



Lutley 
Primary School

Curriculum Progression Document

Science





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Science Curriculum Intent

Lutley Primary School Curriculum Intent

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.

Threshold 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.



Lutley 
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Science in the Early Years Foundation Stage

Developing Early Scientific Skills

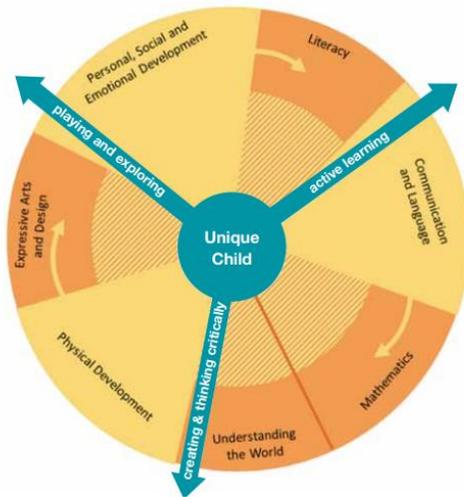
Developing Early Scientific Skills

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 14: Understanding of the World: People and Communities

- Children know about similarities and differences in relation to places, objects, materials and living things.
- They talk about the features of their own immediate environment and how environments might vary from one to another.
- They make observations of animals and plants and explain why some things occur and talk about changes.

Exceeding:

ELG 14: Understanding of the World: People and Communities

- Know that the environment and living things are influenced by human activity.
- Can describe some actions which people in their own community do that help to maintain the area they live in.
- Knows the properties of some materials and can suggest some of the purposes they are used for.
- Are familiar with basic scientific concepts such as floating, sinking, experimentation.



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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 
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Implementation of Whole School
Science Programme of Study

SNAP Science

Lutley Primary School's Science Programme of Study

	Autumn	Spring	Summer
EYFS	<p>Our changing world – the local environment</p> <p>Biology – animals and plants (to lap over into spring)</p>	<p>Biology – animals and plants</p> <p>Our changing world – the local environment</p> <p>Chemistry – objects and materials</p> <p>(to lap over to summer)</p>	<p>Chemistry – objects and materials</p> <p>Physics – light, space, electricity and movement</p> <p>Our changing world – the local environment</p>
Year 1	<p>Our changing world – sensing seasons</p> <p>Everyday materials</p> <p>Using our senses</p>	<p>Looking at animals</p> <p>Our changing world – animal antics</p>	<p>Our changing world – plants</p> <p>Plant detectives</p>
Year 2	<p>Our Changing World</p> <p>Materials: Shaping up</p> <p>What is in your habitat?</p>	<p>Materials: Good choices</p> <p>Take Care</p>	<p>Growing Up</p> <p>The apprentice gardener</p>
Year 3	<p>Can you see me?</p> <p>Amazing bodies</p>	<p>The power of forces</p> <p>How does your garden grow?</p>	<p>Our changing world</p> <p>Rock detectives</p>
Year 4	<p>In a state</p> <p>Switched on</p>	<p>Good vibrations</p> <p>Who am I?</p>	<p>Where does all that food go?</p> <p>Human Impact</p>
Year 5	<p>Feel the force</p> <p>Circle of life</p> <p>Reproduction in plants and animals</p>	<p>Get sorted</p> <p>Everyday materials</p> <p>Marvellous mixtures</p> <p>All change!</p>	<p>The Earth and beyond</p> <p>Our Changing World</p>
Year 6	<p>Our changing world</p> <p>The nature library</p>	<p>Danger! Low voltage</p> <p>Light up your world</p>	<p>Body health</p> <p>Body pump</p> <p>Everything changes</p>



Lutley 
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**Implementation of Whole School
Science Programme of Study
Progression of Skills**

Progression of Skills – Threshold Concepts

At Lutley, we aim to develop the following concepts through the progressive teaching of scientific knowledge, skills and understanding. These essential threshold concepts are based on the requirements of the National Curriculum Programme of Study for Key Stage One and Key Stage two.

- **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.

Implementation

Progression of Skills – Working Scientifically

Threshold Concept:	Key Stage One	Lower Key Stage Two	Upper Key Stage Two
<p>Work scientifically</p> <p>This concept involves learning the methodologies of the discipline of science.</p>	<ul style="list-style-type: none"> • Ask simple questions. • Observe closely, using simple equipment. • Perform simple tests. • Identify and classify. • Use observations and ideas to suggest answers to questions. • Gather and record data to help in answering questions. 	<ul style="list-style-type: none"> • Ask relevant questions. • Set up simple, practical enquiries and comparative and fair tests. • Make accurate measurements using standard units, using a range of equipment, e.g. thermometers and data loggers. • Gather, record, classify and present data in a variety of ways to help in answering questions. • Record findings using simple scientific language, drawings, labelled diagrams, bar charts and tables. • Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. • Use results to draw simple conclusions and suggest improvements, new questions and predictions for setting up further tests. • Identify differences, similarities or changes related to simple, scientific ideas and processes. • Use straightforward, scientific evidence to answer questions or to support their findings. 	<ul style="list-style-type: none"> • Plan enquiries, including recognising and controlling variables where necessary. • Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work. • Take measurements, using a range of scientific equipment, with increasing accuracy and precision. • Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs, and models. • Report findings from enquiries, including oral and written explanations of results, explanations involving causal relationships, and conclusions. • Present findings in written form, displays and other presentations. • Use test results to make predictions to set up further comparative and fair tests. • Use simple models to describe scientific ideas, identifying scientific evidence that has been used to support or refute ideas or arguments.

Implementation

Progression of Skills - Biology

Threshold Concept:	Key Stage One	Lower Key Stage Two	Upper Key Stage Two
<p>Understand plants This concept involves becoming familiar with different types of plants, their structure and reproduction.</p>	<ul style="list-style-type: none"> • Identify and name a variety of common plants, including garden plants, wild plants and trees and those classified as deciduous and evergreen. • Identify and describe the basic structure of a variety of common flowering plants, including roots, stem/trunk, leaves and flowers. • 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. 	<ul style="list-style-type: none"> • Identify and describe the functions of different parts of flowering plants: roots, stem, 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 role of flowers in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. 	<ul style="list-style-type: none"> • Relate knowledge of plants to studies of evolution and inheritance. • Relate knowledge of plants to studies of all living things.
<p>Understand animals and humans This concept involves becoming familiar with different types of animals, humans and the life processes they share.</p>	<ul style="list-style-type: none"> • Identify and name a variety of common animals that are birds, fish, amphibians, reptiles, mammals and invertebrates. • 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 (birds, fish, amphibians, reptiles, mammals and invertebrates, 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. • Notice that animals, including humans, have offspring which grow into adults. • Investigate 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. 	<ul style="list-style-type: none"> • Identify that animals, including humans, need the right types and amounts of nutrition, that they cannot make their own food and they get nutrition from what they eat. • Construct and interpret a variety of food chains, identifying producers, predators and prey. • Identify that humans and some animals have skeletons and muscles for support, protection and movement. • 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. 	<ul style="list-style-type: none"> • Describe the changes as humans develop to old age. • Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. • Recognise the importance of diet, exercise, drugs and lifestyle on the way the human body functions. • Describe the ways in which nutrients and water are transported within animals, including humans.

<p>Investigate living things This concept involves becoming familiar with a wider range of living things, including insects and understanding life processes.</p>	<ul style="list-style-type: none"> • Explore and compare the differences between things that are living, that are dead and 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. 	<ul style="list-style-type: none"> • Recognise that living things can be grouped in a variety of ways. • Explore and use classification keys. • Recognise that environments can change and that this can sometimes pose dangers to specific habitats. 	<ul style="list-style-type: none"> • 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 how living things are classified into broad groups according to common observable characteristics. • Give reasons for classifying plants and animals based on specific characteristics.
<p>Understand evolution and inheritance This concept involves understanding that organisms come into existence, adapt, change and evolve and become extinct.</p>	<ul style="list-style-type: none"> • Identify how humans resemble their parents in many features. 	<ul style="list-style-type: none"> • Identify how plants and animals, including humans, resemble their parents in many features. • Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. • Identify how animals and plants are suited to and adapt to their environment in different ways. 	<ul style="list-style-type: none"> • 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.



Implementation

Progression of Skills – Physics

Threshold Concept:	Key Stage One	Lower Key Stage Two	Upper Key Stage Two
<p>Understand movement, forces and magnets This concept involves understanding what causes motion.</p>	<ul style="list-style-type: none"> • Notice and describe how things move, using simple comparisons such as faster and slower. • Compare how different things move. 	<ul style="list-style-type: none"> • 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. 	<p>Magnets</p> <ul style="list-style-type: none"> • Describe magnets as having two poles. • Predict whether two magnets will attract or repel each other, depending on which poles are facing. <p>Forces</p> <ul style="list-style-type: none"> • Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. • Identify the effect of drag forces, such as air resistance, water resistance and friction that act between moving surfaces. • Describe, in terms of drag forces, why moving objects that are not driven tend to slow down. • Understand that force and motion can be transferred through mechanical devices such as gears, pulleys, levers and springs. • Understand that some mechanisms including levers, pulleys and gears, allow a smaller force to have a greater effect.

Implementation

<p>Understand light and seeing This concept involves understanding how light and reflection affect sight.</p>	<ul style="list-style-type: none"> • Observe and name a variety of sources of light, including electric lights, flames and the Sun, explaining that we see things because light travels from them to our eyes. 	<ul style="list-style-type: none"> • Observe and name a variety of sources of light, including electric lights, flames and the Sun, explaining that we see things because light travels from them to our eyes. 	<ul style="list-style-type: none"> • Understand 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 eyes. • Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them, and to predict the size of shadows when the position of the light source changes. • 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.
<p>Investigate sound and hearing This concept involves understanding how sound is produced, how it travels and how it is heard.</p>	<ul style="list-style-type: none"> • Observe and name a variety of sources of sound, noticing that we hear with our ears. 	<ul style="list-style-type: none"> • Identify how sounds are made, associating some of them with something vibrating. • Recognise that vibrations from sounds travel through a medium to the ear. 	<ul style="list-style-type: none"> • 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.
<p>Understand electrical circuits This concept involves understanding circuits and their role in electrical applications.</p>	<ul style="list-style-type: none"> • Identify common appliances that run on electricity. • Construct a simple series electrical circuit. 	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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.
<p>Understand the Earth's movement in space This concept involves understanding what causes seasonal changes, day and night.</p>	<ul style="list-style-type: none"> • Observe the apparent movement of the Sun during the day. • Observe changes across the four seasons. • Observe and describe weather associated with the seasons and how day length varies. 	<ul style="list-style-type: none"> • Describe the movement of the Earth relative to the Sun in the solar system. • Describe the movement of the Moon relative to the Earth. 	<ul style="list-style-type: none"> • 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.

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. These will be set out as threshold concepts and milestones for each Key Stage.
- Ensuring that appropriate opportunities are taken to develop the major 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.

Implementation

Teaching, Recording, Feedback, Assessment and Reporting

This will happen by:

- Threshold concepts for this subject cover each phase (KS1, LKS2 and UKS2), these concepts form the basis of learning objectives for each lesson taught. These are based on the National Curriculum programme of study.
- Learning objectives are shared with children each lesson and displayed in children's books.
- Threshold concepts are repeated throughout each phase so that children gain a deep understanding of them, rather than moving on to the threshold concepts for later year groups.
- Children are given a context through which they can explore each learning objective.
- Progress milestones for each threshold concept are used to inform and create steps of success, which are referred to throughout lessons.
- The key knowledge for each unit is shared with children and parents through a knowledge organiser, which may include dates, timelines, diagrams, maps, 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 each threshold concept so that children can achieve the milestones specific to their phase.
- 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 based on their success against the steps of success.
- Teachers' feedback should directly relate to the learning objective for the lesson, using the steps of success to give specific ways in which the child has been successful by indicating WWW – What Went Well, EBI – Even Better If, NS – Next Step or GT – Gap Task.
- Children are given the opportunity to assess their own and others' progress against the steps of success and learning objectives. 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. 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 P. O. P. Tasks (Proof Of Progress Tasks) which directly relate to the learning in that unit of work
- Regular retrieval practice focuses on children knowing and remembering more of what they have been taught.
- Assessment information will be used to plan future work for the class, including any intervention.
- 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, threshold concepts and progress milestones.
- 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.

Implementation

Equality of Provision and Inclusion

Teachers ensure that the classroom is an inclusive environment in which pupils feel all contributions are valued and positive steps are taken to allow all pupils to participate. Teaching is responsive to pupil's different learning styles and takes account of their experiences and starting points, in order to engage all pupils. Pupil grouping in the classroom is planned and varied. Teaching styles include collaborative learning so that pupils appreciate the value of working together. All pupils are encouraged to question, discuss and collaborate in problem solving tasks. Teachers challenge stereotypes and foster pupil's critical awareness and concepts of fairness, enabling them to detect bias and challenge inequalities. Resources and displays reflect the experience and backgrounds of pupils, promote diversity and challenge stereotypes across the curriculum. They are reviewed regularly to ensure that they reflect the inclusive ethos of the school.

The curriculum at our school is planned, organised and taught in ways which are compatible with the Equality Act 2010 and school's Equal Opportunities Policy. As a school we will take reasonable and necessary steps to ensure that all children can access a broad and balanced curriculum. This includes ensuring that the environment is accessible as well as lesson content. In some instances, we may consult with external agencies for advice to meet the needs of some children to ensure that they are able to participate in all lessons across the curriculum. A wide variety of strategies are used to ensure that teaching meets the needs of different groups of pupils including those that are more able, those identified with special educational needs, and those from different ethnic or gender groups. These include:

Differentiating Lessons by:

- Using a range of differentiated resources.
- Providing differentiated tasks where appropriate.
- Differentiating questions.
- Using a range of groupings within the class to teach children and support them.
- The amount of adult support that is given and adapting this as necessary.

Effective Lesson Planning and Management

- Setting clear objectives that are understood by each pupil.
- Presenting work in small achievable steps.
- Planning varied activities that motivate pupils and providing alternative activities where needed.
- Creating an atmosphere of encouragement and providing opportunities for pupils to achieve success.
- Identifying the most suitable pace for each student in order to provide sufficient individual challenge whilst fostering enthusiasm and facilitating concentration.
- Involving pupils in taking responsibility for their own learning and encouraging them to develop effective study skills.
- Providing deepening activities for students.

The Appropriate Deployment of Resources

- Analysing the suitability of resources and developing additional resources where necessary.
- Ensuring that teaching assistants and support staff are effectively deployed.

- Considering how specialist equipment, including I.T, can be of help and motivation to pupils.
- Careful assessment and monitoring.
- Using pupil's records and day to day achievements in science to support planning.
- Carefully monitoring pupils' progress to ensure that success is built upon.
- Providing regular feedback to pupils on progress and actively involve pupils in the assessment.



Implementation

Reading in Science

At Lutley Primary School, reading is at the heart of the curriculum. It is our intent to ensure that every child not only develops the skills of reading but also a love of reading that will last them a lifetime. Our children read at home and school for pleasure, for information and to expand and enhance their knowledge and understanding across all subjects. Our children not only learn to read, they read to learn. Appropriate opportunities are taken to enhance children's learning in science through reading with the use of high-quality texts across a wide range of genres.

These are systematically matched to each topic in each year group, in order to impact on learning in the following ways:

- Knowledge of an extensive and rich vocabulary.
- Fluency and accuracy in reading across a wide range of contexts throughout the curriculum.
- The motivation to read for both study and for pleasure.
- Extensive knowledge through having read a rich and varied range of texts.
- Excellent phonic knowledge and skills.
- An excellent comprehension of texts.
- A desire to embrace challenging activities, including opportunities to undertake high-quality research across a range of scientific topics.
- The ability to think, reflect, debate, discuss and evaluate scientific thinking and discoveries.
- The ability to consistently support, evaluate and challenge their own and others' views using detailed, appropriate and accurate scientific evidence and facts.

Implementation

SMSC and Rights Respecting in Science

Rights Respecting and SMSC within the curriculum

As a Rights Respecting School, our children not only respect their rights but they actively promote them. They understand that their rights are universal and unconditional and are true Change Makers when it comes to championing the rights of others in our own community and across the world. We have been awarded the Gold Rights Respecting School Award which means that we have been recognised by Unicef UK for our Rights Respecting School ethos ensuring that teaching children about their rights is explicitly embedded into our school curriculum. Rights Respecting underpins the work we do throughout SMSC development and the two core areas work hand in hand together to equip children with the key skills that they need to become Global Citizens.

What does this look like?

SMSC and Rights Respecting are not lessons which are taught in isolation, they are interwoven throughout our curriculum. Science naturally provides rich opportunities for learning about the convention and there are clear links with global citizenship and sustainable development. Our staff have a deep understanding of the United Nations Convention on the Rights of the Child (UNCRC) and are able to make links in lessons which are deep and meaningful. Staff are able to enhance teaching and learning by modelling rights respecting language and attitudes and making strategic decisions about the content of curriculum lessons that involve the children. Where appropriate, particular articles or areas of SMSC are linked to areas of science to provide children with a broad knowledge and understanding.

What impact does this have?

Due to the fact rights and SMSC development are integrated into our broad and balanced curriculum, children understand the importance of the convention and their SMSC key skills and it becomes a fundamental part of our school ethos. We have found that bringing a rights perspective to areas of the curriculum can enhance and enrich learning and instil a rights respecting ethos within our school. By ensuring that children have a rich SMSC and Rights Respecting understanding, we ensure that they are ready to embrace the challenges of creating a happy and successful adult life in modern Britain.

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.



Lutley 
Primary School

Evaluating the Impact of our Science Curriculum

Subject Leadership in Science

Subject leadership tasks include:

- Leading staff meetings/ staff CPD.
- A self-review by staff of how confident they were in teaching each subject and training requirements that they needed to be more effective.
- Work alongside other subject leaders for consistency across subjects.
- Report back to the SLT on findings and to contribute to the School Improvement Plan and report to Governors (when necessary).
- Resourcing their subject to ensure that children have sufficient resources to be successful including the lowest 20% of children.
- Promoting reading at the heart of the curriculum by provide high quality texts to support their subject.
- Monitor the equality of provision for all to ensure there is consistency across year groups, phases and whole school.
- Implement knowledge organisers in their subject and through book monitoring cross reference to the outcomes.
- Moderation of work across year groups, phases and across the whole school.
- Facilitate 'bring and brag' opportunities for staff to share good practice across the school.
- Compiling a portfolio of work across the school to show the impact the curriculum on learning.
- Lesson observations and drop ins.
- Team teaching.
- Coaching conversations.

Through these leadership tasks, subject leaders are able to:

Rationale and aims about the content and sequencing of the curriculum

- Identify and describe the key strengths and areas for development in their subject.
- Discuss these strengths and areas for development specific to year groups, phases or whole school.
- Describe how do they know it is happening and working in their subject and what it looks like now.

Pupils are accessing sufficient coverage and depth in line with the planned curriculum

- Explain how they guarantee and ensure progression for pupils within their subject curriculum.
- Can show where knowledge builds across a year/year group/key stage.
- Can show where knowledge builds in depth overtime.
- Explain how they ensure that there is suitable challenge and ambition for all pupils in their subject.

Plan for an equality of access for pupils to the curriculum provision

- Share the timetabling arrangements for their subject across the provision, including how often learners get access to their subject area, how they know, how they check.
- Describe the outcomes of their last monitoring and explain what it told them about their subject.
- Explain and show their curriculum is resourced, especially for pupils with additional needs, including bespoke resources needed on occasion and how do they research these.
- Explain and describe what coverage is like for all pupils such as SEND, particularly those with low attainment in basic skills such as reading.

Staff training and expertise to deliver the curriculum

- Explain how the leader and how the staff keep knowledge and understanding of the curriculum up to date.
- Describe the impact of CPD they have undertaken and how it's been relevant to subject curriculum implementation.
- Explain how they support those who are not subject specialists.
- Has evidence to show the impact that the training has had on teachers' subject knowledge and their ability to implement the curriculum.
- Can describe the impact that the training has had on support staff subject knowledge and their ability to implement the curriculum.

Assessment is purposeful to the development of the curriculum

- Describe the purpose of assessment in their subject and explain why the subject is assessed in this way.
- Explain how they assure accuracy of assessment.
- Explain and show how assessment inform and improves the curriculum.
- Share what the assessment information tells them about the quality of the curriculum.

Subject Leadership Files

In a science subject leadership file:

- Subject leader action plan.
- Portfolio of children's work.
- A curriculum overview establishing coverage and depth.
- An effective Action Plan that is targeted to specific aspects of pupils' learning.
- Book scrutiny outcomes and the next steps linked to this.
- Examples of impact that the leader has made within: standards, pupil engagement, behaviour, spiritual, moral, social and cultural education, provision for vulnerable groups...
- Gifted and talented/more able provision.
- Pupil attitudes and pupils' targets from pupil voice.
- Resource requirements and resource ordering.
- Educational visits/specialist visitor provision across the school linked to the subject.
- Lesson observation outcomes, providing a framework for developmental observation.
- Monitoring schedule.