

Lily Lane Primary School – The Science Curriculum

Pillars of our science curriculum:

At Lily lane Primary School our Science curriculum is built on an understanding that expertise in science requires children to build at least 2 forms, or categories, of knowledge:

The first is **substantive knowledge**, which is knowledge of the products of science, such as models, laws, and theories. To ensure that our children develop, over time, their knowledge of substantive concepts we have grouped this knowledge into the following disciplines as outlined in the national curriculum:

1. Biology 2. Physics 3. Chemistry

The second is **disciplinary knowledge**, which is knowledge of the practices of science. This teaches children how scientific knowledge becomes established and gets revised. Importantly, this involves children learning about the many different types of scientific enquiry. To ensure that our children develop, over time, their knowledge of working scientifically, we have grouped this knowledge into the following areas:

1. Asking questions
2. Making predictions
3. Setting up tests
4. Observing and measuring
5. Recording data
6. Interpreting and communicating results
7. Evaluating

Practical enquiries

This involves any teaching and learning activity which at some point involves the children in observing or manipulating the objects and materials they are studying. Practical enquiries can refer to a teacher demonstration, research or a hands-on practical enquiry for children. These are the different types of enquiry:

1. Observing over time
2. Pattern seeking
3. Identifying, classifying and grouping
4. Comparative and fair testing
5. Researching using secondary sources

Learning about scientists

When applicable pupils will learn about scientists that link to the content that they were learning at that time. For example, learning about the work of Mae Jemison when studying space.

EYFS curriculum

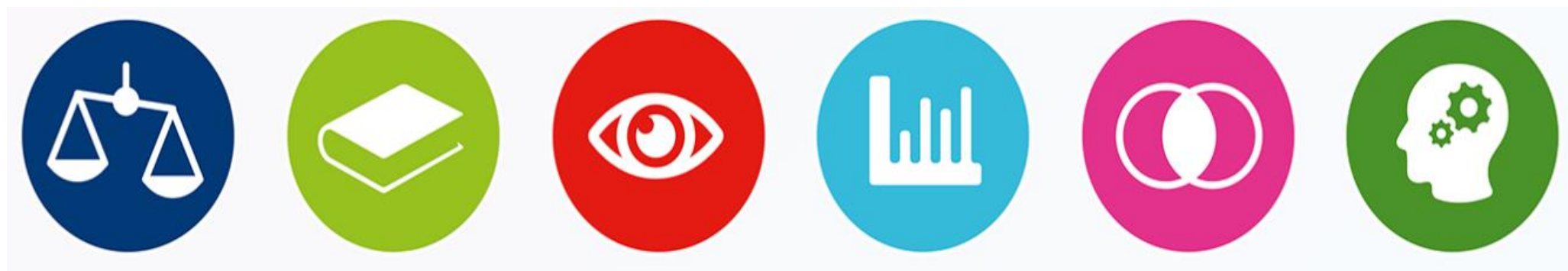
The substantive knowledge has been taken directly from the Development Matters curriculum. Where there is 'missing' knowledge, there is no requirement within that unit and teachers should refer to the sticky knowledge and bridging from EYFS to Year 1 documents, where they will find this knowledge mapped out for them to ensure bridging into year 1 is successful and the children have the required knowledge to access the national curriculum.

Programme of study

Substantive Knowledge (Linked documents: The National Curriculum and Development Matters)

Biology Biology is the part of science that studies life and all living things.		Physics Physics is the part of science that studies matter and its movement as well as how it interacts with energy and forces.		Chemistry Chemistry is the part of science that studies the properties of matter and how they can change with energy.	
Animals including humans	Living things and their habitats	Seasonal change	Earth and space	Everyday materials	Uses of everyday materials
Plants	Evolution and inheritance	Light	Forces	States of matter	Properties and changes of materials
		Sound	Electricity	Rocks	

Disciplinary Knowledge – Working Scientifically (Linked document: Disciplinary knowledge progression)



Comparative fair testing

Research

Observing over time

Pattern seeking

Identifying, grouping
and classifying

Problem solving

Whole School Curriculum Map

Nursery						
Knowledge	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Substantive	<u>Explore signs of Autumn</u>	<u>Explore signs of winter</u>	<u>Light</u>	<u>Living things and habitats</u> Begin to understand the need to respect and care for the natural environment and all living things.	<u>Animals</u> Understand the key features of the life cycle of an animal.	<u>Forces</u> Explore and talk about different forces they can feel.
	<u>Humans</u> Continue developing positive attitudes about the differences between people	<u>Materials</u> - Talk about the differences between materials and changes they notice. - Use all their senses in hands-on exploration of natural materials. - Explore collections of materials with similar and/or different properties.			<u>Plants</u> - Plant seeds and care for growing plants. - Understand the key features of the life cycle of a plant.	
	<u>Sounds</u>	<u>Electricity</u>				
Disciplinary These MUST be taught in each unit. Refer to the disciplinary knowledge progression document to see the detail of each skill and to add others to your planning you think are relevant.	Observing over time	Observing over time Identifying, grouping and classifying.	Identifying, grouping and classifying.	Research	Observe over time	Comparative/fair testing
Disciplinary Statements from Development Matters	Talk about what they see, using a wide vocabulary. Explore how things work. Show interest in different occupations					

Reception						
Knowledge	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Substantive	<u>Humans</u> Describe what they see, hear and feel whilst outside (senses)	<u>Light</u>	<u>Materials</u> Understand some important processes and changes in the natural world around them, including changing states of matter	<u>Living things and their habitats</u> - Explore the natural world around them, making observations and drawing pictures of animals and plants - Know some similarities and differences between the natural world around them and contrasting environments - Recognise some environments that are different to the one in which they live	<u>Seasonal changes</u> - Understand some important processes and changes in the natural world around them, including the seasons - Understand the effect of changing seasons on the natural world around them	<u>Animals</u> Explore the natural world around them, making observations and drawing pictures of animals
			<u>Forces</u>	<u>Bees</u>		
	<u>Seasonal Changes</u> - Understand some important processes and changes in the natural world around them, including the seasons - Understand the effect of changing seasons on the natural world around them	<u>Seasonal Changes</u> - Understand some important processes and changes in the natural world around them, including the seasons - Understand the effect of changing seasons on the natural world around them	<u>Seasonal Changes</u> - Understand some important processes and changes in the natural world around them, including the seasons - Understand the effect of changing seasons on the natural world around them	<u>Seasonal changes</u> - Understand some important processes and changes in the natural world around them, including the seasons - Understand the effect of changing seasons on the natural world around them	<u>Light</u>	<u>Seasonal Changes</u> - Understand some important processes and changes in the natural world around them, including the seasons - Understand the effect of changing seasons on the natural world around them
Disciplinary These MUST be taught in each unit. Refer to the disciplinary knowledge	Observing over time. Research.	Observing over time.	Observing over time.	Identifying, grouping and classifying.	Observing over time.	Identifying, grouping and classifying.

progression document to see the detail of each skill and to add others to your planning you think are relevant.				Observing over time.		Observing over time.
Disciplinary Statements from Development Matters	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					

Year 1

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Program of study	Animals including humans	Everyday materials	Animals including humans	Everyday materials	Seasonal Changes	Plants
Substantive Knowledge See the National Curriculum for the notes and guidance for each unit.	- identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals - describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)	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	- identify and name a variety of common animals that are carnivores, herbivores and omnivores - identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense	- compare and group together a variety of everyday materials on the basis of their simple physical properties.	- observe changes across the four seasons - observe and describe weather associated with the seasons and how day length varies	- 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.
Disciplinary Knowledge These MUST be taught in each unit. Refer to the disciplinary knowledge progression document to see the detail of each skill and to add others to your planning you think are relevant.	Identifying, grouping and classifying Research	Identifying, grouping and classifying Pattern Seeking	Identifying, grouping and classifying Research	Comparative fair testing Problem solving	Observing over time	Observing over time Identifying, grouping and classifying

Year 2

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Program of study	Uses of everyday materials	Living things and their habitats	Animals, including humans	Animals, including humans	Everyday Materials	Plants
Substantive Knowledge See the National Curriculum for the notes and guidance for each unit.	identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses	- 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 - 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	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	find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching	- 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
Disciplinary Knowledge These MUST be taught in each unit. Refer to the disciplinary knowledge progression document to see the detail of each skill and to add others to your planning you think are relevant.	Identifying, grouping and classifying Comparative fair testing Problem solving	Identifying, grouping and classifying Research	Observe over time Pattern seeking	Identifying, grouping and classifying Comparative fair testing	Identifying, grouping and classifying Comparative fair testing Problem solving	Observing over time Pattern seeking Comparative fair testing
Year 3						
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2

Program of study	Animals, including humans	Forces	Animals, including humans	Light	Rocks	Plants
Substantive Knowledge See the National Curriculum for the notes and guidance for each unit.	identify that humans and some other animals have skeletons and muscles for support, protection and movement.	- compare how things move on different surfaces - 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	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	- 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	- 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	- 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 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
Disciplinary Knowledge These MUST be taught in each unit. Refer to the disciplinary knowledge progression document to see the detail of each skill and to add others to your planning you think are relevant.	Identifying, grouping and classifying Pattern seeking Research	Pattern seeking Identifying, grouping and classifying Problem solving	Pattern seeking Identifying, grouping and classifying	Comparative fair testing Pattern seeking	Pattern seeking Identifying, grouping and classifying	Pattern seeking Observing over time
Year 4						
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2

Program of study	Living things and their habitats	States of matter	Animals, including humans	Living things and their habitats	Electricity	Sound
Substantive Knowledge See the National Curriculum for the notes and guidance for each unit.	- 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	- 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 (°C) - identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature	- 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	- recognise that environments can change and that this can sometimes pose dangers to living things  Rule of law (the environment, pollution, littering, deforestation)	- 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 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	- 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
Disciplinary Knowledge These MUST be taught in each unit. Refer to the disciplinary knowledge progression document to see the detail of each skill and to add others to your planning you think are relevant.	Identifying, grouping and classifying	Identifying, grouping and classifying Observing over time	Pattern seeking Research	Pattern seeking Research	Pattern seeking	Pattern seeking Problem solving
Year 5						
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2

Program of study	Properties and changes of materials	Earth and space	Animals, including Humans	Living Things and their Habitats	Properties and changes of materials	Forces
Substantive Knowledge See the National Curriculum for the notes and guidance for each unit.	- 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 - give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic	- 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 and the apparent movement of the sun across the sky	describe the changes as humans develop to old age	- 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 - 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	- know that some materials will dissolve 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 - 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	- 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
Disciplinary Knowledge These MUST be taught in each unit. Refer to the disciplinary knowledge progression document to see the detail of each skill and to add others to your planning you think are relevant.	Identifying, grouping and classifying Comparative testing Problem solving	Pattern seeking Observing over time	Pattern seeking Research	Pattern seeking Scientists: David Attenborough and Jane Goodall	Pattern seeking Identifying, grouping and classifying Scientist: Spencer Silver	Pattern seeking Research Problem solving Scientists: Galileo Galilei and Isaac Newton.

Year 6						
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Program of study	Living things and their habitats	Evolution and Inheritance	Animals including humans	Light	Electricity	
Substantive Knowledge See the National Curriculum for the notes and guidance for each unit.	- 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	- 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	- 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 on the way their bodies function - describe the ways in which nutrients and water are transported within animals, including humans  Rule of law (drugs)	- 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 - use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them	- 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	
Disciplinary Knowledge These MUST be taught in each unit. Refer to the disciplinary knowledge progression document to see the detail of each skill and to add others to your planning you think are relevant.	Identifying, grouping and classifying Scientist: Carl Linnaeus	Identifying, grouping and classifying Scientist: Carl Linnaeus Pattern seeking Research Scientists: Charles Darwin and Alfred Wallace	Pattern seeking Comparative fair testing	Pattern seeking Problem solving	Pattern seeking Comparative fair testing	