment</b> (bulb/lamp, bulb/lamp</p>		<p><b>Ask relevant questions</b>, using scientific enquiry to</p>	<p><i>Identify <b>changes related to simple scientific ideas</b></i></p>

Electricity	<p>use mains or battery electricity.</p> <p>With increased independence, <b>set up a simple, practical investigation</b> – using all components to light a bulb and verbally report on findings.</p> <p>Set up a <b>comparative test</b> to identify which materials make good electrical conductors and which make good electrical insulators.</p> <p>Use scientific language and knowledge of circuits to <b>produce diagrams and create functional objects.</b></p>	holder, buzzer, cell, battery, wire, crocodile clip) to make a working circuit.		<p>answer them, about how appliances convert electrical energy.</p> <p>Know that <b>scientists use their knowledge to form hypotheses and then test them out</b> – investigate questions eg does the order of the components matter?</p> <p>Use straightforward <b>scientific evidence to answer questions</b> and support findings eg how do switches work?</p> <p>Use <b>knowledge of how scientists work</b> to make a <b>prediction, investigate,</b> and use results to <b>draw simple conclusions,</b> make links and <b>identify patterns.</b></p> <p>Review the effectiveness (results) of made products to <b>draw simple conclusions, suggest improvements and raise further questions.</b></p>	<p><i>and processes (Erik Bystrup – electricity pylon).</i></p> <p><i>Learn how scientists have explored, sought proof and used electricity (Benjamin Franklin) and how this has helped people (attracting lightning).</i></p>
Unit 4	Set up simple <b>practical enquiries, comparatives and fair tests</b> (eggshells in different liquids but kept in same place).		<b>Create a model to show and explain a process</b> (the digestive system) in oral and written form.	<p>Know that <b>scientists make careful observations over time to monitor changes and draw conclusions.</b></p> <p>Collectively set up and monitor an experiment to see how different liquids</p>	<p><i>Learn about how the work and innovation of Pierre Fauchard shaped modern day dentistry.</i></p> <p><i>Recognise scientific ideas and processes are</i></p>

Animals, including humans	<p>Create a model (of the stomach) to see the properties a stomach must have if the capacity needs to increase.</p> <p>Set up a simple practical enquiry that supports systematic and careful observations.</p> <p>Know how to construct and interpret a food chain, identifying producers, predators and prey; know that arrows show the movement of energy (food) through the food chain.</p> <p>Sort living things according to their role in a food chain and then according to their habitat.</p>			<p>affect our teeth, observe this over time and draw conclusions.</p> <p>Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations.</p> <p>Draw conclusions about an animal's diet by looking at its teeth.</p>	<p><i>constantly evolving; look at the 'groundbreaking' research on tooth enamel by Dr Zhaoming Liu.</i></p>
Unit 5  Living things and their habitats	<p>Use classification diagrams and careful observation to group living things according to their characteristics.</p> <p>Use dichotomous keys to identify living things and draw conclusions about what they are.</p>	<p>Use observation and a range of equipment, such as magnifying glasses/ specimen magnifying pots, to identify living things in the local area.</p>	<p>Produce a guide book to inform people about the local area and threats it faces.</p> <p>Use data collection techniques to explore the local area, using knowledge of pollution and urbanisation, to identify issues that need resolving.</p> <p>Devise a plan of action to protect living things in the local area.</p>	<p>Reflect on why this (classification) is a process followed in the world of science.</p> <p>Identify and conclude, from observation and wider reading, how environments change over time.</p> <p>Use research and findings from the scientific community to understand how humans are negatively impacting the planet.</p>	<p><i>Know that Carl Linnaeus devised the modern method of classifying living things by grouping similar things together.</i></p> <p><i>Understand that scientists inspire others (such as climate activist, Vanessa Nakate) to protect the planet from the danger posed by human behaviour.</i></p>

		Knowledge of scientific methods  Models Classification Pattern-seeking Fair tests Observation	Knowledge of apparatus and techniques, including measurement  Apparatus Safety Procedures Taking measurement	Knowledge of data analysis and presentation  Graphs Tables Drawings	Knowledge of how science uses evidence to develop explanations  Evidence Validity Conclusions Peer review	Learning from scientists
YEAR FIVE	<p><b>Enquiry 1</b></p> <p><b>Living things and their Habitats</b></p>	<p>Ask questions about the local area and, with support, plan an <b>observation over time</b> enquiry (observing changes in plant or animal life over the year).</p> <p>With support, make decisions about sensible intervals between observations.</p> <p>Carry out the same whole-class investigation so that the process is clear.</p> <p>Towards the end of the unit, plan a more</p>	<p>Choose, with support, how to record findings and equipment.</p>	<p>Present findings from observations through <b>diagrams</b> and photographs with <b>annotations</b>.</p> <p>Monitor and <b>record results</b> over time.</p>	<p>Make <b>predictions</b> using evidence.</p>	<p>Understand considerations when working as a <b>naturalist</b> eg taking care of the area, returning things to where they were found.</p>

	<p>independent observational enquiry – can plants reproduce without seeds.</p> <p>Make supported decisions about the <b>variables</b> to change.</p> <p><b>Sort and group</b> living things in a more complex way by designing <b>classification systems</b>.</p>				
<p>Enquiry 2</p> <p>Earth and Space</p>	<p><b>Plan an observation over time</b> investigation to identify how shadows change throughout the day. Write this independently, compare to a model and amend.</p> <p>With guidance, identify the <b>variables</b> that will stay the same, make decisions about intervals for observations.</p>	<p>Use a metre rule to take and record <b>accurate measurements</b> of length.</p>	<p>Create <b>models</b> to understand the movement of the Earth.</p> <p><b>Present findings</b> through audio and recordings.</p> <p>Present <b>results</b> in a <b>line graph</b> and use this to <b>prove a known fact</b> (about the rotation of the Earth and its orbit around the Sun).</p>	<p>Make <b>predictions</b> using knowledge of night and day.</p> <p>Devise a way to ensure that results are <b>valid</b> (more than one person reading measurements).</p> <p><b>Draw conclusions</b> from the line graph, using the shape of the line and relating this to the movement of the Earth.</p>	<p>Identify <b>scientific evidence</b> that has been used to <b>refute ideas</b> – Copernicus' discovery of a heliocentric universe.</p>

	<p>Enquiry 3</p> <p>Animals Including Humans</p>	<p>Learn the difference between pattern-seeking, comparative and observation over time investigations. Identify which category an investigation falls into.</p> <p>Know that pattern-seeking investigations help us to find relationships.</p> <p>Pupils to devise <b>pattern-seeking</b> questions. Method to be written independently and followed by a class discussion so that changes can be made.</p> <p><b>Categorise</b> changes according to whether they happen to males or females, using a venn diagram. Use sources of information to conduct research and make decisions.</p>	<p>Make shared decisions about the <b>equipment</b> that may be required.</p> <p>Make shared decisions about the <b>units of measure</b> and <b>measuring apparatus</b>.</p> <p>Take <b>accurate measurements</b> using tape measures.</p>	<p>Record results in a <b>table and line graph</b>.</p> <p>Use <b>secondary sources</b> to research data and <b>record this in a table</b>.</p> <p>Use a range of <b>sources</b>.</p> <p>Interpret a <b>scatter graph</b> and compare results to own findings.</p>	<p><b>Make predictions using knowledge from experience</b> beyond school (evidence that older people have larger heads).</p> <p>Take repeat readings and carry out peer review to check <b>validity</b>.</p> <p>Draw a <b>conclusion</b> to explain the <b>causal relationship</b> between size and stage in the life cycle.</p> <p>Understand that <b>secondary sources</b> may not always be <b>reliable</b> and we might need to cross check with other sources.</p> <p>Use data found to answer questions about <b>causal relationships</b>.</p> <p>Explore <b>patterns</b> to find out if there is a <b>relationship</b> between the mass of animals and the</p>	<p>Know that scientists may have to use <b>interviews</b> to find out information. Design and <b>ask questions</b> to find out information and use these answers to draw conclusions.</p> <p>Know that <b>scientists</b> often look for <b>patterns</b> in data to come up with <b>rules</b> that help them to understand unknowns.</p>
--	--	---	--	--	---	---

				length of the gestation period.	
Enquiry 4  Forces	<p>Identify the difference between <b>comparative and fair tests</b>. Know that fair tests look for <b>causal relationships</b>.</p> <p>Independently plan a <b>comparative scientific enquiry</b>, with reminders about the stages to include.</p> <p>Devise <b>fair test</b> questions.</p> <p>Independently plan a <b>fair test enquiry</b>, making choices about the <b>variables</b> to be changed to test the impact of air resistance.</p> <p>Identify further <b>investigations</b> that could be carried out to test relationships.</p>	<p>Take <b>accurate measurements of time</b> using a stopwatch.</p> <p>Take <b>accurate measurements of force</b> using a forcemeter.</p> <p>Identify <b>variables</b> that are difficult to control.</p>	<p>Use <b>scientific diagrams</b> to show the direction of forces.</p> <p>Choose an <b>efficient way to report and present findings</b>.</p> <p>Understand the purpose of different types of graph. <b>Present findings in a bar graph</b>.</p>	<p><b>Compare findings</b> to those of others and consider what this tells us.</p> <p>Take <b>repeat readings</b> to ensure <b>reliability</b>.</p> <p><b>Design further questions</b> that could be investigated.</p> <p>Use knowledge of water resistance to make <b>predictions</b>.</p> <p>Identify <b>relationships</b> between water resistance and shape.</p> <p>Use <b>diagrams to prove conclusions</b> and to show <b>causal relationships</b> (the impact of levers, pulleys and gears on force required).</p>	<p>Identify the <b>scientific evidence</b> that has been used to <b>support or refute ideas</b> about gravity (<i>Galileo Galilei and Isaac Newton</i>).</p>
Enquiry 5	Independently plan a <b>comparative investigation</b> to explore	Take <b>accurate measurements</b> of	Use the information from <b>line graphs</b> to <b>draw conclusions</b> .	<b>Interpret data</b> from a line graph, making predictions	

<p>Properties and changes of materials</p>	<p>which material is the best thermal insulator.</p> <p>Understand the role of <b>independent, dependent and controlled variables</b> in an investigation.</p> <p>Independently plan a <b>fair test</b>, recognising and controlling the <b>variables</b>.</p> <p>Carry out a scientific <b>problem-solving investigation</b> – How can we separate a mixture?</p>	<p><b>temperature</b> using a <b>thermometer</b>.</p> <p>Pupils to consider the <b>risks</b> of using hot water and plan the <b>safety considerations</b> into their investigation planning.</p>	<p>Create own <b>tables</b> to record results.</p> <p>Make informed decisions about the type of graph that should be used.</p> <p>Make decisions about how to <b>record, report and present findings</b>.</p> <p>When presenting findings, explain how they know results are <b>accurate and reliable</b>.</p> <p>Present findings from enquiries in <b>oral and written forms</b>.</p> <p>Report using <b>first-hand observations</b> and findings from demonstrations in <b>written forms</b>.</p>	<p>about what it could be telling us.</p> <p><b>Use own results to make statements</b> about the findings.</p> <p>Use previous test results to make <b>predictions</b> about new enquiries.</p> <p>Explain why scientists take <b>repeat readings</b>.</p> <p><b>Interpret</b> a given table of results. Identify any anomalies and draw <b>conclusions</b> about the causes.</p> <p>Evaluate their investigation: <b>FAR (Fairness, Accuracy, Reliability)</b></p>	
--	--	--	--	---	--






		Knowledge of scientific methods  Models Classification Pattern-seeking Fair tests Observation	Knowledge of apparatus and techniques, including measurement  Apparatus Safety Procedures Taking measurement	Knowledge of data analysis and presentation  Graphs Tables Drawings	Knowledge of how science uses evidence to develop explanations  Evidence Validity Conclusions Peer review	Learning from scientists
YEAR SIX	Enquiry 1  Living things and their Habitats	Use <b>classification keys</b> to <b>sort</b> a range of animals.  Use and apply <b>classification processes</b> to animals in the local area, using <b>classification keys</b> and tables.  Devise own questions linked to classification keys.  Make suggestions for linked <b>pattern-seeking investigations</b> .  Use a <b>plant taxonomy</b> to <b>classify</b> plants.	Know that scientists do not disturb living things when conducting research and we must leave the sites we visit as we left them.	Know that all living things can be broken down into smaller groups using <b>classification</b> .	<b>Analyse the information</b> from classification tables to work out what it could be telling us about the local area. Record any <b>patterns</b> .  Seek data using a <b>dichotomous key</b> .  Explain why classification might be useful for us.  <b>Identify patterns</b> between living things and where they are found in the local area.	Know that scientists <b>classify</b> living things to help explain their relationships to each other and to help us learn things about newly discovered organisms by noting their similarities to known organisms.  Know that Carl Linnaeus' <b>taxonomy</b> was significant and has an impact today.  Know the <b>significance</b> of the work of Joseph Lister on medicine.

<p>Enquiry 2</p> <p>Evolution and Inheritance</p>	<p>Use a range of fossils and/or images of fossils over time and both <b>identify changes and observe changes identified by scientists.</b></p> <p>Compare the <b>adaptations</b> of animals in different habitats.</p> <p>Observe and raise questions about how local plants adapt to their environment.</p>	<p><b>Use microscopes</b> to study roots for signs of adaptation.</p> <p><b>Use magnifying glasses</b> to explore plants.</p> <p>If digging up any plants, this should be done with care.</p>	<p>Use a range of <b>secondary sources</b>, considering <b>validity and reliability</b> of information and using this to compare and contrast.</p> <p><b>Use notes and diagrams to record</b> how plants in the local area have adapted for the environment to ensure they get light and water.</p>	<p>Know how the <b>Fossil Record</b> can be interpreted.</p> <p>Use knowledge of natural selection to <b>suggest</b> how different circumstances may lead to natural selection and evolution.</p> <p><b>Use and apply knowledge</b> of climate change to consider what this means for the adaptation of living things.</p> <p><b>Use findings to make predictions</b> about the future eg could climate change lead to the extinction of further species?</p> <p>Explain how the local environment <b>supports the scientific knowledge</b> learnt during the unit.</p>	<p>Understand how scientists <b>examine</b> fossils to find out about the evolution of different species.</p> <p>Understand how scientists <b>keep records</b> and why these are useful.</p> <p>Know how Charles Darwin <b>conducted scientific studies</b> to inform his theory of evolution. This changed the way people understood human history.</p>
<p>Enquiry 3</p> <p>Electricity</p>	<p>Recognise which <b>variable</b> to control in a <b>fair test</b> and carry out a fair test to see how the number of cells in a</p>	<p>Use a <b>data logger</b> to measure the brightness of a bulb. <b>Create a scale</b> to compare according to brightness.</p>	<p>Create circuits of increasing complexity and <b>represent them using diagrams, annotated</b></p>	<p>Consider the <b>reliability of results</b> given that there is less precision with the measurements in this investigation (lesson 2). Comment on the degree</p>	<p>Know how scientists have <b>developed ideas over time and improved efficiency</b> (Nikolas Tesla).</p>

	<p>circuit affects the brightness.</p> <p><b>Raise a question</b> based on their experience.</p> <p>Plan a fair test to answer a question about how the number of cells affects the brightness of a bulb, recognising the variables and controlling these.</p> <p>Recognise with <b>more accuracy whether an investigation is comparative or a fair test</b>.</p> <p>Come up with their own linked questions.</p> <p><b>Plan a problem-solving scientific enquiry</b>, which recognises and <b>controls variables</b>, to make a working device.</p>	<p>Reflect on accuracy of measuring methods.</p>	<p><b>with scientific diagrams and labels.</b></p> <p>Record and represent findings, including drawing conclusions independently.</p> <p><b>Plan and design own table</b> for recording results.</p> <p><b>Record with increasing complexity using scientific diagrams and labels</b> the different ways to affect the function of a component in a circuit.</p> <p>Report findings and provide <b>clear explanations</b>.</p>	<p>of trust given human error or discrepancy.</p> <p>Ensure results are <b>accurate and reliable</b>.</p> <p><b>Use evidence</b> from previous lessons to <b>make predictions</b> about what will happen in a range of circuit set-ups and test the accuracy of these.</p> <p>Using the patterns found, pupils to <b>make statements based on predictions</b> about other patterns that they think they would find.</p>	<p><b>Understand why scientists use symbols</b> ie international understanding, efficiency.</p> <p>Understand in more depth why scientists often repeat readings to increase the accuracy and precision of their results.</p> <p>Identify how <b>scientists build on the work of other scientists</b> (M. Stanley Whittingham designing lithium-ion batteries).</p>
<p>Enquiry 4</p> <p>Light</p>	<p>Make decisions about how to <b>problem-solve</b>, using knowledge of how the sun travels.</p> <p><b>Investigate the relationship</b> between</p>		<p>Create <b>models</b> to show how light travels in straight lines and is <b>reflected</b>.</p> <p>Use <b>accurate drawings and annotations</b>.</p>	<p>Use knowledge of how light travels to solve a <b>problem</b>.</p> <p>Report and present findings about the refraction of light (as per</p>	<p>Identify <b>scientific evidence that has been used to support or refute ideas or arguments</b> – Isaac Newton’s discovery about the colours of light.</p>

	light sources, objects and shadows.			pencil and glass demonstration) being an example of scientific phenomenon. Explain how the demonstrations provide <b>evidence</b> .	
Enquiry 5  Animals including humans	<p><b>Devise pattern-seeking, comparative and fair test questions.</b></p> <p><b>Independently plan a pattern-seeking experiment</b> to explore the relationship between the types of exercise we can do and heart rate.</p> <p><b>Identify the variables</b> that need to be controlled.</p> <p>Write a <b>hypothesis</b>.</p> <p><b>Plan a method</b> independently for how they will keep this a fair test, <b>how they will measure and record</b>. Include <b>justification</b> for the method.</p> <p>Carry out <b>observations over time</b> to monitor sleep over the course of a week and draw conclusions.</p>	<p>Independently select apparatus and measuring equipment and methods.</p> <p>Use a heart monitor/pulse meter to <b>take measurements and read them with accuracy</b>.</p>	<p><b>Present findings in a graph</b> that pupils consider appropriate.</p> <p><b>Select an appropriate way to record</b> sleep over time.</p>	<p><b>Use diagrams to provide evidence</b> of scientific knowledge.</p> <p><b>Draw conclusions and suggest further investigations.</b></p> <p>Explore nutritional guidance and <b>draw conclusions</b>.</p>	<p>Learn about scientific evidence that has been used to <b>support or refute ideas or arguments</b> (William Harvey).</p> <p>Learn some ways in which <b>technological advancements</b> have changed our exploration of the human body.</p> <p>Understand how scientists may <b>make breakthroughs</b> in finding drugs that can help us.</p>

## The St Marys Church of England Primary School Values linked to Science

Peace	Friendship	Respect	Trust	Perseverance
				
Using my scientific knowledge to develop my responsibility to look after the world.	Sharing resources responsibly and fairly when conducting an experiment.	Respect the ideas of others and communicate my thoughts and ideas confidently and respectfully.	Trust in myself that I can achieve and make a difference.	Keep trying when skills are challenging.
Become responsible citizens through learning about the scientific world.	Working together and collaborating to develop knowledge and understanding.	Understand the importance of our own responsibility to respect the world.	Trust that my knowledge will give me confidence to inspire others.	Develop my enquiry and analytical skills when learning about scientific concepts.
Ask thoughtful questions to develop my understanding of key scientific concepts.	Understand how people have develop science to benefit the world and its people.	Be respectful and responsible when using scientific equipment.	Trust that I can perform a fair test, using the results to inform myself and others.	Aspire to be a fantastic scientist.