



# St Helena's Church of England Primary School

## Science Progression Framework



### Purpose of study

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

### Aims

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

*(National Curriculum)*

Science Progression	KS1		LKS2		UKS2	
	Year A	Year B	Year A	Year B	Year A	Year B
Learning through the context of:	Africa Enchanted Garden	London	Burps, Bottoms and Bile Stone Age - Iron Age Cracking Contraptions	Flash and Bang Ancient Egyptians River to the Sea	To Infinity and Beyond Amazing Me Design - The Apprentice	South America and the Rain Forest Great British Bake-off Son et Lumiere Farming Revolution
Visits, Visitors:	Abbey Farm Lincs Stargazing theatre		School Dentist	Flag Fen	Leicester Space Centre	Parrot zoo Alford Farming museum and Windmill

Curriculum Objectives Explored

Biology: Animals including humans	<ul style="list-style-type: none"> <li>-identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals</li> <li>-identify and name a variety of common animals that are carnivores, herbivores and omnivores</li> <li>-describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)</li> <li>-identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.</li> </ul>	<p><b>Living things and their habitats</b></p> <ul style="list-style-type: none"> <li>-explore and compare the differences between things that are living, dead, and things that have never been alive</li> <li>-identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and how they depend upon each other</li> <li>-notice that animals, including humans, have offspring which grow into adults</li> <li>-find out about and describe the basic needs of animals, including humans, for survival (water, food and air)</li> <li>-describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.</li> </ul>	<ul style="list-style-type: none"> <li>- identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food(unlike plants); they get nutrition from what they eat</li> <li>- identify that humans and some animals have skeletons and muscles for support, protection and movement.</li> <li>- describe the simple functions of the basic parts of the digestive system in humans</li> <li>- identify the different types of teeth in humans and their simple functions</li> <li>- construct and interpret a variety of food chains, identifying producers, predators and prey</li> </ul>	<ul style="list-style-type: none"> <li>-Identify and name a variety of living things (plants and animals) in the local and wider environment, using classification keys to assign them to groups</li> <li>- Recognise that environments can change and that this can sometimes pose dangers to living things.</li> </ul>	<p><b>All living things</b></p> <ul style="list-style-type: none"> <li>-Explain the differences in the life cycles of a mammal, an amphibian, an insect and a bird</li> </ul> <p><b>Animals including humans</b></p> <ul style="list-style-type: none"> <li>-Identify and name the main parts of the human circulatory system, and explain the functions of the heart, blood vessels and blood</li> <li>-Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function</li> <li>-Describe the ways in which nutrients and water are transported within animals, including humans.</li> <li>-Describe the changes as humans develop from birth to old age. Human life processes/reproduction.</li> </ul>	<p><b>Evolution and inheritance - biodiversity.</b></p> <ul style="list-style-type: none"> <li>-Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.</li> <li>-Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.</li> <li>-Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.</li> <li>-Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals.</li> <li>-Give reasons for classifying plants and animals based on specific characteristics.</li> <li>-Plant adaptations for food trade, Genetically Modified crops.</li> </ul>
	Experiments/Scientific Enquiry Opportunities Explored					

What is living in my garden and why?  
Why do some living things eat plants, and some eat other animals?  
Why do I get Goosebumps when its cold?  
How does my body work and what do my senses do?

What is my baby called?  
What do animals need in their habitats? (link to London Zoo).  
Do all animals eat the same things?  
What if there is nobody to feed them?

How does my food travel through my body?  
Why do I need to eat healthily?  
Model Digestive System  
  
What makes teeth decay?  
Egg Experiment: eggs left in a range of liquids for time.

Beach Clean-Up - Plastic Pollution  
How do humans affect nature?

How does our body work?  
What does the heart do?  
What is the pulse and how does it work? (Impact of exercise on heartrate experiment).  
How do animals and humans grow and change?  
What are the lifecycles of living things in our area?

How and why has \_\_\_\_ changed over time due to its surroundings?  
How have South American birds adapted to life in a Lincolnshire zoo?  
How do we categorise living things?

<p>Why here and why now?</p>	<p>This unit builds on the learning from EYFS by exploring themselves as human beings recognising similarities and differences between themselves and their peers celebrating diversity, equality, and differences. At the start of the year, the children learn about the different body parts and link these to their senses. At this point, the children learn specific body part names, relating to the sex education and relationships unit. This then leads into the exploration of the different animal groups through first hand practical experiences such as visits to the zoo and secondary resources such as books, photographs and videos.</p>	<p>Having being introduced to bugs and habitats in EYFS the children develop their knowledge of living things and their habitats. This is a chance for them to deepen their understanding of the basic needs for survival, the idea of a simple food chain and occurring changes in a basic lifecycle.</p>	<p>This unit builds on KS1 knowledge of basic needs of animals and humans and deepens the children's understanding of healthy body, mind and lifestyle. This unit introduces the function of major organs, teeth and the digestive system. This learning links to relationships and sex education. Prior knowledge in KS1 of animal interdependency feeds into interpreting and constructing food chains.</p>	<p>This unit uses the geography river study as the context for understanding plant and animal life in the locality and children explore the human impact on animal survival and adaptation to changing fragile environments. This is an opportunity to further explore our responsibility to care for our planet.</p>	<p>These biology objectives build well on the physical biology taught in LKS2, bringing in the aspects of mental wellbeing.</p> <p>The unit links in with Term 2's Health and Wellbeing PSHE unit, which follows on from relationships in Term 1.</p> <p>The life-cycle learning is placed in the spring term to reflect biology in nature.</p>	<p>We begin with this unit as an engaging opening to the year. This is a good opportunity for the children to learn and consider their own and humanities impact on the wider world.</p> <p>This unit either follows on from (or prepares them) with biology teaching in Year A (life cycles etc).</p> <p>The unit has an environmental focus which links well with RE teaching on considering "being a good person" and PSHE objectives on "Living in the Wider World".</p>
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Science Progression	KS1		LKS2		UKS2	
	Year 1	Year 2	Year A	Year B	Year A	Year B
Learning through the context of:	Africa Enchanted Garden	Beach Huts Barns and Bombers	Burps, Bottoms and Bile Stone Age - Iron Age Cracking Contraptions	Flash and Bang Funky Pharoahs River to the Sea	To Infinity and Beyond Amazing Me Design - The Apprentice	South America and the Rain Forest Great British Bake-off Son et Lumiere Farming Revolution
Visits, Visitors:	Abbey Farm Lincs Stargazing theatre		School Dentist	Flag Fen	Leicester Space Centre	Parrot zoo Alford Farming museum and Windmill
Curriculum Objectives Explored						
Biology: Plants	<ul style="list-style-type: none"> <li>-Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees</li> <li>-identify and describe the basic structure of a variety of common flowering plants, including trees.</li> <li><u>Seasonal changes</u></li> <li>-observe changes across the four seasons</li> <li>-observe and describe weather associated with the seasons and how day length varies.</li> </ul>	<ul style="list-style-type: none"> <li>-Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of plants, and how they depend on each other</li> <li>-identify and name a variety of plants and animals in their habitats, including micro-habitats</li> <li>-describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.</li> </ul>		<ul style="list-style-type: none"> <li>- Identify and describe the functions of different parts of flowering plants: roots, stem leaves and flowers</li> <li>- Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant</li> <li>- Investigate the way in which water is transported within plants</li> <li>-Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</li> </ul>		<ul style="list-style-type: none"> <li>**Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.</li> <li>Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals.</li> <li>Give reasons for classifying plants and animals based on specific characteristics.</li> <li>Plant adaptations for food trade, Genetically Modified crops. ** <u>(All Linked with "Evolution and Biodiversity (Animals including humans))</u></li> </ul>
	Experiments/Scientific Enquiry Opportunities Explored					

	<p>Why doesn't it snow in the summer?          Why isn't it hot in the winter?          Why are flowers their best in the spring?          Why do conifers stay green all year around?          What plants are living in our gardens?          Can we grow daffodils at Christmas time?</p>	<p>Which plants grow in our Lincolnshire countryside?          Can we eat everything that grows?          How do plants get their food?          Who are plants food for?</p>		<p>Do plants drink? (Celery in dye experiment)          How/Is a plant alive?          What do plants need to grow? (Germinating seeds in different environments experiment).</p>		<p>How are Tropical Rainforest plants adapted to suit their environment? `</p>
<p>Why here,          Why now?</p>	<p>Having explored planting in EYFS and identified the basic structure of plants, this unit builds upon their knowledge and subject specific vocabulary. Children learn about deciduous and evergreen trees. This unit develops the cultural capital by celebrating and embracing our rural community.</p>	<p>This unit is an opportunity to explore simple food chains, having acquired a brief understanding of what living things eat in EYFS. They expand their subject specific vocabulary (consumer, producer, herbivore, carnivore and omnivore).</p>		<p>This unit builds upon KS1 prior knowledge of plant growth and uses the river field study to classify and understand conditions for the life and growth of water plants.</p>		<p>(Same unit as before)</p>

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<b>Curriculum Objectives Explored</b>						
<b>Physics: Sound</b>				-Pupils should be taught to: identify how sounds are made, associating some of them with something vibrating -find patterns between the pitch of a sound and features of the object that produced it -find patterns between the volume of a sound and the strength of the vibrations that produced it		
	<b>Experiments/Scientific Enquiry Opportunities Explored</b>					
				Experiment: exploring pitch vs features of an object. Which instrument will make the loudest/highest sound? Will the wind blow the sound away? How does sound get from an object to our ears? Is there a sound if you aren't around to hear it?		
Why here, why now?				Building on knowledge of the human body, children will understand how they hear things. They will begin to understand sound production and this will link with their music curriculum		

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Curriculum Objectives Explored						
Physics: Forces, Earth and Space			<b>Forces and magnets</b> Pupils should be taught to: <ul style="list-style-type: none"> <li>- notice that some forces need contact between two objects, but magnetic forces can act at a distance</li> <li>- observe how magnets attract or repel each other and attract some materials and not others</li> <li>- compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials</li> <li>- describe magnets as having two poles</li> <li>- predict whether two magnets will attract or repel each other, depending on which poles are facing. [Mag-lev trains, Brio trainset]</li> </ul>		<b>Earth and space</b> -Describe the movement of the Earth, and other planets, relative to the Sun in the solar system -Describe the movement of the Moon relative to the Earth -Describe the Sun, Earth and Moon as approximately spherical bodies -Use the idea of the Earth's rotation to explain day and night.  <b>Forces</b> Pupils should be taught to: <ul style="list-style-type: none"> <li>-Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object</li> </ul>	<b>Forces</b> -Understand that force and motion can be transferred through mechanical devices such as gears, pulleys, levers and springs.
	Experiments/Scientific Enquiry Opportunities Explored					

			<p>Magnet Experiments: Which is strongest?  Child-led experiment (i.e how can I use a magnet to pull something?)  How much can my magnet hold?</p>		<p>What is the relationship between the Earth, Moon and Sun?  What forces are important to balance in the universe?  What are stars?  Does the sun really rise and set?  How big is space?</p>	<p>How do forces help us produce food?  Which forces are used in technology?  How does a windmill work?  Experiment: can I predict and observe forces in my own model?</p>
Why here, why now?			<p>Building on KS1's exploration of pushes and pulls, LKS2 children will investigate forces at work in leisure activities. They will practically make and test working models. This will cross over into DT and will give opportunities to apply their knowledge into a practical subject.</p>		<p>We begin the year with this unit to engage the children in the new year.</p> <p>This unit builds on a study into significant scientist Neil Armstrong (KS1, YEAR B).</p> <p>This is a good opportunity to make multiple cross curricular links with DT, Art, Music (Year 5 Unit 2 - listening) and History.</p>	<p>This unit builds on forces learning in LKS2 and offers ample opportunity to build on skills and knowledge gained in this year.</p> <p>The unit has local history links with the mill in Alford and provides opportunity for learning with DT/Computing (gears/pulleys).</p>

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Curriculum Objectives Explored						
Physics: Light				<p style="text-align: center;"><b>Light</b></p> <ul style="list-style-type: none"> <li>-notice that light is reflected from surfaces</li> <li>-find patterns that determine the size of shadows</li> <li>-recognise the need for light in order to see things and that dark is the absence of light</li> <li>-recognise light from the sun can be dangerous</li> <li>- recognise shadows are formed when the light source is blocked by an opaque object</li> </ul>		<p style="text-align: center;"><b>Light:</b></p> <ul style="list-style-type: none"> <li>-Understand that light appears to travel in straight lines</li> <li>-Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye</li> <li>-Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes</li> <li>-Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them, and to predict the size of shadows when the position of the light source changes.</li> </ul>
	Experiments/Scientific Enquiry Opportunities Explored					

				<p>Experiment: measuring length of shadows at different times of day.</p> <p>What is the best position for casting light from a torch?</p> <p>How does the position of a light source effect the length of a shadow? Shadow puppet experiment/activity.</p>		<p>Why do shadows have the same shape as the object?</p> <p>Why does the size of a shadow change?</p> <p>How do we see objects?</p> <p>Can we bend light?</p> <p>Newton's Light Spectrum Experiment</p> <p>Light refraction in water experiment.</p>
Why here, why now?				<p>This is the first opportunity children will have to understand the science behind natural light and how it travels. They will have experienced light and the seasons in KS1 and will have the knowledge to begin to explain the reasons why.</p>		<p>This unit is a good opportunity to revisit (and expand on) knowledge of light in LKS2.</p> <p>This is a chance for the children to learn in more depth about the biology of the eye.</p>

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Curriculum Objectives Explored

Physics: Electricity			<p>Electricity</p> <ul style="list-style-type: none"> <li>- identify common appliances that run on electricity</li> <li>- construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers</li> <li>- identify whether a lamp will light in a simple series circuit, based on whether the lamp is part of a complete loop with a batter</li> <li>- recognise that a switch opens and closes a circuit and associate this with whether a lamp lights in a simple series circuit</li> <li>- recognise some common conductors and insulators and associate metals with being good conductors. [make a vehicle that includes working lights]</li> </ul>			<p>Electricity</p> <ul style="list-style-type: none"> <li>-Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.</li> <li>-Compare and give reasons for variations in how components function, including the brightness of bulbs the loudness of buzzers and the on/off position of switches</li> <li>-Use recognised symbols when representing a simple circuit in a diagram.</li> </ul>	
	Experiments/Scientific Enquiry Opportunities Explored						
				<p>What materials conduct electricity? Why are wires made from copper? How does electricity pass through an object? Do living things conduct electricity? Experiment: testing how different materials conduct electricity.</p>			<p>How can you change the brightness of a bulb? How can you change the loudness of a buzzer? How can we apply out science knowledge to electrical products we use? Buzzer/bulb experiment.</p>
Why here why now?			<p>This is the first opportunity children will have to understand the science behind artificial light and how it works. They will have experienced robotic toys and games in KS1 and will have the knowledge to begin to explain the reasons why and how they operate.</p>			<p>This objective links well with light and offers opportunities for children to apply knowledge across both strands. The unit also has opportunities for cross curricular links with Design Technology and computing.</p>	

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Curriculum Objectives Explored						
Chemistry	<p><b>Everyday materials</b></p> <ul style="list-style-type: none"> <li>-distinguish between an object and the material from which it is made</li> <li>-identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock</li> <li>-describe the simple physical properties of a variety of everyday materials</li> <li>-compare and group together a variety of everyday materials on the basis of their simple physical properties.</li> </ul>	<p><b>Uses of everyday materials</b></p> <ul style="list-style-type: none"> <li>-identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses</li> <li>-find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.</li> </ul>	<p><b>States of matter</b></p> <p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <li>- compare and group materials together, according to whether they are solids, liquids or gases</li> <li>- observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius</li> </ul> <p><b>Rocks</b></p> <ul style="list-style-type: none"> <li>- compare and group together different kinds of rocks on the basis of their appearance and simple physical properties</li> <li>- describe in simple terms how fossils are formed when things that have lived are trapped within rock</li> <li>- recognise that soils are made from rocks and organic matter.</li> </ul>			<p><b>Mixtures</b></p> <ul style="list-style-type: none"> <li>-Demonstrate that dissolving, mixing and changes of state are reversible changes.</li> <li>-Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.</li> <li>-Understand that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution</li> <li>-Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating</li> <li>-Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials.</li> </ul>
	Experiments/Scientific Enquiry Opportunities Explored					
	<p>What materials do humans use every day?</p> <p>What are our houses made out of?</p> <p>Is rock a material?</p> <p>Compare how hard/soft some materials are i.e chalk and stone.</p> <p>What is the best material to have a drink from and why?</p>	<p>Experiment: How malleable are different materials?</p> <p>How can we make a waterproof boat that floats? (Experiment with one that works, and one that doesn't. Why is this?)</p> <p>Why do we use certain materials for certain jobs?</p> <p>What happens if we stretch materials? (Making predictions).</p>	<p>Scientific Observations:</p> <p>What happens when we melt chocolate?</p> <p>What happens when we cool melted chocolate?</p> <p>What are ice cubes and can you change melted ice back into frozen ice?</p> <p>How do gases work?</p>	<p>Experiment: sorting and classifying rocks.</p> <p>How do we know that dinosaurs lived?</p> <p>What is soil made out of?</p>		<p>Can we remove salt from a solution to use in baking?</p> <p>How does food change when we mix it with other products?</p> <p>How can we separate solids?</p> <p>How can we separate two liquids?</p> <p>Can we use the science of cooking to make McDonalds healthy?</p>

<p>Why here, Why now?</p>	<p>Having identified everyday materials in EYFS, this is a chance for children to deepen their understanding and expand their subject specific vocabulary. Children will explore and compare different materials and groups these accordingly. They will distinguish the difference between the object and the material.</p>	<p>This unit allows children to explore and compare the uses of everyday materials. Children are introduced to the scientific process and they begin to make predictions, design, carry out experiments and evaluate their findings.</p>				<p>These objectives consolidate and develop the understanding and knowledge of reversible/irreversible changes. The language and vocabulary are advanced (dissolve, solution, filtering) in scientific enquiry. The unit is intertwined with DT teaching in this half-term (cooking), where children can explore changes of state across the curriculum. The unit also offers opportunities for the children to further their skills in scientific enquiry/investigation and develop their ability to plan, carry out and evaluate their own experiments.</p>
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## Working Scientifically

Science Progression	KS1		LKS2		UKS2	
	Year 1	Year 2	Year A	Year B	Year A	Year B
Learning through the context of:	Africa Me and my magnificent world Castles, fairy tales and knights	Africa Me and my magnificent world Castles, fairy tales and knights	Burps, Bottoms and Bile Cracking Contraptions	Flash and Bang Stone Age - Iron Age River to the Sea	To Infinity and Beyond Amazing Me Design - The Apprentice	South America and the Rain Forest Great British Bake-off Son et Lumiere Farming Revolution
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Working Scientifically in each Phase						
Working scientifically - asking questions	Ask simple questions and recognise that they can be answered in different ways		Ask relevant questions and use different types of scientific enquiries to answer them Set up simple practical enquiries, comparative and fair tests		Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary	
Working scientifically - measuring and recording	Observe closely, using simple equipment Perform simple tests Gather and record data to help in answering questions		Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables Gather, record, classify and present data in a variety of ways to help in answering questions		Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs	
Working scientifically - concluding	Identify and classify Use their observations and ideas to suggest answers to questions		Identify differences, similarities or changes related to simple scientific ideas and processes Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions Use straightforward scientific evidence to answer questions or to support their findings		Identify scientific evidence that has been used to support or refute ideas or arguments Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations	
Working scientifically - evaluating			Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions		Use test results to make predictions to set up further comparative and fair tests	