



# Science Curriculum

## EYFS to Year 6



# Overarching Principles

## Science

### Subject Intent

- ❖ Children to know that science is a subject – focusing on learning about how things work – including living things
- ❖ Understand that 'working scientifically' is at the heart of science– and what kinds of simple investigations we can use. Using and understanding the school 'working scientifically' expectations.
- ❖ Understand that scientific knowledge is usually factual, not an opinion
- ❖ The curriculum covers most 'Big Ideas' several times to assure depth of knowledge
- ❖ Know the key knowledge identified in each unit, so that they have a firm knowledge base to study individual science disciplines from Key Stage 3

### Substantive Dimension

- ❖ Physics, biology, Chemistry, Earth Sciences

### Disciplinary Dimension

- ❖ The pursuit of knowledge through empirical testing

### Connecting Themes

- ❖ Sequential presentation of substantive elements, through 'Big Ideas'
- ❖ Scientific enquiry within all substantive dimensions

### Key Subject Teaching Approaches

- ❖ Science is a fine balance between direct instruction and scientific enquiry
- ❖ Lessons will begin with a spaced retrieval session of vital knowledge and vocabulary which children need to know in order to build their learning; vocabulary is high value and high priority
- ❖ All units of work with encompass a range of scientific enquiry approaches; including empirical testing

## The 'Big Ideas' Across our Science Curriculum

### 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.

### 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.

### 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 into different forms in order to survive in the environments in which they live.

Earth Science												
<b>E1:</b> The Earth is one of eight planets that orbit the sun.												
<b>E2:</b> The Earth is tilted and spins on its axis leading to day and night, the seasons and the climate.												
<b>E3:</b> 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.)												

## Big Idea Map

Year Group	Physics			Chemistry			Biology			Earth Science		
	P1	P2	P3	C1	C2	C3	B1	B2	B3	E1	E2	E3
1				Spring	Spring			Autumn Summer 2	Autumn	Summer 1		
2				Autumn	Autumn		Spring Summer	Spring				
3	Autumn 2	Spring 2	Autumn 2	Spring 1	Spring 1	Spring 1	Summer	Summer	Autumn 1 Summer			Spring 1
4	Autumn 2 Spring 1		Autumn 2 Spring 1	Spring 2	Spring 1 Spring 2	Spring 2		Summer	Autumn 1 Summer			
5	Autumn 2	Autumn 2			Spring Summer 1	Spring Summer 1	Summer			Autumn 1	Autumn 1	
6	Autumn 1 Autumn 2		Autumn 1 Autumn 2				Summer	Spring 1	Spring 2			

## Topic Map (Including key focus scientists)

Year Group	Autumn		Spring		Summer	
1	Animals Including Humans <i>Jane Goodall – studied primates</i>		Everyday Materials		Seasonal Changes*	Plants
2	Uses of Everyday Materials <i>Leo Baekeland invented plastic</i>		Living Things and Life Cycles		Plants and Animals including Humans	
3	Light <i>Isaac Newton</i>		Rocks and Fossils	Forces and Magnets	Plants and Animals <i>Carl Linnaeus – plant classification</i>	
4	Animals including Humans	Sound <i>Thomas Edison-phonograph</i>	Electricity	Solids, Liquids and Gasses <i>Marie Curie</i>	Living things and their Habitats	
5	Earth and Space <i>Stephen Hawking</i>	Forces	Properties and Changes of Materials <i>William Perkin – invented man-made dye, perfume</i>			Living things and Life Cycles
6	Light	Electricity <i>Joseph Swan - lightbulb</i>	Living Things and their Habitats <i>Alexander Fleming</i>	Evolution and Adaptation <i>Charles Darwin</i>	Animals including Humans	

\*This unit of work is covered across the year, with this unit drawing learning together

## Early Years Foundations of Learning

Across reception, scientific knowledge and skills are explicitly taught as foundations for the KS1 National Curriculum.

The science learning opportunities topics allow children to develop knowledge and skills in order for them to reach the requirements of the 'The Natural World' Early Learning Goal.

### ELG: The Natural World

#### Children at the expected level of development will:

- Explore the natural world around them, making observations and drawing pictures of animals and plants;
- Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class;
- Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

Term	Reception Science Topics	Links to KS1 Science Topic
Autumn 1	This is me ...	Animals including humans – Year 1
Autumn 2	Autumn (Harvest)	Seasonal changes – Year 1
Spring 1	Winter (clothes, Polar animals, penguins)	Everyday materials - Year 1
Spring 2	Easter (Spring, New life)	Seasonal changes – Year 1 Living Things and Life Cycles – Year2
Summer 1	Farm Life	Animals including humans – Year 1
Summer 2	Green Fingers	Plants – Year 1 Living Things and Life Cycles - Year2

## EYFS Science Topics

### Year Group Scientist: David Attenborough

In addition to the topics listed below, the children will have the opportunity to constantly learn about the world around them. They will explore the local environment in Autumn, Winter, Spring and summer, noticing similarities and differences, taking photographs and making a big book. They will discuss the weather each day and notice how the weather changes through the seasons. The children will also be encouraged to notice the moon and its phases (full moon, half moon, crescent moon and gibbous moon). There will be an exploration table (display of interesting things) in the EYFS classroom where the children will be encouraged to use magnifying glasses and photographs to look closely, ask and answer questions. We will also seize the moment for example on a windy day provide wind chimes, windmills, bubbles, kites ... to explore the effects of wind, play with shadows on a sunny day, make ice when the weather is freezing. The children will cook/bake regularly and discuss changes. They will be given the opportunity to grow and take care of a variety plants.

Topic Title: This is me ...		Half term: Autumn 1
What will be taught – key ideas?	Key Language introduced and reinforced	Big Idea
To draw a picture and talk about our own families – to know there are similarities and differences within families.	Baby Toddler Child	Biology <b>B1:</b> Living things are special collections of matter that make copies of themselves, use energy and grow.

<p>To understand and talk about being similar and different to each other. Make observations and paint self-portraits naming features correctly.</p> <p>To know that some things stay the same and some things change as we grow up.</p> <p>To name common body parts through songs, rhymes, games and pictures.</p> <p>Sort ourselves into 2 groups – boys/girls, long hair/short hair, brown eyes/ blue eyes etc</p> <p><b>Question</b> – is the oldest person in our class the tallest?</p> <p>Begin to formulate own questions – adults to scaffold the process to begin with – Who is the tallest? Youngest? How many people wear glasses? etc</p> <p>Read – Growing up, We are all different, Titch</p>	<p>Teenager Adult Elderly Boy, girl, man, woman, lady, male, female</p> <p>Same Different Change Features</p> <p>Head, neck, face, shoulders, arms, legs, hands, feet, ankle, elbow, knee, fingers, toes, eyes, nose, mouth, chin, cheeks etc</p>	
<p><b>Topic Title: Autumn (Harvest)</b></p>		
<p><b>What will be taught – key ideas?</b></p>	<p><b>Key Language introduced and reinforced</b></p>	<p><b>Half term: Autumn 2</b></p> <p><b>'Core Concept' Foundations (delete as applicable)</b></p>
<p>Go for an Autumn walk and collect things to bring back to school. What do we see, hear, smell or find in Autumn time? Ask the children to bring things in from their own family walks too. Make a collection with labels and questions.</p> <p>Make observations. Look at the colour of the leaves. Make an Autumn tree display. Encourage the children to look closely at the different shapes of leaves. Take Leaf rubbings and make mobiles.</p> <p>Which wild animals live in our local environment – ask the children to name them and describe them. Where do they live? What do they eat? Make each animal and add it to our Autumn display.</p> <p>Introduce the children to the correct vocabulary for the local wild animals. Name their babies, male and female vocabulary.</p> <p>On the interest table put the life cycle of an owl for discussion.</p>	<p>Season Autumn Change Weather Environment Habitat Tree, bark, branch, twig, stick, leaf Horse chestnut tree Oak tree Conker, acorn,</p> <p>Wild animal Domestic animal, pet</p> <p>The same, similar, different</p> <p>Fox, vixen, dog, cub, den Badger, sow, boar, cub, set</p>	<p>Biology</p> <p><b>B1:</b> Living things are special collections of matter that make copies of themselves, use energy and grow.</p> <p><b>B3:</b> The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live.</p> <p>Earth Science</p> <p><b>E2:</b> The Earth is tilted and spins on its axis leading to day and night, the seasons and the climate.</p>

<p><b>Questions</b> – would a squirrel make a good pet? Why? Are all dogs the same? Explore</p> <p>Look at a variety of fruit. Name and describe it (colour, shape, smell). Where does it come from? How is it grown? Photographs of it growing.</p> <p><b>Investigation</b> – which fruit has the most seeds? Are all the seeds the same? Cut into the fruit. Discuss similarities and differences between the seeds. Show photographs of it growing ...</p> <p>To know that fruit contains seeds and vegetables do not.</p> <p><b>Question</b> – which is the most popular fruit? pictograph</p> <p>Look at a variety of vegetables. Name and describe it. Where does it come from? How is it grown? Which part do we eat? <b>Investigation</b> – what happens to fruit/vegetables if left uneaten? Formulate own questions – once again adults to scaffold the process.</p> <p>Read books about Autumn both fiction and non-fiction. Read Percy the park keeper stories, the Leaf Man,</p>	<p>Squirrel, sow, boar, kitten, nests Rabbit, doe, buck, kitten, burrow</p> <p>Fruit, seeds, stones, pips</p> <p>Vegetables, roots, stems and leaves, rotten, decompose</p>	
<p><b>Topic Title: Winter (clothes, polar animals, penguins)</b></p>		
<p><b>What will be taught – key ideas?</b></p>	<p><b>Key Language introduced and reinforced</b></p>	<p><b>Half term: Spring 1</b> <b>'Core Concept' Foundations (delete as applicable)</b></p>
<p>Go for a winter walk. Discuss what we should wear and why. Look at the bare trees. What is winter like? Discuss the weather. Talk about the wild animals hibernating.</p> <p>Sort a collection of clothes into two hoops winter and summer. Name and describe each item. What is it? Why do we wear it? What does it feel like? Talk about similarities and differences.</p> <p><b>Question</b> – would a scarf be made from plastic? Paper?</p> <p>Draw attention to thick, warm clothes, waterproof clothes, thin, cool clothes. Clothes need to be comfortable. Adults to</p>	<p>Season Winter Cold Frosty Wet ice</p> <p>Material Wool Cotton Rubber Leather Plastic</p>	<p>Chemistry <b>C2:</b> 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).</p> <p>Biology <b>B3:</b> The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live.</p> <p>Earth Science</p>

<p>use the correct vocabulary – wool, cotton, leather, rubber, plastic, thick, thin, waterproof, warm and cool.</p> <p>Look at the Arctic and Antarctica. Name and describe the wild animals that live there. Compare them to our local wild animals. Find out what the correct vocabulary for the male, female and baby is. Ask questions about them and find the answers from books or internet.</p> <p><b>Investigation</b> – Can we make ice? what is ice?</p> <p><b>Question</b> – should polar animals be kept in zoos? Discuss</p> <p>Look more closely at penguins. Carry out a penguin study. Are all penguins the same? How are they similar/different? make a fact book, penguin display.</p> <p>Read books about Winter both fiction and non-fiction. – Read a little bit of winter. Read books about penguins both fiction and non-fiction.</p>	<p>Thick, thin, soft, hard, comfortable, waterproof</p> <p>The Same, Similar, different</p>	<p><b>E2:</b> The Earth is tilted and spins on its axis leading to day and night, the seasons and the climate.</p>
<p><b>Topic Title: Spring (New Life)</b></p>		
<p><b>What will be taught – key ideas?</b></p>	<p><b>Key Language introduced and reinforced</b></p>	<p><b>Half term: Spring 2</b></p> <p><b>'Core Concept' Foundations (delete as applicable)</b></p>
<p>Make a mind map – What might we find on our spring walk? Have the children got any questions?</p> <p>Go for a spring walk. Look at the trees, bushes, grass... What can you see, hear, smell? Compare to Autumn and winter. Discuss the weather. Talk about new life in terms of plants and animals. Make a spring interest table.</p> <p>Show the children pictures of baby animals that will be in the fields and parks around us. Can they name them? Foal, lamb, calf, piglet, chick, gosling, duckling ... Play games and have quizzes.</p> <p>Visit the farm – Big Sheep, Little Cow – feed a lamb, wash a piglet, ride in a tractor ...</p> <p>On the interest table put the life cycle of a frog both visual and small world (plastic animals). Make a small pond.</p>	<p>Season spring warm Tree, bark, branch, twig, stick, leaf</p> <p>same, similar, different</p> <p>new life, buds, blossom</p> <p>wild flowers – daisy, dandelion ...</p> <p>Foal, lamb, calf, piglet, chick, gosling, duckling, fry ... Caterpillar, chrysalis, butterfly</p>	<p>Biology</p> <p><b>B1:</b> Living things are special collections of matter that make copies of themselves, use energy and grow. <b>B2:</b> 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. <b>B3:</b> The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live.</p> <p>Earth Science</p> <p><b>E2:</b> The Earth is tilted and spins on its axis leading to day and night, the seasons and the climate</p>

<p>On the interest table put the life cycle of a dandelion – try to collect it too.</p> <p>Buy live caterpillars and make observations of them. Take care of them and watch their life cycle – first-hand experience.</p> <p>Mini beast study – build a bug hotel outside. Identify and classify bugs.</p> <p>Option to buy duck eggs!!! Must have somewhere to set them free before buying.</p> <p>Read stories set in spring both fiction and non-fiction. Read – The Very Hungry Caterpillar, Baby Goz, what the ladybird heard ... The Gruffalo</p>	<p>Frogspawn, Tadpole, froglet, frog</p>	
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<b>Topic Title: Farm Life</b>		<b>Half term: Summer 1</b>
<b>What will be taught – key ideas?</b>	<b>Key Language introduced and reinforced</b>	<b>'Core Concept' Foundations (delete as applicable)</b>
<p>Make a mind map – What might we find at the farm? Have the children got any questions? Make a note and support.</p> <p>Set up a role play farm shop outside. Small world farm inside.</p> <p><b>Visit to farm</b> – Big Sheep, Little Cow. Make first-hand observations and discuss the features of a farm environment. Compare this to our school environment in terms of similarities and differences.</p> <p><b>Question</b> -What animals live on a farm? Would a cow make a good pet? Why? Do all cows/ horses look the same?</p> <p>Draw/paint/ collage farm animals. Introduce the correct vocabulary for male, female and baby animals– e.g horse, mare, stallion, foal, cow, bull, calf etc – PowerPoint presentation. Create an interactive classroom display.</p>	<p>Farm, Farmyard, farmhouse Field Barn Stable Hay Haystack Pen Pigsty</p> <p>Environment same, similar, different</p> <p>Tractor Combine harvester Trailer Scarecrow</p> <p>Foal, lamb, calf, piglet, chick, gosling, duckling, kid</p>	<p>Biology</p> <p><b>B2:</b> 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.</p>



<p>Discuss similarities and difference between the animals. Small world Farm. Sort farm animals into different criteria. Animals with 4 legs, 2 legs, where do they live on the farm? What do they eat?</p> <p>Sort and match baby animals to their parents. What things stay the same and what things change as they grow up?</p> <p>Have a quiz – farm animals what am I? Introduce the correct vocabulary for a group of animals – flock, herd, gaggle, crowd, shoal</p> <p>Discuss where food comes from e.g milk, bread, bacon, lamb chop, eggs ...</p> <p>Share lots of stories set on farms – both fiction and non-fiction. Read Farmer Duck</p>	<p>Flock of sheep Herd of cows Gaggle of geese Crowd of people</p>	
<p><b>Topic Title: Green Fingers</b></p>		<p><b>Half term: Summer 2</b></p>
<p><b>What will be taught – key ideas?</b></p>	<p><b>Key Language introduced and reinforced</b></p>	<p><b>'Core Concept' Foundations (delete as applicable)</b></p>
<p>Set up a garden Centre role play area outside. Discuss the different roles that the children can take on.</p> <p>Set up Mr McGregor's Garden (Peter Rabbit) in the builder's tray for exploration put unusual vegetables, seeds and gardening equipment.</p> <p>Begin by looking at a variety of flowering and non-flowering plants. Provide magnifying glasses. Ask the children to draw and label a simple plant. Are they all the same – discuss similarities and differences.</p> <p>Grow tomatoes in the classroom so that the children can see the blossom turn into the fruit. Taste tomatoes – show variety.</p> <p><b>Question</b> – Are tomatoes always red?</p> <p>All children to plant their own giant sunflower seeds. Keep a plant diary. Use strong, clear plastic pots so that they can see the roots.</p>	<p>Plants Seeds Bulbs Soil/ compost Plant pot Trowel Wheel barrow</p> <p>Blossom Fruit Roots, stem, leaves, flower</p> <p>Sunlight, warmth, water</p> <p>same, similar, different</p> <p>care</p>	<p>Biology</p> <p><b>B1:</b> Living things are special collections of matter that make copies of themselves, use energy and grow.</p>

<p>Make observations through photographs and drawings. Take care of our plants. What do they need?  <b>Investigation</b> - Will a seed still grow without water?</p> <p>Make a giant collage sunflower and label it.</p> <p>On the interest table put the life cycle of a sunflower – try to collect it too.</p> <p>Share lots of stories about growing plants – both fiction and non-fiction.  Read katie's sunflowers, Jack and the Beanstalk, Jasper's beanstalk, Peter Rabbit stories,</p>		
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## Assessment in Science

Assessing children against key knowledge and understanding is vital to ensure that key learning 'sticks' for future learning and adulthood. As such, we use the key knowledge identified in the Teacher Assessment Frameworks to assess children against. This assessment is a bank of formative assessments, which build towards a summative picture. Teachers assess against each criteria, away from the point of teaching, to ensure that the children retain the key knowledge required. These assessments can take the form of low stakes quizzes, simple tasks and tests and simply talking with children to illicit their understanding.

**For Key Stage 1, the key learning statements are:**

### **Working scientifically (these are assessed throughout pupils ongoing work)**

The pupil can, using appropriate scientific language from the national curriculum:

- ask their own questions about what they notice
- use different types of scientific enquiry to gather and record data, using simple equipment

where appropriate, to answer questions:

- observing changes over time
- noticing patterns
- grouping and classifying things
- carrying out simple comparative tests
- finding things out using secondary sources of information

- communicate their ideas, what they do and what they find out in a variety of ways.

### **Science content**

The pupil can:

- name and locate parts of the human body, including those related to the senses [year 1], and describe the importance of exercise, a balanced diet and hygiene for humans [year 2]
- describe the basic needs of animals for survival and the main changes as young animals, including humans, grow into adults [year 2]
- describe the basic needs of plants for survival and the impact of changing these and the main changes as seeds and bulbs grow into mature plants [year 2]
- identify whether things are alive, dead or have never lived [year 2]
- describe and compare the observable features of animals from a range of groups [year 1]
- group animals according to what they eat [year 1], describe how animals get their food from other animals and/or from plants, and use simple food chains to describe these relationships [year 2]
- describe seasonal changes [year 1]
- name different plants and animals and describe how they are suited to different habitats [year 2]
- distinguish objects from materials, describe their properties, identify and group everyday materials [year 1] and compare their suitability for different uses [year 2].

**For Key Stage 2, the key learning statements are:**

### **Working scientifically**

The pupil can, using appropriate scientific language from the national curriculum:

- describe and evaluate their own and others' scientific ideas related to topics in the national curriculum (including ideas that have changed over time), using evidence from a range of sources
- 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)
- use a range of scientific equipment to take accurate and precise measurements or readings, with repeat readings where appropriate
- record data and results using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- draw conclusions, explain and evaluate their methods and findings, communicating these in a variety of ways

- raise further questions that could be investigated, based on their data and observations.

## **Science content**

The pupil can:

- name and describe the functions of the main parts of the digestive [year 4], musculoskeletal [year 3] and circulatory systems [year 6]; and describe and compare different reproductive processes and life cycles in animals [year 5]
- describe the effects of diet, exercise, drugs and lifestyle on how the body functions [year 6]
- name, locate and describe the functions of the main parts of plants, including those involved in reproduction [year 5] and transporting water and nutrients [year 3]
- use the observable features of plants, animals and micro-organisms to group, classify and identify them into broad groups, using keys or other methods [year 6]
- construct and interpret food chains [year 4]
- describe the requirements of plants for life and growth [year 3]; and explain how environmental changes may have an impact on living things [year 4]
- use the basic ideas of inheritance, variation and adaptation to describe how living things have changed over time and evolved [year 6]; and describe how fossils are formed [year 3] and provide evidence for evolution [year 6]
- group and identify materials [year 5], including rocks [year 3], in different ways according to their properties, based on first-hand observation; and justify the use of different everyday materials for different uses, based on their properties [year 5]
- describe the characteristics of different states of matter and group materials on this basis; and describe how materials change state at different temperatures, using this to explain everyday phenomena, including the water cycle [year 4]
- identify and describe what happens when dissolving occurs in everyday situations; and describe how to separate mixtures and solutions into their components [year 5]
- identify, with reasons, whether changes in materials are reversible or not [year 5]
- use the idea that light from light sources, or reflected light, travels in straight lines and enters our eyes to explain how we see objects [year 6], and the formation [year 3], shape [year 6] and size of shadows [year 3]
- use the idea that sounds are associated with vibrations, and that they require a medium to travel through, to explain how sounds are made and heard [year 4]
- describe the relationship between the pitch of a sound and the features of its source; and between the volume of a sound, the strength of the vibrations and the distance from its source [year 4]

- describe the effects of simple forces that involve contact (air and water resistance, friction) [year 5], that act at a distance (magnetic forces, including those between like and unlike magnetic poles) [year 3], and gravity [year 5]
- identify simple mechanisms, including levers, gears and pulleys, that increase the effect of a force [year 5]
- use simple apparatus to construct and control a series circuit, and describe how the circuit may be affected when changes are made to it; and use recognised symbols to represent simple series circuit diagrams [year 6]
- describe the shapes and relative movements of the Sun, Moon, Earth and other planets in the solar system; and explain the apparent movement of the sun across the sky in terms of the Earth's rotation and that this results in day and night [year 5].

## Year 1

Year 1 – Ongoing throughout year – Working scientifically	
NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> <li>Sc1/1.1 asking simple questions and recognising that they can be answered in different ways</li> <li>Sc1/1.2 observing closely, using simple equipment</li> <li>Sc1/1.3 performing simple tests</li> <li>Sc1/1.4 identifying and classifying</li> <li>Sc1/1.5 using their observations and ideas to suggest answers to questions</li> <li>Sc1/1.6 gathering and recording data to help in answering questions</li> </ul>	<p><u>New learning and vocabulary</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>

Year 1 – Autumn 1 and 2 – Animals including humans	
NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> <li>Sc1/2.2a identify and name a variety of common animals including, fish, amphibians, reptiles, birds and mammals</li> <li>Sc1/2.2b identify and name a variety of common animals that are carnivores, herbivores and omnivores</li> <li>Sc1/2.2c describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets)</li> <li>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.</li> </ul>	<p><u>Big idea(s): B2, B3</u>  <u>Famous scientist - Jane Goodall</u>  <u>New learning and vocabulary</u>  <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; know that many humans are examples of omnivores (though not vegetarians)</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 backbone</p> <p>Know that fish are different in having gills so that they can breathe underwater <b>and</b> 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 <b>and</b> 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 <b>and</b> 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>

### Year 1 – Spring 1 and 2 – Everyday materials

NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> <li>Sc1/3.1a distinguish between an object and the material from which it is made</li> <li>Sc1/3.1b identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock</li> <li>Sc1/3.1c describe the simple physical properties of a variety of everyday materials</li> <li>Sc1/3.1d compare and group together a variety of everyday materials on the basis of their simple physical properties</li> </ul>	<p><u>Big idea(s):</u> <b>C1, C2</b></p> <p><u>New learning and vocabulary</u>  <b>absorption, matter, property,</b> wood, plastic, glass, metal, water, rock</p> <p>Know from observation how to distinguish between materials made of wood, plastic, glass, metal, water, rock            Know that an object is made from/of a material            Know that materials can be hard, soft, strong, weak, absorbent, heavy, light, solid and runny, smooth and rough;            these descriptions denote the properties of a material            Know that matter (stuff) is made from tiny building blocks</p>

### Year 1 - Summer 1 – Seasonal changes

NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> <li>Sc1/4.1a observe changes across the 4 seasons</li> <li>Sc1/4.1b observe and describe weather associated with the seasons and how day length varies.</li> </ul>	<p><u>Big idea(s):</u> <b>E2</b></p> <p><u>New learning and vocabulary</u>  <b>energy, freezing, melting, orbit, reflection,</b> Sun, clouds, wind, snow, ice, spring, summer, autumn, winter</p> <p>Know that days are longer in the summer and shorter in winter            Know that weather changes through the year, getting hotter in the summer and colder in the winter            Know that the winter is likely to bring ice on the ground when water freezes due to the cold            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>

Year 1 - Summer 2 – Plants

NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> <li>Sc1/2.1a identify and name a variety of common wild and garden plants, including deciduous and evergreen trees</li> <li>Sc1/2.1b identify and describe the basic structure of a variety of common flowering plants, including trees</li> </ul>	<p><u>Big idea(s): B2</u></p> <p><u>Revision</u>  <b>energy, habitat</b></p> <p><u>New learning and vocabulary</u>  <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            Know an oak tree, a birch tree and a horse chestnut tree by sight            Know that evergreen trees maintain their leaves throughout the year and that deciduous trees shed their leaves in autumn            Know that a flowering plants consist of roots, stem, leaves and flowers, and that a tree's stem is called a trunk</p>



## Year 2

Year 2 – Ongoing throughout year – Working scientifically	
NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> <li>Sc2/1.1 asking simple questions and recognising that they can be answered in different ways</li> <li>Sc2/1.2 observing closely, using simple equipment</li> <li>Sc2/1.3 performing simple tests</li> <li>Sc2/1.4 identifying and classifying</li> <li>Sc2/1.5 using their observations and ideas to suggest answers to questions</li> <li>Sc2/1.6 gathering and recording data to help in answering questions</li> </ul>	<p><u>Learning and vocabulary – continuing from year 1</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>

Year 2 – Autumn 1 and 2 – Uses of everyday materials	
NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> <li>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</li> <li>Sc2/3.1b compare how things move on different surfaces.</li> <li>Sc2/3.1c find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching</li> </ul>	<p><u>Big idea(s): C1, C2</u>  <u>Famous scientist - Leo Baekeland invented plastic</u></p> <p><u>Revision</u>  <b>absorption, matter, property</b>            Objects are made from materials such as wood, plastic, glass, metal, water, rock            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            Matter (stuff) is made from tiny building blocks</p> <p><u>New learning and vocabulary</u>  <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.)            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,            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            Know that applying forces to objects can change their shape</p>

Year 2 – Spring 1 and 2 – Living things and life cycles

NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> <li>Sc2/2.1a explore and compare the differences between things that are living, dead, and things that have never been alive</li> <li>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</li> <li>Sc2/2.1c identify and name a variety of plants and animals in their habitats, including microhabitats</li> <li>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.</li> </ul>	<p><u>Big idea(s):</u> <b>B1, B3</b></p> <p><u>Revision</u>  <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.  Trees can be deciduous or evergreen.  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</p> <p><u>New learning and vocabulary</u>  <b>birth, decay, energy</b>, microhabitat, dead, life cycle, food chain, source, nutrients, reproduction, consumption, environment</p> <p>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 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 underwater  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.</p>

Year 2 – Summer 1 and 2 – Plants and Animals including humans

NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> <li>• Sc2/2.2a observe and describe how seeds and bulbs grow into mature plants</li> <li>• Sc2/2.2b find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.</li> <li>• Sc2/2.3a notice that animals, including humans, have offspring which grow into adults</li> <li>• Sc2/2.3b find out about and describe the basic needs of animals, including humans, for survival (water, food and air)</li> <li>• Sc2/2.3c describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.</li> </ul>	<p><u>Big idea(s): B1</u></p> <p><u>Revision</u>  <b>growth, habitat</b>, nutrients, consumption</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><u>New learning and vocabulary</u>  <b>reproduction</b>, offspring, adult, bulb, seed, survival, temperature, hygiene, exercise</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)            Know that plants that are deprived of light, food or air will not grow and will die.            Know that plants and animals produced offspring that grow into adults.            Know that animals, including humans, need food, water and air to survive            Know the basic food groups: fruit and vegetables, carbohydrates, protein, dairy, fat and sugary foods            Know that more than half of our diet should be made up of carbohydrates, fruit and vegetables            Know that fats and sugary foods should be eaten rarely and in small amounts            Know that people need to exercise often to help their body stay strong and fit            Know that keeping clean, including washing and brushing teeth, is an important part of staying healthy</p>

## Year 3

### Year 3 – Ongoing throughout year – Working scientifically

#### NC objectives

- Sc4/1.1 asking relevant questions and using different types of scientific enquiries to answer them
- Sc4/1.2 setting up simple practical enquiries, comparative and fair tests
- 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
- Sc4/1.4 gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- Sc4/1.5 recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- Sc4/1.6 reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- Sc4/1.7 using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- Sc4/1.8 identifying differences, similarities or changes related to simple scientific ideas and processes
- Sc4/1.9 using straightforward scientific evidence to answer questions or to support their findings.

#### Key knowledge and vocabulary

Revision  
**properties**, observe, test, magnifying glass, object, record, equipment

Know that we can ask questions about the world and that when we observe the world to answer these questions, this is science  
 Know that we can use magnifying glasses to observe objects closely  
 Know that we can test our questions to see if they are true  
 Know that objects can be identified or sorted into groups based on their observable properties  
 Know that we can write down numbers and words or draw pictures to record what we find

New learning and vocabulary  
 prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis

Know that we can ask questions and answer them by setting up scientific enquiries  
 Know how to make relevant predictions that will be tested in a scientific enquiry  
 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  
 Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stopwatches  
 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  
 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  
 Know how to precis a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry  
 Know that scientific enquiries can suggest relationships, but that they do not prove whether a prediction is true  
 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  
 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)  
 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

Year 3 – Autumn 1 and 2 - Light

NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> <li>• Sc3/4.1a recognise that they need light in order to see things and that dark is the absence of light</li> <li>• Sc3/4.1b notice that light is reflected from surfaces</li> <li>• Sc3/4.1c recognise that light from the Sun can be dangerous and that there are ways to protect their eyes</li> <li>• Sc3/4.1d recognise that shadows are formed when the light from a light source is blocked by a solid object</li> <li>• Sc3/4.1e find patterns in the way that the size of shadows change.</li> </ul>	<p><u>Big idea(s):</u> <b>P1, P3</b>  <u>Famous scientist –</u> <b>Isaac Newton</b></p> <p><u>Revision</u>  <b>absorption, energy, property, reflection</b></p> <p><u>New learning and vocabulary</u>  <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            Know that energy comes in different forms and can be neither created nor destroyed, only changed from one form to another            Know that we need light to see things and that darkness is the absence of light            Know that light travels in straight lines            Know that light is reflected when it travels from a light source and then 'bounces' off an object            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            Know that the Sun is a light source, but that the Moon is not and is merely reflecting light from the Sun            Know that many light sources give off light and heat            Know that the Sun gives off light and heat when hydrogen turns into helium            Know that filaments in traditional bulbs heat up until they glow, giving off light and heat            Know that fluorescent bulbs glow when electricity adds energy to a gas within the bulb            Know that sunglasses can protect eyes from sunlight <b>but looking at the Sun directly – even with sunglasses – can damage the eyes</b>            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 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  <b>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</b></p> <p>(NB: the Sun and the Moon are capitalized when being discussed in an astronomical context.)</p>

Year 3 – Spring 1 – Rocks and Fossils

NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> <li>Sc3/3.1a compare and group together different kinds of rocks on the basis of their appearance and simple physical properties</li> <li>Sc3/3.1b describe in simple terms how fossils are formed when things that have lived are trapped within rock</li> <li>Sc3/3.1c recognise that soils are made from rocks and organic matter.</li> </ul>	<p><u>Big idea(s):</u> <b>C1, C2, C3, E3</b></p> <p><u>Revision</u>  <b>decay, matter, melting</b>, material,                      Rock is a type of solid material.</p> <p><u>New learning and vocabulary</u>  <b>extinction</b>, igneous, metamorphic, sedimentary, paleontologist, weathering, molten rock, crust, tectonic plates, scavengers, fossil</p> <p>Know that there are three kinds of rocks: igneous, sedimentary and metamorphic                      Know that the Earth has a solid crust made up of tectonic plates with molten rock beneath                      Know that granite and basalt are types of igneous rock and that igneous rocks form from molten rock below the Earth's crust                      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                      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                      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                      Know that soil is made from tiny particles of rock broken down by the action of weather (weathering)</p>

## Year 3 – Spring 2 – Forces and Magnets

NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> <li>• Sc3/4.2a compare how things move on different surfaces</li> <li>• Sc3/4.2b notice that some forces need contact between 2 objects, but magnetic forces can act at a distance</li> <li>• Sc3/4.2c observe how magnets attract or repel each other and attract some materials and not others</li> <li>• 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</li> <li>• Sc3/4.2e describe magnets as having 2 poles</li> <li>• Sc3/4.2f predict whether 2 magnets will attract or repel each other, depending on which poles are facing.</li> </ul>	<p><u>Big idea(s): P2</u></p> <p><u>Revision</u>  <b>energy, matter, property, wave</b>, metal, material, surface, friction, force, stretch, squash, rough, smooth</p> <p>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</p> <p><u>New learning and vocabulary</u>            magnetic, non-magnetic, pole, north, south, sliding friction, static friction, elastic, resist, attraction, repulsion</p> <p>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            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            Know that there is a magnetic field around a magnet which is strongest at each pole            Know that some materials are magnetic, meaning that they are attracted to a magnet, while other materials are non-magnetic</p>

Year 3 – Summer 1 and 2 – Plants and Animals including Humans

NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> <li>Sc3/2.1a identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers</li> <li>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</li> <li>Sc3/2.1c investigate the way in which water is transported within plants</li> <li>Sc3/2.1d explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</li> <li>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</li> <li>Sc3/2.2b identify that humans and some other animals have skeletons and muscles for support, protection and movement</li> </ul>	<p><u>Big idea(s): B1, B2, B3</u>  <u>Famous Scientist</u> Carl Linnaeus – plant classification  <u>Revision</u>  <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, vertebrate, skeleton</p> <p>Evergreen trees maintain their leaves throughout the year and that deciduous trees shed their leaves in autumn          Flowering plants consist of roots, stem, leaves and flowers, and that a tree's stem is called a trunk          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.          Plants absorb energy from the Sun; that this energy is consumed by herbivorous animals; and that carnivorous animals eat other animals.          Seeds and bulbs need to be buried underground in soil and that they will grow into adult plants under the right conditions (water, warmth)          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.          Animals, including humans, need food, water and air to 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</p> <p><u>New learning and vocabulary</u>  <b>extinction</b>, fruit, nectar, anther, ovary, ovule, petal, pollen, stigma, style, stamen, function, exchange, dispersal, fertilization, vitamin, balanced diet, cartilage, invertebrate, contract, loosen, ribcage, insect</p> <p>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</p> <p>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  <b>NB – some food groups are difficult to afford for some families so sensitivity is required in teaching this area</b>          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.          Know that some animals (such as insects) have an exoskeleton – a solid covering on the outside of their body          Know that many invertebrates (such as earthworms and slugs) have water held inside by muscles which act like a skeleton          Know that skeletons provide support for muscles and protect the body; for example, the ribcage protects the vital organs in the human body          Know that human skeletons are made up of bones and cartilage          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>



## Year 4

Year 4 – Ongoing throughout year – Working scientifically	
NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> <li>Sc4/1.1 asking relevant questions and using different types of scientific enquiries to answer them</li> <li>Sc4/1.2 setting up simple practical enquiries, comparative and fair tests</li> <li>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</li> <li>Sc4/1.4 gathering, recording, classifying and presenting data in a variety of ways to help in answering questions</li> <li>Sc4/1.5 recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables</li> <li>Sc4/1.6 reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</li> <li>Sc4/1.7 using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions</li> <li>Sc4/1.8 identifying differences, similarities or changes related to simple scientific ideas and processes</li> <li>Sc4/1.9 using straightforward scientific evidence to answer questions or to support their findings.</li> </ul>	<p><u>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            Know that we can use magnifying glasses to observe objects closely            Know that we can test our questions to see if they are true            Know that objects can be identified or sorted into groups based on their observable properties            Know that we can write down numbers and words or draw pictures to record what we find</p> <p><u>New learning and vocabulary – ongoing from year 3</u>            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            Know how to make relevant predictions that will be tested in a scientific enquiry            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            Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stopwatches            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            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            Know how to precis a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry            Know that scientific enquiries can suggest relationships, but that they do <u>not</u> prove whether a prediction is true            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            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)            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</p>

Year 4 – Autumn 1 – Animals including humans

NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> <li>Sc4/2.2a describe the simple functions of the basic parts of the digestive system in humans</li> <li>Sc4/2.2b identify the different types of teeth in humans and their simple functions</li> <li>Sc4/2.2c construct and interpret a variety of food chains, identifying producers, predators and prey.</li> </ul>	<p><u>Big idea(s): B3</u></p> <p><u>Revision</u>  <b>absorption, component, dissolving, energy,</b> nutrients, consumption, hygiene, herbivore, carnivore, organ</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)            A food group can cause ill health, such as tooth decay due to excess sugar            Living things move, grow, consume nutrients and reproduce            Plants absorb energy from the Sun; that this energy is consumed by herbivorous animals; and that carnivorous animals eat other animals.</p> <p><u>New learning and vocabulary</u>            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</p> <p>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            Know that undigested food is stored in the rectum before being excreted through a muscle called the anus            Know that a food chain traces the path of energy through a habitat            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            Know that consumers take in energy by eating            Know that an animal that is eaten by another is called prey, and that an animal that eats other animals is called a predator            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            Know that the arrows in a food chain show the direction that energy is travelling through a habitat</p>

Year 4 – Autumn 2 – Sound

NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> <li>Sc4/4.1a identify how sounds are made, associating some of them with something vibrating</li> <li>Sc4/4.1b recognise that vibrations from sounds travel through a medium to the ear</li> <li>Sc4/4.1c find patterns between the pitch of a sound and features of the object that produced it</li> <li>Sc4/4.1d find patterns between the volume of a sound and the strength of the vibrations that produced it.</li> <li>Sc4/4.1e recognise that sounds get fainter as the distance from the sound source increases</li> </ul>	<p><b>Big idea(s): P1, P3</b>  <u>Famous Scientist</u> Thomas Edison- phonograph  <u>Revision</u>  <b>absorption, conductor, energy, insulator, 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>  <b>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            Know that energy comes in different forms and can be neither created nor destroyed, only changed from one form to another            Know that sound is a form of energy that transfers in a longitudinal wave - like that seen in a slinky - <u>not</u> a transverse wave - like that seen in water ripples            Know that sound travels through a medium (e.g. particles in the air) and thus sounds does <u>not</u> travel through a vacuum which has no particles in it at all            Know that longitudinal sound waves are detected in the ear by humans and that the brain interprets this as the sounds we hear            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 <u>after</u> we see lightning as the light reaches our eye before the sound reaches our ears            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            Know that volume is how loud or quiet a sound is and that this is determined by the amount of energy in the wave (e.g. from how hard or soft a percussion instrument is hit)            Know that the volume of a sound is quieter if the listener is further away from the object</p>

## Year 4 – Spring 1 – Electricity

### NC objectives

- Sc4/4.2a identify common appliances that run on electricity
- Sc4/4.2b construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers
- 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
- 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
- Sc4/4.2e recognise some common conductors and insulators, and associate metals with being good conductors.

### Key knowledge and vocabulary

Big idea(s): **P1, P3, C2**

#### Revision

**component, conductor, energy, insulator, particle, property,** material

An object is made from/of a material

Metal is a material from which objects can be made.

Matter (stuff) is made from tiny building blocks

Energy comes in different forms and can be neither created nor destroyed, only changed from one form to another

#### New learning and vocabulary

**circuit,** appliance, charge, electron, battery, cell, bulb, buzzer, switch, wire, current electricity, static electricity, negative terminal, positive terminal, chemical reaction, emit

Know that electrical energy is one of many forms of energy

Know that static electricity is an imbalance of charged particles on a material; it does not operate by flowing around a complete circuit

Know that current electricity is the flow of charged particles called electrons around a circuit

Know that electrical current flows well through some materials, called electrical conductors, and poorly through other materials, called electrical insulators

Know that conductors have free electrons and that when electrical current flows around a conductor the electrons move

Know that electrical conductivity (how well a material conducts electricity) is an example of a property

Know that metals are good electrical conductors

Know that a chemical reaction inside a cell produces the charged particles that can flow around a circuit

Know that more than one cell lined up to work together is called a battery

Know that electrical current can flow if there is a complete circuit

Know that wires – which contain a conductor inside them, usually made of metal – can allow electrical current to flow around a circuit

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

Know that a switch functions by completing or breaking a complete circuit

Know how to construct a simple circuit using components

Know that exposure to high levels of electrical current can be dangerous

Year 4 – Spring 2 – Solids, liquids and gases

NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> <li>Sc4/3.1a compare and group materials together, according to whether they are solids, liquids or gases</li> <li>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)</li> <li>Sc4/3.1c identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</li> </ul>	<p><u>Big idea(s):</u> <b>C1, C2, C2</b>  <u>Famous Scientist:</u> Marie Curie  <u>Revision</u>  <b>absorption, dissolving, energy, evaporation, freezing, matter, melting, particle</b>, temperature, ice, water, solid</p> <p>An object is made from/of a material            Materials can be hard, soft, strong, weak, absorbent, heavy, light, solid and runny, smooth and rough; these descriptions denote the properties of a material            Know that matter (stuff) is made from tiny building blocks</p> <p><u>New learning and vocabulary</u>  <b>bond, condensation, evaporation, reversible</b>, boiling point, melting point, liquid, gas, thermometer, water cycle, continuous precipitation, transpiration, surface run off process, sublimation</p> <p>Know that things are composed of a material in one of three states of matter: solid, liquid or gas            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            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°C and that the boiling point of water is 100°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            Know that rain condenses in clouds and falls to earth as rain, snow or hail in a process called precipitation            Know that water flows across the land in rivers and streams in a process called surface run-off and under the ground as groundwater</p>

Year 4 – Summer 1 and 2 – Living things and their habitats

NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> <li>Sc4/2.1a recognise that living things can be grouped in a variety of ways</li> <li>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</li> <li>Sc4/2.1c recognise that environments can change and that this can sometimes pose dangers to living things.</li> </ul>	<p><u>Big idea(s):</u> <b>B2, B3</b></p> <p><u>Revision</u>  <b>decay, energy, habitat, freezing</b> 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.  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.  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 backbone  Fish are different in having gills so that they can breathe underwater <b>and</b> 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 <b>and</b> 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 <b>and</b> 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</p> <p><u>New learning and vocabulary</u>  kingdom, classification key, species, fungi, bacteria, climate change, characteristics, offspring, extinction, pollution</p> <p>Know that 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)  Know that living things are divided into kingdoms: the animal kingdom, plants, fungi, bacteria, and single-celled organisms  Know that a species is a group of living things have many similarities that can reproduce together produce offspring  Know that a classification key uses questions to sort and identify different living things  Know how to use a classification key to identify living things  Know how to create a classification key to sort plants on the school premises  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  Know that human activity – such as climate change caused by pollution - can change the environment for many living things, endangering their existence  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>

## Year 5

### Year 5 – Ongoing throughout year – Working scientifically

NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> <li>Sc5/1.1 planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</li> <li>Sc5/1.2 taking measurements, using a range of scientific equipment, with increasing accuracy and precision</li> <li>Sc5/1.3 recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, and bar and line graphs</li> <li>Sc5/1.4 using test results to make predictions to set up further comparative and fair tests</li> <li>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</li> <li>Sc5/1.6 identifying scientific evidence that has been used to support or refute ideas or arguments.</li> </ul>	<p><u>Revision</u> 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 Know how to make relevant predictions that will be tested in a scientific enquiry 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 Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stopwatches 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 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 Know how to precis a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry Know that scientific enquiries can suggest relationships, but that they do <u>not</u> prove whether a prediction is true 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 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) 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</p> <p><u>New learning and vocabulary</u> 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) 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)</p>

## Year 5 – Autumn 1 - Earth and space

NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> <li>• Sc5/4.1a describe the movement of the Earth, and other planets, relative to the Sun in the solar system</li> <li>• Sc5/4.1b describe the movement of the Moon relative to the Earth</li> <li>• Sc5/4.1c describe the Sun, Earth and Moon as approximately spherical bodies</li> <li>• 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.</li> </ul>	<p><u>Big idea(s): E1, E2</u>  <u>Famous scientist – Stephen Hawking</u>  <u>Revision</u>  <b>absorption, energy, freezing, melting, orbit, reflection, wave</b>, Sun, spring, summer, autumn, winter</p> <p>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</p> <p>(NB: the Sun and the Earth are capitalized when being discussed in an astronomical context.)</p> <p><u>New learning and vocabulary</u>                      planet, satellite, sphere, solar system, eclipse, star, universe, constellation, axis, celestial body, Moon, rotating, lunar, solar, telescope, rotation</p> <p>Know that the universe comprises all matter and space in existence                      Know that a celestial body is a large object in the universe                      Know that a star is an exceptionally hot ball of gas, originally made from hydrogen and helium                      Know that the Sun is a star                      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                      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                      Know that there are eight major planets in our solar system: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune                      Know that the universe is utterly vast and that our solar system makes up a tiny fraction of the universe                      Know that a satellite orbits a planet and that moons are natural satellites                      Know that the Moon orbits the Earth roughly every 28 days                      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                      Know that humans have sent man-made satellites into orbit that assist with telecommunication                      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                      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                      Know that night and day are the result of the Earth rotating on its axis                      Know that the tilt of the Earth towards and away from the Sun's light as the Earth orbits the Sun leads to the seasons as during winter the light is spread over a wider area                      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>



## Year 5 – Autumn 2 - Forces

NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> <li>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</li> <li>Sc5/4.2b identify the effects of air resistance, water resistance and friction, that act between moving surfaces</li> <li>Sc5/4.2c recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect</li> </ul>	<p><u>Big idea(s):</u> <b>P1, P2</b></p> <p><u>Revision</u>  <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            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            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).            Objects move differently on rough and smooth surfaces; objects resist movement more on rough surfaces because there is higher friction as the object moves</p> <p><u>New learning and vocabulary</u>            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            Know that pull forces can be measured using a device called a force meter            Know that the amount of matter (stuff) in an object is its mass            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            Know that acceleration is a change in speed and that unbalanced forces acting on an object cause it to accelerate            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            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            Know that a parachute's shape increases the air resistance that a falling object experiences, giving it a much lower terminal velocity            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            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            Know how to draw a force diagram with arrows representing the different forces acting on an object            Know that a lever is a rigid length pivoting around a fulcrum            Know that a pulley is a wheel with a fulcrum that supports a moving cable or belt            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            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 at the other end</p>

## Year 5 – Spring 1 & 2 and Summer 1 - Properties and changes of materials

NC objectives	Key knowledge and vocabulary
<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 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><b>Big idea(s): C2, C3</b>  <b>Famous Scientist: William Perkin – invented man-made dye, perfume</b>  <u>Revision</u>  <b>absorption, bond, condensation, conductor, evaporation, matter, melting, particle, property, reversible,</b> 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            An object is made from/of a material            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.)            Electrical conductivity (how well a material conducts electricity) is an example of a property            Metals are good electrical conductors            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,            Things are composed of a material in one of three states of matter: solid, liquid or gas            Things are made of particles (tiny building blocks) and that these are organized differently in each state            Materials can change state when temperature changes            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            When solids turn into liquids, this is called melting and that the reverse process is called freezing            When liquids turn into gases, this is called evaporation and that the reverse process is called condensation            When a solid turns into a gas without passing through the liquid state, this is called sublimation            The melting point of water is 0° C and that the boiling point of water is 100° C            Some materials are magnetic, meaning that they are attracted to a magnet, while other materials are non-magnetic</p> <p><u>New learning and vocabulary</u>  <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            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; 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 sized 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</p>

## Year 5 – Summer 2 - Living things and Life Cycles

### NC objectives

### Key knowledge and vocabulary

Sc5/2.1a describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird

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.

Big idea(s): B1

Revision  
**decay**, 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

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 backbone  
 Fish are different in having gills so that they can breathe underwater **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 stages of development starting with a fertilized egg in animals or a seed in many plants  
 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  
 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  
 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  
 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  
 Know that humans go through stages of development; they begin as fertilized eggs and then develop into 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

(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.)

Year 6 – Ongoing throughout year – Working scientifically

NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> <li>Sc5/1.1 planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</li> <li>Sc5/1.2 taking measurements, using a range of scientific equipment, with increasing accuracy and precision</li> <li>Sc5/1.3 recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, and bar and line graphs</li> <li>Sc5/1.4 using test results to make predictions to set up further comparative and fair tests</li> <li>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</li> <li>Sc5/1.6 identifying scientific evidence that has been used to support or refute ideas or arguments.</li> </ul>	<p><u>Revision</u> 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 Know how to make relevant predictions that will be tested in a scientific enquiry 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 Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stopwatches 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 Know how to precis a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry Know that scientific enquiries can suggest relationships, but that they do <u>not</u> prove whether a prediction is true 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 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) 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</p> <p><u>New learning and vocabulary</u> 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) 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)</p>

## Year 6 – Autumn 1 - Light

NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> <li>• Sc6/4.1a recognise that light appears to travel in straight lines</li> <li>• 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</li> <li>• 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</li> <li>• 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</li> </ul>	<p><b>Big idea(s): P1, P3</b></p> <p><u>Revision</u>  <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 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 sunlight <b>but looking at the Sun directly – even with sunglasses – can damage the eyes</b>            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</p> <p>(NB: the Sun and the Moon are capitalized when being discussed in an astronomical context.)</p> <p><u>New learning and vocabulary</u>            angle of incidence, angle of reflection, refraction, spectrum, translucent, medium, periscope</p> <p>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 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>

## Year 6 – Autumn 2 - Electricity

NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> <li>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</li> <li>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</li> <li>Sc6/4.2c use recognised symbols when representing a simple circuit in a diagram.</li> </ul>	<p><b>Big idea(s): P1, P3</b>  <b>Famous Scientist: Joseph Swan - lightbulb</b>  <u>Revision</u>  <b>circuit, component, conductor, energy, insulator, particle, property</b>, 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  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 <u>not</u> 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</p> <p><u>New learning and vocabulary</u>  series circuit, parallel circuit, resistance, voltage</p> <p>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, <b>not</b> 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)</p>

Year 6 – Spring 1 – Living things and their habitats

NC objectives	Key knowledge and vocabulary
<ul style="list-style-type: none"> <li>Sc6/2.1a describe how living things are classified into broad groups according to common observable characteristics and based on similarities</li> <li>and differences, including micro-organisms, plants and animals</li> <li>Sc6/2.1b give reasons for classifying plants and animals based on specific characteristics.</li> </ul>	<p><b>Big idea(s): B2</b>  <u>Famous scientist</u> Alexander Fleming  <u>Revision</u>  <b>component, habitat</b>, plant, structure, fish, bird, amphibian, reptile, mammal, kingdom, classification key, species, fungi, bacteria, characteristics, offspring, vertebrate, invertebrate, insect</p> <p>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 backbone  Fish are different in having gills so that they can breathe underwater <b>and</b> 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 <b>and</b> 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 <b>and</b> they feed milk to their young  Different parts of plants have one or more functions (jobs)</p> <p><u>New learning vocabulary</u>  micro-organism, virus, thorax, arthropod, abdomen, arachnid, antenna, jointed limbs</p> <p>Know that there are three types of micro-organism: viruses, fungi and bacteria; of these three, viruses are often not really considered to be alive by many scientists mainly because they don't have the 'machinery' to reproduce inside them  Know that germs are disease-causing bacteria  Know that an arthropod is an invertebrate with a hard , external skeleton and jointed limbs  Know that insects are a type of arthropod; their bodies consist of six legs, a head, a thorax and an abdomen; most insects also have a pair of antennae and a pair of wings  Know that an arachnid (e.g. spider) is a type of arthropod with eight legs and no antennae or wings  Know that a crustacean is a type of arthropod with two pairs of antennae (e.g. woodlouse)  Know that a myriapod is an arthropod with a flat and long or cylindrical body and many legs (e.g. centipede)</p>

Year 6 – Spring 2 – Evolution and adaptation

NC objectives

Key knowledge and vocabulary

- Sc6/2.3a recognise that living things have changed over time 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 in different ways and that adaptation may lead to evolution.

Big idea(s): B3  
Famous Scientist Charles Darwin  
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 pollution - can change the environment for many living things, endangering their existence  
 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  
 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 changes over time and that this gradual change is called evolution  
 Know that natural selection is the cause of this change; natural selection works as 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 are 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



Year 6 – Summer 1 & 2 – Animals including humans

NC objectives

Key knowledge and vocabulary

- 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
- Sc6/2.2b recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function
- Sc6/2.2c describe the ways in which nutrients and water are transported within animals, including humans.

Big idea(s): B1

Revision  
**component, energy, growth**, survival, nutrients, consumption, skeleton, ribcage, protein, carbohydrate, fat, digestion, skeleton, organ

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.

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 that the heart and lungs are organs protected by the ribcage  
 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 overused  
 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

**NB – note that discussion of drugs needs sensitive teaching due to family circumstances (Link with PSCE Curriculum)**