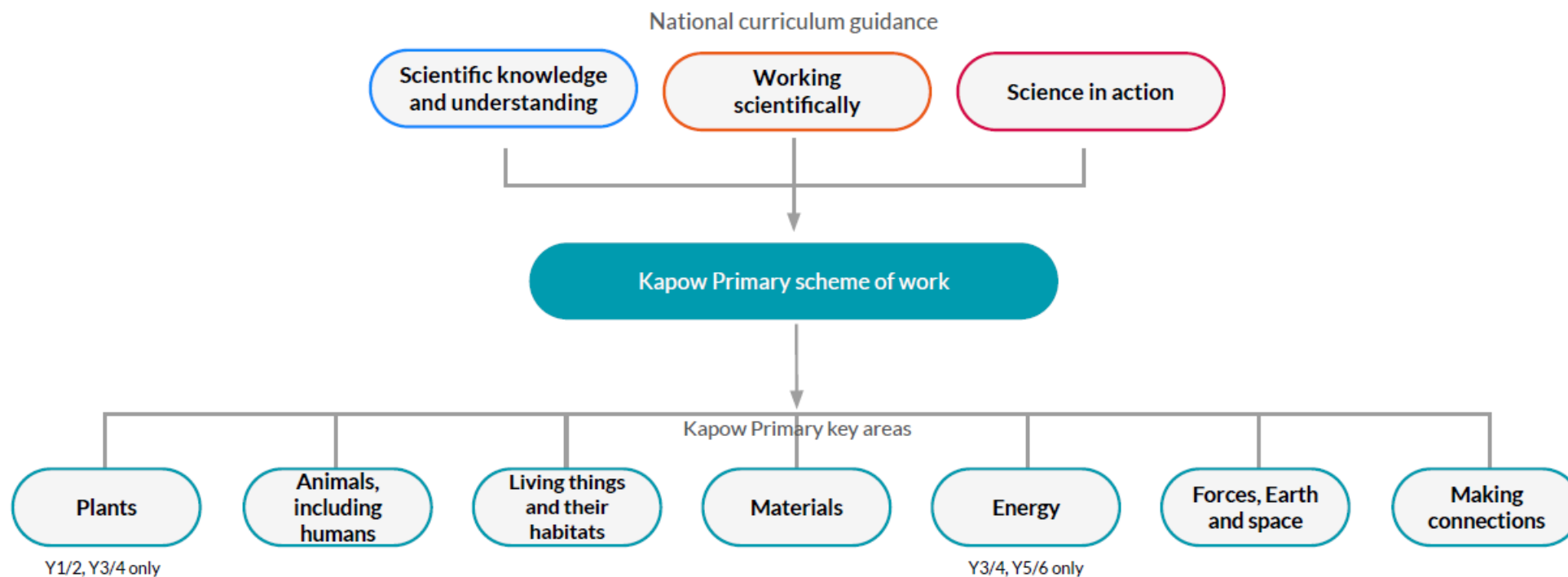




# Science Long Term Plan

How is the Science scheme of work organised?



# Key areas in Science

Pupils will develop **Scientific knowledge and understanding** in seven key areas. The learning in each area is summarised below:

## Animals, including humans



Identifying animals, their basic structure and their eating habits, as well as their basic needs for survival. Children learn about the life cycles of animals and their place in food chains.

Naming parts of the human body and recognising the function of skeletons, muscles, teeth and the digestive and circulatory systems. Learning about the importance of hygiene and of the right type and amount of nutrition. Children learn about the impact of diet, drugs and exercise on the body and study the life cycles of humans.

This key area covers the Year 1, Year 2, Year 3, Year 4, Year 5 and Year 6 subject content titled 'Animals, including humans' from the National curriculum.

## Living things and their habitats



Identifying something as living and how it is grouped based on its characteristics, similarities and differences.

Naming different types of habitats, learning what they provide for life and the impact of habitats changing. Children learn about the life cycles and reproduction of animals and plants, and how this affects the variation of living things around us, past and present.

This key area covers the Year 2, Year 4, Year 5 and Year 6 subject content titled 'Living things and their habitats' and 'Evolution and inheritance' from the National curriculum.

## Plants



Identifying different plants and their key structures, growing seeds and plants and understanding their requirements for growth. Recognising the function of different plant structures and understanding how plants reproduce.

This key area covers the Year 1, Year 2 and Year 3 subject content titled 'Plants' from the National curriculum.

## Materials



Naming materials, describing their properties and understanding why materials have specific uses. Identifying how materials may change and the factors that may contribute to this, including changes of state within the water cycle. Children learn about different mixtures and how they can be separated based on their properties.

Identifying different types of rocks and their physical properties, and understanding how fossils and soil are formed.

This key area covers the Year 1, Year 2, Year 3, Year 4 and Year 5 subject content titled 'Everyday materials', 'Uses of everyday materials', 'Rocks', 'States of matter' and 'Properties and changes of materials' from the National curriculum.

## Energy



Learning about light and its properties, how it enables us to see and how shadows are formed. Identifying the relationship between sounds, volume, pitch and vibrations, and how sound travels to the ear.

Recognising electrical appliances and the components that make up different circuits. Building electrical circuits and identifying factors that affect the output.

This key area covers the Year 3, Year 4 and Year 6 subject content titled 'Light', 'Electricity' and 'Sound' from the National curriculum.

# Key areas in Science

Pupils will develop **Scientific knowledge and understanding** in seven key areas. The learning in each area is summarised below:

## Forces, Earth and space



Identifying changes across the seasons, and the weather and day length associated with each.

Recognising different types of forces and understanding their effect on objects, including the role of pulleys, levers and gears. Children learn about magnetic materials and that magnets attract and repel.

Learning about the movements of planets and moons within the solar system and how this relates to our day and night.

This key area covers the Year 1, Year 3 and Year 5 subject content titled 'Seasonal changes', 'Forces and magnets', 'Earth and space' and 'Forces' from the National curriculum.

## Making connections



[Finding the optimum: the science subject report](#) (Ofsted, 2023) states that schools should ensure that teachers

**'regularly connect new learning to what pupils have already learned. This includes showing pupils how knowledge from different areas of the curriculum connects.'**

One of the ways in which we do this is through our Making connections units, which give pupils opportunities, beyond the National curriculum programme of study, to make connections between their science learning.

# A spiral curriculum

The scheme of work has been designed as a spiral curriculum with the following key principles in mind:

- ✓ **Cyclical:** Pupils return to the key knowledge and skills repeatedly during their time in primary school.
- ✓ **Increasing depth:** Each time a skill is revisited it is covered with greater complexity and in varying contexts. Progression includes:
  - studying a specific scientific concept in more detail;
  - studying further examples of a specific concept to broaden contextual knowledge;
  - studying a broader range of equipment and methods to test an hypothesis;
  - explaining concepts using models or ideas that can't be seen;
  - making and explaining links across areas in science;
  - engaging with increasingly complex ideas and ethical dilemmas.
- ✓ **Prior knowledge:** Prior knowledge is utilised so pupils can build upon previous foundations, rather than starting again.



## Year 1/2 Cycle A

<b>Autumn 1</b>	<p><b>Plants</b></p> <p><u>Introduction to plants</u> (6 lessons) Venturing outside, children identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. They use magnifying glasses to observe and name plant parts and draw and label diagrams of flowers. Children closely observe leaves and sort them into groups based on their appearance. They use non-standard units to measure leaf length and record their observations in a table. Pupils investigate if beans need water for growth and identify edible plant parts.</p>	<b>Autumn 2</b>	<p><b>Forces, Earth and space</b></p> <p><u>Seasonal changes</u> (6 lessons) Reflecting on their own experiences, children learn about the four seasons and the weather associated with each. Pupils explore how seasonal changes affect trees, daylight hours and our choices about outfits. They plan and carry out their own weather reports, considering the knowledge required for this job.</p>
<b>Spring 1</b>	<p><b>Living things and their habitats</b></p> <p><u>Habitats</u> (6 lessons) Considering the life processes that all living things have in common, pupils classify objects into alive, was once alive or has never been alive. Pupils explore global habitats, naming plants and animals that can be found there. They learn how a range of different living things depend on each other for food or shelter. Pupils explore this further by creating food chains to show the sequence that living things eat each other for energy to grow and stay healthy.</p>	<b>Spring 2</b>	<p><b>Animals, including humans</b></p> <p><u>Life cycles and health</u> (6 lessons) Studying the life cycles of various animals, children learn what animals need to survive and how they change over time. Pupils collect data that allows them to observe changes in their peers, while also developing their ability to take measurements and record data. They consider how scientific knowledge helps people to make healthy choices.</p>
<b>Summer 1</b>	<p><b>Plants</b></p> <p><u>Plant growth</u> (6 lessons) Carrying out comparative tests, pupils identify the conditions required for seed germination and compare these to the survival needs of plants in later growth phases. Pupils use rulers to measure stem growth and record data in a table. They use their results to conclude that plants need water, light and a suitable temperature to grow and stay healthy. Children identify the stages in a plant's life cycle and discover how humans impact plants in the environment.</p>	<b>Summer 2</b>	<p><b>Making connections</b></p> <p><u>Ocean protectors</u> (5 lessons) Consolidating knowledge of life cycles, habitats and food chains, children explore the ocean and rock pools. They investigate what happens to litter when it is left in water to better understand the choices we make about materials available. Pupils role-play as marine biologists to collect data about population sizes to plot as pictograms and to better understand how we can protect the oceans.</p>

## Year 1/2 Cycle B

	Animals, including humans		Materials
<b>Autumn 1</b>	<p><u><a href="#">Sensitive bodies</a></u> (6 lessons)</p> <p>Familiarising themselves with the basic parts of the human body, children investigate their senses through stimulating experiences that highlight how we interact with the world around us. They work scientifically, using their senses to make observations, spot patterns and use data to answer questions. They develop an understanding of how science can support those who have lost sensory function and consider how firefighters use their senses at work.</p>	<b>Autumn 2</b>	<p><u><a href="#">Everyday materials</a></u> (6 lessons)</p> <p>Identifying the difference between objects and materials, children explore their surroundings to find examples of each. They work scientifically by planning tests, making observations and recording data. Pupils use results to answer questions and sort and group materials based on their properties.</p>
<b>Spring 1</b>	<p><u><a href="#">Comparing animals</a></u> (6 lessons)</p> <p>Studying both local and global animals, children recognise common characteristics and physical features. They use this information to make comparisons and classify animals. Pupils consider the most effective way to collect data about class pets and record their findings in a block chart. They develop their understanding of classification by comparing the dietary habits of different animals and role play as Jane Goodall carrying out research into chimpanzees in the wild.</p>	<b>Spring 2</b>	<p><u><a href="#">Uses of everyday materials</a></u> (6 lessons)</p> <p>Building on their knowledge of everyday materials and their properties, pupils recognise that materials are suited to specific purposes and explore how actions such as stretching and bending affect the shape of solid objects. They compare the suitability of materials; gather and record data in tables and block graphs and use their results to answer questions. Children also learn about the harmful effects of plastic and explore eco-friendly alternatives.</p>
<b>Summer 1</b>	<p><u><a href="#">Living things and their habitats</a></u></p> <p><u><a href="#">Microhabitats</a></u> (6 lessons)</p> <p>Developing their understanding of scientific enquiry, pupils learn that scientists use a range of skills to answer questions. They discover that microhabitats provide what minibeasts need to survive and carry out a survey to find out where different minibeasts live in the school grounds. They practise asking scientific questions and follow a method to investigate which conditions woodlice prefer. Pupils explore the job role of a botanist by identifying flowering plants.</p>	<b>Summer 2</b>	<p><u><a href="#">Making connections</a></u></p> <p><u><a href="#">Fairytale science</a></u> (5 lessons)</p> <p>Using familiar fairytales, pupils develop their working scientifically skills through practical investigations. Prompted by 'The Tortoise and the Hare', children compare animal features and speed. Investigating materials with 'The Gingerbread Man', they test properties such as waterproofing and strength. Exploring 'Goldilocks', pupils investigate temperature differences and sensitivity of touch. With 'The Princess and the Pea', they record results and present findings using block graphs.</p>

## Year 3/4 Cycle A

<p><b>Autumn 1</b></p>	<p><b>Energy</b></p> <p><u>Light and shadows</u> (6 lessons) Identifying examples of light sources, children learn that light is needed to see and how its absence causes darkness. Children investigate reflection and shadow formation, including how different factors affect shadows. They explore how shadows can be used to entertain in the arts and create shadow puppets to recount how different people work or experiment with light.</p>	<p><b>Autumn 2</b></p>	<p><b>Animals, including humans</b></p> <p><u>Movement and nutrition</u> (6 lessons) Studying the human skeleton, children identify key bones and compare them to other animals explaining the role within the body. Pupils explore how changes in muscles result in movement and the implications these discoveries have in the scientific development of prosthetic limbs. They study how energy is used by the body, what constitutes a balanced diet in humans and how research contributes to nutritionist expertise.</p>
<p><b>Spring 1</b></p>	<p><b>Materials</b></p> <p><u>Rocks and soil</u> (6 lessons) Studying rocks and their properties, children learn how to classify rocks and identify how they were formed. They look at the work of paleontologists to learn about fossil formation and use models to explore how fossils tell us about the past. Pupils investigate the physical properties of rocks and link these to their particular uses. Pupils also explore soil formation, separate soil using a sedimentation jar and test soil drainage.</p>	<p><b>Spring 2</b></p>	<p><b>Animals, including humans</b></p> <p><u>Digestion and food</u> (6 lessons) Using models, children describe the function of key organs in the digestive system. Pupils identify the types of human teeth to create their own model and investigate factors that impact our dental health. They compare human teeth to other animals' and consider this in the light of prior knowledge about predators, prey and food chains. Children take on the role of a naturalist investigating animal faeces for clues about diet, digestion and dentition.</p>
<p><b>Summer 1</b></p>	<p><b>Energy</b></p> <p><u>Electricity and circuits</u> (6 lessons) Exploring appliances that use electricity in their setting, children learn how to work with electricity safely and build circuits. Pupils investigate electrical conductors and insulators and explore the relationship between the number of bulbs and bulb brightness. Real scenarios and historical discoveries inform children about scientific progression and home safety.</p>	<p><b>Summer 2</b></p>	<p><b>Making connections</b></p> <p><u>How does food affect muscle fatigue?</u> (5 lessons) Using practical investigations, pupils develop their working scientifically skills by exploring how food influences muscle fatigue. Revisiting learning on digestion, nutrition and energy, they plan and carry out a comparative test, measuring muscle endurance before and after eating. Gathering and recording data carefully, pupils analyse their findings and evaluate the reliability of their test. They extend their understanding by investigating whether food can provide chemical energy to power an electrical circuit, before presenting their results clearly to others.</p>

## Year 3/4 Cycle B

	Forces, Earth and space		Materials
<b>Autumn 1</b>	<p><u><b>Forces and magnets</b></u> (6 lessons)</p> <p>Investigating the movement of vehicles on different surfaces, children learn about the impact of friction and compare uses and drawbacks. They broaden their experience in writing scientific methods and recording data as they investigate contact and non-contact forces. Pupils explore the properties of different magnets and use this to understand their uses.</p>	<b>Autumn 2</b>	<p><u><b>States of matter</b></u> (6 lessons)</p> <p>Investigating the properties of solids, liquids and gases, children learn about the different states of matter. They explore changes of state using relatable examples and use this to explain changes to water through the water cycle. Pupils investigate the relationship between temperature and rate of evaporation while broadening their experience of working scientifically.</p>
<b>Spring 1</b>	<p><b>Energy</b></p> <p><u><b>Sound and vibrations</b></u> (6 lessons)</p> <p>Exploring different ways of producing sounds, children learn about the relationship between vibrations and what they hear. They study dolphins and whales to develop their understanding of how sound travels between objects and investigate the role of insulation to protect our ears. Pupils explore how pitch and volume can be altered and make their own musical instruments to demonstrate these principles.</p>	<b>Spring 2</b>	<p><b>Living things and their habitats</b></p> <p><u><b>Classification and changing habitats</b></u> (6 lessons)</p> <p>Identifying different ways to group living things, children make classification keys to explore which grouping methods are most effective. Pupils study how habitats change over time and understand that humans can have both positive and negative effects on their surroundings. They play the role of conservationists and design conservation pamphlets.</p>
<b>Summer 1</b>	<p><b>Plants</b></p> <p><u><b>Plant reproduction</b></u> (6 lessons)</p> <p>Building on their prior knowledge of plant structures, children describe the functions of named parts and use evidence to explain their significance in plant development. They investigate factors that may affect plant growth and how water is transported. They explore how seeds vary and create models to show seed dispersal methods.</p>	<b>Summer 2</b>	<p><b>Making connections</b></p> <p><u><b>How does wind force affect seed dispersal?</b></u> (5 lessons)</p> <p>Using different wind speeds to disperse seeds, pupils measure how force affects the distance they travel. They consider how seeds are shaped differently and how this links with the way they are dispersed. Extending the enquiry, pupils measure the volume of different wind speeds to better explain their results. They explore biomimicry, considering how seed shapes have contributed to product design.</p>

## Year 5/6 Cycle A

Year 5/6 Cycle A			
Autumn 1	Materials		
	<p><u>Mixtures and separation</u> (6 lessons)</p> <p>Pupils explore different types of mixtures and the different methods that can be used to separate them. They dissolve a range of substances, identify different solutions and investigate how temperature affects the time taken to dissolve. They design and create a water filter, sieve soil and evaporate solutions.</p>	Autumn 2	<p><u>Properties and changes</u> (6 lessons)</p> <p>Broadening their experience of the properties of materials, children investigate hardness, transparency and conductivity and consider how these properties influence the uses of materials. They explore reversible changes, including dissolving and changes of state. Children compare these to irreversible changes, including rusting, burning and mixing vinegar and bicarbonate of soda.</p>
Spring 1	Forces, Earth and space	Spring 2	Animals, including humans
	<p><u>Earth and space</u> (6 lessons)</p> <p>Exploring some of the key celestial bodies in our Solar System, children learn their names and compare their movements. Pupils discover the relationship between the Earth's rotation and daylight, making models to represent their knowledge. They make their own sundials and consider how and why humans' ideas about the universe have changed over time.</p>		<p><u>Circulation and health</u> (6 lessons)</p> <p>Studying the human circulatory system, children learn about the role of the heart, blood and blood vessels and use models to demonstrate their function. They explore how lifestyle choices affect our health and use secondary sources to help them play the role of healthcare professionals advising patients. Pupils devise their own investigation to look at the relationship between exercise and heart rate, applying their knowledge of variables and then analysing secondary data to understand fitness better.</p>
Summer 1	Energy	Summer 2	Making connections
	<p><u>Light and reflection</u> (6 lessons)</p> <p>Proving that light travels in a straight line, children use this information to explain observations of reflection and shadows. They explore how our eyes allow us to see and how mirrors can be used in a variety of ways. Pupils investigate factors affecting the size of shadows and the laws of reflection. Children apply what they have learned about light by exploring real-life uses of mirrors.</p>		<p><u>How reflective are space blankets?</u> (5 lessons)</p> <p>Exploring the reflectiveness of space blankets through experiments, the children analyse data, draw conclusions and apply their understanding of reflection to make predictions, plan and carry out an enquiry. They consider how inventions can be used in new contexts, such as space technologies being used for marathon runners. Extending the enquiry, children explore further properties of space blankets, like reflection of light, transparency, conductivity and hardness. Developing persuasive speech, the class share their findings like a scientist by advertising the uses and properties of space blankets.</p>

## Year 5/6 Cycle B

Autumn 1	Living things and their habitats	Autumn 2	Forces, Earth and space
	<p><u>Life cycles and reproduction</u> (6 lessons)</p> <p>Studying animal life cycles, children learn about the significance of reproduction for a species' survival. Pupils compare asexual and sexual reproduction in plants and grow cuttings to measure and plot root growth over time. Children compare the life cycles of mammals, birds, amphibians and insects identifying key differences. They analyse secondary data to investigate how the amphibian life cycle is affected by predators and climate change.</p>		<p><u>Unbalanced forces</u> (6 lessons)</p> <p>Building on their knowledge of forces, children explore gravity, air resistance and water resistance in more depth and consider the effect of these forces being unbalanced. They demonstrate key principles in the classroom and plan investigations to further their understanding of the effects of these forces. Pupils test their ideas using models and compete to build the most effective pulley system.</p>
Spring 1	Living things and their habitats	Spring 2	Energy
	<p><u>Classifying big and small</u> (6 lessons)</p> <p>Children broaden their knowledge of how vertebrates, invertebrates, plants and micro-organisms are grouped using shared characteristics. They discover how Carl Linnaeus developed the Linnaean and binomial systems for classifying and naming living things. Pupils use and produce classification keys to sort and identify organisms.</p>		<p><u>Circuits, batteries and switches</u> (6 lessons)</p> <p>Using their prior knowledge of electrical circuits, children learn to draw conventional circuit diagrams and use models to explain current, resistance and voltage. They compare different batteries and consider the effect on bulb brightness. Pupils apply their knowledge of switches and electrical circuits to design and produce their own practical devices.</p>
Summer 1	Living things and their habitats	Summer 2	Animals, including humans
	<p><u>Evolution and inheritance</u> (6 lessons)</p> <p>Studying patterns in humans and other species, children learn about characteristics that are inherited from parents and those that are environmental. Through the eyes of Darwin and Wallace, they learn how observations lead to theories and explore natural selection. By modelling the variation and natural selection of Darwin's finches, they begin to explain how species evolve over time and the role of fossil evidence that supports this theory.</p>		<p><u>Human timeline</u> (3 lessons)</p> <p>Studying human development and changes, children identify key stages and consider what data may help determine if a child is growing normally. They describe how puberty affects girls and boys and produce graphs to compare how gestation periods vary across different mammals, including humans.</p>
			Making connections
			<p><u>How does light affect the direction of plant growth?</u> (3 lessons)</p> <p>Developing their working scientifically skills, pupils explore how plants respond to their environment. Prompted by observing phototropism, pupils plan and carry out a comparative test to investigate how light direction affects plant growth. Gathering and analysing observational data, they draw conclusions and evaluate the reliability of their results. Pupils extend their understanding by debating the evolutionary advantages of plants growing towards light.</p>