Science Sequence and Progression at St Luke's C.E. Primary School

Intent:

At St Luke's, we recognise the importance of Science in every aspect of daily life. As one of the core subjects taught in primary schools, we give the teaching and learning of Science the prominence it requires.

In conjunction with the aims of the National Curriculum, our Science teaching offers opportunities for children to:

- 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.
- To be equipped with the scientific skills required to understand the uses and implications of science, today and for the future.
- Use a range of methods to communicate their scientific information and present it in a systematic, scientific manner, including I.C.T., diagrams, graphs and charts.

At St Luke's, we encourage children to be inquisitive throughout their time at school and beyond. The Science curriculum fosters a healthy curiosity in children about our universe and promotes respect for the living and non-living. Throughout the programmes of study, the children will acquire and develop the key knowledge that has been identified within each unit and across each year group. The key knowledge identified by each year group is informed by the national curriculum. The curriculum is designed to ensure that children are able to acquire key scientific knowledge through practical experiences; using equipment, conducting experiments, building arguments and explaining concepts confidently. Cross curricular opportunities are also identified, mapped and planned to ensure contextual relevance. Children are encouraged to ask questions and be curious about their surroundings and a love of science is nurtured through a whole school ethos and a varied science curriculum. The National Curriculum will provide a structure and skill development for the science curriculum being taught throughout the school.

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Implementation:

At St Luke's teachers create a positive attitude to science learning within their classrooms and reinforce an expectation that all pupils are capable of achieving high standards in science. Our whole school approach to the teaching and learning of science involves the following;

- Science will be taught as both a stand-alone subject and through theme planning (where applicable).
- Existing knowledge is checked at the beginning of each science topic. This ensures that teaching is informed by the children's starting points.
- Through our planning, we involve problem solving opportunities that allow children to apply their knowledge, and find out answers for themselves. Children are encouraged to ask their own questions and be given opportunities to use their scientific skills and research to discover the answers. Planning involves teachers creating engaging lessons that use precise questioning in class to test conceptual knowledge and skills, and assess pupils regularly to identify those children with gaps in learning, so that all pupils keep up. Tasks are selected and designed to provide appropriate challenge to all learners, in line with the school's commitment to inclusion.
- We build upon the knowledge and skill development of the previous years. As the children's knowledge and understanding increases, they become more proficient in selecting, using scientific equipment, collating and interpreting results, they become increasingly confident in their growing ability to come to conclusions based on real evidence.
- Children in Key stage 2 begin to develop their own investigation format and then proceed to build their own independent investigations.
- Working Scientifically skills are embedded into lessons to ensure that skills are systematically developed throughout the children's school career and new vocabulary and challenging concepts are introduced through direct teaching.
- Teachers demonstrate how to use scientific equipment, and the various Working Scientifically skills in order to embed scientific understanding.
- At the end of each topic, key knowledge is reviewed by the children and rigorously checked by the teacher and consolidated as necessary.

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Impact:

Children will receive a fun, engaging, high-quality science education, that provides children with the foundations and knowledge for understanding the world.

- Children will achieve age related expectations in Science at the end of their cohort year.
- Children will retain knowledge that is pertinent to Science with a real life context.
- Children will be able to question ideas and reflect on knowledge.
- Children will work collaboratively and practically to investigate and experiment.

Children will be able to explain the process they have taken and be able to reason scientifically.

CULTURAL CAPITAL

Our pupils will develop scientific knowledge and conceptual understanding. They will 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. We will equip the children with the scientific knowledge required to understand the uses and implications of Science, today and for the future. The children will develop the essential scientific enquiry skills to deepen their scientific knowledge. They will use a range of methods to communicate their scientific information and present it in a systematic, scientific manner. The children will develop a respect for the materials and equipment they handle with regard to their own, and other children's safety. They will develop an enthusiasm and enjoyment of scientific learning and discovery.

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Science Long Term Plan

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Reception	Human life cycles, change and growth (All about me) Senses	Investigating Light and Dark (Autumn) Seasons - Autumn	Plants Showing care and concern for living things (RE/Easter/ Growing) Seasons - Winter	Developing an understanding of decay and changes over time (dinosaurs) Seasons - Spring Teeth Brushing	Finding out about and exploring Caterpillar/frog lifecycles growth/change (mini-beasts) Exploring different animals and their habitats (mini-beasts)	Seasonal Change - Summer
Year 1	Animals including Humans	Space/ Seasonal change (Autumn)	Everyday Materials Seasonal change (Winter)	Everyday Materials	Plants	Plants Seasonal change (Summer)
Year 2	Animals including Humans	Living Things and their Habitats	Everyday Materials	Everyday Materials	Plants	Living Things and Gardens
Year 3	Animals including Humans	Forces and Magnets	Rocks and Fossils	Light and Shadows	Roots and Shoots	Plants

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Year 4	States of Matter	Sound	Electricity	Teeth and Digestion	Living Things and their Habitats	Living Things and their Habitats
Year 5	Earth and Space	Forces	Properties and Changes in Materials	Properties and Changes in Materials	Living Things and Habitats	Animals including Humans
Year 6	Light	Electricity	Living Things and their Habitats	Evolution and Inheritance	Animals including Humans	STEM Projects

National Curriculum Programme for Study			
EYFS	Understanding The World Children at the expected level of development will: - Explore the natural world around them, making observations and drawing pictures of animals and plants; 15 - Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class; - Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.		
	Autumn	Spring	Summer
Year 1	Animals including Humans Pupils should be taught to: • identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals • identify and name a variety of common animals that are carnivores, herbivores and omnivores • describe and compare the structure of a variety of common animals (fish,	Everyday Materials Pupils should be taught to: • distinguish between an object and the material from which it is made • identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock • describe the simple physical properties of a variety of everyday	Plants Pupils should be taught to: • identify and name a variety of common wild and garden plants, including deciduous and evergreen trees • identify and describe the basic structure of a variety of common flowering plants, including trees

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	amphibians, reptiles, birds and mammals including pets) • identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense **Seasonal Change** Pupils should be taught to: • observe changes across the 4 seasons • observe and describe weather associated with the seasons and how day length varies	materials • compare and group together a variety of everyday materials on the basis of their simple physical properties SCIENTIST STUDY - **Chester Greenwood** **(Inventor of Earmuffs)** **Seasonal Change** Pupils should be taught to: • observe changes across the 4 seasons • observe and describe weather associated with the seasons and how day length varies	**Seasonal Change** Pupils should be taught to: • observe changes across the 4 seasons • observe and describe weather associated with the seasons and how day length varies
Year 2	**Animals including Humans** Pupils should be taught to: • notice that animals, including humans, have offspring which grow into adults • find out about and describe the basic needs of animals, including humans, for survival (water, food and air) describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene SCIENTIST STUDY - **Florence Nightingale** **(Nurse)**	**Everyday Materials** Pupils should be taught to: • identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses • find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching	**Plants** Pupils should be taught to: • observe and describe how seeds and bulbs grow into mature plants • find out and describe how plants need water, light and a suitable temperature to grow and stay healthy

	Living Things and Their Habitats Pupils should be taught to: • explore and compare the differences between things that are living, dead, and things that have never been alive • 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 plants, and how they depend on each other • identify and name a variety of plants and animals in their habitats, including microhabitats • 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		
Year 3	**Animals including humans** Pupils should be taught to: • identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat • identify that humans and some other animals have skeletons and muscles for support, protection and movement	**Rocks and Fossils** Pupils should be taught to: • compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • describe in simple terms how fossils are formed when things that have lived are trapped within rock	**Plants** Pupils should be taught to: • identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers • explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how

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	Forces and Magnets Pupils should be taught to- • compare how things move on different surfaces • notice that some forces need contact between 2 objects, but magnetic forces can act at a distance • observe how magnets attract or repel each other and attract some materials and not others • 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 • describe magnets as having 2 poles • predict whether 2 magnets will attract or repel each other, depending on which poles are facing	• recognise that soils are made from rocks and organic matter SCIENTIST STUDY - **Anjana Khatwa** **(Geologist)** **Light and Shadows** Pupils should be taught to: • recognise that they need light in order to see things and that dark is the absence of light • notice that light is reflected from surfaces • recognise that light from the sun can be dangerous and that there are ways to protect their eyes • recognise that shadows are formed when the light from a light source is blocked by an opaque object • find patterns in the way that the size of shadows change	they vary from plant to plant • investigate the way in which water is transported within plants • explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal
Year 4	**States of Matter** Pupils should be taught to: • compare and group materials together, according to whether they are solids, liquids or gases • 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 (mC)	**Electricity** Pupils should be taught to: • identify common appliances that run on electricity • construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers • identify whether or not a lamp will	**Living things and their habitats** Pupils should be taught to: • recognise that living things can be grouped in a variety of ways • explore and use classification keys to help group, identify and name a variety of living things in

	• identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature **Sound** Pupils should be taught to: • identify how sounds are made, associating some of them with something vibrating • recognise that vibrations from sounds travel through a medium to the ear • 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 • recognise that sounds get fainter as the distance from the sound source increases	light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery • recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit • recognise some common conductors and insulators, and associate metals with being good conductors **Animals including humans** Pupils should be taught to: • describe the simple functions of the basic parts of the digestive system in humans • identify the different types of teeth in humans and their simple functions • construct and interpret a variety of food chains, identifying producers, predators and prey	their local and wider environment • recognise that environments can change and that this can sometimes pose dangers to living things **SCIENTIST STUDY - Wangari Maathai (Biologist and environmental activist awarded the 2004 Nobel Peace Prize)**
Year 5	**Earth and Space** Pupils should be taught to: • 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	**Properties and Changes in Materials** Pupils should be taught to: • compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets • know that some materials will dissolve	**Living Things and their Habitats** Pupils should be taught to: • describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird • describe the life process of reproduction in some plants and animals **SCIENTIST STUDY -**

	• use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky **Forces** Pupils should be taught to: • explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object • identify the effects of air resistance, water resistance and friction, that act between moving surfaces • recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect	in liquid to form a solution, and describe how to recover a substance from a solution • use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating • give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic • demonstrate that dissolving, mixing and changes of state are reversible changes • 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	**David Attenborough (Naturalist and TV presenter)** **Animals Including Humans** Pupils should be taught to: • describe the changes as humans develop to old age
Year 6	**Light** Pupils should be taught to: • recognise that light appears to travel in straight lines • 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 • explain that we see things because light travels from light sources to our eyes or	**Living Things and their Habitats** Pupils should be taught to: • 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 • give reasons for classifying plants and animals based on specific	**Animals including Humans** Pupils should be taught to: • identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood • recognise the impact of diet, exercise, drugs and lifestyle

	from light sources to objects and then to our eyes • use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them **Electricity** Pupils should be taught to: • associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit • 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 • use recognised symbols when representing a simple circuit in a diagram	characteristics **Evolution and Inheritance** Pupils should be taught to: • recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago • recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution SCIENTIST STUDY - **Charles Darwin** **(Natural Historian)**	on the way their bodies function • describe the ways in which nutrients and water are transported within animals, including humans •

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Progression of Working Scientifically Skills							
	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Questioning and Enquiry Planning	Begin to ask simple questions about the world around them.	Ask simple questions.	Ask more complex questions and look at different points of view.	Ask relevant questions and use different types of scientific enquiries to answer them.	Ask relevant questions and make own decisions about the most appropriate type of scientific enquiry they might use to answer questions.	Explore ideas and raise different kinds of questions. Select and plan the most appropriate type of scientific enquiry to use to answer scientific questions.	Plan different types of scientific enquiries to answer questions, including recognising and identifying controlling variables where necessary. Raise different types of questions.
Observations	Observe similarities and differences. Make observations of animals and plants.	Observe closely using simple equipment.	Make refined observation through use of equipment. Use observations and ideas to	Make systematic and careful observations through the use of equipment.	Make systematic and careful observations through the use of equipment with increasing	Observe and take measurements, using a range of equipment, with increased accuracy.	Observe and make accurate measurements using a range of methods for different investigations.

			suggest a variety of answers.		independence and confidence.		
Identifying Grouping and Classifying	Group and sort with support.	Identify and Classify. Use observations and ideas to suggest answers.	Group, sort and classify.	Group, sort, compare and classify using simple keys.	Use own criteria to group, sort, compare and classify using simple keys.	Use and develop keys and other information records to identify, classify and describe.	Use and develop keys and other information records to identify, classify and describe with increased accuracy.
Investigating	Talk about the features of their own immediate environment and how environments might vary.	Perform simple tests.	Perform simple tests with increasing independence and confidence.	Set up simple practical enquiries, comparative and fair tests.	Set up simple practical enquiries, comparative and fair tests, with increasing independence and confidence.	Use test results to make predictions and set up further comparative and fair tests.	Select, plan and carry out the most appropriate types of scientific enquiries to test predictions. Suggest improvements to plans and explain the reasons why.

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Recording and Reporting Findings	Gather and record data in a way they can verbally explain to answer their own questions.	Gather and record data to answer questions.	Gather and record data accurately to answer questions confidently.	Gather, record, classify and present data to answer questions. Record findings using simple scientific language, diagrams and charts. Take accurate measurements using a range of equipment.	Gather, record, classify and present data to answer questions, including diagrams and charts, and oral and written explanations.	Record data and results of increasing complexity using diagrams and graphs etc.	Present observations and data using appropriate methods.
Reviewing and Conclusions	Talk about what they have found out.	Talk about what they have found out and how they found out.	Talk about what they have found out, how they found it out and suggest simple changes to the investigation.	Report on findings- including results and conclusions. Use results to draw simple conclusions, predictions and suggest improvements and raise questions.	Report on findings- including results and conclusions. Use results to draw simple conclusions, predictions and suggest improvements and raise questions that	Report and present findings from enquiries, including conclusions and explanations of results. Identify scientific evidence that has been used	Interpret observations and data, including identifying patterns and data to draw conclusions. Present and evaluate reasoned explanations, including data

				Identify differences, similarities or changes.	arise from data making new predictions.	to support or refute ideas. Use results to make predictions to set up further comparative tests.	in relations to predictions and hypotheses. Identify further questions arising from results to make predictions to set up further comparative tests.

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Progression of Skills						
Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
During the EYFS, pupils should be encouraged to • ask questions about the world around them. To explore the natural world, make observations and drawings of animals and plants. • know some similarities and differences between the natural world around them and contrasting environments. • understand some important processes and changes in the	During years 1 and 2, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content: • asking simple questions and recognising that they can be answered in different ways • observing closely, using simple equipment • performing simple tests • identifying and classifying • using their observations and ideas to suggest answers to questions • gathering and recording data to help in answering questions.		During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content: • asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative and fair tests • making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, • using a range of equipment, including thermometers and data loggers • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions		During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content: • planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries,	

natural world around them, including the seasons and changing states of matter.		• recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes using straightforward scientific evidence to answer questions or to support their findings.	including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • identifying scientific evidence that has been used to support or refute ideas or arguments.