Lutley Primary School

Curriculum Progression Document

Science

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Lutley Primary School

Science Curriculum Intent

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Lutley Primary School Curriculum Intent

As a values-led school, our curriculum is underpinned by Learning, Caring, Aiming High-Together. It is through these values that we develop the whole child. It is our intent that children leave Lutley ready to move forward in their learning, kind, resilient and well equipped digital and global citizens.

Science Subject Intent

It is our intent that children will have a secure and broad knowledge of the physical, chemical and biological scientific world around them. This will be achieved through exploration, observation, critical thinking and working scientifically. Through allowing equal scientific opportunities for all, children will develop a passion for exploring, unpicking and unlocking the world of science. Children will plan and carry out their own investigations, experiments and fieldwork, solving challenging problems and reporting scientific findings.

Essential Characteristics in the Subject

- The ability to think independently and raise questions about working scientifically and the knowledge and skills that it brings.
- Confidence and competence in the full range of practical skills, taking the initiative in, for example, planning and carrying out scientific investigations.
- Excellent scientific knowledge and understanding which is demonstrated in written and verbal explanations, solving challenging problems and reporting scientific findings.
- High levels of originality, imagination or innovation in the application of skills.
- The ability to undertake practical work in a variety of contexts, including fieldwork.
- A passion for science and its application in past, present and future technologies.

Curriculum Concepts

Work scientifically.
This concept involves learning the methodologies of the discipline of science.
Understand plants.
This concept involves becoming familiar with different types of plants, their structure and reproduction.
Understand animals and humans.
This concept involves becoming familiar with different types of animals, humans and the life processes they share.
Investigate living things.
This concept involves becoming familiar with a wider range of living things, including insects, and understanding life processes.
Understand evolution and inheritance.
This concept involves understanding that organisms come into existence, adapt, change, and evolve and become extinct.
Investigate materials.
This concept involves becoming familiar with a range of materials, their properties, uses and how they may be altered or changed.

Understand movement, forces, and magnets.
This concept involves understanding what causes motion.
Understand the Earth's movement in space.
This concept involves understanding what causes seasonal changes, day and night.
Investigate light and seeing.
This concept involves understanding how light and reflection affect sight.
Investigate sound and hearing.
This concept involves understanding how sound is produced, how it travels and how they are heard.
Understand electrical circuits.
This concept involves understanding circuits and their role in electrical applications.

Science vision and principles

Science is good when...

Lutley Primary School
Learning, Caring, Aiming High - Together
...we explore problem solving

Lutley Primary School
Learning, Caring, Aiming High - Together
...it develops enquiry skills.

Lutley Primary School
Learning, Caring, Aiming High - Together
...it is hands on and practical

Lutley Primary School
Learning, Caring, Aiming High - Together
...when it is challenging and engaging

Lutley Primary School
Learning, Caring, Aiming High - Together
...we are encouraged to be independent thinkers

Lutley Primary School
Learning, Caring, Aiming High - Together
...our learning builds on previous knowledge

Science Subject Intent

It is our intent that children will have a secure and broad knowledge of the physical, chemical and biological scientific world around them. This will be achieved through exploration, observation, critical thinking and working scientifically. Through allowing equal scientific opportunities for all, children will develop a passion for exploring, unpicking and unlocking the world of science. Children will plan and carry out their own investigations, experiments and fieldwork, solving challenging problems and reporting scientific findings.

Lutley Primary School

Science in the Early Years Foundation Stage

Developing early scientific skills

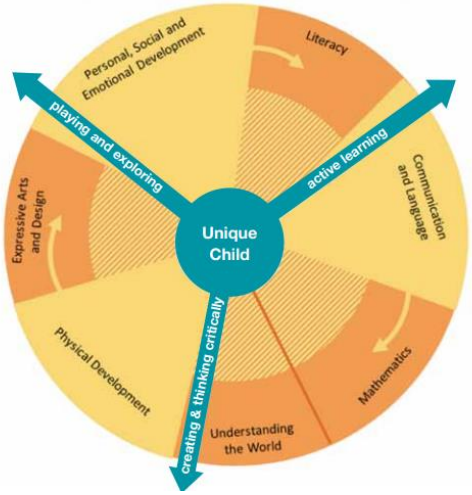
Developing Early Scientific Skills

The Unique Child reaches out to relate to people and things through the **Characteristics of Effective Learning**, which move through all areas of learning.

- playing and exploring
- active learning
- creating and thinking critically

Children develop in the context of relationships and the environment around them.

This is unique to each family, and reflects individual communities and cultures.



Prime areas are fundamental, work together, and move through to support development in all other areas.

- Personal, Social and Emotional Development
- Communication and Language
- Physical Development

Specific areas include essential skills and knowledge for children to participate successfully in society.

- Literacy
- Mathematics
- Understanding the World
- Expressive Arts and Design

Each area of the EYFS curriculum has an **Early Learning Goal**, which is the standard that a child is expected to achieve by the end of their reception year. The ELG (Early Learning Goals) covers all of the 7 areas of learning as specified in the Early Years Foundation Stage Curriculum.

The following link to the teaching and learning of science in our EYFS:

ELG 15: Understanding the World: The Natural World

Children at the expected level of development will:

- 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, 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.

Lutley Primary School

Science and the National Curriculum

Science and the National Curriculum: Key Stage One

The principal focus of science teaching in key stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. They should be encouraged to be curious and ask questions about what they notice. They should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information. They should begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. Most of the learning about science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos.

'Working scientifically' is described separately in the programme of study but must **always** be taught through and clearly related to the teaching of substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

Pupils should be taught about:

- Working scientifically by 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.

Year 1

- 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.
- 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, 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.
- 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.

Pupils should be taught to:

- Observe changes across the four seasons.
- Observe and describe weather associated with the seasons and how day length varies.

Year 2

- 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 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.
- 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.
- 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.
- 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.

Science and the National Curriculum: Lower Key Stage Two

The principal focus of science teaching in lower key stage 2 is to enable pupils to broaden their scientific view of the world around them. They should do this through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments, and by beginning to develop their ideas about functions, relationships and interactions. They should ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out.

'Working scientifically' is described separately at the beginning of the programme of study but must **always** be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge.

Pupils should be taught about:

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.
- 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.

Pupils should be taught to:

Year 3

- 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.
- 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.
- 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.
- 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 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.

Year 4

- 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.
- Recognise that environments can change and that this can sometimes pose dangers to living things.
- 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.
- 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.
- 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.
- 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.

Science and the National Curriculum: Upper Key Stage Two

The principal focus of science teaching in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information. Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings.

'Working and thinking scientifically' is described separately at the beginning of the programme of study but must **always** be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

Pupils should read, spell and pronounce scientific vocabulary correctly.

Pupils should be taught about:

- 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 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.

Pupils should be taught to:

Year 5

- 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 changes as humans develop to old age.

- 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 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.
- 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.
- 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.

Year 6

- 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.
- 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.
- 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.
- 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.

Lutley Primary School

Whole School Science Programme of Study

Lutley Primary School's Science Programme of Study

Science Programme of Study

Year group	Plants	Animals including humans	Living things and their habitats	Materials	Seasonal changes	Rocks	Light	Electricity	Sound	Forces	Earth and space	Evolution and inheritance
1	R	R		R	R							
2	R	R	R	R								
3	R	R				R	R			R		
4		R	R	R				R	R			
5		R	R	R						R	R	
6		R	R				R	R				R

	Autumn	Spring	Summer
EYFS	All about me and families My locality	All around the world Growing	Growing Into the woods
Year 1	Animals including humans **Seasonal changes**	Materials **Seasonal changes**	Plants **Seasonal changes**
Year 2	Animals including humans Living things and their habitats	Materials	Plants
Year 3	Animals including humans Forces	Lights Rocks	Plants
Year 4	Animals including humans Living things and their habitats	Materials	Electricity Sound
Year 5	Animals including humans Living things and their habitats	Properties and changing of materials	Forces Earth and space
Year 6	Animals including humans Living things and their habitats	Light Electricity	Evolution and inheritance

Science Programme of Study

Lutley Primary School

Year 1	Plants	Animals including humans	Living things and their habitats	Materials	Seasonal changes	Working Scientifically
Term to be taught	Summer	Autumn		Spring	Continuous throughout the year – each term	
National curriculum What do the children need to learn?	**Prior knowledge learned in EYFS:** Explore the natural world around them, making observations and drawing pictures of plants. **National Curriculum for year 1** 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	**Prior knowledge learned in EYFS:** Explore the natural world around them, making observations and drawing pictures of animals **National Curriculum for year 1** 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, 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		**Prior knowledge learned in EYFS:** **National Curriculum for year 1** 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	**Prior knowledge learned in EYFS:** Understand some important changes in the natural world around them, including the seasons. **National Curriculum for year 1** observe changes across the 4 seasons observe and describe weather associated with the seasons and how day length varies	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
Suggested sequence of teaching	The weather The seasons Daytime and night-time Day length Garden plants Wild plants Plant structures – stem and roots Plant structures – leaves, flowers and fruit Plant structures – bulbs and seeds Comparing plants Deciduous trees Evergreen trees Tree structures – leaves Tree structures – flowers, fruits and seeds Tree – trunk and branches	Fish Amphibians Reptiles Birds Mammals Comparing animals Carnivores, herbivores and omnivores Looking at animals Habitats Studying animals Body parts the senses Testing your senses		Everyday materials Natural or man-made What things are made of Hard and soft materials Stretchy and bendy materials Stretching materials Shiny and dull materials Rough and smooth materials Waterproof and absorbent materials Opaque and transparent materials Comparing materials Choosing a material		Ensure to use these in teaching sessions  to explain what scientific enquiry type the children are focusing on in the lesson.
Vocabulary	Deciduous, Evergreen trees, Leaves, Flowers (blossom), Petals, Fruit, Roots, Bulb, Seed, Trunk, Branches, Stem	Fish, Reptiles, Mammals, Birds, Amphibians Herbivore, Omnivore, Carnivore, Human-being, Leg, Arm, Elbow, Head, Ear, Nose, Back, Wings, Beak		Wood, Plastic, Glass, Paper, Water, Metal, Rock, Hard, Soft, Bendy, Rough, Smooth	Summer, Spring, Autumn, Winter, Sun, Earth, Day, Moon, Night, Light, Dark	
Scientists to consider	• Beatrix Potter Author & Botanist	• Chris Packham-Animal Conservationist		• William Addis: Toothbrush Inventor • Charles Mackintosh Waterproof coat • John MacAdam roads • Chester Greenwood Earmuffs	• Dr Steve Lyons Extreme Weather • Holly Green Meteorologist	
Texts	• Plant life (Foxton) • Let's grow	• The human body (Foxton) • Foxton collection on animals		• Everyday materials (Foxton) • Project science – materials	• Seasons and weather(Foxton)	
Experiment ideas	Comparing plants / flowers based on visual observations	identifying, classifying and grouping;		comparative and fair testing (controlled investigations) using materials	observing over time; Choose a tree / plant within the school grounds – return throughout the year to observe changes / seasons.	
CPD	Primary Resources Science | Reach Out CPD	Primary Resources Science | Reach Out CPD		Primary Resources Science | Reach Out CPD	Primary Resources Science | Reach Out CPD	
Non-Statutory Guidance	Pupils should use the local environment throughout the year to explore and answer questions about plants growing in their habitat. Where possible, they should observe the growth of flowers and vegetables that they have planted. They should become familiar with common names of flowers, examples of deciduous and evergreen trees, and plant structures (including leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem). Pupils might work scientifically by: observing closely, perhaps using magnifying glasses, and comparing and contrasting familiar plants; describing how they were able to identify and group them, and drawing diagrams showing the parts of different plants including trees. Pupils might keep records of how plants have changed over time, for example, the leaves falling off trees and buds opening; and compare and contrast what they have found out about different plants.	Pupils should use the local environment throughout the year to explore and answer questions about animals in their habitat. They should understand how to take care of animals taken from their local environment and the need to return them safely after study. Pupils should become familiar with the common names of some fish, amphibians, reptiles, birds and mammals, including those that are kept as pets. Pupils should have plenty of opportunities to learn the names of the main body parts (including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth) through games, actions, songs and rhymes. Pupils might work scientifically by: using their observations to compare and contrast animals at first hand or through videos and photographs, describing how they identify and group them; grouping animals according to what they eat; and using their senses to compare different textures, sounds and smells.		Pupils should explore, name, discuss and raise and answer questions about everyday materials so that they become familiar with the names of materials and properties such as: hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent. Pupils should explore and experiment with a wide variety of materials, not only those listed in the programme of study, but including for example: brick, paper, fabrics, elastic, foil. Pupils might work scientifically by: performing simple tests to explore questions, for example: 'What is the best material for an umbrella? ... for lining a dog basket? ... for curtains? ... for a bookshelf? ... for a gymnast's leotard?'	Pupils should observe and talk about changes in the weather and the seasons. Note: pupils should be warned that it is not safe to look directly at the sun, even when wearing dark glasses. Pupils might work scientifically by: making tables and charts about the weather; and making displays of what happens in the world around them, including day length, as the seasons change	

Year 2	Plants	Animals including humans	Living things and their habitats	Materials	Working Scientifically
Term to be taught	Summer	Autumn	Autumn / Spring	Spring / summer	
National curriculum What do the children need to learn?	**Prior knowledge learned in year 1** identify and describe the basic structure of a variety of common flowering plants, including trees **National Curriculum for year 2** 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	**Prior knowledge learned in year 1** identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense **National Curriculum for year 2** 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	**Prior knowledge learned in year 1** - Not covered in year 1. However, as part of 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 **National Curriculum for year 2** 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	**Prior knowledge learned in year 1** 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 **National Curriculum for year 2** 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	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
Suggested sequence of teaching	Seeds and bulbs Germination Watching plants change Plants throughout the year Water Lights Temperature Keeping a plant healthy Reproduction in plants	Human growth Animals growth Studying growth Food and water Air Exercise Eating healthily A balanced diet Keeping clean	Looking at habitats Habitats in the water Extreme habitats Comparing habitats Living together Exploring habitats What eats what	Wood Metal Plastic Glass Brick Rock Paper and cardboard Building materials Squashing and stretching Bending and twisting Designing materials New uses for old materials Making musical instruments	Ensure to use these in teaching sessions  to explain what scientific enquiry type the children are focusing on in the lesson.
Vocabulary	Seeds, Bulbs, Water, Light, Soil, Temperature, Growth	Survival, Water, Air, Food, Elderly, Adult, Teenager, Child, baby, Offspring, Growth, Kitten, Calf, Puppy, Iava, Pupa, Chrysalis Female, Male, Exercise, Hygiene	Living, Dead, Habitat, Energy, Food chain, Predator, Prey, Woodland, Pond, Desert Herbivore, Omnivore, Carnivore	Stretchy, Stiff, Shiny, Dull, Waterproof, Absorbent, Opaque, Transparent, Brick, Paper, Fabrics, Squashing, Bending, Twisting, Stretching Elastic, Foil Hard, Soft, Rough, Smooth, Bendy	
Scientists to consider	• Captain Cook- Botanists • Agnes Arber Botanist • Alan Titchmarsh- Botanist & Gardener	• Florence Nightingale Pioneer of modern nursing in GB • Elizabeth Garrett Anderson - First British female physician and surgeon • Steve Irwin -Wildlife expert • Robert Winston Human Scientist	• Rachel Carson- Marine Pollution • Liz Bonnin Conservationniste • Eugenie Clark- marine biologist	• Charles Macintosh-Waterproof material • John MacAdam- Tarmac	
Texts	• Green garden • Roots, stems, leaves and flowers – all about plant parts. • National geographic – seed to plant	• Why can't humans fly?	• Living things and their habitats • Hidden in the grass • Magnificent habitats	• Project science – materials	
Experiment ideas	Observing over time	researching using secondary sources.	identifying, classifying and grouping;	comparative and fair testing (controlled investigations);	
CPD	Primary Resources Science | Reach Out CPD	Primary Resources Science | Reach Out CPD	Primary Resources Science | Reach Out CPD	Primary Resources Science | Reach Out CPD	
Non-Statutory Guidance	Pupils should use the local environment throughout the year to observe how plants grow. Pupils should be introduced to the requirements of plants for germination, growth and survival, as well as the processes of reproduction and growth in plants. Note: seeds and bulbs need water to grow but most do not need light; seeds and bulbs have a store of food inside them. Pupils might work scientifically by: observing and recording, with some accuracy, the growth of a variety of plants as they change over time from a seed or bulb, or observing similar plants at different stages of growth; setting up a comparative test to show that plants need light and water to stay healthy.	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	Pupils should be introduced to the idea that all living things have certain characteristics that are essential for keeping them alive and healthy. They should raise and answer questions that help them to become familiar with the life processes that are common to all living things. Pupils should be introduced to the term 'habitat' (a natural environment or home of a variety of plants and animals) and 'microhabitat' (a very small habitat, for example for woodlice under stones, logs or leaf litter). They should raise and answer questions about the local environment that help them to identify and study a variety of plants and animals within their habitat and observe how living things depend on each other, for example, plants serving as a source of food and shelter for animals. Pupils should compare animals in familiar habitats with animals found in less familiar habitats, for example, on the seashore, in woodland, in the ocean, in the rainforest. Pupils might work scientifically by: sorting and classifying things according to whether they are living, dead or were never alive, and recording their	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	

			findings using charts. They should describe how they decided where to place things, exploring questions like: 'Is a flame alive? Is a deciduous tree dead in winter?' and talk about ways of answering their questions. They could construct a simple food chain that includes humans (e.g., grass, cow, human). They could describe the conditions in different habitats and microhabitats (under log, on stony path, under bushes); and find out how the conditions affect the number and type(s) of plants and animals that live there.		

Year 3	Plants	Animals including humans	Rocks	Light	Forces	Working scientifically
Term to be taught	Summer	Autumn	Spring	Spring	Autumn	
National curriculum What do the children need to learn?	**Prior knowledge learned in year 2** 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 **National Curriculum for year 3** 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	**Prior knowledge learned in year 2** find out about and describe the basic needs of animals, including humans, for survival (water, food and air) **National Curriculum for year 3** 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	**Prior knowledge learned in year 2** Not covered – new learning **National Curriculum for year 3** 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	**Prior knowledge learned in year 2** Not covered – new learning **National Curriculum for year 3** 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	**Prior knowledge learned in year 2** Not covered – new learning **National Curriculum for year 3** 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	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 • 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. Ensure to use these in teaching sessions to explain what  scientific enquiry type the children are focusing on in the lesson.
suggested sequence of teaching	The parts of a plant Measuring plants What plants need for growth Leaves and growth Plants and light Roots Water travels up the stem Plants and water Flowers and pollination Seeds Seed dispersal	Animals need food Food groups Foods for growth Foods for energy Balanced diets Animal diets What do cats eat The skeleton is made of bones Animals with skeletons The skeleton supports the body Comparing bone lengths Muscles and bones	Rocks are everywhere Grouping rocks by appearance Grouping rocks by their properties Grouping rocks How fossils are made Looking at fossils What is soil made of Looking at difference soils Different soils Comparing soils	Light and dark Reflected light What are shadows Changing shadows	Forces are pushes or pulls Forces and surfaces Testing surfaces Magnetic forces Testing magnets Magnetic poles Magnetic materials Uses of magnets	
Vocabulary	Reproduction, Nutrients, Transportation, Dispersal, Pollination, Flower, Air, Temperature, Light, Water, Soil,	Movement, Muscles, Tissue, Bones, Contract, Relax, Harvest, Nutrition, Skeletons	Fossils, Soils, Sandstone, Granite, Marble, Pumice, Crystals, Absorbent	Shadows, Mirror, Reflective, Reflection. Light, Dark	Magnetic, Force, Contact, Attract, Repel, Friction, Poles, Push, Pull	
Scientists to consider	• Joseph Banks- Botanist • Ahmed Mumin Warfa - Botanist • Marianne North- Botanist	• Marie Curie- Radiation • Wilhelm Rontgen - X rays • Adelle Davis -Nutritionist	• Mary Anning- Fossil hunter • Dr Anjana Khatwa Geologist • Ursula Marvin- Geologist • William Smith Fossils strata • Inge Lehrmasn -Earth's Mantle • Katia Krafft - Geologist and Volcanologist	• Justus Von Liebig Mirrors • James Clerk Maxwell • (Visible and Invisible Waves of Light)	• Andre Marie Ampere-Electro-magnetism • The Wright Brothers- Airplanes • Henry Ford- Cars	
Texts	• (Foxton) All about plants	• (Foxton) The human body • Gardens and parks in summer • Gardens and parks in winter	• (Foxton) rocks • 100 questions about rocks and minerals	• (Foxton) Light	• (Foxton) Magnets and friction	
Experiment ideas	pattern seeking;	pupils should seek answers to questions through collecting, analysing and presenting data.	identifying, classifying and grouping;	researching using secondary sources.	comparative and fair testing (controlled investigations);	
CPD	Primary Resources Science | Reach Out CPD	Primary Resources Science | Reach Out CPD	Primary Resources Science | Reach Out CPD	Primary Resources Science | Reach Out CPD	Primary Resources Science | Reach Out CPD	
Non-Statutory Guidance	Pupils should be introduced to the relationship between structure and function: the idea that every part has a job to do. They should explore questions that focus on the role of the roots and stem in nutrition and support, leaves for nutrition and flowers for reproduction.	Pupils should continue to learn about the importance of nutrition and should be introduced to the main body parts associated with the skeleton and muscles, finding out how different parts of the body have special functions.	Linked with work in geography, pupils should explore different kinds of rocks and soils, including those in the local environment. Pupils might work scientifically by: observing rocks, including those used in buildings and gravestones, and exploring how and why they might have	Pupils should explore what happens when light reflects off a mirror or other reflective surfaces, including playing mirror games to help them to answer questions about how light behaves. They should think about why it is important to protect their eyes from bright lights. They should look for, and measure, shadows, and find out how they are	Pupils should observe that magnetic forces can act without direct contact, unlike most forces, where direct contact is necessary (for example, opening a door, pushing a swing). They should explore the behaviour and everyday uses of different magnets (for example, bar, ring, button and horseshoe).	

	Note: pupils can be introduced to the idea that plants can make their own food, but at this stage they do not need to understand how this happens. Pupils might work scientifically by: comparing the effect of different factors on plant growth, for example, the amount of light, the amount of fertiliser; discovering how seeds are formed by observing the different stages of plant life cycles over a period of time; looking for patterns in the structure of fruits that relate to how the seeds are dispersed. They might observe how water is transported in plants, for example, by putting cut, white carnations into coloured water and observing how water travels up the stem to the flowers.	Pupils might work scientifically by: identifying and grouping animals with and without skeletons and observing and comparing their movement; exploring ideas about what would happen if humans did not have skeletons. They might compare and contrast the diets of different animals (including their pets) and decide ways of grouping them according to what they eat. They might research different food groups and how they keep us healthy, and design meals based on what they find out.	changed over time; using a hand lens or microscope to help them to identify and classify rocks according to whether they have grains or crystals, and whether they have fossils in them. Pupils might research and discuss the different kinds of living things whose fossils are found in sedimentary rock and explore how fossils are formed. Pupils could explore different soils and identify similarities and differences between them and investigate what happens when rocks are rubbed together or what changes occur when they are in water. They can raise and answer questions about the way soils are formed.	formed and what might cause the shadows to change. Note: pupils should be warned that it is not safe to look directly at the sun, even when wearing dark glasses. Pupils might work scientifically by: looking for patterns in what happens to shadows when the light source moves or the distance between the light source and the object changes.	Pupils might work scientifically by: comparing how different things move and grouping them; raising questions and carrying out tests to find out how far things move on different surfaces, and gathering and recording data to find answers to their questions; exploring the strengths of different magnets and finding a fair way to compare them; sorting materials into those that are magnetic and those that are not; looking for patterns in the way that magnets behave in relation to each other and what might affect this, for example, the strength of the magnet or which pole faces another; identifying how these properties make magnets useful in everyday items and suggesting creative uses for different magnets.	

Year 4	Animals including humans	Living things and their habitats	Materials	Electricity	Sound	Working scientifically
Term to be taught	Autumn	Autumn / Spring Note: these may overlap due to weeks available in each term		Summer	Summer	
National curriculum What do the children need to learn?	**Prior knowledge learned in year 3** 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 **National Curriculum for year 4** 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	**National Curriculum KS1** 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 - 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 **Not covered in year 3** **National Curriculum for year 4** 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 recognise that environments can change and that this can sometimes pose dangers to living things	**Prior knowledge learned in year 1** 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 **National Curriculum for year 2** 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 **Prior knowledge learned in year 3 - not covered (rocks)** **National Curriculum for year 4** 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	**Prior knowledge learned in year 3 – not covered** **National Curriculum for year 4** 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	**Prior knowledge learned in year 3 - not covered** **National Curriculum for year 4** 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	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 • 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.
suggested sequence of teaching	Parts of the digestive system Digesting your food Your teeth Shapes of teeth Different types of teeth Looking after your teeth What animals eat Predators and prey Producers Food chains Studying food chains	Living things Grouping living things Using keys to identify things Vertebrate groups Invertebrate groups Investigating local wildlife Where animals live Matching animals to their habitats Changing habitats Habitats for woodlice The environment needs protection Humans and the environment	Solid, liquid or gas Solids and liquids More about liquids Some solids act like liquids Gases Water and ice Melting and freezing Melting ice Evaporation What affects evaporation Boiling Condensation	Electrical appliances Parts of a circuit What makes a circuit work Drawing circuits Working safely with electricity Switches Changing the brightness of bulbs Conductors and insulators Finding good conductors	Hearing sounds Making sounds from vibrations Sound travels through things Volume Sounds travelling Stopping sound from travelling Muffling sound Pitch means how high Pitch and volume The pitch of a drum Making an instrument The pitch of stringed instruments	

			Water changing state The water cycle		The pitch of wind instruments	Ensure to use these in teaching sessions  to explain what scientific enquiry type the children are focusing on in the lesson.
Vocabulary	Mouth, Tongue, Teeth, Oesophagus, Stomach, Small Intestine, Large Intestine, Energy, Waste, Faeces, Urine, Digestion, Incisor, Canine, Pre-molar Molar	Vertebrates, Invertebrates, Fish, Amphibians, Reptiles, Birds, Mammals, Snails, Slugs, Worms, Spiders, Insects, Environment, Habitats, Producer, consumer, Predator, Prey, Herbivore, Carnivore, Omnivore,	Solid, Liquid, Gas, Evaporation, Condensation, Particles, Freezing, Heating, Temperature,	Cells, Wires, Bulbs, Switches, Buzzers, Battery, Circuit, Series, Conductors, Insulators	Volume, Vibration, Wave, Pitch, Tone, Speaker	
Scientists to consider	• Joseph Lister-Antiseptic • Ivan Pavlov- Digestive System Mechanisms • Washington & Lucius Sheffield- Toothpaste in a tube	• Jacques Cousteau -Marine Biology • Cindy Looy-Environmental Change and Extinction • Joean Beauchamp Procter Zoologist	• Joseph Priestly – Discovered oxygen • Lord Kelvin -Absolute zero (temperature) • Anders Celsius -Temperature Scale • Daniel Fahrenheit-Temperature Scale / Invention of the Thermometer • George Washington Carver- chemist	• Michael Faraday- Discovered relationship between magnets and electricity • Thomas Edison- Lightbulb • Joseph Swan- Incandescent Light Bulb	• Alexander Graham Bell - Invented the telephone • Aristotle - Sound Waves • Galileo Galilei - Frequency and Pitch of Sound Waves	
Texts	• Gardens and parks in summer • Gardens and parks in winter	• (Foxton) Living things and their changing habitats • Gardens and parks in summer • Gardens and parks in winter	• (Foxton) States of matter, solids liquids and gases	• (Foxton) Electricity	• (Foxton) sound	
Experiment ideas	https://www.stem.org.uk/resources/community/collection/12365/year-4-animals-including-humans STEM	identifying, classifying and grouping;	pattern seeking comparative and fair testing (controlled investigations);	Testing circuits / bulbs / buzzers / batteries	pattern seeking; researching using secondary sources.	
CPD	Primary Resources Science | Reach Out CPD	Primary Resources Science | Reach Out CPD classification Primary Resources Science | Reach Out CPD environments and habitats	Primary Resources Science | Reach Out CPD changing materials Primary Resources Science | Reach Out CPD states of matter	Primary Resources Science | Reach Out CPD	Primary Resources Science | Reach Out CPD	
Non-Statutory Guidance	Pupils should be introduced to the main body parts associated with the digestive system, for example: mouth, tongue, teeth, oesophagus, stomach, and small and large intestine, and explore questions that help them to understand their special functions. Pupils might work scientifically by: comparing the teeth of carnivores and herbivores and suggesting reasons for differences; finding out what damages teeth and how to look after them. They might draw and discuss their ideas about the digestive system and compare them with models or images.		Pupils should explore a variety of everyday materials and develop simple descriptions of the states of matter (solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container). Pupils should observe water as a solid, a liquid and a gas and should note the changes to water when it is heated or cooled. Note: teachers should avoid using materials where heating is associated with chemical change, for example, through baking or burning. Pupils might work scientifically by: grouping and classifying a variety of different materials; exploring the effect of temperature on substances such as chocolate, butter, cream (for example, to make food such as chocolate crispy cakes and ice-cream for a party). They could research the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid. They might observe and record evaporation over a period of time, for example, a puddle in the playground or washing on a line, and investigate the effect of temperature on washing drying or snowmen melting.	Pupils should explore and identify the way sound is made through vibration in a range of different musical instruments from around the world; and find out how the pitch and volume of sounds can be changed in a variety of ways. Pupils might work scientifically by: finding patterns in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands of different thicknesses. They might make earmuffs from a variety of different materials to investigate which provides the best insulation against sound. They could make and play their own instruments by using what they have found out about pitch and volume.	Pupils should construct simple series circuits, trying different components, for example, bulbs, buzzers and motors, and including switches, and use their circuits to create simple devices. Pupils should draw the circuit as a pictorial representation, not necessarily using conventional circuit symbols at this stage; these will be introduced in year 6. Note: pupils might use the terms current and voltage, but these should not be introduced or defined formally at this stage. Pupils should be taught about precautions for working safely with electricity. Pupils might work scientifically by: observing patterns, for example, that bulbs get brighter if more cells are added, that metals tend to be conductors of electricity, and that some materials can and some cannot be used to connect across a gap in a circuit	

Year 5	Properties and changing of materials	Living things and their habitats	Forces	Animals including humans	Earth and space	Working scientifically
Term to be taught	Autumn	Autumn	Spring	Spring / summer	Summer	
National curriculum What do the children need to learn?	**Prior knowledge learned in year 4** 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)	**Prior knowledge learned in year 4** 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	**Prior knowledge learned in year 3** 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	**Prior knowledge learned in year 4** 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	**Prior knowledge learned in year 4 - not covered** **National Curriculum for year 5**	• 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:

	identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature **National Curriculum for year 5** 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 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 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 environments can change and that this can sometimes pose dangers to living things **National Curriculum for year 5** 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	**National Curriculum for year 5** 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	**National Curriculum for year 5** describe the changes as humans develop to old age	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	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 Ensure to use these in teaching  sessions to explain what scientific enquiry type the children are focusing on in the lesson.
Suggested sequence of teaching	Properties of materials Comparing materials Using materials Keeping things warm Changes of state Mixing and separating solids Separating mixtures by filtering Making solutions Separating solutions Separating mixtures Some materials react Changes due to heating More reactions	Sexual reproduction in animals Sexual reproduction in plants Asexual reproduction in plants Taking cuttings Life cycles of mammals Life cycles of birds Life cycles of insects Life cycles of amphibians Life cycles of animals Life cycles of plants	Forces Force meters Forces and movement Friction Water resistance Moving through water Sinking shapes Air resistance Gravity Pulleys Gears	Human growth Puberty Humans and other animals Measuring human growth	The sun and planets The earth, moon and the sun are spheres The movement of the earth The movement of other planets Changing ideas about the solar system A model solar system Day and night Making a shadows clock Moons The movement of the moon The moon cycle	
Vocabulary	Hardness, Solubility, Transparency, Conductivity, Magnetic, Filter, Dissolving, Mixing Evaporation,	Life cycle, life process, Reproduction, Offspring Invertebrates, Vertebrates, Mammal, Amphibian, Reptile, Bird, Insect,	Air resistance, Water resistance, Gravity, Newton, Gears, Pulleys Friction,	Foetus, Embryo, Womb, Gestation, Puberty Baby, Toddler, Teenager, Elderly, Growth, Development,	Axis, Rotation, Phases of the Moon, star, constellation, Earth, Sun, Moon, Day, Night,	
Scientists to consider	• Sir Humphrey Davy- Separating gases • Jamie Garcia (BP website)- Invention of a new plastic • Becky Schroeder - fluorescence material • Spencer Silver, Arthur Fry and Alan Amron - Post-It Notes Ruth Benerito - Wrinkle-Free Cotton	• Jane Goodall- naturalist • Sylvia Earle - Marine biologist • Dr. Paula Kahumbu-wildlife conservationist • Mangala Mani – Antarctic scientist • Sir David Attenborough- Animal Behaviourist	• Isaac Newton- Gravity • Albert Einstein- The Theory Of relativity • Galileo Galilei - Gravity and Acceleration • Archimedes of Syracuse- Levers	• Alexander Fleming- Penicillin • Louis Pasteur- Vaccination • Eva Crane -Reproduction in Bees • Virginia Apgar- obstetrical anaesthesiologist	• Margaret Hamilton- Computer scientist (Moon Landings) • Stephen Hawking- Black Holes • Mae Jemison – Astronaut • Claudius Ptolemy and Nicolaus Copernicus - Heliocentric vs Geocentric Universe • Neil Armstrong- First man on the Moon • Helen Sharman- GB astronaut • *Caroline Herschel- First to find a comet* • Valentina Tereshkova-Cosmonaut • Dr Sian Proctor- Analog Astronaut	
Texts	(Foxton) Properties and changes of materials	(Foxton) life cycles and reproduction Classification	(Foxton) forces	(Foxton) human body	(Foxton) Earth and space	
Experiment ideas	pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations);	https://www.stem.org.uk/resources/community/collection/12775/year-5-living-things-and-their-habitats	researching using secondary sources Pupils should seek answers to questions through collecting, analysing and presenting data.	https://www.stem.org.uk/resources/community/collection/13293/year-5-animals-including-humans STEM	Observation over time Pattern seeking	
CPD	Primary Resources Science | Reach Out CPD	Primary Resources Science | Reach Out CPD classification	Primary Resources Science | Reach Out CPD changing materials	Primary Resources Science | Reach Out CPD	Primary Resources Science | Reach Out CPD	

		Primary Resources Science | Reach Out CPD environments and habitats	Primary Resources Science | Reach Out CPD states of matter			
Non-Statutory Guidance		Pupils should study and raise questions about their local environment throughout the year. They should observe life-cycle changes in a variety of living things, for example, plants in the vegetable garden or flower border, and animals in the local environment. They should find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall. Pupils should find out about different types of reproduction, including sexual and asexual reproduction in plants, and sexual reproduction in animals. Pupils might work scientifically by: observing and comparing the life cycles of plants and animals in their local environment with other plants and animals around the world (in the rainforest, in the oceans, in desert areas and in prehistoric times), asking pertinent questions and suggesting reasons for similarities and differences. They might try to grow new plants from different parts of the parent plant, for example, seeds, stem and root cuttings, tubers, bulbs. They might observe changes in an animal over a period of time (for example, by hatching and rearing chicks), comparing how different animals reproduce and grow.	Pupils should be introduced to a model of the sun and Earth that enables them to explain day and night. Pupils should learn that the sun is a star at the centre of our solar system and that it has 8 planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a 'dwarf planet' in 2006). They should understand that a moon is a celestial body that orbits a planet (Earth has 1 moon; Jupiter has 4 large moons and numerous smaller ones). Note: pupils should be warned that it is not safe to look directly at the sun, even when wearing dark glasses. Pupils should find out about the way that ideas about the solar system have developed, understanding how the geocentric model of the solar system gave way to the heliocentric model by considering the work of scientists such as Ptolemy, Alhazen and Copernicus. Pupils might work scientifically by: comparing the time of day at different places on the Earth through internet links and direct communication; creating simple models of the solar system; constructing simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day; finding out why some people think that structures such as Stonehenge might have been used as astronomical clocks.	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 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	Pupils should explore falling objects and raise questions about the effects of air resistance. They should explore the effects of air resistance by observing how different objects such as parachutes and sycamore seeds fall. They should experience forces that make things begin to move, get faster or slow down. Pupils should explore the effects of friction on movement and find out how it slows or stops moving objects, for example, by observing the effects of a brake on a bicycle wheel. Pupils should explore the effects of levers, pulleys and simple machines on movement. Pupils might find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation. Pupils might work scientifically by: exploring falling paper cones or cupcake cases, and designing and making a variety of parachutes and carrying out fair tests to determine which designs are the most effective. They might explore resistance in water by making and testing boats of different shapes. They might design and make products that use levers, pulleys, gears and/or springs and explore their effects.	

Year 6	Animals including humans	Living things and their habitats	Light	Electricity	Evolution and inheritance	Working scientifically
Term to be taught	Autumn	Autumn	Spring	Spring	Summer	
National curriculum What do the children need to learn?	**Prior knowledge learned in year 5** describe the changes as humans develop to old age **National Curriculum for year 6** 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	**Prior knowledge learned in year 5** 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 **National Curriculum for year 6** 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	**National Curriculum for year 6** 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	**Prior knowledge learned in year 4** 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 **National Curriculum for year 6** 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	**Prior knowledge learned in year 5 - not covered** **National Curriculum for year 6** 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	• 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, 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 Ensure to use these in teaching  sessions to explain what scientific enquiry type the children are focusing on in the lesson.
Suggested sequence of teaching	The human body The heart Blood vessels Calculating pulse rate A balance diet Types of food Foods for energy and foods for growth Sugar and fat Fruit and vegetables Testing an idea Exercise Exercise and your pulse How exercise affects pule rate Drugs and your body Drugs as medicine	Grouping organisms Plants Animals Micro-organisms Using keys Making keys Using a classification system	How we see things Light travels in straight lines Light travels into your eyes Light can be reflective What happens when light is reflected Shiny vs dull Using reflection Making a periscope Making shadows Shadows changing length Size of shadows	Circuits Changing the brightness of a bulb Changing the volume of a buzzer Burning out components Using switches Circuit diagrams and symbols Making a steady hand game Using circuits safely	Characteristics Parents and offspring Variation in offspring Adaptations of animals Adaptations of plants Animals and plants in their habitats Living things in their habitats The fossil record Adaptations and inheritance evolution of living things Adaptation and evolution Darwin and evolution	
Vocabulary	Circulatory, Heart, Blood Vessels, Veins, Arteries, Oxygenated, Deoxygenated, Valve, Exercise, Respiration	Classification, Micro-organisms, Vertebrates, Invertebrates, Amphibians, Reptiles, Mammals, Birds, Insects	Refraction, Spectrum, Reflection, Light, Rainbow, Colour	Amps, Volts, Cells, Wires, Bulbs, Switches, Buzzers, Battery, Circuit, Series, Conductors, Insulators,	Adaptation, Evolution, Characteristics, Reproduction, Genetics Fossils,	
Scientists to consider	• Leonardo Da Vinci- anatomy • Santorio Santorio-Anatomist • Dr. Katherine Dibb – Expert in Cardiovascular Sciences • Justus von Liebig- Theories of Nutrition and Metabolism • Sir Richard Doll- Linking Smoking and Health Problems	• Carl Linneus Classification • Libby Hyman Classification • Invertebrates	• Thomas Edison -Invented electric light bulb • Patricia Bath (BP website)- saving sight • Thomas Young • (Wave Theory of Light) • Ibn al-Haytham -Light and our Eyes • Percy Shaw - The Cats Eye • Maria Telkes- Solar energy	• Nikola Telsa -AC electric system • Alessandro Volta- Electrical Battery • Nicola Tesla- Alternating Currents • Edith Clarke -Electrical engineer	• Hippocrates -The Father of Medicine • Charles Darwin- Evolution • Alfred Russell Wallace – naturalist • Rosalind Franklin – DNA • Nettie Stevens – Geneticist • Professor Alice Roberts - Evolutionary biologist	
Texts	• (Foxton) human body	• (Foxton) life cycles and reproduction classification	• (Foxton) light	• (Foxton) electricity	• (Foxton) prehistoric life • Evolution and inheritance	
Experiment ideas	Research and fair testing	pattern seeking; identifying, classifying and grouping;	pattern seeking and researching using secondary sources.	Pupils should seek answers to questions through collecting, analysing and presenting data Fair test	researching using secondary sources. pattern seeking Pupils should seek answers to questions through collecting, analysing and presenting data	
CPD	Primary Resources Science | Reach Out CPD	Primary Resources Science | Reach Out CPD classification Primary Resources Science | Reach Out CPD environments and habitats	Primary Resources Science | Reach Out CPD	Primary Resources Science | Reach Out CPD	Primary Resources Science | Reach Out CPD	
Non-Statutory Guidance	Pupils should build on their learning about grouping living things in year 4 by looking at the classification system in more detail.	Pupils should build on their learning from years 3 and 4 about the main body parts	Pupils should build on the work on light in year 3, exploring the way that light behaves, including light sources, reflection	Building on their work in year 4, pupils should construct simple series circuits, to help them to	Building on what they learned about fossils in the topic on rocks in year 3,	

	They should be introduced to the idea that broad groupings, such as micro-organisms, plants and animals can be subdivided. Through direct observations where possible, they should classify animals into commonly found invertebrates (such as insects, spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds and mammals). They should discuss reasons why living things are placed in one group and not another. Pupils might find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification. Pupils might work scientifically by: using classification systems and keys to identify some animals and plants in the immediate environment. They could research unfamiliar animals and plants from a broad range of other habitats and decide where they belong in the classification system.	and internal organs (skeletal, muscular and digestive system) to explore and answer questions that help them to understand how the circulatory system enables the body to function. Pupils should learn how to keep their bodies healthy and how their bodies might be damaged – including how some drugs and other substances can be harmful to the human body. Pupils might work scientifically by: exploring the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health.	and shadows. They should talk about what happens and make predictions. Pupils might work scientifically by: deciding where to place rear-view mirrors on cars; designing and making a periscope and using the idea that light appears to travel in straight lines to explain how it works. They might investigate the relationship between light sources, objects and shadows by using shadow puppets. They could extend their experience of light by looking a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water, and coloured filters (they do not need to explain why these phenomena occur).	answer questions about what happens when they try different components, for example, switches, bulbs, buzzers and motors. They should learn how to represent a simple circuit in a diagram using recognised symbols. Note: pupils are expected to learn only about series circuits, not parallel circuits. Pupils should be taught to take the necessary precautions for working safely with electricity. Pupils might work scientifically by: systematically identifying the effect of changing one component at a time in a circuit; designing and making a set of traffic lights, a burglar alarm or some other useful circuit.	pupils should find out more about how living things on earth have changed over time. They should be introduced to the idea that characteristics are passed from parents to their offspring, for instance by considering different breeds of dogs, and what happens when, for example, Labradors are crossed with poodles. They should also appreciate that variation in offspring over time can make animals more or less able to survive in particular environments, for example, by exploring how giraffes' necks got longer, or the development of insulating fur on the arctic fox. Pupils might find out about the work of palaeontologists such as Mary Anning and about how Charles Darwin and Alfred Wallace developed their ideas on evolution. Note: at this stage, pupils are not expected to understand how genes and chromosomes work. Pupils might work scientifically by: observing and raising questions about local animals and how they are adapted to their environment; comparing how some living things are adapted to survive in extreme conditions, for example, cactuses, penguins and camels. They might analyse the advantages and disadvantages of specific adaptations, such as being on 2 feet rather than 4, having a long or a short beak, having gills or lungs, tendrils on climbing plants, brightly coloured and scented flowers.	

Lutley Primary School

Implementation

Approaches to Teaching and Learning in Science

Teaching and learning will focus on a range of agreed entitled experiences and there will be a focus on:

- Developing a clear progression of knowledge and skills linked to the essential learning objectives of the subject.
- Ensuring that appropriate opportunities are taken to develop cross-curricular skills such as English, Mathematics and Computing skills.
- The explicit teaching of how to work scientifically in each year group by carrying out a range of investigations and experiments.
- The consistent use of a range of teaching and learning approaches to engage pupils in the study of science. This will include objective and question led learning, observation and recording, class and group discussion, role play, handling a range of different materials, teaching of specific knowledge and retrieval practise activities.
- The study of important people, both male and female, who have influenced our understanding of science throughout history and in the modern world.
- The study of important scientific discoveries
- To use scientific knowledge to support, evaluate and challenge their own and others' views using detailed, appropriate and accurate scientific evidence derived from a range of sources. These are particularly relevant when understanding how the actions of others and their own actions impact on the world around them.
- The use of enrichment opportunities such as trips, visits and visitors.

Teaching, Recording, Feedback, Assessment and Reporting

This will happen by:

- Learning objectives are shared with children each lesson and displayed in children's books.
- Children are given a context through which they can explore each learning objective.
- The key knowledge for each unit is shared with children and parents through a knowledge organiser, which may include diagrams, key vocabulary, essential facts and key people associated with the learning. It will also highlight the key learning that will have taken place prior to this and pose questions which will form the basis of the learning enquiry.
- Teaching is focused on input, experiences and activities which promote the development of scientific understanding in the given area of learning at that time.
- The various methods of recording should demonstrate the children's understanding of the lesson's learning objective and how deeply they have understood the objective.
- Teachers' feedback should directly relate to the learning objective for the lesson, give specific ways in which the child has been successful by indicating WWW – What Went Well, GT – Gap Task and any verbal feedback where necessary.
- Children are given the opportunity to assess their own and others' progress. This may be recorded in books or done verbally.
- All Gap Tasks should be meaningful and purposeful and linked to small next steps for progress in science understanding and knowledge. They should be scaffolded where necessary.
- Teachers should use observations and work recorded by children to make judgements of the children's current progress against their year group's expectations.
- Teachers' judgements will also be informed by lessons outcomes and quizzes based on questions within the knowledge organisers.
- Regular retrieval practice focuses on children knowing and remembering more of what they have been taught previously.
- Assessment information will be used to plan future work for the class, including any intervention necessary.
- This continual assessment will be used to report to parents. End of year academic reports will contain comments about an individual pupil's progress against the year group expectations.
- All formative and summative assessments made will be used to inform discussions around pupils' progress and attainment in the subject at appropriate times, for example discussions with other professionals and reporting to parents on during parent consultation evening etc.
- Key scientist have been considered and chosen specifically for each area of focus and year group. Children will be introduced to these and links made to them in their learning. These scientists have been systematically planned over the year groups to allow progression in knowledge and understanding of the world around them.
- Children are exposed to, and will build, a range of age and topic related vocabulary from EYFS to year 6. This is found in the POS and builds on prior knowledge.
- Children are assessed at the end of each topic area. This is done through quizzes and assessment of understanding in lessons which is then collated by the class teacher and recorded on an assessment document. This can then be monitored by the science leader. Teachers can use this information for future planning opportunities / retrieval task / GT etc.

Implementation

Using Skills Builder in Science

These are the skills that underpin success at every stage of life: they unlock learning while at school, ensure young people are fully prepared for the independence of university and college, and empower people to land their dream job. At Lutley, we use skills builder framework in many ways.

A mastery approach underpins the framework – that means, no steps should be skipped and only when a step is mastered should learners move onto the next one. Mastery of a step is evident when a child or young person is regularly able to demonstrate that step in different contexts.

Once staff know where the children are in the essential skills they are working on, they can focus the activities, in this subject, towards the specific next skill steps.

Implementation