Longney CofE Primary Academy
Science Curriculum
Progression and 2 Year Rolling Programme

Working Scientifically

At Longney, we use the following language, shared with the children, to describe the key elements of scientific enquiry:

Our science curriculum is planned around key scientific questions. Each unit starts with the asking of a scientific question and a prediction of what they think the answer will be based on prior knowledge. Each unit finishes with the answering of the same question using newly acquired knowledge and vocabulary.

Types of Scientific Enquiry

The types of scientific enquiry children will encounter repeatedly throughout our curriculum are set out below – these are carefully planned into the rolling programme to ensure breadth of experience:

Name	What is it?	Example
Research	Pupils find out about a subject through a secondary source	Reading books or websites, watching a video, talking to someone, input from the teacher, looking at photographs
Pattern seeking	Gathering data through another type of enquiry, recording it and looking for a pattern	Survey of flowers in the school grounds, taking your heartbeat when doing different exercises
Comparative test	Comparing one thing with another by testing them	Which different materials are waterproof, measuring the size of different shadows throughout the day.
Fair test	Testing something by changing one variable	Growing plants in different areas around the classroom to see which grows best – the variable is the place in the classroom, everything else is kept the same.
Observation over time	Observing to see how something changes over time	Taking a photograph of a tree through different seasons, watching a time lapse video of the impact of fizzy drinks on teeth or a plant growing from a bulb.
Observation in the moment	Observing with your senses to understand something further	Looking at a leaf through a magnifying glass, holding different materials to understand what they look and feel like, tasting different fruits
Identifying, grouping and classifying	Establish what something is, group it with other things that are the same, give that group a name	Carnivores, deciduous trees, waterproof materials.
Problem solving	Try out different ways of doing something to see which one works most effectively	Give the children equipment they could use to separate materials and see which one works best e.g. sieves, filters, spoons, funnels

Enquiry Skills Progression Grid

When carrying out one of the above different types of enquiry, progression in enquiry skills will be achieved as set out below:

	Asking questions	Making predictions	Setting up tests	Observing and measuring	Recording data	Interpreting and communicating results	Evaluating
Skylark Class	What simple question do I want to answer?	What do I think is the answer? Why? Identifying scientific evidence that has been used to support or refute ideas or arguments	Whole class carries out the same type of enquiry: What will we do? What equipment do we need? What will we change and what will we keep the same?	Magnifying glasses Specimen pots Ultraviolet light Ruler - Measuring in cm Large playground stopwatch - measuring in minutes and seconds Frequency counting e.g. how many plants or animals in an area. Using 5 senses to describe. Using their observations to suggest answers to questions.	Year 1 – tally chart and frequency table whole class Year 2 – tally chart and frequency table independently	Orally in the moment and through class discussion What do the results tell me? Was my prediction correct?	Orally in the moment and through class discussion What went well? What would I do better next time?

	Asking questions	Making predictions	Setting up tests	Observing and measuring	Recording data	Interpreting and communicating results	Evaluating
Goldfinch Class	What do I want to find out?	What do I predict is the answer? What do I know or have observed already that has made me predict this?	Whole class carries out the same test: What will we do? Introduction of vocabulary - method. What one thing will we change? Introduction of vocabulary – variable. What will we keep the same in order to make it a fair test? Introduction of vocabulary – constant What is the most effective equipment we could use? Do we have that equipment in school?	iPads photographs to magnify Measuring in ml, cm and mm Data loggers - thermometer	Pictogram where the symbol represents a single item (year 3) and multiple items (year 4) Block diagrams Drawings Labelled diagrams Keys Tables	What do my results tell me? Has anything changed? Was my hypothesis correct? How do I know? Can I spot any similarities or differences?	Class discussion followed by individual recording What went well? What would I do differently next time? What further question do I now have?

	Asking questions	Making predictions	Setting up tests	Observing and measuring	Recording data	Interpreting and communicating results	Evaluating
Swift Class	What questions could I answer on this topic? Which one am I going to answer today?	What is my evidence-based hypothesis? What do I know or have observed already that has helped me form this hypothesis? Introduction of the word hypothesis	As above but independently choosing different approaches and setting up their own tests – not whole class. Recognising and controlling the variables. Setting up a second test based on a further prediction after looking at the results of their first test.	Online microscopes e.g. virtualmicroscope.org Data loggers – light Increasing accuracy and repeat readings when appropriate.	Pictogram where the symbol represents multiple items Bar chart Time graph Scientific diagrams and labels Classification keys Scatter graph	What do the results tell me? What caused these results? What do I know now that I didn't know before? Was my evidence-based hypothesis correct? How do I know? If not, what new evidence proves this? What further prediction could I now make and how could I go on to test this? Identifying scientific evidence that has been used to support or refute ideas or arguments.	Independent written evaluation Presentation of findings in oral and written forms. Did I answer the question I set out to? Do I have enough proof, to answer the question for definite? What else would I need to do to be sure? How much trust can I put in to the results and why? How could the test be changed to make it more effective in the future? What question would I want to answer to provide a next step in this enquiry?

During each unit, there will be a 'scientific enquiry focus' which allows more time to be spent on modelling and assessing one key enquiry skill. This is the part of the enquiry that ***must*** be recorded independently in books during that unit. The other steps of the enquiry as set out above ***may*** be completed orally during an enquiry but will not always be recorded in books.

Two-year rolling programme

Skylark Class

National Curriculum Key Stage 1 working scientifically objectives – these are taught through our enquiry skills focus and through the different types of scientific enquiry outlined above and planned for across the two-year rolling programme:

- Asking simple questions and recognising that they can be answered in different ways.
- Using their observations and ideas to suggest answers to questions.
- Identifying and Classifying
- Gathering and recording data to help in answering questions
- Performing simple tests
- Observing closely, using simple equipment

Year	Term	Enquiry question	NC Unit	Knowledge objectives (National Curriculum)	Types of enquiry	Scientific Equipment – new equipment needs to be modelled.	Enquiry Skills Focus
Year A	Autumn 1	Am I a predator?	Living things and their habitats	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.	Identifying, grouping and classifying Research		
	Autumn 2	Why is a rock not alive?	Animals including humans Living things and	Living things and their habitats - Explore and compare the differences between things that are living, dead and things that have never been alive. Animals including humans - Notice that animals, including humans, have offspring which grow into adults.	Research Observation over time (offspring growing in to adults)		 

			their habitats	Find out about and describe the basic needs of animals, including humans, for survival (water, food and air)	Observation in the moment Identifying, grouping and classifying		
	Spring 1	Could a polar bear live in Longney?	Living things and their habitats	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 micro habitats.	Research Identifying, grouping and classifying Observation in the moment	Specimen pots Magnifying glasses	
	Spring 2	Can you grow a plant anywhere?	Plants	Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. Observe and describe how seeds and bulbs grow into mature plants.	Research Fair test Pattern seeking Observation over time (observe the plants as they grow over the whole term).	Rulers to measure height of plant in cm and compare heights using 1st, 2nd, 3rd	 
	Summer 1	Why aren't windows made out of wood?	Uses of Everyday Materials	Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.	Identifying, grouping and classifying Comparative test Pattern seeking		

	Summer 2	Can we shape glass?	Uses of Everyday Materials	Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	Comparative test Pattern seeking Observation in moment Problem solving		
Year B	Autumn 1	Why is a rock a rock?	Uses of Everyday Materials	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 materials. Compare and group together a variety of everyday materials on the basis of their simple physical properties.	Identifying, grouping and classifying Comparative test Pattern seeking Observation in the moment		 
	Autumn 2	How does my body heal?	Animals including humans	Describe the importance for humans of hygiene (use e-bug materials – book stored in staffroom)	Research Observation in the moment Fair test	Ultraviolet light	 
	Spring 1	What makes a healthy me?	Animals including humans	Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. Describe the importance for humans of exercise and eating the right amounts of different types of food.	Research Identifying, grouping and classifying Pattern seeking	Large playground stopwatch	 
	Spring 2	Are all animals the same?	Animals including humans	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.	Identifying, grouping and classifying Research		

				Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets).			
	Summer 1	What's growing in Longney?	Plants	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.	Research Identifying, grouping and classifying Observation in the moment	Magnifying glasses	
	Summer 2	How do we look after our habitat in Longney?	Living things and their habitats	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. Note - this is an extra enquiry – the children have learnt these objectives in an enquiry in Year A – the focus this time should be on Longney as a habitat and what animals and plants live in Longney and how we can help preserve this habitat.			

<u>Cross-curricular Links</u>

Science Year	Subject Year and Term	Subject	NC Unit	Knowledge objectives (National Curriculum)	Types of enquiry	Scientific Equipment – new equipment needs to be modelled.	Enquiry Skills Focus
Year A and B	Autumn, Spring and Summer	Gardening Sessions and Forest School	Plants	Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees.	Identifying, grouping and classifying	Magnifying glasses Gardening tools	

				Identify and describe the basic structure of a variety of common flowering plants, including trees. Observe and describe how seeds and bulbs grow into mature plants. Observe changes across the four seasons. Observe and describe weather associated with the seasons and how day length varies.	Observation in the moment Observation over time		

Goldfinch Class

National Curriculum Lower Key Stage 2 working scientifically objectives – these are taught through our enquiry skills focus and through the different types of scientific enquiry outlined above and planned for across the two-year rolling programme:

- 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
- 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.

Year	Term	Enquiry question	NC Unit	Knowledge objectives (National Curriculum)	Types of enquiry	Scientific Equipment – new equipment needs to be modelled.	Enquiry Skills Focus
Year A	Autumn 1	How and why does a lion chase its prey?	Animals including humans	Construct and interpret a variety of food chains, identifying producers, predators and prey. Identify that humans and some other animals have skeletons and muscles for support, protection and movement.	Research Pattern seeking		
	Autumn 2	Where does my food go?	Animals including humans	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.	Research Observation in the moment	Mirror	
	Spring 1	Is the sun plugged in?	Electricity	Identify common appliances that run on electricity. Construct a simple electrical circuit, identifying and naming the basic parts including cells, wires, bulbs, switches and buzzers. Identify whether or not a lamp will light in a simple series circuit, based on whether or not	Research Fair test Problem solving	Electrical circuit equipment e.g. battery, wires, buzzer, bulb	

				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.			
	Spring 2	Can I make ice disappear?	States of matter	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.	Identifying, grouping and classifying Observation over time Comparative test Pattern seeking	Thermometer on data logger	
	Summer 1	So where did the ice really go?	States of Matter	Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. Describe and understand key aspects of the water cycle – geography NC objective.	Fair test Research	Thermometer on data logger Ruler (cm and mm)	
	Summer 2	Why do we need bees?	Plants	Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers.	Research Observation over time Problem solving – seed dispersal		
Year B	Autumn 1	How do cats' eyes keep me safe?	Light	Notice that light is reflected from surfaces.	Research Observation in the moment Problem solving		Setting up tests

	Autumn 2	Can rocks change?	Rocks	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. Recognise that soils are made from rocks and organic matter.	Research Identifying, grouping and classifying Observation in the moment Observation over time	iPad photographs to magnify petri dish for samples	
	Spring 1	Does everything I touch really move?	Forces and Magnets	Notice that some forces need contact between two 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 two poles. Predict whether two magnets will attract or repel each other, depending on which poles are facing.	Comparative test Observation in the moment Identifying, grouping and classifying	Magnets	Prediction
	Spring 2	Which surface is best for speed?	Forces and Magnets Properties and changes of materials.	Compare and group together everyday materials on the basis of their properties including their hardness and transparency. Give reasons based on evidence from comparative and fair tests, for the particular use of everyday materials, including metals, wood and plastic. Compare how things move on different surfaces.	Comparative test Fair test Pattern seeking	Stop watch	

	Summer 1	Why can't pigs fly?	Living things and their habitats	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 their local and wider environment.	Identifying, grouping and classifying Pattern seeking in the local environment	ICT link- ipad app for creating classification keys	
	Summer 2	Can plants grow in the desert?	Plants	Investigate the way in which water is transported within plants. Explore the requirements for plants for life and growth (air, light, water, nutrients from the soil and room to grow) and how they vary from plant to plant.	Fair test	Measuring cylinders (ml)	

Cross-curricular Links

Subject	NC Unit	Knowledge objectives (National Curriculum)
Gardening Sessions and Forest School	Plants	Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers.
D&T/PSHE	Animals including humans	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.
D&T	Electricity	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.
D&T	Light	Recognise that they need light to see things and that dark is the absence of light. Recognise that shadows are formed when the light from a light source is blocked by a solid object. Find patterns in the way that the size of shadows change.
Music	Sound	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 produce 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.
Geography	States of Matter	Describe and understand key aspects of the water cycle.

Swift Class

National Curriculum Upper Key Stage 2 working scientifically objectives – these are taught through our enquiry skills focus and through the different types of scientific enquiry outlined above and planned for across the two-year rolling programme:

- 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, including conclusions, causal relationships and explanations of and a 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

Year	Term	Enquiry question	NC Unit	Knowledge objectives (National Curriculum)	Types of enquiry	Scientific Equipment – new equipment needs to be modelled.	Enquiry Skills Focus
Year A	Autumn 1	What does a Kangaroo have in common with a stomach bug?	Living things and their habitats	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 characteristics.	Identifying, grouping and classifying Research		
	Autumn 2	Can we bend the sun's rays?	Light	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 from light sources to objects and then to our eyes.	Problem solving Pattern seeking Research		

				Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.			
	Spring 1	Why do giraffes have long necks?	Evolution and Inheritance	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.	Observation over time Observation in the moment Research Pattern seeking	Online microscope	
	Spring 2	How can we make our school eco-friendly? (Net-zero project)	Living things and their habitats	Recognise that environments can change and that this can sometimes pose dangers to living things. *Non-statutory: Pupils should explore examples of human impact (both positive and negative) on environments, for example, the positive effects of nature reserves, ecologically planned parks, or garden ponds and the negative effects of population and development, litter or deforestation*	Research Problem Solving		
	Summer 1	Can I make my heartbeat faster?	Animals including humans	Identify and name the main parts of the human circulatory system and describe the functions of the heart, blood vessels and blood. Describe the ways in which nutrients and water are transported within animals including humans.	Research		
	Summer 2	What am I like on the inside?	Animals including humans	Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.	Pattern seeking		

Year B	Autumn 1	Why is it night-time in Australia and day-time here?	Earth and Space	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 objects. Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.	Research Observation over time		
	Autumn 2	How does my torch work?	Electricity	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. Compare and group together everyday material on the basis of their conductivity (electrical and thermal).	Problem solving Pattern seeking		
	Spring 1	Do all living things lay eggs?	Living things and their habitats	Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. Describe the process of reproduction in some plants and animals.	Research Identifying, grouping and classifying		
	Spring 2	Can I get salt out of the sea?	Properties and changes of materials	Know that some materials will dissolve in liquids 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. Demonstrate that dissolving, mixing and changes of state are reversible changes.	Problem solving Comparative test Identifying, grouping and classifying		

				Compare and group together everyday materials on the basis of their properties including their solubility.			
	Summer 1	Why don't we fall off the Earth?	Forces	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, friction and water resistance that act between moving surfaces.	Comparative test Pattern seeking		
	Summer 2	Can I turn my toast back to bread?	Properties and changes of materials	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.	Observation over time Pattern seeking		

Cross-curricular Links

Subject	NC unit	Knowledge objectives
D&T	Electricity	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. Compare and group together everyday material on the basis of their conductivity (electrical and thermal).
RE	Evolution and Inheritance	Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago
PSHE	Animals including humans	Describe the changes as humans develop to old age
D&T	Forces	To recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect.