



## Science Curriculum Intent

At St Mary's CE Academy, we aim to ensure that all pupils:

### Principles of teaching and learning in Science

#### St-Mary's Science Mission Statement

Our vision is for every child to actively engage in the Science curriculum through a creative approach that is supported by the Cornerstones curriculum and enhanced by STEM challenges. By engaging in a process of observing, questioning, doing and understanding we aim to foster the view that Science is relevant, fun and something which all pupils can participate in.

Teaching and learning of Science is most effective when:

Key Principle for Science Teaching	Qualities it will foster in the pupils
All adults have a clear understanding of scientific concepts and present that topic in the most engaging way.	<ul style="list-style-type: none"> <li>• Motivated</li> <li>• Engaged</li> <li>• Positive view of Science, see as being fun</li> <li>• View Science as being relevant to them and society as a whole.</li> <li>• Development of practical skills linked to working scientifically- which will be relevant in their secondary education onwards</li> <li>• Use of equipment, including equipment specific to Science e.g. pooters</li> <li>• Develop, use and understand scientific vocabulary</li> <li>• Independent thinker</li> <li>• Critical thinker</li> <li>• Evaluate</li> <li>• Decision making</li> <li>• Co-operate</li> <li>• Be curious</li> <li>• Question</li> <li>• Persevere</li> <li>• Be open minded</li> <li>• Responsible – environmental etc.</li> </ul>
Pupils are given the opportunity to learn through discovery by being provided with a variety of hands on, practical activities, including all types of scientific enquiry.	
Activities are based on thorough assessment of existing knowledge and practical skills in order to ensure that pupils progress their thinking and learning.	
Adults model activities, scientific vocabulary and thinking, including posing questions and interpreting evidence.	
Pupils are given the opportunity to pose questions, discuss their ideas, using scientific vocabulary, theories, and interpret results and evidence.	
Pupils are given the opportunity to test their own thinking and theories.	
Adults plan activities that are connected to recent scientific discoveries, topical issues and pupils interest so that they make connections to their lives and view science as being relevant.	
Scientific vocabulary is modelled by the adults. Scientific vocabulary is displayed and pupils' are actively encouraged to refer to it and use it during discussions and written work.	
Pupils are presented with resources that are in good working order and in sufficient supply in order for pupils to pursue their individual ideas.	

- Sensitive- ethics of science etc
- Adaptable/ tolerate uncertainty -evidence changes
- Consider a career in science

**Junior leadership Team (representing pupil views) wanted science to be.....**

- Fun and exciting
- Hands on- 'not writing'
- To sometimes work in groups and sometimes on their own
- Give them the skills for a career in Science.

The above principles were written with the pupil's voice in mind.

# \*\*\*\*\*: KEY STAGE 1

## Knowledge & Skills

### Over Arching Themes and Ideas:

#### Key Themes and Ideas for Physics:

**P1:** The universe follows unbreakable rules that are all about forces, matter and energy.

**P2:** Forces are different kinds of pushes and pulls that act on all the matter that is in the universe. Matter is all the stuff, or mass, in the universe.

**P3:** Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it.

#### Key Themes and Ideas for Chemistry:

**C1:** All matter (stuff) in the universe is made up of tiny building blocks.

**C2:** The arrangement, movement and type of the building blocks of matter and the forces that hold them together or push them apart explain all the properties of matter (e.g. hot/cold, soft/hard, light/heavy, etc).

**C3:** Matter can change if the arrangement of these building blocks changes.

#### Key Themes and Ideas for Biology:

**B1:** Living things are special collections of matter that make copies of themselves, use energy and grow.

**B2:** Living things on Earth come in a huge variety of different forms that are all related because they all came from the same starting point 4.5 billion years ago.

**B3:** The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations in to different forms in order to survive in the environments in which they live.

#### Key Themes and Ideas for Earth Science:

**E1:** The Earth is one of eight planets that orbit the sun.

**E2:** The Earth is tilted and spins on its axis leading to day and night, the seasons and the climate.

**E3:** The Earth is made up of several layers, including a relatively thin rocky surface which is divided into tectonic plates, and the movement of these plates leads to many geologic events (such as earthquakes and volcanoes) and geographical features (such as mountains.)

#### Key Themes and Ideas for Study and Impact of Science:

**D1:** Science seeks to explain things that we see in the natural world by attempting to understand their causes.

**D2:** Scientific theories are explanations of what we see in the natural world that best fit with evidence that has been gathered. Because of this, theories can be changed when new evidence is found.

**D3:** The knowledge produced by science leads to new technology that humans find useful. These technologies don't always necessarily make the world better so we have to think carefully about how—and whether—we use them.

**Repeating Concepts:** Also contained within the science curriculum are 26 key concepts that repeat in different units: absorption, birth, bond, circuit, component, condensation, conductor, decay, dissolving, energy, evaporation, extinction, freezing, growth, habitat, insulator, irreversible, matter, melting, orbit, particle, property, reflection, reproduction, reversible, wave.

National Curriculum Programmes of Study:	Unit	NC Objectives:	Key Knowledge and Vocabulary
Year 1	Working Scientifically : (Ongoing throughout the Year)	<p>Sc1/1.1 asking simple questions and recognising that they can be answered in different ways</p> <p>Sc1/1.2 observing closely, using simple equipment</p> <p>Sc1/1.3 performing simple tests</p> <p>Sc1/1.4 identifying and classifying</p> <p>Sc1/1.5 using their observations and ideas to suggest answers to questions</p> <p>Sc1/1.6 gathering and recording data to help in answering questions</p>	<p><b><u>New learning and vocabulary</u></b></p> <p><b>properties</b>, observe, test, magnifying glass, object, record, equipment</p> <p>Know that we can ask questions about the world and that when we observe the world to answer these questions, this is science</p> <p>Know that we can use magnifying glasses to observe objects closely</p> <p>Know that we can test our questions to see if they are true</p> <p>Know that objects can be identified or sorted into groups based on their observable properties</p> <p>Know that we can write down numbers and words or draw pictures to record what we find</p> <p><b>Enhancing the Curriculum (Non Statutory guidance for Key Stage 1).</b></p> <p>Know and experience different types of scientific enquiries, including practical activities, and begin to recognise ways in which they might answer scientific questions.</p> <p>Know how to use simple features to compare objects, materials and living things and, with help, decide how to sort and group them,</p> <p>Know how to observe changes over time, and, with guidance, begin to notice patterns and relationships.</p> <p>Know how to use simple secondary sources to find answers to the questions that they have asked.</p> <p>Know how to use simple measurements and equipment (for example, hand lenses, egg timers) to gather data,</p> <p>Know how to carry out simple tests, record simple data, and talk about what they have found out and how they found it out.</p> <p>Knows how to record and communicate their findings in a range of ways and begin to use simple scientific language, with help.</p> <p><b>(For skills and progression for each year group in this area please see progression grid).</b></p>

<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Year 1</b></p>	<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Everyday Materials</b> (Autumn 1 and 2)</p>	<p>Sc1/3.1a distinguish between an object and the material from which it is made</p> <p>Sc1/3.1b identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock</p> <p>Sc1/3.1c describe the simple physical properties of a variety of every day materials</p> <p>Sc1/3.1d compare and group together a variety of every day materials on the basis of their simple physical properties</p>	<p><b>Key Theme or Idea: C1, C2</b></p> <p><b><u>New learning and vocabulary</u></b></p> <p><b>absorption, matter, property</b>, wood, plastic, glass, metal, water, rock</p> <p>Know that an object is made from/of a material</p> <p>Knows the difference between an object and the material that it is made from</p> <p>Know from observation how to distinguish between materials made of wood, plastic, glass, metal, water, rock</p> <p>Know that materials can be hard, soft, strong, weak, absorbent, heavy, light, solid and runny, smooth and rough; these descriptions denote the physical properties of a material</p> <p>Knows how to compare and group together a variety of everyday materials on the basis of their simple physical properties.</p> <p>Know that matter (stuff) is made from tiny building blocks</p> <p><b>Enhancing the Curriculum (Non Statutory guidance for Key Stage 1).</b></p> <p>Know how to explore, name, discuss and raise and answer questions about everyday materials</p> <p>Knows other properties of materials such as: hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent</p> <p>Know of a wider range of materials, for example brick, paper, fabrics, elastic, foil.</p> <p>Know how to perform 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?’</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Year 1</b></p>	<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Animals including Humans:</b> (Spring 1 and Spring 2)</p>	<p>Sc1/2.2a identify and name a variety of common animals including, fish, amphibians, reptiles, birds and mammals</p> <p>Sc1/2.2b identify and name a variety of common animals that are carnivores, herbivores and omnivores</p> <p>Sc1/2.2c describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets)</p>	<p><b>Key Theme or Ideas: B2, B3</b></p> <p><b><u>New learning and vocabulary</u></b></p> <p><b>energy, growth, habitat</b>, fish, amphibian, reptile, bird, mammal, offspring, carnivore, herbivore, omnivore, vertebrate, skeleton, organ</p> <p>Know that a trout is an example of fish, a frog is an example of an amphibian; a lizard is an example of a reptile; a robin is an example of a bird; a rabbit and a human are examples of a mammal</p> <p>Know that herbivorous animals eats plants; a carnivorous animal eats other animals; omnivorous animals eat both animals and plants</p> <p>Know that a cat is an example of a carnivore; that a rabbit is an example of a herbivore;</p> <p>know that many humans are examples of omnivores (though not vegetarians or vegans)</p>

		<p>Sc1/2.2d identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense</p>	<p>Know that fish, amphibians, reptiles, birds and mammals are similar in that they have internal skeletons and organs; these are known as vertebrates, which means they are animals that have a back bone</p> <p>Know that fish are different in having gills so that they can breathe under water and scaly skin</p> <p>Know that amphibians are different in that they begin their lives with gills but then develop lungs and breath on land</p> <p>Know that reptiles are different in that they breath air and have scaly skin</p> <p>Know that birds are different to other animals in that they have feathers and wings</p> <p>Know that mammals are different to other animals in that they have fur/hair and they feed milk to their young</p> <p>Know that feet, legs, arms, hands, torso, head, skin, ears, eyes, nose, mouth and tongue are part so the body and identify them</p> <p>Know that eyes are associated with sight, ears with sound, nose with smell, tongue with taste and skin with touch.</p> <p><b>Enhancing the Curriculum (Non Statutory guidance for Key Stage 1).</b> Knows that the local environment can be used throughout the year to explore and answer questions about animals in their habitat.</p> <p>Knows how to take care of animals taken from their local environment and the need to return them safely after study.</p> <p>Know the common names of some fish, amphibians, reptiles, birds and mammals, including those that are kept as pets.</p> <p>Know 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.</p> <p>Knows how to make observations in order to compare and contrast animals at first hand or through videos and photographs,</p> <p>Knows how to identify and group them; grouping animals according to what they eat; and using their senses to compare different textures, sounds and smells.</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Year 1</b></p>	<p><b>Seasonal Changes</b> (Summer 1)</p>	<p>Sc1/4.1a observe changes across the four seasons</p> <p>Sc1/4.1b observe and describe weather associated with the seasons and how day length varies</p>	<p><b>Key Theme or Idea: E2</b></p> <p><b><u>New learning and vocabulary</u></b></p> <p><b>Energy, freezing, melting, orbit, reflection, Sun, clouds, wind, snow, ice, spring, summer, autumn, winter</b></p> <p>Know that days are longer in the summer and shorter in winter</p>

			<p>Know that weather changes through the year, getting hotter in the summer and colder in the winter</p> <p>Know that the winter is likely to bring ice on the ground when water freezes due to the cold</p> <p>Know that the Earth orbits the Sun with one orbit constituting a year of 365/366 days</p> <p>(NB: the Sun and the Earth are capitalized when being discussed in an astronomical context.)</p> <p><b>Enhancing the Curriculum (Non Statutory guidance for Key Stage 1).</b> Know how to observe and talk about changes in the weather and the seasons.</p> <p>Know that it is not safe to look directly at the Sun, even when wearing dark glasses.</p> <p>Know how to making tables and charts about the weather;</p> <p>Know how to make displays to show happening in the world around them, including day length, as the seasons change.</p>
Year 1	<p><b>Plants</b> (Summer 2)</p>	<p>Sc1/2.1a identify and name a variety of common wild and garden plants, including deciduous and evergreen trees</p> <p>Sc1/2.1b identify and describe the basic structure of a variety of common flowering plants, including trees</p>	<p><b>Key Theme or Idea:</b> B2</p> <p><b>Prior Learning/ Revision</b> energy, habitat</p> <p><b>New learning and vocabulary</b></p> <p><b>component, energy, growth,</b> deciduous, evergreen, flower, plant, tree, structure, roots, stem, leaf, trunk, flower</p> <p>Know a rose bush, a sunflower and a dandelion by sight</p> <p>Know an oak tree, a birch tree and a horse chestnut tree by sight</p> <p>Know a variety of common wild and garden plants, including deciduous and evergreen trees</p> <p>Know that evergreen trees maintain their leaves throughout the year and that deciduous trees shed their leaves in autumn</p> <p>Know that a flowering plants consist of roots, stem, leaves and flowers, and that a tree's stem is called a trunk</p> <p><b>Enhancing the Curriculum (Non Statutory guidance for Key Stage 1).</b> Know how to use the local environment throughout the year to explore and answer questions about plants growing in their habitat.</p> <p>Know how to observe the growth of flowers and vegetables that they have planted.</p> <p>Know the common names of flowers, examples of deciduous and evergreen trees, and</p>

			<p>Know the name of plant structures (including leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches and stem).</p> <p>Know how to observing closely, perhaps using magnifying glasses, and comparing and contrasting familiar plants; describing how they were able to identify and group them</p> <p>Know how to draw diagrams, showing the parts of different plants including trees.</p> <p>Know how to 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.</p>
<b>Year 2</b>	<b>Working Scientifically :</b>  (Ongoing throughout the Year)	<p>Sc2/1.1 asking simple questions and recognising that they can be answered in different ways</p> <p>Sc2/1.2 observing closely, using simple equipment</p> <p>Sc2/1.3 performing simple tests</p> <p>Sc2/1.4 identifying and classifying</p> <p>Sc2/1.5 using their observations and ideas to suggest answers to questions</p> <p>Sc2/1.6 gathering and recording data to help in answering questions</p>	<p><b><u>New learning and vocabulary</u></b> –Continuing from Y1- Build on / practice previous skills</p> <p style="text-align: center;"><b>properties</b>, observe, test, magnifying glass, object, record, equipment</p> <p>Know that we can ask questions about the world and that when we observe the world to answer these questions, this is science</p> <p>Know that we can use magnifying glasses to observe objects closely</p> <p>Know that we can test our questions to see if they are true</p> <p>Know that objects can be identified or sorted into groups based on their observable properties</p> <p>Know that we can write down numbers and words or draw pictures to record what we find</p> <p><b><u>Enhancing the Curriculum (Non Statutory guidance for Key Stage 1).</u></b> Know and experience different types of scientific enquiries, including practical activities, and begin to recognise ways in which they might answer scientific questions.</p> <p>Know how to use simple features to compare objects, materials and living things and, with help, decide how to sort and group them,</p> <p>Know how to observe changes over time, and, with guidance, begin to notice patterns and relationships</p> <p>Know how to use simple secondary sources to find answers to the questions that they have asked.</p> <p>Know how to use simple measurements and equipment (for example, hand lenses, egg timers) to gather data, carry out simple tests, record simple data, and talk about what they have found out and how they found it out.</p> <p>Knows how to record and communicate their findings in a range of ways and begin to use simple scientific language, with help.</p> <p><b>(For skills and progression for each year group in this area please see progression grid).</b></p>

<b>Year 2</b>	<b>Using Every day Materials</b> (Autumn 1 and Autumn 2)	<p>Sc2/3.1a identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for different uses</p> <p>Sc2/3.1b compare how things move on different surfaces.</p> <p>Sc2/3.1c find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching</p>	<p><b>Key Theme or Idea:</b> C1, C2</p> <p><b>Revision</b> Absorption, matter, property</p> <p>Objects are made from materials such as wood, plastic, glass, metal, water, rock</p> <p>Materials have properties such as being hard, soft, strong, weak, absorbent, heavy, light, solid, runny, smooth and rough; these descriptions denote the properties of a material</p> <p>Matter (stuff) is made from tiny building blocks</p> <p><b>New learning and vocabulary</b></p> <p><b>conductor</b>, brick, paper, cardboard, friction, movement, suitability, surface, stretch, twist, waterproof, deformation, flexible, rigid</p> <p>Know that materials can have useful properties for a given job (including being waterproof, strong, hard, soft, flexible, rigid, light or heavy.)</p> <p>Know that many types of plastic are waterproof, that steel (a type of metal) is strong, that rock is hard, that cotton wool is soft, that rubber is flexible, that rock is rigid, that polystyrene (a type of plastic) is light and that iron (a type of metal) is heavy,</p> <p>Know and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.</p> <p>Know that when objects move across a surface there is friction when they rub against each other and that sometimes this friction is larger or smaller</p> <p>Know that applying forces to objects can change their shape (squashing, bending, twisting and stretching)</p> <p><b>Enhancing the Curriculum (Non Statutory guidance for Key Stage 1).</b></p> <p>Know the uses of different everyday materials so that they become familiar with how some materials are used for more than one thing (metal can be used for coins, cans, cars and table legs; wood can be used for matches, floors, and telegraph poles).</p> <p>Know that different materials are used for the same thing (spoons can be made from plastic, wood, metal, but not normally from glass).</p> <p>Know about the properties of materials that make them suitable or unsuitable for particular purposes and they should be encouraged to think about unusual and creative uses for everyday materials.</p> <p>Know about people who have developed useful new materials, for example John Dunlop, Charles Macintosh or John McAdam.</p> <p>Know about and compare the uses of everyday materials in and around the school with materials found in other places (at home, the journey to school, on visits, and in stories, rhymes and songs);</p>
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			Observing closely, identifying and classifying the uses of different materials, and recording their observations.
Year 2	Animals Including Humans (Spring 1)	<p>Sc2/2.3a notice that animals, including humans, have off spring which grow into adults</p> <p>Sc2/2.3b find out about and describe the basic needs of animals, including humans, for survival (water, food and air)</p> <p>Sc2/2.3c describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene</p>	<p><b>Key Theme or Idea:</b> B1</p> <p><b>Prior Learning/ Revision</b></p> <p><b>growth, habitat,</b> nutrients, consumption, Living things move, grow, consume nutrients and reproduce;</p> <p>Dead things used to do these things, but no longer do; and that things that never lived have never done these things.</p> <p><b>New learning and vocabulary</b></p> <p><b>reproduction,</b> offspring, adult, survival, hygiene, exercise</p> <p>Know that animals produce offspring that grow into adults</p> <p>Know that animals, including humans, need food, water and air to survive</p> <p>Know the basic food groups: fruit and vegetables, carbohydrates, protein, dairy, fat and sugary foods</p> <p>Know that more than half of our diet should be made up of carbohydrates, fruit and vegetables</p> <p>Know that fats and sugary foods should be eaten rarely and in small amounts</p> <p>Know that people need to exercise often to help their body stay strong and fit</p> <p>Know that keeping clean, including washing and brushing teeth, is an important part of staying health</p> <p><b>Enhancing the Curriculum (Non Statutory guidance for Key Stage 1).</b></p> <p>Know the basic needs of animals for survival, as well as the importance of exercise and nutrition for humans.</p> <p>Know the processes of reproduction and growth in animals, recognising growth; they should not be expected to understand how reproduction occurs. The following examples might be used: egg, chick, chicken; egg, caterpillar, pupa, butterfly; spawn, tadpole, frog; lamb, sheep. Growing into adults can include reference to baby, toddler, child, teenager, adult.</p> <p>Know from observing, through video or first-hand observation and measurement, how different animals, including humans, grow; asking questions about what things animals need for survival and what humans need to stay healthy; and suggesting ways to find answers to their questions.</p>
Year 2	Plants (Spring 1)	<p>Sc2/2.2a observe and describe how seeds and bulbs grow into mature plants</p> <p>Sc2/2.2b find out and describe how plants need water, light and</p>	<p><b>Key Theme or Idea:</b> B1</p> <p><b>Prior Learning/ Revision</b></p> <p><b>growth, habitat,</b> nutrients, consumption Living things move, grow, consume nutrients and reproduce;</p>

		<p>a suitable temperature to grow and stay healthy.</p>	<p>Dead things used to do these things, but no longer do; and that things that never lived have never done these things.</p> <p><u>New learning and vocabulary</u></p> <p><b>reproduction</b>, offspring, adult, bulb, seed, survival, temperature,</p> <p>Know that seeds and bulbs need to be buried underground in soil and that they will grow into adult plants under the right conditions (water, warmth)</p> <p>Know that plants that are deprived of light, food or air will not grow and will die.</p> <p>Know that plants produce offspring that grow into adults.</p> <p><u>Enhancing the Curriculum (Non Statutory guidance for Key Stage 1).</u></p> <p>Know and observe the local environment throughout the year to observe how different plants grow.</p> <p>Know the requirements of plants for germination, growth and survival, as well as to 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.</p> <p>Know and understand 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.</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Year 2</b></p>	<p><b>Living Things</b>  (Summer 1 and 2)</p>	<p>Sc2/2.1a explore and compare the differences between things that are living, dead, and things that have never been alive</p> <p>Sc2/2.1b 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</p> <p>Sc2/2.1c identify and name a variety of plants and animals in their habitats, including microhabitats</p>	<p><u>Key Theme or Idea:</u> B1, B2</p> <p><u>Prior Learning / Revision</u></p> <p><b>habitat, growth, absorption</b>, deciduous, evergreen, flower, plant, tree, structure, roots, stem, leaf, trunk, flower, herbivore, carnivore, omnivore</p> <p>Dandelions, rose bushes, grass, ash trees, birch trees and conifers trees are examples of plants.</p> <p>Trees can be deciduous or evergreen.</p> <p>A trout is an example of fish, a frog is an example of an amphibian; a lizard is an example of a reptile; a robin is an example of a bird; a rabbit and a human are examples of a mammal.</p> <p>Herbivorous animals eats plants; a carnivorous animal eats other animals; omnivorous animals eat both animals and plants.</p>

Sc2/2.1d 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.

### New learning and vocabulary

**birth, decay, energy**, microhabitat, dead, life cycle, food chain, source, nutrients, reproduction, consumption, environment

Know that living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things.

Know that most living things live in habitats to which they are adapted and provide them with what they need to survive.

Know and name a variety of plants and animals in their habitats, including microhabitats.

Know that polar bears are an example of an animal adapted to its environment—thick fur for warmth and oily paw pads to ensure that they don't freeze to the ice.

Know that sharks are another example—smooth skin and streamlined shape for quick swimming; and gills for breathing under water.

Know that cacti are an example of a plant adapted to its environment—thick skin keeps a store of water safe; sharp spikes keep animals from stealing the water.

Know that pine trees have thick bark and pine cones to protect against cold winters.

Know that woodlice live under logs—an example of a microhabitat—as they need somewhere dark and damp so that they do not dry out.

Know that frogs can live in ponds—an example of a microhabitat—as they water in which to lay their eggs (frogspawn).

Know that plants absorb energy from the Sun; that this energy is consumed by herbivorous animals; and that carnivorous animals eat other animals.

Know that the arrows on a food chain show the direction that the energy travels.

### Enhancing the Curriculum (Non Statutory guidance for Key Stage 1).

Know that all living things have certain characteristics that are essential for keeping them alive and healthy.

Know how to ask and answer questions that help them to become familiar with the life processes that are common to all living things.

Know the terms 'habitat' (a natural environment or home of a variety of plants and animals) and 'micro-habitat' (a very small habitat, for example for woodlice under stones, logs or leaf litter).

Know how to ask 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.

		<p>Know how to 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.</p> <p>Know how to sort and classify things according to whether they are living, dead or were never alive, and recording their findings using charts. They should describe how they decided where to place things, exploring questions for example: 'Is a flame alive? Is a deciduous tree dead in winter?' and talk about ways of answering their questions.</p> <p>Know how to construct a simple food chain that includes humans (e.g. grass, cow, human).</p> <p>Know and describe the conditions in different habitats and micro-habitats (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.</p>
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**\*\*\*\*\*: LOWER KEY STAGE 2**  
Knowledge & Skills

National Curriculum Programmes of Study:	Unit	NC Objectives:	Key Knowledge and Vocabulary
<b>Year 3</b>	<p><b>Working Scientifically :</b> (Ongoing throughout the Year)</p>	<p>Sc4/1.1 asking relevant questions and using different types of scientific enquiries to answer them</p> <p>Sc4/1.2 setting up simple practical enquiries, comparative and fair tests</p> <p>Sc4/1.3 making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers</p> <p>Sc4/1.4 gathering, recording, classifying and presenting data in a variety of ways to help in answering questions</p>	<p><u>Prior Learning/ Revision</u> <b>properties</b>, observe, test, magnifying glass, object, record, equipment</p> <p>Know that we can ask questions about the world and that when we observe the world to answer these questions, this is science</p> <p>Know that we can use magnifying glasses to observe objects closely</p> <p>Know that we can test our questions to see if they are true</p> <p>Know that objects can be identified or sorted into groups based on their observable properties</p> <p>Know that we can write down numbers and words or draw pictures to record what we find</p>

		<p>Sc4/1.5 recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables</p> <p>Sc4/1.6 reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</p> <p>Sc4/1.7 using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions</p> <p>Sc4/1.8 identifying differences, similarities or changes related to simple scientific ideas and processes</p> <p>Sc4/1.9 using straight forward scientific evidence to answer questions or to support their findings</p>	<p><u>New learning and vocabulary</u></p> <p>prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis</p> <p>Know that we can ask questions and answer them by setting up different types of scientific enquiries.</p> <p>Know how to make relevant predictions that will be tested in a scientific enquiry.</p> <p>Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same.</p> <p>Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stop watches.</p> <p>Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw an eat table; how to draw a classification key; how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table.</p> <p>Know—with structured guidance-how to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion.</p> <p>Know how to precis a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry.</p> <p>Know that scientific enquiries can suggest relationships, but that they do not prove whether a prediction is true.</p> <p>Know that scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which conditions can vary even, and that repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry.</p> <p>Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or</p>
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			<p>extended to different contexts (e.g. effect of changing sunlight on a plant—does this work with other plants /different types of light / etc)</p> <p>Know that they can draw conclusions from the findings of other scientists.</p> <p>Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry.</p> <p><b>Enhancing the Curriculum (Non Statutory guidance for Lower Key Stage 2).</b></p> <p>Know how to ask their own questions about the world around them based on a range of scientific experiences.</p> <p>Know how to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions; recognise when a simple fair test is necessary and help to decide how to set it up; talk about criteria for grouping, sorting and classifying; and use simple keys.</p> <p>Know how to look for naturally occurring patterns and relationships and decide what data to collect to identify them.</p> <p>Know how to help to make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used.</p> <p>Know how to use new equipment, such as data loggers, appropriately.</p> <p>Know how to collect data from their own observations and measurements, using notes, simple tables and standard units, and help to make decisions about how to record and analyse this data.</p> <p>Know how to (with support) look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions.</p> <p>Know how to (with support) identify new questions arising from the data, making predictions for new values within or beyond the data they have collected and finding ways of improving what they have already</p>
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			<p>done.</p> <p>Know when and how secondary sources might help them to answer questions that cannot be answered through practical investigations.</p> <p>Know and use relevant scientific language to discuss their ideas and communicate their findings in ways that are appropriate for different audiences.</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Year 3</b></p>	<p style="text-align: center;"><b>Plants</b> (Autumn 1)</p>	<p>Sc3/2.1a identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers</p> <p>Sc3/2.1b 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</p> <p>Sc3/2.1c investigate the way in which water is transported within plants</p> <p>Sc3/2.1d explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</p>	<p><b>Key Theme or Idea:</b>    <b>B1, B2, B3</b></p> <p><u>Prior Learning/ Revision</u></p> <p><b>component, energy ,growth, habitat, reproduction, decay,</b> offspring, adult, bulb, seed, survival, temperature, nutrients, consumption, deciduous, evergreen, flower, plant, tree, structure, roots, stem, leaf, trunk, flower,</p> <p>Evergreen trees maintain their leaves throughout the year and that deciduous trees shed their leaves in autumn.</p> <p>Flowering plants consist of roots, stem, leaves and flowers, and that a tree's stem is called a trunk.</p> <p>Living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things.</p> <p>Plants absorb energy from the Sun; that this energy is consumed by herbivorous animals; and that carnivorous animals eat other animals.</p> <p>Seeds and bulbs need to be buried underground in soil and that they will grow into adult plants under the right conditions (water, warmth).</p> <p>The arrows on a food chain show the direction that the energy travels. Plants that are deprived of light, food or air will not grow and will die.</p> <p><u>New learning and vocabulary</u></p>

**extinction**, fruit, nectar, anther, ovary, ovule, petal, pollen, stigma, style, stamen, function, exchange, dispersal, fertilization,

Know 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.

Know that different parts of plants have one or more functions (jobs).

Know that the roots collect water and minerals from the soil, and hold the plant firmly in the ground.

Know that the stem holds up the leaves so that they can gather light to make food and holds up the flowers so that they can receive pollen and disperse their fruits; know that the stem also transports water and minerals from the roots to the other parts of the plant.

Know that the leaves make food by trapping light and using its energy to turn carbon dioxide and water into carbohydrates.

Know that the function of a flower is reproduction, where flowers of the same kind exchange pollen—made by an anther—in a process called fertilisation, and a structure in the flower's ovary called an ovule becomes a seed; the ovary then becomes a fruit which helps the seed leave the plant in a process called dispersal.

**Enhancing the Curriculum (Non Statutory guidance for Lower Key Stage 2).**

Know that plants can make their own food, but at this stage they do not need to understand how this happens.

Know how to compare the effect of different factors on plant growth, for example, the amount of light, the amount of fertiliser.

Know how seeds are formed by observing the different stages of plant life cycles over a period of time.

Know how to look for patterns in the structure of fruits that relate to how the seeds are dispersed.

Know how water is transported in plants, for example, by

			<p>putting cut, white carnations into coloured water and observing how water travels up the stem to the flowers.</p>
<b>Year 3</b>	<b>Light</b>  (Autumn 2 and Spring 1)	<p>Sc3/4.1a recognise that they need light in order to see things and that dark is the absence of light</p> <p>Sc3/4.1b notice that light is reflected from surfaces</p> <p>Sc3/4.1c recognise that light from the Sun can be dangerous and that there are ways to protect their eyes</p> <p>Sc3/4.1d recognise that shadows are formed when the light from a light source is blocked by a solid object</p> <p>Sc3/4.1e find patterns in the way that the size of shadows change</p>	<p><b><u>Key Theme or Idea:</u> P1, P3</b></p> <p><b><u>Prior Learning/ Revision</u></b></p> <p style="text-align: center;"><b>absorption, energy, property, reflection</b></p> <p><b><u>New learning and vocabulary</u></b></p> <p><b>wave</b>, mirror, incident ray, image, beam, photons, solid, opaque, transparent, object, source, data logger</p> <p>Know that light is a form of energy.</p> <p>Know that energy comes in different forms and can be neither created nor destroyed, only changed from one form to another.</p> <p>Know that we need light to see things and that darkness is the absence of light.</p> <p><b>Know that light travels in straight lines.</b></p> <p>Know that light is reflected when it travels from a light source and then ‘bounces’ off an object or surface.</p> <p>Know that everything that we can see is either a light source or something that is reflecting light from a light source into our eyes.</p> <p>Know that the Sun is a light source, but that the Moon is not and is merely reflecting light from the Sun.</p> <p>Know that many light sources give off light and heat.</p> <p>Know that the Sun gives off light and heat when hydrogen turns into helium.</p> <p>Know that filaments in traditional bulbs heat up until they glow, giving off light and heat.</p> <p>Know that fluorescent bulbs glow when electricity adds energy to a gas within the bulb.</p> <p>Know that sunglasses can protect eyes from sun light but</p>

looking at the Sun directly—even with sunglasses—can damage the eyes.

Know that opaque objects block light creating shadows and that light passes through transparent objects.

Know that opacity/transparency and reflectiveness are properties of a material.

Know that shadows are formed when the light from a light source is blocked by an opaque object.

Know that as objects move towards a light source, the size of the shadow increases.

Know how to show the changing of shadow size by drawing a diagram with straight lines representing light.

Know that a data logger can keep track of light levels and that this can be plotted on a graph to show how this changes over the course of a day

(NB: the Sun and the Moon are capitalized when being discussed in an astronomical context.)

**Enhancing the Curriculum (Non Statutory guidance for Lower Key Stage 2).**

Know 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.

Know why it is important to protect their eyes from bright lights.

Know how to look for, and measure, shadows, and find out how they are formed and what might cause the shadows to change.

Know how to look for patterns in what happens to shadows when the light source moves or the distance between the light source and the object changes.

## Forces and Magnets (Spring 2)

Sc3/4.2a compare how things move on different surfaces

Sc3/4.2b notice that some forces need contact between 2 objects, but magnetic forces can act at a distance

Sc3/4.2c observe how magnets attract or repel each other and attract some materials and not others

Sc3/4.2d 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

Sc3/4.2e describe magnets as having 2 poles

Sc3/4.2f predict whether 2 magnets will attract or repel each other, depending on which poles are facing.

### Key Theme or Idea: P2

### Prior Learning / Revision

**energy, matter, property, wave**, metal, material, surface, friction, force, stretch, squash, rough, smooth

Metal is a material from which objects can be made.

As objects move across a surface there is friction when they rub against each other and that sometimes this friction is larger or smaller.

Applying forces to objects can change their shape.

Know that the roughness of a material is an example of a property.

### New learning and vocabulary

magnetic, non-magnetic, pole, north, south, sliding friction, static friction, elastic, resist, attraction, repulsion

Know that a force can be thought of as a push or a pull.

Know that there are three types of contact force: impact forces (when two surfaces collide), frictional forces (when two surfaces are already in contact) and strain forces (when an elastic material is stretched or squashed).

Know that objects move differently on rough and smooth surfaces; objects resist movement more on rough surfaces because there is higher friction as the object moves.

Know that there are also non-contact forces that can act between objects without them touching and that magnetism is an example of a non-contact force, thus acting at a distance.

Know that magnets have two poles called north and south.

Know that like poles (south-south and north-north) of two magnets repel each other and that opposite poles of two magnets (north-south) attract each other.

			<p>Know that there is a magnetic field around a magnet which is strongest at each pole.</p> <p>Know that some materials are magnetic, meaning that they are attracted to a magnet, while other materials are non-magnet.</p> <p>Know how to compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet.</p> <p><b>Enhancing the Curriculum (Non Statutory guidance for Lower Key Stage 2).</b></p> <p>Know and 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).</p> <p>Know and explore the behaviour and everyday uses of different magnets (for example, bar, ring, button and horseshoe).</p> <p>Know and compare how different things move and group 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 their questions;</p> <p>Know how to explore the strengths of different magnets and find a fair way to compare them;</p> <p>Know how to sort 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;</p> <p>Know how these properties make magnets useful in everyday items and suggest creative uses for different magnets.</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Year3</b></p>	<p style="text-align: center;"><b>Rocks and Fossils</b> (Summer 1)</p>	<p>Sc3/3.1a compare and group together different kinds of rocks on the basis of their appearance and simple physical properties</p> <p>Sc3/3.1b describe in simple terms</p>	<p><b><u>Key Theme or Idea: C1, C2, C3, E3,</u></b></p> <p><b><u>Prior Learning/ Revision</u></b></p>

		<p>how fossils are formed when things that have lived are trapped within rock</p> <p>Sc3/3.1c recognise that soils are made from rocks and organic matter.</p>	<p><b>decay, matter, melting, material</b></p> <p><u>New learning and vocabulary</u></p> <p><b>extinction</b>, igneous, metamorphic, sedimentary, palaeontologist, weathering, molten rock, crust, tectonic plates, scavengers, fossil</p> <p>Knows how to compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.</p> <p>Know that there are three kinds of rocks: igneous, sedimentary and metamorphic</p> <p>Know that the Earth has a solid crust made up of tectonic plates with molten rock beneath</p> <p>Know that granite and basalt are types of igneous rock and that igneous rocks form from molten rock below the Earth's crust</p> <p>Know that limestone and sandstone are types of sedimentary rock which form when small, weathered fragments of rock or shell settle and stick together, often in layers</p> <p>Know that marble and slate are types of metamorphic rock which form when rocks in Earth's crust get squashed and heated in processes such as when tectonic plates press against each other</p> <p>Know that fossils form when a plant or animal dies and is quickly covered with silt or mud so that it cannot be rotted by microbes or eaten by scavenging animals; in time layers of sediment build, squashing the mud and turning it to stone around the dead plant or animal; the materials in the body are replaced by minerals that flow in water through the rock, leaving a rock in the shape of the animal or plant that was once there</p> <p>Know that soil is made from tiny particles of rock broken down by the action of weather (weathering) and organic matter.</p> <p><b>Enhancing the Curriculum (Non Statutory guidance for Lower Key Stage 2).</b></p>
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			<p>Linked with work in geography, pupils should explore different kinds of rocks and soils, including those in the local environment.</p> <p>Know how to use 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.</p> <p>Know how to make careful observations of rocks, including those used in buildings and gravestones, and exploring how and why they might have changed over time.</p> <p>Know about what happens when rocks are rubbed together or what changes occur when they are in water.</p> <p>Know about the different kinds of living things whose fossils are found in sedimentary rock and explore how fossils are formed.</p> <p>Know about the different soils and identify similarities and differences between them.</p> <p>Knows how to ask and answer questions about the way soils are formed.</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Year 3</p>	<p><b>Animals Including Humans</b> (Summer 2)</p>	<p>Sc3/2.2a 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</p> <p>Sc3/2.2b identify that humans and some other animals have skeletons and muscles for support, protection and movement</p>	<p><u>Key Theme or Idea</u> <b>B1, B2, B3</b></p> <p><u>Prior Learning/ Revision</u></p> <p><b>component, energy ,growth, habitat, reproduction, decay</b>, offspring, adult, survival, temperature, nutrients, consumption, vertebrate, skeleton</p> <p>Living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things.</p> <p>Plants absorb energy from the Sun; that this energy is consumed by herbivorous animals; and that carnivorous animals eat other animals.</p> <p>The arrows on a food chain show the direction that the energy travels.</p> <p>Animals, including humans, need food, water and air to</p>

survive

There are food groups: fruit and vegetables, carbohydrates, protein, dairy, fat and sugary foods

More than half of our diet should be made up of carbohydrates, fruit and vegetables

Fats and sugary foods should be eaten rarely and in small amounts

New learning and vocabulary

**extinction**, vitamin, balanced diet, cartilage, invertebrate, contract, loosen, ribcage, insect

Know 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.

Know that proteins are good for growth, carbohydrates for energy and fruit and vegetables provide vitamins and minerals which help keep us healthy(e.g. calcium for healthy bones and teeth).

Know that getting the right amount of each food group (including over half of the diet made up of fruit, vegetables and carbohydrates) is called a balanced diet.

Know that lack of a nutrient can cause ill health; for example, a lack of vitamin D leads to a disease called rickets.

Know that excess of a food group can cause ill health, such as tooth decay due to excess sugar NB–some food groups are difficult to afford for some families so sensitivity is required in teaching this area.

Know that excess fat from fatty foods such as butter and cheese-and created in the body from excess calories–builds up in the body and can cause obesity.

Know that excess body fat can lead to heart disease and increases the strain on joints and growing bones.

Know that animals, including humans, have a skeleton made up of solid objects.

			<p>Know that some animals (such as insects) have an exoskeleton—a solid covering on the outside of their body.</p> <p>Know that many invertebrates (such as earthworms and slugs) have water held inside by muscles which act like a skeleton.</p> <p>Know that skeletons provide support for muscles and protect the body; for example, the ribcage protects the vital organs in the human body.</p> <p>Know that human skeletons are made up of bones and cartilage.</p> <p>Know that muscles can only contract, so they must be arranged in pairs in the body so that as one contracts the other loosens.</p> <p><b>Enhancing the Curriculum (Non Statutory guidance for Lower Key Stage 2).</b> Know about the importance of nutrition.</p> <p>Know about the main body parts associated with the skeleton and muscles, finding out how different parts of the body have special functions.</p> <p>Know about and group animals with and without skeletons and observing and comparing their movement;</p> <p>Know about what would happen if humans did not have skeletons.</p> <p>Know how to compare and contrast the diets of different animals (including their pets) and decide ways of grouping them according to what they eat.</p> <p>Know about different food groups and how they keep us healthy and design meals based on what they find out.</p>
Year 4	<p><b>Working Scientifically :</b> (Ongoing throughout the Year)</p>	<p>Sc4/1.1 asking relevant questions and using different types of scientific enquiries to answer them</p> <p>Sc4/1.2 setting up simple practical</p>	<p><b><u>Prior Learning/ Revision</u></b> <b>properties</b>, observe, test, magnifying glass, object, record, equipment</p> <p>Know that we can ask questions about the world and that when we observe the world to answer these questions, this is science</p>

		<p>enquiries, comparative and fair tests</p> <p>Sc4/1.3 making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers</p> <p>Sc4/1.4 gathering, recording, classifying and presenting data in a variety of ways to help in answering questions</p> <p>Sc4/1.5 recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables</p> <p>Sc4/1.6 reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</p> <p>Sc4/1.7 using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions</p> <p>Sc4/1.8 identifying differences ,similarities or changes related to simple scientific ideas and processes</p> <p>Sc4/1.9 using straightforward scientific evidence to answer questions or to support their findings</p>	<p>Know that we can use magnifying glasses to observe objects closely</p> <p>Know that we can test our questions to see if they are true</p> <p>Know that objects can be identified or sorted into groups based on their observable properties</p> <p>Know that we can write down numbers and words or draw pictures to record what we find</p> <p><u>New learning and vocabulary</u> –ongoing from year 3</p> <p>prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis</p> <p>Know that we can ask questions and answer them by setting up scientific enquiries</p> <p>Know how to make relevant predictions that will be tested in a scientific enquiry</p> <p>Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same</p> <p>Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stop watches</p> <p>Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw a neat table; how to draw a classification key; how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table</p> <p>Know how–with structured guidance–to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion</p> <p>Know how to precis a scientific enquiry write-up into a</p>
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			<p>brief oral discussion of what was found in a scientific enquiry</p> <p>Know that scientific enquiries can suggest relationships, but that they do not prove whether a prediction is true</p> <p>Know that scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which conditions can vary even, and that repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry</p> <p>Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended to different contexts (e.g. effect of changing sunlight on a plant—does this work with other plants /different types of light / etc)</p> <p>Know that they can draw conclusions from the findings of other scientists</p> <p>Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry.</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Year 4</p>	<p style="text-align: center;"><b>Animals including Humans</b> (Autumn 1)</p>	<p>Sc4/2.2a describe the simple functions of the basic parts of the digestive system in humans</p> <p>Sc4/2.2b identify the different types of teeth in humans and their simple functions</p> <p>Sc4/2.2c construct and interpret a variety of food chains, identifying producers, predators and prey</p>	<p><b><u>Key Theme or Idea: B3</u></b></p> <p><b><u>Prior Learning/ Revision</u></b></p> <p style="text-align: center;"><b>absorption, component, energy, nutrients, consumption, hygiene, herbivore, carnivore, organ</b></p> <p>Proteins are good for growth, carbohydrates for energy and fruit and vegetables provide vitamins and minerals which help keep us healthy (e.g. calcium for healthy bones and teeth)</p> <p>A food group can cause ill health, such as tooth decay due to excess sugar</p> <p>Living things move, grow, consume nutrients and reproduce</p> <p>Plants absorb energy from the Sun; that this energy is consumed by herbivorous animals; and that carnivorous animals eat other animals.</p>

New learning and vocabulary

**dissolving**, digestion, excretion, peristalsis, anus, duodenum, small intestine, large intestine, stomach, rectum, esophagus, tongue, saliva, acid, bile, enzymes, incisors, canines, molars, predator, prey, producer, consumer, primary, secondary, tertiary

Know that food passes through the body with the nutrients being extracted and the waste products excreted, and that this process is called digestion.

Know that the process of digestion involves breaking complex foodstuffs into simpler building blocks that can be absorbed by the body.

Know that the process of digestion begins with food being chewed in the mouth by the teeth and saliva added.

Know that a human has three types of teeth—incisors, canines and molars—and that these each perform different functions.

Know that incisors slice food, canines tear food (especially meat) and that molars grind food.

Know that children develop an initial set of teeth which are gradually replaced between the ages of 6 and 12.

Know that food is squeezed down the esophagus towards the stomach in a wave-like action called peristalsis.

Know that the stomach releases acid and enzymes to continue breaking down the food; the stomach is an organ; an organ is a part of living thing that is self-contained and has a specific important job.

Know that further enzymes and bile break down the food further as it moves through the duodenum towards the small intestine.

Know that the small intestine adds more enzymes and then absorbs the nutrients.

Know that the large intestine absorbs water from the undigested food.

			<p>Know that undigested food is stored in the rectum before being excreted through a muscle called the anus.</p> <p>Know that a food chain traces the path of energy through a habitat.</p> <p>Know that all energy for a food chain initially comes from the Sun which is absorbed and turned into energy by plants which are called producers.</p> <p>Know that consumers take in energy by eating.</p> <p>Know that an animal that is eaten by another is called prey, and that an animal that eats other animals is called a predator.</p> <p>Know that the first consumer in a food chain is called a primary consumer, the second is called a secondary consumer and above it is called a tertiary consumer</p> <p>Know that the arrows in a food chain show the direction that energy is travelling through a habitat.</p> <p><b>Enhancing the Curriculum (Non Statutory guidance for Lower Key Stage 2).</b></p> <p>Know about the main body parts associated with the digestive system, for example, mouth, tongue, teeth, oesophagus, stomach and small and large intestine.</p> <p>Know about and understand the special functions of the parts of the digestive system.</p> <p>Know how to draw and discuss their ideas about the digestive system and compare them with models or images.</p> <p>Know about and compare the teeth of carnivores and herbivores, suggesting reasons for differences;</p> <p>Know about what damages teeth and how to look after them.</p>
<p style="text-align: center;">4 Year</p>	<p style="text-align: center;"><b>Sound</b> (Autumn 2)</p>	<p>Sc4/4.1a identify how sounds are made, associating some of them with something vibrating</p>	<p><b>Key Theme or Idea:</b> P1, P3</p> <p><b>Prior Learning/ Revision:</b></p>

		<p>Sc4/4.1b recognise that vibrations from sounds travel through a medium to the ear</p> <p>Sc4/4.1c find patterns between the pitch of a sound and features of the object that produced it</p> <p>Sc4/4.1d find patterns between the volume of a sound and the strength of the vibrations that produced it.</p> <p>Sc4/4.1e recognise that sounds get fainter as the distance from the sound source increases</p>	<p><b>absorption, conductor, energy, wave</b></p> <p>Energy comes in different forms and can be neither created nor destroyed, only changed from one form to another</p> <p><u>New learning and vocabulary</u></p> <p><b>insulator, particle</b>, vibration, percussion instrument, wind instrument, string instrument, frequency, volume, pitch, transverse wave, longitudinal wave, medium, vacuum</p> <p>Know that sound is generated when an object vibrates; some of the energy from the vibrating object is transferred to the air, making the air particles move.</p> <p>Know that energy comes in different forms and can be neither created nor destroyed, only changed from one form to another.</p> <p>Know that sound is a form of energy that transfers in a longitudinal wave-like that seen in a slinky-nota transverse wave-like that seen in water ripples.</p> <p>Know that sound travels through a medium (e.g. particles in the air) and thus sounds does not travel through a vacuum which has no particles in it at all.</p> <p>Know that longitudinal sound waves are detected in the ear by humans and that the brain interprets this as the sounds we hear.</p> <p>Know that sound travels at different speeds through different objects; it travels at around 340 metres per second in air, much slower than light travels; this is why we often hear thunder after we see lightning as the light reaches our eye before the sound reaches our ears.</p> <p>Know that pitch is how high or low a sound is and that this is determined by how many vibrations per second are being made by the vibrating object; the number of vibrations per second is called frequency.</p> <p>Know how to identify patterns between the pitch of a sound and features of the object that produced it</p> <p>Know that volume is how loud or quiet a sound is and that this is determined by the amount of energy in the</p>
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			<p>wave (e.g. from how hard or soft a percussion instrument is hit).</p> <p>Knows how to find patterns between the volume of a sound and the strength of the vibrations that produced it).</p> <p>Know that the volume of a sound is quieter if the listener is further away from the object.</p> <p><b>Enhancing the Curriculum (Non Statutory guidance for Lower Key Stage 2).</b>          Know and identify the way sound is made through vibration in a range of different musical instruments from around the world;</p> <p>Know how the pitch and volume of sounds can be changed in a variety of ways.</p> <p>Know how to find patterns in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands of different thicknesses.</p> <p>Know how to conduct experiments looking at sound insulation, e.g. making earmuffs from a variety of different materials to investigate which provides the best insulation against sound.</p> <p>Know how to make and play their own instruments by using what they have found out about pitch and volume.</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Year 4</b></p>	<p><b>Living Things and Their Habitats</b> (Spring 1 and 2)</p>	<p>Sc4/2.1a recognise that living things can be grouped in a variety of ways</p> <p>Sc4/2.1b explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment</p> <p>Sc4/2.1c recognise that environments can change and that this can sometimes pose dangers to living things</p>	<p><b>Key Theme or Idea:</b> B2, B3</p> <p><b>Prior Learning/ Revision:</b></p> <p>decay, energy, habitat, freezing plant, structure, herbivore, carnivore, omnivore, microhabitat, environment, reproduction, vertebrate</p> <p>Living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things.</p> <p>Polar bears are an example of an animal adapted to its environment—thick fur for warmth and oily paw pads to ensure that they don't freeze to the ice.</p>

A trout is an example of fish, a frog is an example of an amphibian; a lizard is an example of a reptile; a robin is an example of a bird; a rabbit and a human are examples of a mammal.

Herbivorous animals eats plants; a carnivorous animal eats other animals; omnivorous animals eat both animals and plants.

A cat is an example of a carnivore; that a rabbit is an example of a herbivore; know that many humans are examples of omnivores (though not vegetarians).

Fish, amphibians, reptiles, birds and mammals are similar in that they have internal skeletons and organs; these are known as vertebrates, which means they are animals that have a back bone.

Fish are different in having gills so that they can breathe under water **and** have scaly skin.

Amphibians are different in that they begin their lives with gills but then develop lungs and breath on land.

Reptiles are different in that they breath air **and** have scaly skin.

Birds are different to other animals in that they have feathers **and** wings.

Mammals are different to other animals in that they have fur/hair and they feed milk to their young.

Know a rose bush, grass, dandelion by sight.

Know an ash tree, birch tree and conifer tree by sight.

### New learning and vocabulary

kingdom, classification key, species, fungi, bacteria, climate change, characteristics, offspring, extinction, pollution

Know a variety of living things in their local and wider environment

Know that animals can be grouped based on their physical characteristics(e.g. vertebrates and

			<p>invertebrates) and based on their behaviour (e.g. herbivores, carnivores and omnivores).</p> <p>Know that living things are divided into kingdoms: the animal kingdom, plants, fungi, bacteria, and single-celled organisms.</p> <p>Know that a species is a group of living things have many similarities that can reproduce together produce offspring.</p> <p>Know that a classification key uses questions to sort and identify different living things.</p> <p>Know how to use a classification key to identify and group living things.</p> <p>Know how to create a classification key to sort plants on the school premises.</p> <p>Know that changes to the environment can make it more difficult for animals to survive and reproduce; in extreme cases this leads to extinction, where an entire species dies.</p> <p>Know that human activity—such as climate change caused by pollution—can change the environment for many living things, endangering their existence .</p> <p>Know that the polar bear is a famous example of climate change endangering the existence of a species; as the climate changes and gets warmer, the sea ice on which polar bears live reduces in amount making it harder for them to survive and reproduce</p> <p><b>Enhancing the Curriculum (Non Statutory guidance for Lower Key Stage 2).</b></p> <p>Know how to use the local environment throughout the year to raise and answer questions that help them to identify and study plants and animals in their habitat.</p> <p>Know how the habitat changes throughout the year.</p> <p>Know different ways of grouping a wide selection of living things that include animals and flowering plants and non-flowering plants. For example by beginning to put vertebrate animals into groups such as fish, amphibians,</p>
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			<p>reptiles, birds, and mammals; and invertebrates into snails and slugs, worms, spiders, and insects. Note: Plants can be grouped into categories such as flowering plants (including grasses) and non-flowering plants, such as ferns and mosses.</p> <p>Know examples of human impact (both positive and negative) on environments, for example, the positive effects of nature reserves, ecologically planned parks, or garden ponds, and the negative effects of population and development, litter or deforestation.</p> <p>Know how to use and make simple guides or keys to explore and identify local plants and animals; making a guide to local living things</p> <p>Know how to raise and answer questions based on their observations of animals and what they have found out about other animals that they have researched.</p>
Year 4	<p><b>Electricity (Summer 1)</b></p>	<p>Sc4/4.2a identify common appliances that run on electricity</p> <p>Sc4/4.2b construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers</p> <p>Sc4/4.2c 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</p> <p>Sc4/4.2d recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit</p> <p>Sc4/4.2e recognise some common conductors and insulators, and associate metals with being good conductor</p>	<p><b><u>Key Theme or Idea:</u></b> P1, P3, C2</p> <p><b><u>Prior Learning/ Revision:</u></b></p> <p><b>component, conductor, energy, insulator, particle, property, material</b></p> <p>An object is made from/of a material</p> <p>Metal is a material from which objects can be made</p> <p>Matter (stuff) is made from tiny building blocks</p> <p>Energy comes in different forms and can be neither created nor destroyed, only changed from one form to another</p> <p><b><u>New learning and vocabulary</u></b></p> <p><b>circuit, appliance, charge, electron, battery, cell, bulb, buzzer, switch, wire, current electricity, static electricity, negative terminal, positive terminal, chemical reaction, emit</b></p>

			<p>Know the name of common appliances that run on electricity.</p> <p>Know that electrical energy is one of many forms of energy.</p> <p>Know that static electricity is an imbalance of charged particles on a material; it does not operate by flowing around a complete circuit.</p> <p>Know that current electricity is the flow of charged particles called electrons around a circuit.</p> <p>Know that electrical current flows well through some materials, called electrical conductors, and poorly through other materials, called electrical insulators, and can recognise some common examples of each.</p> <p>Know that conductors have free electrons and that when electrical current flows around a conductor the electrons move.</p> <p>Know that electrical conductivity (how well a material conducts electricity) is an example of a property.</p> <p>Know that metals are good electrical conductors.</p> <p>Know that a chemical reaction inside a cell produces the charged particles that can flow around a circuit.</p> <p>Know that more than one cell lined up to work together is called a battery.</p> <p>Know that electrical current can flow if there is a complete circuit.</p> <p>Know that wires—which contain a conductor inside them, usually made of metal—can allow electrical current to flow around a circuit.</p> <p>Knows the basic electrical parts, including cells, wires, bulbs, switches and buzzers.</p> <p>Know that when electrical current flows through a circuit, components within that circuit—such as buzzers which make a noise and bulbs which emit light—begin to work.</p> <p>Know that a switch functions by completing or breaking a complete circuit and associate this with whether or not a</p>
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			<p>lamp lights in a simple series circuit.</p> <p>Know how to construct a simple series electrical circuit using components.</p> <p>Know that exposure to high levels of electrical current can be dangerous.</p> <p><b>Enhancing the Curriculum (Non Statutory guidance for Lower Key Stage 2).</b></p> <p>Know how to construct simple series circuits, trying different components, for example, bulbs, buzzers and motors, and including switches, and use their circuits to create simple devices.</p> <p>Know how to draw the circuit as a pictorial representation, not necessarily using conventional circuit symbols at this stage; these will be introduced in year 6.</p> <p>Know and use the terms current and voltage, but these should not be introduced or defined formally at this stage.</p> <p>Know about precautions for working safely with electricity.</p> <p>Know how to observe 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.</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Year 4</b></p>	<p><b>Solids Liquids and Gases (States of Matter)</b></p> <p>(Summer 2)</p>	<p>Sc4/3.1a compare and group materials together, according to whether they are solids, liquids or gases</p> <p>Sc4/3.1b 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)</p> <p>Sc4/3.1c identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature</p>	<p><b><u>Key Theme or Idea:</u> C1, C2, C3</b></p> <p><b><u>Prior Learning/ Revision:</u></b></p> <p><b>absorption, dissolving, energy, freezing, matter, melting, particle, temperature,</b> ice, water, solid</p> <p>An object is made from/of a material</p> <p>Materials can be hard, soft, strong, weak, absorbent, heavy, light, solid and runny, smooth and rough; these descriptions denote the properties of a material</p> <p>Know that matter (stuff) is made from tiny building blocks</p>

### New learning and vocabulary

**bond, condensation, evaporation, reversible,** boiling point, melting point, liquid, gas, thermometer, water cycle, continuous precipitation, transpiration, surface runoff process, sublimation

Know that things are composed of a material in one of three states of matter: solid, liquid or gas and that materials can be grouped according to their state.

Know that things are made of particles (tiny building blocks) and that these are organized differently in different states.

Know that materials can change state when temperature changes and measure or research the temperature at which this happens in degrees Celsius ( $^{\circ}\text{C}$ )

Know that there are bonds between the particles (building blocks) in a solid; as temperature increases, these bonds are somewhat overcome as the particles absorb energy and solids can change into liquids; with a further increase in temperature, the particles become even more energetic and the bonds are overcome entirely so the liquid changes into a gas.

Know that when solids turn into liquids, this is called melting and that the reverse process is called freezing.

Know that when liquids turn into gases, this is called evaporation and that the reverse process is called condensation.

Know that when a solid turns into a gas without passing through the liquid state, this is called sublimation.

Know that the melting point of water is  $0^{\circ}\text{C}$  and that the boiling point of water is  $100^{\circ}\text{C}$ .

Know that water flows around our world in a continuous process called the water cycle

Know that, along with evaporation, water on the Earth's surface moves to the air in a process called transpiration in which water turns into water vapour (gas) on the surface of leaves on plants

			<p>Know that rain condenses in clouds and falls to earth as rain, snow or hail in a process called precipitation.</p> <p>Know that water flows across the land in rivers and streams in a process called surface run-off and under the ground as ground water.</p> <p><b>Enhancing the Curriculum (Non Statutory guidance for Lower Key Stage 2).</b></p> <p>Know of about 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).</p> <p>Know the changes to water when it is heated or cooled, thus observing water as a solid, a liquid and a gas.</p> <p>Note: Teachers should avoid using materials where heating is associated with chemical change, for example, through baking or burning.</p> <p>Know how to group and classify 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).</p> <p>Know how to research the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid.</p> <p>Know how to 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.</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Year 5</b></p>	<p style="text-align: center;"><b>Working Scientifically :</b> (Ongoing throughout the Year)</p>	<p>Sc5/1.1 planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</p> <p>Sc5/1.2 taking measurements, using a range of scientific equipment, within creasing accuracy and precision</p>	<p><b><u>Prior Learning/ Revision:</u></b></p> <p style="text-align: center;">prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis</p> <p>Know that we can ask questions and answer them by setting up scientific enquiries.</p>

		<p>Sc5/1.3 recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, and bar and line graphs</p> <p>Sc5/1.4 using test results to make predictions to set up further comparative and fair tests</p> <p>Sc5/1.5 reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of results, in oral and written forms such as displays and other presentations</p> <p>Sc5/1.6 identifying scientific evidence that has been used to support or refute ideas or arguments</p>	<p>Knowhow to make relevant predictions that will be tested in a scientific enquiry</p> <p>Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured(dependent variable) while all other conditions are kept the same</p> <p>Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stop watches</p> <p>Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw a neat table; how to draw a classification key; how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table</p> <p>Know—with structured guidance-how to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion</p> <p>Know how to precis a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry</p> <p>Know that scientific enquiries can suggest relationships, but that they do not prove whether a prediction is true</p> <p>Know that scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which condition scan vary even, and that repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry</p> <p>Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended to different contexts (e.g. effect</p>

of changing sunlight on a plant—does this work with other plants / different types of light / etc)

Know that they can draw conclusions from the findings of other scientists

Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry

### New learning and vocabulary

line graph, relationship, outlier

Know how to choose appropriate variables to test a hypothesis (e.g. plant height as a dependent variable when measuring effect of light on plant growth).

Know how to identify conditions that were imperfectly controlled and can explain how these might affect results.

Know how to accurately use further measuring devices, including digital and analogue scales, measuring cylinders and beakers, recognizing the relative accuracy of each device.

Know how and when to repeat measurements, how to find an average of a set of measurements and how to recognize and remove outliers from a set of data, justifying the removal as a potential mis-measurement.

Know how to independently write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion.

Know how to present brief oral findings from an enquiry, speaking clearly and with confidence and

using notes where necessary.

Know examples of instances where scientific evidence has been used to support or refute ideas or arguments (e.g. fossil records as evidence of natural selection).

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 degree of trust in results, in oral and written forms such as displays and other presentations ♣ identifying science

Pupils in years 5 and 6 should use their science experiences to: explore ideas and raise different kinds of questions; select and plan the most appropriate type of scientific enquiry to use to answer scientific questions; recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why. They should use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment. They should make their own decisions about what observations to make, what measurements to use and how long to make them for, and whether to repeat them; choose the most appropriate equipment to make measurements and explain how to use it accurately. They should decide how to record data from a choice of familiar

			<p>approaches; look for different causal relationships in their data and identify evidence that refutes or supports their ideas. They should use their results to identify when further tests and observations might be needed; recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact. They should use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas and should talk about how scientific ideas have developed over time.</p> <p>These opportunities for working scientifically should be provided across years 5 and 6 so that the expectations in the programme of study can be met by the end of year 6. Pupils are not expected to cover each aspect for every area of study</p>
Year 5	<b>Properties and Changes of Materials</b> (Autumn 1 and 2)	<p>Sc5/3.1a 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</p> <p>Sc5/3.1b know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution</p> <p>Sc5/3.1c use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating</p> <p>Sc5/3.1d give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic</p> <p>Sc5/3.1e demonstrate that dissolving, mixing and changes of state are</p>	<p><b>Key Theme or Idea:</b> C2, C3</p> <p><b>Prior Learning/ Revision:</b></p> <p><b>absorption, bond, condensation, conductor, evaporation, matter, melting, particle,</b> property, reversible, freezing, wood, plastic, glass, metal, water, rock, suitability, surface, waterproof, flexible, rigid, boiling point, melting point, solid, liquid, gas, sublimation, magnetic</p> <p>One can distinguish between materials made of wood, plastic, glass, metal, water, rock.</p> <p>An object is made from/of a material.</p> <p>Materials can have useful properties for a given job (including being waterproof, strong, weak, hard, soft, flexible, rigid, solid, runny, light, heavy, smooth, rough, flexible or rigid.).</p> <p>Electrical conductivity (how well a material conducts electricity) is an example of a property.</p> <p>Metals are good electrical conductors</p> <p>Many types of plastic are waterproof, that steel (a type of metal) is strong, that rock is hard, that cotton wool is soft, that rubber is flexible, that rock is rigid, that polystyrene (a type of plastic) is light and that iron (a type of metal) is</p>

		<p>reversible changes</p> <p>Sc5/3.1f 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</p>	<p>heavy.</p> <p>Things are composed of a material in one of three states of matter: solid, liquid or gas.</p> <p>Things are made of particles (tiny building blocks) and that these are organized differently in each state.</p> <p>Materials can change state when temperature changes.</p> <p>There are bonds between the particles (building blocks) in a solid; as temperature increases, these bonds are somewhat overcome as the particles absorb energy and solids can change into liquids; with a further increase in temperature, the particles become even more energetic and the bonds are overcome entirely so the liquid changes into a gas.</p> <p>When solids turn into liquids, this is called melting and that the reverse process is called freezing.</p> <p>When liquids turn into gases, this is called evaporation and that the reverse process is called condensation.</p> <p>When a solid turns into a gas without passing through the liquid state, this is called sublimation.</p> <p>The melting point of water is 0 °C and that the boiling point of water is 100°C.</p> <p>Some materials are magnetic, meaning that they are attracted to a magnet, while other materials are non-magnetic.</p> <p><u><a href="#">New learning and vocabulary</a></u></p> <p><b>irreversible</b>, dissolve, soluble, insoluble, solvent, solute, solution, filter, sieve, saturation, crystallization, thermal, chemistry</p> <p>Know that materials can be sorted in a variety of ways based on their properties</p> <p>Know that in some solid materials the bonds between particles break when surrounded by a liquid; this allows the liquid to absorb the solid; when this happens, the solid is called a solute, the liquid is called a solvent and the result is a solution;</p>
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when a solid does dissolve in a liquid it is described as being soluble in that solvent (e.g. sugar in water); when it cannot it is insoluble (e.g. sand in water).

Know that a given amount of solvent can only absorb a certain amount of solid before no more will dissolve; when this happens the liquid is said to be saturated.

Know that when a solvent is evaporated from a solution, the original solute is left behind; the remaining solid will often form crystals—the slower the solvent evaporates, the larger the crystals that will be formed.

Know how to dissolve and a solute in a solvent and then how to evaporate the solvent to recover the solute.

Know that a reversible change is one that can be reversed and that examples of this are mixing, dissolving and changes of state where no chemical reaction takes place.

Know that an irreversible change is one that cannot be reversed and that examples of this often involve a chemical change where a new material is made, often a gas (e.g. burning, boiling an egg, the reaction of bicarbonate of soda and acid).

Know that filtering allows solids and liquids to be separated and that sieving allows solids made up of different sizes parts to be separated.

Know how to separate a mixture of sand, salt and small stones by sieving (to remove the small stones), followed by dissolving in water (so the salt is absorbed), followed by filtering to remove the sand from the mixture, followed finally by evaporation of the water to recover the salt.

Know that materials' different properties can be tested through acting upon them, including testing to find whether materials are magnetic, thermally

conductive and electrically conductive;

Know that the various properties of different materials make them suitable for a given function.

Know how to explain orally and in writing the reasons why various materials are suited or unsuited to a function.

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

**Enhancing the Curriculum (Non Statutory guidance for Upper Key Stage 2).**

Pupils should build a more systematic understanding of materials by exploring and comparing the properties of a broad range of materials, including relating these to what they learnt about magnetism in year 3 and about electricity in year 4. They should explore reversible changes, including, evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes. Pupils should explore changes that are difficult to reverse, for example, burning, rusting and other reactions, for example,

			<p>vinegar with bicarbonate of soda. They should find out about how chemists create new materials, for example, Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton. Pupils are not required to make quantitative measurements about conductivity and insulation at this stage. It is sufficient for them to observe that some conductors will produce a brighter bulb in a circuit than others and that some materials will feel hotter than others when a heat source is placed against them. Safety guidelines should be followed when burning materials. Pupils might work scientifically by: carrying out tests to answer questions, for example, 'Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?' They might compare materials in order to make a switch in a circuit. They could observe and compare the changes that take place, for example, when burning different materials or baking bread or cakes. They might research and discuss how chemical changes have an impact on our lives, for example, cooking, and discuss the creative use of new materials such as polymers, super-sticky and super-thin materials</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Year 5</p>	<p><b>Living Things and Their Habitats</b></p> <p><b>Animals Including Humans</b></p> <p>(Spring 1 and 2)</p>	<p>5/2.1a describe the differences in the lifecycles of a mammal, an amphibian, an insect and a bird</p> <p>Sc5/2.1b describe the life process of reproduction in some plants and animals.Sc5/2.2a describe the changes as humans develop to old age</p>	<p><b>Key Theme or Idea:</b> B1</p> <p><b>Prior Learning/ Revision:</b></p> <p><b>decay</b>, plant, structure, reproduction, nutrients, reproduction, fish, bird, amphibian, reptile, mammal, fruit, nectar, anther, ovary, ovule, petal, pollen, stigma, style, stamen, function, exchange, dispersal, fertilization, insect, vertebrates</p> <p>Living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things.</p> <p>A trout is an example of fish, a frog is an example of an amphibian; a lizard is an example of a reptile; a robin is an example of a bird; a rabbit and a human are examples of a mammal.</p> <p>Fish, amphibians, reptiles, birds and mammals are</p>

similar in that they have internal skeletons and organs; these are known as vertebrates, which means they are animals that have a back bone.

Fish are different in having gills so that they can breathe under water **and** have scaly skin.

Amphibians are different in that they begin their lives with gills but then develop lungs and breath on land.

Reptiles are different in that they breath air **and** have scaly skin .

Birds are different to other animals in that they have feathers and wings.

Mammals are different to other animals in that they have fur/hair **and** they feed milk to their young.

Different parts of plants have one or more functions (jobs).

Roots collect water and minerals from the soil, and hold the plant firmly in the ground.

The stem holds up the leaves so that they can gather light to make food and holds up the flowers so that they can receive pollen and disperse their fruits; the stem also transports water and minerals from the roots to the other parts of the plant.

The leaves make food by trapping light and using its energy to turn carbon dioxide and water into carbohydrates.

The function of a flower is reproduction, where flowers of the same kind exchange pollen—made by an anther—in a process called fertilisation, and a structure in the flower's ovary called an ovule becomes a seed; the ovary then becomes a fruit which helps the seed leave the plant in a process called dispersal.

#### New learning and vocabulary

life cycle, life span, embryo, womb, weaned, adolescence, metamorphosis, pupa, larva, chrysalis, caterpillar, tadpole, hatchling, fledgling, insect

Know that the life cycle of a living thing is a series of

			<p>stages of development starting with a fertilized egg in animals or a seed in many plants.</p> <p>Know that in most mammals(e.g. dogs)a fertilized egg develops in the womb into an embryo and is then born and fed on milk before it is weaned onto the food that is adapted to eat; it then develops to maturity in a period called adolescence after which it can reproduce and the cycle can begin again.</p> <p>Know that in amphibians (e.g. frogs)a fertilized egg develops into an embryo and then hatches into a tadpole; the tadpole develops adult characteristics, metamorphoses into the adult form after which it can reproduce and the cycle can begin again.</p> <p>Know that in many insects (e.g. butterflies)a fertilized egg develops into wingless feeding form called a larva(caterpillar); the larva feeds then later becomes a pupa (chrysalis) with a protective cocoon; inside this cocoon, the pupa metamorphoses into the adult butterfly after which it can reproduce and the cycle can begin again.</p> <p>Know that in birds (e.g. robins)a fertilized egg hatches in a nest(a hatchling) and is fed by its parents until it is ready to fly (i.e. becomes a fledgling); it then leaves the nest and grows into an adult after which it can reproduce and the cycle can begin again.</p> <p>Know that humans go through stages of development; they begin as fertilized eggs and then develop in to embryos before developing into babies; once they are born, these newborn babies become infants (roughly 2 months to 2 years) then into young children(roughly 2-12 years old); children develop into adults during adolescence(roughly 12-16 years old) at which age they become physically capable of reproduction; as adults develop into old age (roughly 55+ years old)they experience changes in their body which require them to move more carefully and rest more frequently.</p> <p>(NB: the changes of adolescence in humans is taught as part of mandatory sex and relationship education; it must be taught with due sensitivity to children's family backgrounds; if in doubt, delay sensitive discussions until the formal teaching of sex and relationship education).</p> <p>Know and describe the life process of reproduction in</p>
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some plants.

**Enhancing the Curriculum (Non Statutory guidance for Upper Key Stage 2).**

Know about and raise questions about their local environment throughout the year.

Know about the 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.

Know about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall.

Know about different types of reproduction, including sexual and asexual reproduction in plants, and sexual reproduction in animals.

Know how to observe and compare 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.

Know how to grow new plants from different parts of the parent plant, for example, seeds, stem and root cuttings, tubers, bulbs.

Know how to observe changes in an animal over a period of time (for example, by hatching and rearing chicks), comparing how different animals reproduce and grow.

Know how to draw a timeline to indicate stages in the growth and development of humans.

Know about the changes experienced in puberty.

Know the gestation periods of other animals (by researching it) and comparing them with humans;

Know how to find out and record the length and mass of a baby as it grows.

## Earth and Space (Summer 1)

Sc5/4.1a describe the movement of the Earth, and other planets, relative to the Sun in the solar system

Sc5/4.1b describe the movement of the Moon relative to the Earth

Sc5/4.1c describe the Sun, Earth and Moon as approximately spherical bodies

Sc5/4.1d use the idea of the Earth's rotation to explain day and night, and the apparent movement of the Sun across the sky.

**Key Theme or Idea:** E1, E2

**Prior Learning/ Revision:**

**absorption, energy, freezing, melting, orbit, reflection, wave,** Sun, spring, summer, autumn, winter

Days are longer in the summer and shorter in winter.

Weather changes through the year, getting hotter in the summer and colder in the winter.

Earth orbits the Sun with one orbit constituting a year of 365/366 days

Light is a form of energy.

We need light to see things and that darkness is the absence of light.

Light travels in straight lines.

Everything that we can see is either a light source or something that is reflecting light from a light source into our eyes.

The Sun is a light source, but that the Moon is not and is merely reflecting light from the Sun.

Many light sources give off light and heat.

The Sun gives off light and heat when hydrogen turns into helium (NB: the Sun and the Earth are capitalized when being discussed in an astronomical context.)

**New learning and vocabulary**

planet, satellite, sphere, solar system, eclipse, star, universe, constellation, axis, celestial body, Moon, rotating, lunar, solar, telescope, rotation

Know that the universe comprises all matter and space in existence.

Know that a celestial body is a large object in the universe.

			<p>Know that a star is an exceptionally hot ball of gas, originally made from hydrogen and helium.</p> <p>Know that the Sun is a star.</p> <p>Know that a planet(e.g. Earth) is defined as a spherical celestial body that orbits a star and that has cleared the neighbourhood of its orbit of other objects, some of which crash into the planet and others that become moons of that planet.</p> <p>Know it was once thought that everything orbited the Earth, but that scientists like Copernicus and Galileo used telescopes and measurement to show that the Earth orbited the Sun.</p> <p>Know that there are eight major planets in our solar system: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune.</p> <p>Know that the universe is utterly vast and that our solar system makes up a tiny fraction of the universe.</p> <p>Know that a satellite orbits a planet and that moons are natural satellites.</p> <p>Know that the Moon orbits the Earth roughly every 28 days.</p> <p>Know that as the Moon orbits the Sun, different parts of it are lit up by the Sun, which is why we see a different shape lit up on the Moon as the lunar cycle progresses.</p> <p>Know that humans have sent man-made satellites into orbit that assist with telecommunication.</p> <p>Know that all the planets in the solar system orbit the Sun and that the further away they are from the Sun, the longer their orbit.</p> <p>Know that the Earth spins around an imaginary line through its centre called an axis and that this axis is tilted relative to the Earth's orbit.</p> <p>Know that night and day are the result of the Earth rotating on its axis.</p> <p>Know that the tilt of the Earth towards and away from the</p>
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			<p>Sun's light as the Earth orbits the Sun leads to the seasons as during winter the light is spread over a wider area.</p> <p>Know that a solar eclipse occurs when the Moon is between the Sun and the Earth, casting a shadow on the Earth; a lunar eclipse occurs when the Earth is between the Sun and the Moon, casting a shadow on the Moon.</p> <p><b>Enhancing the Curriculum (Non Statutory guidance for Upper Key Stage 2).</b>          Know how models of the Sun and Earth can help them to explain day and night.</p> <p>Know that the Sun is a star at the centre of our solar system and that it has eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a 'dwarf planet' in 2006).</p> <p>Know and understand that a moon is a celestial body that orbits a planet (Earth has one moon; Jupiter has four large moons and numerous smaller ones).</p> <p>Know that it is not safe to look directly at the Sun, even when wearing dark glasses.</p> <p>Know 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.</p> <p>Know how to compare 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.</p> <p>Know why some people think that structures such as Stonehenge might have been used as astronomical clocks.</p>
5 Year	<p><b>Forces</b> (Summer 1)</p>	<p>Sc5/4.2a explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object</p>	<p><b>Key Theme or Idea:</b> P1, P2</p> <p><b>Prior Learning/ Revision:</b></p>

		<p>Sc5/4.2b identify the effects of air resistance, water resistance and friction, that act between moving surfaces</p> <p>Sc5/4.2c recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect</p>	<p><b>energy, matter, particle</b>, surface, friction, force, stretch, squash, rotation, rough, smooth, sliding friction, static friction</p> <p>A force can be thought of as a push or a pull</p> <p>As objects move across a surface there is friction when they rub against each other and that sometimes this friction is larger or smaller.</p> <p>Applying forces to objects can change their shape.</p> <p>Know that the roughness of a material is an example of a property</p> <p>There are three types of contact force: impact forces (when two surfaces collide), frictional forces (when two surfaces are already in contact) and strain forces (when an elastic material is stretched or squashed).</p> <p>Objects move differently on rough and smooth surfaces; objects resist movement more on rough surfaces because there is higher friction as the object move.</p> <p><u><b>New learning and vocabulary</b></u></p> <p>acceleration, air resistance, buoyancy, effort, force meter, fulcrum, gravity, load, mass, mesh, Newton, pivot, rigid, streamlined, terminal velocity, unsupported, water resistance, weight</p> <p>Know that a force is measured in a unit called Newtons, named after a British scientist called Sir Isaac Newton who discovered lots about gravity and how planets move.</p> <p>Know that pull forces can be measured using a device called a force meter.</p> <p>Know that the amount of matter (stuff) in an object is its mass.</p> <p>Know that gravity is a force that acts between all objects in the universe, but that it acts much more strongly between objects that have more mass and that are close together.</p> <p>Know that unsupported objects are pulled towards the Earth by the force of gravity.</p> <p>Know that acceleration is a change in speed and that</p>
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			<p>unbalanced forces acting on an object cause it to accelerate.</p> <p>Know that air resistance is a force felt by an object as it moves through the air; it is caused by the object bumping into the gas particles that make up air; the quicker an object moves, the more gas particles it bumps into and the more air resistance it experiences.</p> <p>Know that a falling object will accelerate until its air resistance matches the gravitational force pulling it down; at this point, the object will continue to move at this speed (called its terminal velocity) without getting any quicker or slowing down.</p> <p>Know that a parachute's shape increases the air resistance that a falling object experiences, giving it a much lower terminal velocity.</p> <p>Know that friction is a force that is felt act between moving surfaces.</p> <p>Know that water resistance is a force felt by an object as it moves through water; it is caused by the object bumping into the water particles.</p> <p>Know that the shape of an object determines how much air resistance or water resistance it experiences; shapes of object that experience little air resistance or water resistance are described as streamlined.</p> <p>Know how to draw a force diagram with arrows representing the different forces acting on an object.</p> <p>Know that a lever is a rigid length pivoting around a fulcrum.</p> <p>Know that a pulley is a wheel with a fulcrum that supports a moving cable or belt.</p> <p>Know that a gear is a rotating wheel with cut teeth that mesh with the teeth of another gear so that turning one gear turns an adjacent gear in the opposite direction.</p> <p>Know that gears, levers and pulleys are simple machines that used to allow a smaller force to have a greater effect; they do this by moving a smaller force over a longer distance at one end of the machine, which the machine turns into a larger forcer over a small distance</p>
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			<p>at the other end.</p> <p><b>Enhancing the Curriculum (Non Statutory guidance for Lower Key Stage 2).</b>          Know how to explore falling objects and raise questions about the effects of air resistance.</p> <p>Know how to explore the effects of air resistance by observing how different objects such as parachutes and sycamore seeds fall.</p> <p>Know that forces that make things begin to move, get faster or slow down.</p> <p>Know how to 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.</p> <p>Know how to explore the effects of levers, pulleys and simple machines on movement.</p> <p>Know how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation.</p> <p>Know how to explore falling paper cones or cup-cake cases, and designing and making a variety of parachutes and carrying out fair tests to determine which designs are the most effective.</p> <p>Know about resistance in water by making and testing boats of different shapes.</p> <p>Know how to design and make products that use levers, pulleys, gears and/or springs and explore their effects.</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Year 6</b></p>	<p style="text-align: center;"><b>Working Scientifically :</b> (Ongoing throughout the Year)</p> <p>describe and evaluate their own and others' scientific ideas related to topics in the national</p>	<p>Sc5/1.1 planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</p> <p>Sc5/1.2 taking measurements, using a range of scientific equipment, with increasing accuracy and precision</p> <p>Sc5/1.3 recording data and results of</p>	<p><b><u>Prior Learning/ Revision:</u></b></p> <p>prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis</p> <p>Know that we can ask questions and answer them by setting up scientific enquiries</p> <p>Know how to make relevant predictions that will be tested in a scientific enquiry</p>

	<p>curriculum (including ideas that have changed over time), using evidence from a range of sources</p> <ul style="list-style-type: none"> <li>• ask their own questions about the scientific phenomena that they are studying, and select the most appropriate ways to answer these questions, recognising and controlling variables where necessary (i.e. 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)</li> <li>• use a range of scientific equipment to take accurate and precise measurements or readings, with repeat readings where appropriate</li> <li>• record data and results using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs</li> <li>• draw conclusions, explain and evaluate their methods and findings, communicating these in a variety of ways</li> <li>• raise further questions that could be investigated, based on their data and observations.</li> </ul>	<p>increasing complexity using scientific diagrams and labels, classification keys, tables, and bar and line graphs</p> <p>Sc5/1.4 using test results to make predictions to set up further comparative and fair tests</p> <p>Sc5/1.5 reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of results, in or a land written forms such as displays and other presentations</p> <p>Sc5/1.6 identifying scientific evidence that has been used to support or refute ideas or arguments</p>	<p>Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same</p> <p>Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stop watches</p> <p>Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw a neat table; how to draw a classification key; how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table</p> <p>Know—with structured guidance—how to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion</p> <p>Know how to precis a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry</p> <p>Know that scientific enquiries can suggest relationships, but that they do not prove whether a prediction is true</p> <p>Know that scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which condition can vary even, and that repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry</p> <p>Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended to different contexts (e.g. effect of changing sunlight on a plant—does this work with other plants /different types of light / etc)</p> <p>Know that they can draw conclusions from the findings of other scientists</p> <p>Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry</p>
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			<p><u>New learning and vocabulary</u></p> <p>line graph, relationship, outlier</p> <p>Know how to choose appropriate variables to test a hypothesis (e.g. plant height as a dependent variable when measuring effect of light on plant growth)</p> <p>Know how to identify conditions that were imperfectly controlled and can explain how these might affect results Know how to accurately use further measuring devices, including digital and analogue scales, measuring cylinders and beakers, recognizing the relative accuracy of each device</p> <p>Know how and when to repeat measurements, how to find an average of a set of measurements and how to recognize and remove outliers from a set of data, justifying the removal as a potential mis-measurement</p> <p>Know how to independently write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion</p> <p>Know how to present brief oral findings from an enquiry, speaking clearly and with confidence and using notes where necessary</p> <p>Know examples of instances where scientific evidence has been used to support or refute ideas or arguments (e.g. fossil records as evidence of natural selection)</p>
Year 6	<p><b>Animals including Humans</b> (Autumn 1 and 2)</p>	<p>Sc6/2.2a identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood</p> <p>Sc6/2.2b recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function</p> <p>Sc6/2.2c describe the ways in which nutrients and water are transported</p>	<p><u>Key Theme or Idea:</u>    <b>B</b></p> <p><u>Prior Learning/ Revision:</u></p> <p><b>component, energy, growth</b>, survival, nutrients, consumption, skeleton, ribcage, protein, carbohydrate, fat, digestion, skeleton, organ</p> <p>Living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things.</p>

within animals, including human

Animals, including humans, need food, water and air to survive.

People need to exercise often to help their body stay strong and fit.

Keeping clean, including washing and brushing teeth, is an important part of staying healthy.

There are food groups: fruit and vegetables, carbohydrates, protein, dairy, fat and sugary foods.

Proteins are good for growth, carbohydrates for energy and fruit and vegetables provide vitamins and minerals which help keep us healthy (e.g. calcium for healthy bones and teeth).

More than half of our diet should be made up of carbohydrates, fruit and vegetables.

Fats and sugary foods should be eaten rarely and in small amounts.

Getting the right amount of each food group (including over half of the diet made up of fruit, vegetables and carbohydrates) is called a balanced diet.

A lack of a nutrient can cause ill health; for example, a lack of vitamin D leads to a disease called rickets.

Know that excess of a food group can cause ill health, such as tooth decay due to excess sugar.

**NB—some food groups are difficult to afford for some families so sensitivity is required in teaching this area**

Food passes through the body with the nutrients being extracted and the waste products excreted, and that this process is called digestion.

The process of digestion involves breaking complex foodstuffs into simpler building blocks that can be absorbed by the body.

**New learning and vocabulary**

artery, aorta, atrium, blood vessels capillary, circulatory system, vein, pulse, ventricle, replenished,

resting heart rate, body

Know how nutrients and water are transported within animals, including humans.

Know that the heart and lungs are organs protected by the rib cage.

Know that blood travels around the body transporting nutrients that have been absorbed into the blood stream from digestion; blood also carries oxygen around the body which is used to power the body; this use of oxygen to create energy is called respiration.

Know that the heart beats, pumping blood around the body and that blood vessels carry the blood; arteries carry blood away from the heart; veins carry blood towards the heart; capillaries are tiny blood vessels that connect arteries and veins.

Know that the heart is composed of four chambers: two atria and two ventricles; the aorta is the largest artery in the body and most major arteries branch off from it.

Know that when we exercise, our heart beats more frequently so that the oxygen that is used around the body can be replenished; it returns to a resting heart rate afterwards; fitter people tend to have lower resting heart rates.

Know that drugs are chemicals that have an impact on the natural chemicals in a person's; know that drugs can be harmful or helpful, depending on what they are and how they are used; know that all drugs can be harmful if over used.

Know that paracetamol and aspirin are examples of drugs that can be helpful as a painkiller.

Know that cannabis and cocaine are examples of illegal drugs that can have serious negative effects.

Know that alcohol and tobacco are examples of drugs that are legal to adults but that can have serious negative effects, such as liver disease and lung disease, respectively.

			<p><b>NB</b>–note that discussion of drugs needs sensitive teaching due to family circumstances</p> <p><b>Enhancing the Curriculum (Non Statutory guidance for Upper Key Stage 2).</b>  Pupils should build on their learning from years 3 and 4 about the main body parts 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.</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Year 6</b></p>	<p style="text-align: center;"><b>Light</b> (Spring 1)</p>	<p>Sc6/4.1a recognise that light appears to travel in straight lines</p> <p>Sc6/4.1b 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</p> <p>Sc6/4.1c 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> <p>Sc6/4.1d use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them</p>	<p><b>Key Theme or Idea:</b> P1, P3</p> <p><b>Prior Learning/ Revision:</b>  <b>absorption, energy, property, reflection, wave,</b> mirror, incident ray, image, beam, photons, solid, opaque, transparent, object, source,</p> <p>Light is a form of energy  Energy comes in different forms and can be neither created nor destroyed, only changed from one form to another  We need light to see things and that darkness is the absence of light  Light travels in straight lines  Light is reflected when it travels from a light source and then ‘bounces’ off an object  Everything that we can see is either a light source or something that is reflecting light from a light source into our eyes  The Sun is a light source, but that the Moon is not and is merely reflecting light from the Sun  Many light sources give off light and heat  The Sun gives off light and heat when hydrogen</p>

turns into helium  
Filaments in traditional bulbs heat up until they glow, giving off light and heat  
Fluorescent bulbs glow when electricity adds energy to a gas within the bulb  
Sunglasses can protect eyes from sun light but looking at the Sun directly—even with sunglasses—can damage the eyes  
Opaque objects block light creating shadows and that light passes through transparent objects  
Opacity/transparency and reflectiveness are properties of a material  
As objects move towards a light source, the size of the shadow increases  
The changing of shadow size can be shown by drawing a diagram with straight lines representing light(NB: the Sun and the Moon are capitalized when being discussed in an astronomical context)

### New learning and vocabulary

angle of incidence, angle of reflection, refraction, spectrum, translucent, medium, periscope

Know that translucent objects allow some light to pass through, but some of the light changes direction as it passes through the object; this means that an something seen through a translucent object is not clearly defined

Know that when light passes from one medium to another (e.g. from air to water), it changes direction; this is called refraction; this happens because light travels at different speeds in different media.

Know that white light comprises all the colours of light

Know that white light refracted by two surfaces in a prism will spread out so that all of its constituent colours can be seen; this array of colours is called a spectrum; it happens because the different colours of that constitute white light travel at different speeds.

Know how to draw a diagram to show why the shape of a shadow will match the shape of an object

Know that when light reflects off an object, the

			<p>angle of incidence is equal to the angle of reflection          Know that a periscope takes advantage of the predictable angles of incidence and reflection to allow an image to be shown to a viewer</p> <p>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.</p> <p><b>Enhancing the Curriculum (Non Statutory guidance for Upper Key Stage 2).</b>          Pupils should build on the work on light in year 3, exploring the way that light behaves, including light sources, reflection 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)</p>
	<p><b>Electricity</b>          (Spring 2)</p>	<p>Sc6/4.2a associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit</p> <p>Sc6/4.2b 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</p> <p>Sc6/4.2c use recognised symbols</p>	<p><b><u>Key Theme or Idea:</u> P1, P3</b></p> <p><b><u>Prior Learning/ Revision:</u></b></p> <p><b>circuit, component, conductor, energy, insulator, particle,</b> property, material, appliance, charge, electron, battery, cell, bulb, buzzer, switch, wire, current electricity, static electricity, negative terminal, positive terminal, voltage, chemical reaction, emit</p> <p>An object is made from/of a material</p>

when representing a simple circuit in a diagram

Metal is a material from which objects can be made.  
Matter (stuff) is made from tiny building blocks  
Electrical energy is a form of energy  
Energy comes in different forms and can be neither created nor destroyed, only changed from one form to another  
Static electricity is an imbalance of charged particles on a material; it does not operate by flowing around a complete circuit  
Current electricity is the flow of charged particles called electrons around a circuit  
Electrical current flows well through some materials, called electrical conductors, and poorly through other materials, called electrical insulators  
Conductors have free electrons, and when electrical current flows through a conductor, the electrons move like people in a queue  
Electrical conductivity (how well a material conducts electricity) is an example of a property  
Metals are good electrical conductors  
A chemical reaction inside a cell produces the charged particles that can flow around a circuit  
More than one cell lined up to work together is called a battery  
Electrical current can flow if there is a complete circuit  
Wires—which contain a conductor inside them, usually made of metal—can allow electrical current to flow around a circuit  
When electrical current flows through a circuit components within that circuit—such as buzzers which make a noise and bulbs which emit light—begin to work  
A switch functions by completing or breaking a complete circuit  
A simple circuit can be constructed using components  
Exposure to high levels of electrical current can be dangerous

**New learning and vocabulary**

series circuit, parallel circuit, resistance, voltage

Know that voltage is a measure of the power of a

cell to produce electricity; it is a measure of the 'push' of electric current, not the size of the electric current

Know that as the number and voltage of cells in a circuit increases, the brightness of a bulb or the volume of a buzzer will increase (though too high a voltage may 'blow' the bulb or buzzer)

Know how to draw simple circuit diagrams

Know the recognized symbols for a battery, bulb, motor, buzzer and wire

Know how to predict whether components will function in a given circuit, depending on whether or not the circuit is complete; whether or not a switch is in an on or off position; and whether or not there is a cell to provide electrical current to the circuit

Know that two bulbs in a circuit can be wired up to create a series circuit or a parallel circuit; if one bulb blows in a series circuit the other will not shine as the circuit has been broken; in contrast, if one bulb blows in a parallel circuit, there will still be a complete circuit for the other bulb so it will continue to shine; use this

knowledge to explain the advantages of using parallel circuits (e.g. in the lighting in homes)

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.

**Enhancing the Curriculum (Non Statutory guidance for Upper Key Stage 2).**

Building on their work in year 4, pupils should construct simple series circuits, to help them to 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
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## Year 6

### Living Things and their Habitats (Summer 1)

Sc6/2.1a 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

Sc6/2.1b give reasons for classifying plants and animals based on specific characteristics

Key Theme or Idea: B2

#### Prior Learning/ Revision:

**component, habitat,** plant, structure, fish, bird, amphibian, reptile, mammal, kingdom, classification key, species, fungi, bacteria, characteristics, offspring, vertebrate, invertebrate, insect

Animals can be grouped based on their physical characteristics (e.g. vertebrates and invertebrates) and based on their behavior (e.g. herbivores, carnivores and omnivores) Living things are divided into kingdoms: the animal kingdom, plants, fungi, bacteria, and single-celled organisms

A species is a group of living things have many similarities that can reproduce together produce offspring

A classification key uses questions to sort and identify different living things

A classification key can be used to identify living things

Living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things

A trout is an example of fish, a frog is an example of an amphibian; a lizard is an example of a reptile; a robin is an example of a bird; a rabbit and a human are examples of a mammal

Fish, amphibians, reptiles, birds and mammals are similar in that they have internal skeletons and organs; these are known as vertebrates, which means they are animals that have a back bone  
Fish are different in having gills so that they can breathe under water **and** have scaly skin

Amphibians are different in that they begin their lives with gills but then develop lungs and breath on land

Reptiles are different in that they breath air **and** have scaly skin

Birds are different to other animals in that they have feathers and wings

Mammals are different to other animals in that they have fur/hair **and** they feed milk to their young  
Different parts of plants have one or more functions (i.e.)

**Evolution and adaptation**  
(Summer 2)

Sc6/2.3a recognise that living things have changed overtime and that fossils provide information about living things that inhabited the Earth millions of years ago

Sc6/2.3b recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents

Sc6/2.3c identify how animals and plants are adapted to suit their environment indifferent ways and that adaptation may lead to evolution

Key Theme or Idea: B3

Prior Learning/ Revision:

**birth, decay, energy, habitat, irreversible, extinction,** microhabitat, dead, life cycle, food chain, source, nutrients, reproduction, consumption, environment, extinction, species, characteristic, adaptation

Living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things.

Polar bears are an example of an animal adapted to its environment—thick fur for warmth and oily paw pads to ensure that they don't freeze to the ice.

Sharks are another example—smooth skin and streamlined shape for quick swimming; and gills for breathing underwater.

Cacti are an example of a plant adapted to its environment—thick skin keeps a store of water safe; sharp spikes keep animals from stealing the water.

Pine trees have thick bark and pine cones to protect against cold winters.

Woodlice live under logs—an example of a microhabitat-as they need somewhere dark and damp so that they do not dry out.

Frogs can live in ponds—an example of a microhabitat-as they water in which to lay their eggs (frogspawn).

A species is a group of living things have many similarities that can reproduce together produce offspring.

Changes to the environment can make it more difficult for animals to survive and reproduce; in extreme cases this leads to extinction, where an entire species dies.

Human activity, such as climate change caused by

Fossils form when a plant or animal dies and is quickly covered with silt or mud so that it cannot be rotted by microbes or eaten by scavenging animals; in time layers of sediment build, squashing the mud and turning it to stone around the dead plant or animal; the materials in the body are replaced by minerals that flow in water through the rock, leaving a rock in the shape of the animal or plant that was once there

### New learning and vocabulary

evolution, natural selection, variation, advantageous  
Know that all life on Earth began from a single point around 4.5 billion years ago

Know that living things change over time and that this gradual change is called evolution

Know that natural selection is the cause of this change; natural selection works across a species there is natural variation within a species; there is also competition to survive and reproduce and that members of a species with advantageous characteristics survive and reproduce—these characteristics are passed down to their offspring; members of a species with less advantageous characteristics do not survive and reproduce—these characteristics are not passed down to offspring  
Know that offspring vary and are not identical to their parents

Know that Charles Darwin posited this theory of evolution by natural selection

Know that the gradual change of species over millions of years can be observed by looking at examples of fossil

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.

**Enhancing the Curriculum (Non Statutory guidance for Upper Key Stage 2).**

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 two feet rather than four, having a long or a short beak, having gills or lungs, tendrils on climbing plants, brightly coloured and scented flowers

