



# Science Progression Supporting Documents



<h2 style="text-align: center;">Areas of Science Progression Map</h2>							
Year Group	Biology			Chemistry		Physics	
EYFS	Physical development	Understanding the world		Understanding the world	Expressive Arts and Design	Understanding the world	Expressive Arts and Design
Year 1	Animals including humans	Plants		Everyday Materials		Seasonal Changes	
Year 2	Animals including humans	All living things and their habitats	Plants	Everyday Materials			
Year 3	Animals including humans	Plants		Rocks	Forces	Light	
Year 4	Animals including humans	All living things and their habitats		States of Matter	Electricity	Sound	
Year 5	Animals including humans	All living things and their habitats		Properties and Changes in Materials	Forces	Earth and Space	
Year 6	Animals including humans (Circulatory System)	Evolution and Inheritance	All living things and their habitats			Electricity (Circuits)	Light

Planning Resources	<ul style="list-style-type: none"> <li>• Developing Experts</li> <li>• Explorify</li> <li>• Snap Science</li> <li>• Primary Science Teaching Trust</li> </ul>
Scientists	<p>All children will learn about a range of scientists and careers in science that link to what they are learning about.</p> <p style="text-align: center;"><a href="http://www.primary-science.co.uk">Scientists across the Curriculum   PSEC (primary-science.co.uk)</a></p>



# EYFS



## Early Learning Goals

Physical Development	<ul style="list-style-type: none"> <li>Manage their own basic hygiene and personal needs, including dressing, going to the toilet and understanding the importance of healthy food choices.</li> </ul>
Understanding the World	<ul style="list-style-type: none"> <li>Describe their immediate environment using knowledge from observation, discussion, stories, non-fiction texts and maps.</li> <li>Explore the natural world around them, making observations and drawing pictures of animals and plants.</li> <li>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.</li> <li>Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.</li> </ul>
Expressive Arts and Design	<ul style="list-style-type: none"> <li>Explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function.</li> <li>Explaining the process they have used.</li> <li>Make use of props and materials when role playing characters in narratives and stories.</li> <li>Sing a range of well-known nursery rhymes and songs</li> </ul>

## Summary of Science In EYFS taken from Development Matters

Areas	3 and 4 Year olds	Reception
Animals, including Humans	<ul style="list-style-type: none"> <li>Learn about the life cycles of animal (UW)</li> <li>Learn about the life cycles of humans (UW)</li> <li>Learn about how to take care of themselves (PD)</li> <li>Make healthy choices about food, drink, activity and toothbrushing (PD)</li> </ul>	<ul style="list-style-type: none"> <li>Name and describe animals that live in different habitats (UW)</li> <li>Name and describe people who are familiar to them (UW)</li> <li>Manage their personal hygiene and learn about how to take care of themselves (PD)</li> <li>Using their sense describe what they hear feel and see (UW)</li> </ul>
Living things and their habitats	<ul style="list-style-type: none"> <li>Explore the surrounding natural environment (UW)</li> <li>Begin to understand the need to care and respect the natural environment (UW)</li> <li>Explore natural objects from the surrounding environment – linked to materials (UW)</li> </ul>	<ul style="list-style-type: none"> <li>Explore the plants in the surrounding natural environment (UW)</li> <li>Explore the animals in the surrounding natural environment (UW)</li> <li>Explore plants and animals in a contrasting natural environment (UW)</li> </ul>
Plants	<ul style="list-style-type: none"> <li>Plant seeds(UW)</li> <li>Care for growing plants (UW)</li> <li>Understand the key features of the life cycle of a plant (UW)</li> </ul>	<ul style="list-style-type: none"> <li>After close observation, draw pictures of the natural world, including animals and plants (UW)</li> <li>Name and describe some plants and animals children are likely to see, encouraging children to recognise familiar plants and animals whilst outside (UW)</li> </ul>

Seasonal Changes		<ul style="list-style-type: none"> <li>Understand the effect of changing seasons on the natural world around them (UW)</li> <li>Play and explore outside in all seasons and in different weather (UW)</li> <li>Observe living things throughout the year (UW)</li> </ul>
Materials, including changing materials	<ul style="list-style-type: none"> <li>Explore a range of materials using their senses (UW)</li> <li>Explore a collection of materials and identify similarities and differences (UW)</li> <li>Shape and join materials (EAD)</li> <li>Combine and mix ingredients (UW)</li> <li>Change materials by: heating and cooling, including cooking and melting (UW)</li> </ul>	<ul style="list-style-type: none"> <li>Explore a range of materials, including natural materials (UW)</li> <li>Make objects from different materials, including natural materials (EAD)</li> <li>Observe, measure and record how materials change when heated and cooled (UW)</li> <li>Compare how materials change over time and in different conditions (UW)</li> </ul>
Electricity		<ul style="list-style-type: none"> <li>Identify electrical devices (CI)</li> <li>Use battery-powered devices (CI)</li> </ul>
Light	<ul style="list-style-type: none"> <li>Explore light sources sun, torch (UW)</li> <li>Shine light on or through different materials (UW)</li> </ul>	<ul style="list-style-type: none"> <li>Explore shadows by observing how an object casts a shadow (UW)</li> <li>Explore light travelling through transparent materials (UW)</li> </ul>
Forces	<ul style="list-style-type: none"> <li>Explore and talk about different forces they can feel (UW)</li> <li>Explore how things work: wind-up toys, pulleys (UW)</li> <li>Explore how objects/materials are affected by forces e.g. stretching, magnetic, water resistance (UW)</li> </ul>	<ul style="list-style-type: none"> <li>Explore how to change how things work (UW)</li> <li>Explore how the wind can move objects (UW)</li> <li>Explore how objects move in water, water resistance (UW)</li> </ul>
Sound	<ul style="list-style-type: none"> <li>Listen to sounds (EAD)</li> <li>Make sounds (EAD)</li> </ul>	<ul style="list-style-type: none"> <li>Using senses to listen to sounds outside and identify the source (UW)</li> <li>Make sounds (EAD)</li> </ul>
Earth and space		<ul style="list-style-type: none"> <li>Learn about the Solar System and stars through stories (EAD)</li> </ul>
Scientists	<ul style="list-style-type: none"> <li>Show interest in different occupations that link to Science e.g. farmer, vet, member of the emergency services (UW)</li> </ul>	



# Year 1



## Animals Including Humans

<b>NC Objectives</b>	<p>1) Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals.</p> <p>2) Identify and name a variety of common animals that are carnivores, herbivores and omnivores.</p> <p>3) Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets).</p> <p>4) Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.</p>	
<b>Key Knowledge</b>	<p>1) Know common animals that the children would be familiar with.</p> <p>2) Know animals eat certain things - some eat other animals, some eat plants, some eat both plants and animals. Give examples that children are familiar with (EG. carnivores cat, herbivores rabbit and omnivores human)</p> <p>3) Know that animals vary in many ways having different structures e.g. wings, tails, ears etc.</p> <p>3) Know they also have different skin coverings e.g. scales, feathers, hair. These key features can be used to identify them.</p> <p>4) Know humans have key parts in common (label feet, legs, arms, hands, torso, head, skin, ears, eyes, nose, mouth, tongue), but these vary from person to person.</p> <p>4) Know humans (and other animals) find out about the world using their senses. Humans have five senses – sight, touch, taste, hearing and smelling. These senses are linked to particular parts of the body.</p>	
<b>Progression</b>	Prior Learning	Future Learning
	<ul style="list-style-type: none"> <li>Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes. (Early Learning Goal)</li> </ul>	<ul style="list-style-type: none"> <li>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. (Y2 - Living things and their habitats)</li> <li>Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals. (Y6 - Living things and their habitats)</li> <li>Give reasons for classifying plants and animals based on specific characteristics. (Y6 - Living things and their habitats)</li> </ul>
<b>Vocabulary</b>	<p>amphibians, arms, birds, body parts, carnivores, ears, elbows, environment, eyes, face, fish, habitat, hair, head, hearing, herbivores, knees, legs, mammals, mouth, neck, omnivores, pets, reptiles, seeing, senses, smells, sounds, taste, teeth, touch.</p>	
<b>Working Scientifically</b>	<p>Children might work scientifically by: using their observations to compare and contrast animals at first hand or through videos and photographs, describing how they identify and group them; grouping animals according to what they eat; and using their senses to compare different textures, sounds and smells.</p>	
<b>Misconceptions</b>	<p>Some children may think:</p> <ul style="list-style-type: none"> <li>only four-legged mammals, such as pets, are animals</li> <li>humans are not animals</li> <li>insects are not animals</li> <li>all 'bugs' or 'creepy crawlies', such as spiders, are part of the insect group</li> <li>amphibians and reptiles are the same.</li> </ul>	

Plants	
NC Objectives	<ol style="list-style-type: none"> <li>1) Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees.</li> <li>2) Identify and describe the basic structure of a variety of common flowering plants, including trees.</li> </ol>
Key Knowledge	<ol style="list-style-type: none"> <li>1) Know that in our school grounds there are plants which have specific names (flowers – rose bush, daffodil, dandelion &amp; trees – oak, birch, sycamore).</li> <li>1) Know some trees keep their leaves all year (evergreen) while other trees drop (deciduous) their leaves during autumn and grow them again during spring.</li> <li>2) Know these can be identified by looking at the key characteristics of the plant. Plants have common parts (roots, stems, leaves and flowers), but they vary between the different types of plants (leaves, flowers, trunk size).</li> </ol>
Progression	Prior Learning
	Future Learning
	<ul style="list-style-type: none"> <li>• Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes. (Early Learning Goal)</li> </ul>
	<ul style="list-style-type: none"> <li>• Observe and describe how seeds and bulbs grow into mature plants. (Y2 – Plants)</li> <li>• Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. (Y2 – Plants)</li> <li>• Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 – Living things and their habitats)</li> <li>• Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. (Y3 – Plants)</li> <li>• Investigate the way in which water is transported within plants. (Y3 Plants)</li> </ul>
Vocabulary	branches, bud, bulb, deciduous tree, evergreen tree, flowers, fruit, garden/flowering plants, leaves, petals, roots, seed, stem, trunk, wild plants.
Working Scientifically	Children might work scientifically by: observing closely, perhaps using magnifying glasses, and comparing and contrasting familiar plants; describing how they were able to identify and group them, and drawing diagrams showing the parts of different plants and trees. Children might keep records of how plants have changed over time, for example the leaves falling off trees and buds opening; and compare and contrast what they have found out about different plants.
Misconceptions	<ul style="list-style-type: none"> <li>• plants are flowering plants grown in pots with coloured petals and leaves and a stem</li> <li>• trees are not plants</li> <li>• all leaves are green</li> <li>• all stems are green</li> <li>• a trunk is not a stem</li> <li>• blossom is not a flower.</li> </ul>
Materials	
NC Objectives	<ol style="list-style-type: none"> <li>1) Distinguish between an object and the material from which it is made.</li> <li>2) Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock.</li> <li>3) Describe the simple physical properties of a variety of everyday materials.</li> <li>4) Compare and group together a variety of everyday materials on the basis of their simple physical properties.</li> </ol>

Key Knowledge	<p>1 &amp; 2) Know the names of the materials: wood, plastic, glass, metal, water, and rock.</p> <p>3) Know materials can be described by their properties e.g. shiny, stretchy, rough etc – see vocabulary.</p> <p>1) Know all objects are made of one or more materials (compare everyday classroom objects).</p> <p>1) Know some objects can be made from different materials e.g. plastic, metal or wooden spoons.</p> <p>3 &amp; 4) Know some materials e.g. plastic can be in different forms with very different properties.</p>	
Progression	Prior Learning	Future Learning
	<ul style="list-style-type: none"> <li>Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes. (Early Learning Goal)</li> </ul>	<ul style="list-style-type: none"> <li>Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 – Uses of everyday materials)</li> <li>Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 – Uses of everyday materials)</li> </ul>
Vocabulary	<p>absorbent/not absorbent, bending, bendy/not bendy, gas, glass, hard/soft, liquid, metal, plastic, property, rock, rough/smooth, shiny/dull, solid, squashing, stretching, stretchy/stiff, twisting, water, waterproof/not waterproof, wood.</p>	
Working Scientifically	<p>Children might work scientifically by: performing simple tests to explore questions, for example: <i>What is the best material for an umbrella? ... for lining a dog basket? ... for curtains? ... for a bookshelf? ... for a gymnast's leotard?</i></p>	
Misconceptions	<p>Some children may think:</p> <ul style="list-style-type: none"> <li>only fabrics are materials</li> <li>only building materials are materials</li> <li>only writing materials are materials</li> <li>the word 'rock' describes an object rather than a material</li> <li>'solid' is another word for hard.</li> </ul>	
<b>Seasonal Changes</b>		
NC Objectives	<p>1) Observe changes across the four seasons.</p> <p>2) Observe and describe weather associated with the seasons and how day length varies..</p>	
Key Knowledge	<p>1&amp;2) Know in the UK, the day length is longest in the summer and gets shorter in the winter.</p> <p>1&amp;2) Know the weather also changes with the seasons (autumn, winter, spring, summer).</p> <p>1&amp;2) Know that in the UK, it is usually colder and rainier in winter, and hotter and dryer in the summer.</p> <p>1&amp;2) Know the change in weather causes many other changes. Some examples are: numbers of minibeasts found outside; seed and plant growth; leaves on trees; and type of clothes worn by people.</p>	
Progression	Prior Learning	Future Learning
	<ul style="list-style-type: none"> <li>Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes. (Early Learning Goal)</li> </ul>	<ul style="list-style-type: none"> <li>Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 – Light)</li> <li>Use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky. (Y5 – Earth and space)</li> <li>The seasons and the Earth's tilt, day length at different times of year, in different hemispheres. (KS3)</li> </ul>

Vocabulary	autumn, dark, day length, days, hours, light, months, moon, movement, shadow, spring, summer, sun, winter
Working Scientifically	Children might work scientifically by: making tables and charts about the weather; and making displays of what happens in the world around them, including day length, as the seasons change.
Misconceptions	<ul style="list-style-type: none"><li>• it always snows in winter</li><li>• it is always sunny in the summer</li><li>• there are only flowers in spring and summer</li><li>• it rains most in the winter.</li></ul>



# Year 2



## Living Things and their Habitats

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">NC Objectives</p>	<p>1) Explore and compare the differences between things that are living, dead, and things that have never been alive</p> <p>2) Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other</p> <p>3) Identify and name a variety of plants and animals in their habitats, including micro-habitats</p> <p>4) 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</p>	
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Key Knowledge</p>	<p>1) Know all objects are either living, dead or have never been alive.</p> <p>1) Know living things are plants (including seeds) and animals.</p> <p>1) Know dead things include dead animals and plants and parts of plants and animals that are no longer attached e.g. leaves and twigs, shells, fur, hair and feathers.</p> <p>1) Know that living things move, grow, consume nutrients and reproduce and 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>1) Know an object made of wood is classed as dead. Objects made of rock, metal and plastic have never been alive.</p> <p>2) Know animals and plants live in a habitat to which they are suited, which means that animals have suitable features that help them move and find food and plants have suitable features that help them to grow well (polar bear, fish, hedgehog)</p> <p>2) Know the habitat provides the basic needs of the animals and plants – shelter, food and water.</p> <p>3) Know that within a habitat there are different micro-habitats e.g. in a woodland – in the leaf litter, on the bark of trees, on the leaves.</p> <p>3) Know these micro-habitats have different conditions e.g. light or dark, damp or dry. These conditions affect which plants and animals live there.</p> <p>3) 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</p> <p>3) Know that frogs can live in ponds (an example of a microhabitat) as they water in which to lay their eggs (frogspawn)</p> <p>4) Know the plants and animals in a habitat depend on each other for food and shelter etc.</p> <p>4) Know the way that animals obtain their food from plants and other animals can be shown in a food chain.</p> <p>4) Know that the arrows on a food chain shows the direction that the energy travels.</p>	
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Progression</p>	<p style="text-align: center;">Prior Learning</p> <ul style="list-style-type: none"> <li>• Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants)</li> <li>• Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants)</li> <li>• Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals including humans)</li> <li>• Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals including humans)</li> <li>• Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 - Animals, including humans)</li> <li>• Observe changes across the four seasons. (Y1 - Seasonal changes)</li> </ul>	<p style="text-align: center;">Future Learning</p> <ul style="list-style-type: none"> <li>• Recognise that living things can be grouped in a variety of ways. (Y4 - Living things and their habitats)</li> <li>• Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. (Y4 - Living things and their habitats)</li> <li>• Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats)</li> <li>• Construct and interpret a variety of food chains, identifying producers, predators and prey. (Y4 - Animals, including humans)</li> </ul>

Vocabulary	adaptation, alive, carnivore, characteristics, conditions, consumer, dead, excrete, feed, food chain, grow, habitat, heat, herbivore, life processes, light, living/non-living, micro-habitat, move, ocean, omnivore, pond, producer, rainforest, reproduce, respire, respond to stimuli, seashore, sound, touch, woodland.	
Working Scientifically	Children will begin to learn about the characteristics and life processes shared by all living things, and will think about the main differences between things that are alive, that are dead, and that have never been alive. They will show their ability to work scientifically by classifying things according to whether they are alive, dead or non-living. With help, they will learn how to explain their reasons for placing things in different categories. They will continue to build on this logical categorisation of objects in their work in Year 3. Children will begin to understand what is meant by 'habitat' and 'micro-habitat', and will study a range of different plants and animals in their local area. They will also be encouraged to compare animals in a range of habitats to see how living things depend on each other, learning about simple food chains as part of this work. They will demonstrate that they can work scientifically by recording their observations, comparing how different animals are suited to life in their habitats, and drawing and labelling a simple food chain	
Misconceptions	<ul style="list-style-type: none"> <li>• an animal's habitat is like its 'home'</li> <li>• plants and seeds are not alive as they cannot be seen to move</li> <li>• fire is living</li> <li>• arrows in a food chain mean 'eats'.</li> </ul>	
<b>Plants</b>		
NC Objectives	<ol style="list-style-type: none"> <li>1) Observe and describe how seeds and bulbs grow into mature plants.</li> <li>2) Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.</li> </ol>	
Key Knowledge	<ol style="list-style-type: none"> <li>1) Know plants may grow from either seeds (a range of seeds) or bulbs (a range of bulbs).</li> <li>1) Know these then germinate and grow into seedlings which then continue to grow into mature plants.</li> <li>1) Know these mature plants may have flowers which then develop into seeds, berries, fruits etc.</li> <li>1) Know seeds (beans) and bulbs (daffodil) need to be planted outside at particular times of year and they will germinate and grow at different rates.</li> <li>1) Know that plants produce seeds that grow into another plant.</li> <li>2) Know that plants that are deprived of light, food and air will not grow healthy and will eventually die.</li> <li>2) Know some plants are better suited to growing in full sun and some grow better in partial or full shade.</li> <li>2) Know plants also need different amounts of water and space to grow well and stay healthy.</li> </ol>	
Progression	Prior Learning	Future Learning
	<ul style="list-style-type: none"> <li>• Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants)</li> <li>• Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants)</li> </ul>	<ul style="list-style-type: none"> <li>• Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. (Y3 - Plants)</li> <li>• 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. (Y3 - Plants)</li> <li>• Investigate the way in which water is transported within plants. (Y3 - Plants)</li> <li>• Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)</li> </ul>
Vocabulary	As for Year 1, plus: germination, insect pollination, nutrients, pollination, seed dispersal, wind pollination.	

Working Scientifically	Children will build on their observations and categorisation of different types and features of plants from Year 1. They will look at how plants grow, beginning with seeds and bulbs, and find out about the conditions plants need in order to grow and stay healthy. They will conduct simple comparative experiments and tests to demonstrate this, and will record their results with increasing accuracy. Children's findings in Year 2 will prepare them for a more detailed study of the conditions needed for plant growth, in Year 3.	
Misconceptions	<ul style="list-style-type: none"> <li>• plants are not alive as they cannot be seen to move</li> <li>• seeds are not alive</li> <li>• all plants start out as seeds</li> <li>• seeds and bulbs need sunlight to germinate.</li> </ul>	
<b>Animals including Humans</b>		
NC Objectives	<ol style="list-style-type: none"> <li>1) Notice that animals, including humans, have offspring which grow into adults.</li> <li>2) Find out about and describe the basic needs of animals, including humans, for survival (water, food and air).</li> <li>3) Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.</li> </ol>	
Key Knowledge	<ol style="list-style-type: none"> <li>1) Know animals, including humans, have offspring which grow into adults.</li> <li>1) Know in humans and some animals, these offspring will be young, such as babies or kittens, that grow into adults.</li> <li>1) Know, in other animals, such as chickens or insects, there may be eggs laid that hatch to young or other stages which then grow to adults.</li> <li>1) Know the young of some animals do not look like their parents e.g. tadpoles.</li> <li>2) Know all animals, including humans, need water, air and food to survive.</li> <li>3) Know to grow into healthy adults, they also need the right amounts and types of food (Eat well plate).</li> <li>3) Know that humans also need exercise to keep their body strong and healthy.</li> <li>3) Good hygiene (washing and brushing teeth) is also important in preventing infections and illnesses.</li> </ol>	
Progression	Prior Learning	Future Learning
	<ul style="list-style-type: none"> <li>• Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans)</li> <li>• Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans)</li> </ul>	<ul style="list-style-type: none"> <li>• 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. (Y3 - Animals, including humans)</li> <li>• Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats)</li> <li>• Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats)</li> <li>• Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (Y6 - Animals, including humans)</li> </ul>
Vocabulary	adult, baby, bacteria, balanced diet, carbohydrates, child, circulation, dairy, exercise, fats, fibre, fitness, food groups, germs, growth, healthy, heart rate, infection, life cycle, minerals, nutrition, protein, teenager, toddler, unhealthy, vitamins.	
Working Scientifically	Children will find out what humans and other animals need in order to grow and to survive. They will find out about animal life cycles, but with an emphasis on how animals grow and change as they age, rather than on reproduction. They will begin to learn about the important factors which help humans stay healthy, including exercise, a balanced diet, and hygiene. Children will work scientifically by observing animals and humans at first hand or using secondary sources, and by thinking of good questions about how animals grow and survive, and suggesting possible ways of finding out the answers to their questions.	

Misconceptions	<ul style="list-style-type: none"> <li>• an animal's habitat is like its 'home'</li> <li>• all animals that live in the sea are fish</li> <li>• respiration is breathing</li> <li>• breathing is respiration.</li> </ul>	
<b>Uses of everyday materials</b>		
NC Objectives	<p>1) Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.</p> <p>2) Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.</p>	
Key Knowledge	<p>1) Know all objects are made of one or more materials that are chosen specifically because they have suitable properties for the task. (For example, a water bottle is made of plastic because it is transparent allowing you to see the drink inside and waterproof so that it holds the water – see vocabulary).</p> <p>1) Know when choosing what to make an object from, the properties needed are compared with the properties of the possible materials, identified through simple tests and classifying activities.</p> <p>1) Know a material can be suitable for different purposes and an object can be made of different materials.</p> <p>2) Know objects made of some materials can be changed in shape by bending, stretching, squashing and twisting. (For example, clay can be shaped by apply force of squashing, stretching, rolling, pressing etc.)</p>	
Progression	Prior Learning	Future Learning
	<ul style="list-style-type: none"> <li>• Distinguish between an object and the material from which it is made. (Y1 - Everyday materials)</li> <li>• Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials)</li> <li>• Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials)</li> <li>• Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials)</li> </ul>	<ul style="list-style-type: none"> <li>• Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. (Y3 - Rocks)</li> <li>• Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 - Forces and magnets)</li> <li>• 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. (Y5 - Properties and changes of materials)</li> <li>• Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. (Y5 - Properties and changes of materials)</li> </ul>
Vocabulary	As for Year 1, plus: characteristics, classification, man-made, natural, properties.	
Working Scientifically	Children will build on the work begun in Year 1, by learning about the different uses of specific materials such as metal, wood, plastic, glass etc. They will help to design tests and experiments to show some of the basic properties of different materials and how they can be used. They may also find out about scientists and inventors of new materials, and why their discoveries were so useful. They will work scientifically by observing, identifying and classifying the uses of different materials, both in and around the school and elsewhere in the world around them. They will continue to explore properties of materials in their work on Forces in Year 3.	
Misconceptions	<ul style="list-style-type: none"> <li>• only fabrics are materials</li> <li>• only building materials are materials</li> <li>• only writing materials are materials</li> <li>• the word rock describes an object rather than a material</li> <li>• solid is another word for hard.</li> </ul>	



# Year 3



## Plants

<p>NC Objectives</p>	<p>1) Identify and describe the functions of different parts of flowering plants: roots; stem/trunk; leaves; and flowers.</p> <p>2) Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant.</p> <p>3) Investigate the way in which water is transported within plants.</p> <p>4) Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</p>	
<p>Key Knowledge</p>	<p>1) Know many plants, but not all, have roots, stems/trunks, leaves and flowers/blossom (use the school grounds)</p> <p>1 &amp; 3) Know the roots absorb water and nutrients from the soil and anchor the plant in place.</p> <p>1 &amp; 3) Know the stem transports water and nutrients/minerals around the plant and holds the leaves and flowers up in the air to enhance photosynthesis, pollination and seed dispersal.</p> <p>1 &amp; 3) Know the leaves use sunlight and water to produce the plant's food.</p> <p>2) Know different plants require different conditions for germination (revisit from Y2)</p> <p>2) Know different plants require different conditions for growth (compare cactus and parsley plant giving minimal water).</p> <p>4) Know some plants produce flowers which enable the plant to reproduce (daffodil).</p> <p>4) Know pollen, which is produced by the male part of the flower, is transferred to the female part of other flowers (pollination).</p> <p>4) Know this forms seeds, sometimes contained in berries or fruits which are then dispersed in a process called dispersal.</p>	
<p>Progression</p>	<p>Prior Learning</p>	<p>Future Learning</p>
	<ul style="list-style-type: none"> <li>Observe and describe how seeds and bulbs grow into mature plants. (Y2 - Plants)</li> <li>Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. (Y2 - Plants)</li> </ul>	<ul style="list-style-type: none"> <li>Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats)</li> <li>Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. (KS3)</li> </ul>
<p>Vocabulary</p>	<p><b>As for previous years, plus:</b> absorb, competition for resources, function, minerals, optimum conditions, plant life cycle, plant tissues, pores (stomata), reproduction, seed formation, structure, support, well-aerated soil, well-drained soil.</p>	
<p>Working Scientifically</p>	<p>Building on the work done in Year 2, children will learn more about the parts of a plant, and find out about the specific functions of those different parts (in particular, the role of flowers in a plant's life cycle and the importance of the root system and stem for transporting water and providing support) . They will find out more about the things plants need in order to live and grow healthily, and will compare the needs of different plants. They will work scientifically by devising and carrying out simple fair tests to identify the impact of different factors (such as light, water, fertiliser etc.) on plant growth. They will also do simple experiments to demonstrate how water travels within plants.</p>	
<p>Misconceptions</p>	<ul style="list-style-type: none"> <li>plants eat food</li> <li>food comes from the soil via the roots</li> <li>flowers are merely decorative rather than a vital part of the life cycle in reproduction</li> <li>plants only need sunlight to keep them warm</li> <li>roots suck in water which is then sucked up the stem.</li> </ul>	

## Animals including humans

<b>NC Objectives</b>	<p>1) Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food – they get nutrition from what they eat.</p> <p>2) Identify that humans and some other animals have skeletons and muscles for support, protection and movement.</p>	
<b>Key Knowledge</b>	<p>1) Know animals, unlike plants (which can make their own food) need to eat in order to get the nutrients they need.</p> <p>1) Know food contains a range of different nutrients – carbohydrates (including sugars), protein, vitamins, minerals, fats, sugars, water – and fibre that are needed by the body to stay healthy (link to Y2 Eat well plate).</p> <p>1) Know a piece of food will often provide a range of nutrients.</p> <p>1) Know a lack of a nutrient can cause ill health (lack vitamin D can cause the disease rickets).</p> <p>1) Know that excess of a food group can cause ill health (tooth decay due to excess sugar).</p> <p>1) 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.</p> <p>1&amp;2) Know that excess body fat can lead to heart disease and increases the strain on joints and growing bones</p> <p>2) Know humans, and some other animals, have skeletons and muscles which help them move and provide protection and support.</p> <p>2) Know that skeletons provide support for muscles and protect the body; for example, the rib cage protects the vital organs in the human body.</p> <p>2) Know that animals, including humans, have a skeleton made up of solid objects (bones).</p> <p>2) Know that some animals (such as insects) have an exoskeleton – a solid covering on the outside of their body.</p>	
<b>Progression</b>	<b>Prior Learning</b>	<b>Future Learning</b>
	<ul style="list-style-type: none"> <li>• Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals, including humans)</li> <li>• Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans)</li> <li>• Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 - Animals, including humans)</li> <li>• Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). (Y2 - Animals, including humans)</li> <li>• Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans)</li> </ul>	<ul style="list-style-type: none"> <li>• Describe the simple functions of the basic parts of the digestive system in humans. (Y4 - Animals, including humans)</li> <li>• Identify the different types of teeth in humans and their simple functions. (Y4 - Animals, including humans)</li> <li>• Construct and interpret a variety of food chains, identifying producers, predators and prey. (Y4 - Animals, including humans)</li> <li>• Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (Y6 - Animals, including humans)</li> </ul>
<b>Vocabulary</b>	<p><b>As for previous years, plus:</b> ankle, arteries, backbone, ball and socket joints, bone, brain, branching blood vessels, capillaries, cardio-vascular system, cartilage, collar bone (clavicle), contract, endoskeleton, exoskeleton, extensor, fibula, finger, fixed joints, flexor, foot, hand, heart, hinge joints, humerus, involuntary muscles, joints, knee cap (patella), ligaments, moveable joints, movement, muscles, opposing pairs, pelvis, protection, shoulder blades (scapula), skeletal and muscular systems, radius, relax, ribs, skeletons, skull, sliding joints, spinal cord, sternum, support, thigh bone (femur), tibia, toe, ulna, veins, vertebrates, voluntary muscles, wrist.</p>	

Working Scientifically	Children will continue the work done in Year 2 on the importance of nutrition for animals' health, by looking at the different food groups and finding out about the contribution that each group makes. They will have opportunities to compare and contrast the needs of different animals (including humans). This work will be extended during Year 4 as children learn about the digestive system and in Year 6 as they learn about the circulatory system. Finally they will explore the role of the skeleton and muscles in some animals for support, protection and movement. Children will work scientifically to group animals in different ways (i.e. whether or not they have skeletons) and compare the ways in which animals move.	
Misconceptions	<ul style="list-style-type: none"> <li>• certain whole food groups like fats are 'bad' for you</li> <li>• certain specific foods, like cheese are also 'bad' for you</li> <li>• diet and fruit drinks are 'good' for you</li> <li>• snakes are similar to worms, so they must also be invertebrates</li> <li>• invertebrates have no form of skeleton.</li> </ul>	
<b>Rocks</b>		
NC Objectives	<ol style="list-style-type: none"> <li>1) Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.</li> <li>2) Describe in simple terms how fossils are formed when things that have lived are trapped within rock.</li> <li>3) Recognise that soils are made from rocks and organic matter.</li> </ol>	
Key Knowledge	<ol style="list-style-type: none"> <li>1) Know rock is a naturally occurring material.</li> <li>1) Know that there are three kinds of rocks: igneous, sedimentary and metamorphic</li> <li>1) Know that granite and basalt are types of igneous rock and that igneous rocks form from molten rock below the Earth's crust (<a href="#">Links to LT Volcanoes</a>)</li> <li>1) 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</li> <li>1) 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</li> <li>1) Know rocks can be hard or soft. They have different sizes of grain or crystal. They may absorb water. Rocks can be different shapes and sizes (stones, pebbles, boulders).</li> <li>2) Know fossils were formed millions of years ago. When plants and animals died, they fell to the seabed. They became covered and squashed by other material. Over time the dissolving animal and plant matter is replaced by minerals from the water.</li> <li>3) Know that soils are made up of pieces of ground down rock (by the action of weathering) which may be mixed with plant and animal material (organic matter). Some rocks contain fossils.</li> </ol>	
Progression	Prior Learning	Future Learning
	<ul style="list-style-type: none"> <li>• Distinguish between an object and the material from which it is made. (Y1 - Everyday materials)</li> <li>• Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials)</li> <li>• Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials)</li> <li>• Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials)</li> <li>• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials)</li> </ul>	<ul style="list-style-type: none"> <li>• Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. (Y6 - Evolution and inheritance)</li> <li>• The composition of the Earth. (KS3)</li> <li>• The structure of the Earth. (KS3)</li> <li>• The rock cycle and the formation of igneous, sedimentary and metamorphic rocks. (KS3)</li> </ul>

Vocabulary	crystalline, crystals, erosion, fossils, grains, layers (strata), molten magma, particles, permeability, permeable, physical properties, soils.	
Working Scientifically	Children will devise different ways of grouping and sorting rocks according to their characteristics, and will make direct close observation of the structure of rocks and soils using tools such as hand lenses and microscopes. They will learn about how fossils occur, which will link with their work on Evolution in Year 6. Children will work scientifically by conducting their own observations of rocks in the local environment, and will use secondary sources to find out more about fossils and learn about how rocks might change over time.	
Misconceptions	<ul style="list-style-type: none"> <li>• rocks are all hard in nature</li> <li>• rock-like, man-made substances such as concrete or brick are rocks</li> <li>• materials which have been polished or shaped for use, such as a granite worktop, are not rocks as they are no longer 'natural'</li> <li>• certain found artefacts, like old bits of pottery or coins, are fossils</li> <li>• a fossil is an actual piece of the extinct animal or plant</li> <li>• soil and compost are the same thing.</li> </ul>	
<b>Light</b>		
NC Objectives	<ol style="list-style-type: none"> <li>1) Recognise that they need light in order to see things, and that dark is the absence of light.</li> <li>2) Notice that light is reflected from surfaces.</li> <li>3) Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.</li> <li>4) Recognise that shadows are formed when the light from a light source is blocked by an opaque object.</li> <li>5) Find patterns in the way that the size of shadows change.</li> </ol>	
Key Knowledge	<ol style="list-style-type: none"> <li>1) Know that we see objects because our eyes can sense light. Dark is the absence of light. We cannot see anything in complete darkness.</li> <li>1) Know that some objects, for example, the sun, light bulbs and candles are sources of light.</li> <li>1) Objects are easier to see if there is more light.</li> <li>2) Some surfaces reflect light. Objects are easier to see when there is less light if they are reflective.</li> <li>3) Know that the light from the sun can damage our eyes and therefore we should not look directly at the sun and can protect our eyes by wearing sunglasses or sunhats in bright light.</li> <li>4) Know that shadows are formed on a surface when an opaque or translucent object is between a light source and the surface and blocks some of the light.</li> <li>5) Know that the size of the shadow depends on the position of the source, object and surface.</li> </ol>	
Progression	Prior Learning	Future Learning
	<ul style="list-style-type: none"> <li>• Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans)</li> </ul>	<ul style="list-style-type: none"> <li>• Recognise that light appears to travel in straight lines. (Y6 - Light)</li> <li>• 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. (Y6 - Light)</li> <li>• 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. (Y6 - Light)</li> <li>• Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. (Y6 - Light)</li> </ul>
Vocabulary	absorb, bright, dim, emit, light beam, light sources, light spectrum, opaque, rays, reflect, reflection, speed of light, sunlight, torch, translucent, transparent.	

Working Scientifically	Children will find out how light makes it possible for us to see things. They will learn about shadows and conduct simple experiments to show how the size of a shadow is affected by the distance between the object casting the shadow and the light source.	
Misconceptions	<ul style="list-style-type: none"> <li>• we can still see even where there is an absence of any light</li> <li>• our eyes 'get used to' the dark</li> <li>• the moon and reflective surfaces are light sources</li> <li>• a transparent object is a light source</li> <li>• shadows contain details of the object, such as facial features on their own shadow</li> <li>• shadows result from objects giving off darkness.</li> </ul>	
<b>Forces and Magnets</b>		
NC Objectives	<ol style="list-style-type: none"> <li>1) Compare how things move on different surfaces.</li> <li>2) Notice that some forces need contact between two objects, but magnetic forces can act at a distance.</li> <li>3) Observe how magnets attract or repel each other and attract some materials and not others.</li> <li>4) 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>5) Describe magnets as having two poles.</li> <li>6) Predict whether two magnets will attract or repel each other, depending on which poles are facing.</li> </ol>	
Key Knowledge	<ol style="list-style-type: none"> <li>1) Know that when an object moves on a surface, the texture of the surface and the object affect how it moves. It may help the object to move better or it may hinder its movement e.g. ice skater compared to walking on ice in normal shoes.</li> <li>2) Know that force can be thought of as a push or a pull.</li> <li>2) Know for some forces to act, there must be contact e.g. a hand opening a door, the wind pushing the trees.</li> <li>2 &amp; 3) Some forces can act at a distance e.g. magnetism. The magnet does not need to touch the object that it attracts.</li> <li>2 &amp; 3) Know a magnet attracts magnetic material. Iron and nickel and other materials containing these, e.g. stainless steel, are magnetic.</li> <li>5 &amp; 6) Know the strongest parts of a magnet are the poles. Magnets have two poles – a north pole and a south pole. If two like poles, e.g. two north poles, are brought together they will push away from each other – repel. If two unlike poles, e.g. a north and south, are brought together they will pull together – attract.</li> </ol>	
Progression	Prior Learning	Future Learning
	<ul style="list-style-type: none"> <li>• Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)</li> </ul>	<ul style="list-style-type: none"> <li>• Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. (Y5 - Forces)</li> <li>• Identify the effects of air resistance, water resistance and friction, that act between moving surfaces. (Y5 - Forces)</li> <li>• Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. (Y5 - Forces)</li> <li>• Magnetic fields by plotting with compass, representation by field lines. (KS3)</li> <li>• Earth's magnetism, compass and navigation. (KS3)</li> </ul>
Vocabulary	air resistance, attract, compress, direction of force, faster, floating, flying, forcemeter, forces, friction, gravity, magnetic, magnetic field, magnetic forces, Newton meter, Newtons (N), non-magnetic, north pole, poles, pull, push, repel, sinking, sliding, slower, south pole, speed, streamlined, stretch, twist, water resistance.	

Working Scientifically	<p>Children will begin to compare magnetic forces (which can operate at a distance, without direct contact) with other forces, where direct contact is needed. They will learn that magnets have two opposite poles. They will conduct experiments to show how magnets attract or repel each other, depending on which poles are facing, and this will enable them to make accurate predictions of the behaviour of magnets. They will work scientifically by devising a fair test.</p>
Misconceptions	<ul style="list-style-type: none"><li>• the bigger the magnet the stronger it is</li><li>• all metals are magnetic.</li></ul>



# Year 4



## Living Things and their Habitats

NC Objectives	<p>1) Recognise that living things can be grouped in a variety of ways.</p> <p>2) Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.</p> <p>3) Recognise that environments can change and that this can sometimes pose dangers to living things.</p>	
Key Knowledge	<p>1) Know that living things can be grouped (classified) in different ways according to their features.</p> <p>2) Know classification keys can be used to identify and name living things.</p> <p>2) Know how to use a classification key to identify living things</p> <p>3) Know that living things live in a habitat which provides an environment to which they are suited (Year 2 learning).</p> <p>3) Know that environments may change naturally e.g. through flooding, fire, earthquakes (Y3 LT), volcanic eruption (Y3 LT) etc.</p> <p>3) Know that humans also cause the environment to change. This can be in a good way (i.e. positive human impact, such as setting up nature reserves) or in a bad way (i.e. negative human impact, such as littering).</p> <p>3) 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 (<a href="#">Link to Y2 habitats polar bear</a>)</p> <p>3) Know that environments also change with the seasons (Y1 seasons); different living things can be found in a habitat at different times of the year.</p>	
Progression	<p>Prior Learning</p> <ul style="list-style-type: none"> <li>Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants)</li> <li>Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants)</li> <li>Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals including humans)</li> <li>Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 - Animals, including humans)</li> <li>Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 - Living things and their habitats)</li> </ul>	<p>Future Learning</p> <ul style="list-style-type: none"> <li>Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats)</li> <li>Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats)</li> <li>Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals. (Y6 - Living things and their habitats)</li> <li>Give reasons for classifying plants and animals based on specific characteristics. (Y6 - Living things and their habitats)</li> </ul>
Vocabulary	<p><b>As for Year 2, plus:</b> classification keys, differences, human effects on the environment (population, development, deforestation, pollution), invertebrates (snails and slugs, worms, spiders, insects), organism, plant groups (trees, grasses, flowering plants, non-flowering plants), similarities, variation characteristics, vertebrates (fish, amphibians, reptiles, birds, mammals).</p>	
Working Scientifically	<p>Children will continue to observe and identify plants and animals in the local environment, and will learn how to classify animals into vertebrates and invertebrates using classification keys. They will also learn to group plants into different categories, such as flowering and non-flowering plants. As part of their study of the local environment, children will learn about how animal and plant habitats are affected by changes in the environment (both human and natural) throughout the year.</p>	
Misconceptions	<ul style="list-style-type: none"> <li>the death of one of the parts of a food chain or web has no or limited consequences on the rest of the chain</li> <li>there is always plenty of food for wild animals</li> <li>animals are only land-living creatures</li> <li>animals and plants can adapt to their habitats, however they change</li> <li>all changes to habitats are negative.</li> </ul>	

## Animals including humans

NC Objectives	<p>1) Describe the simple functions of the basic parts of the digestive system in humans.</p> <p>2) Identify the different types of teeth in humans and their simple functions.</p> <p>3) Construct and interpret a variety of food chains, identifying producers, predators and prey.</p>	
Key Knowledge	<p>1) Know that food enters the body through the mouth. Digestion starts when the teeth start to break the food down. Saliva is added and the tongue rolls the food into a ball.</p> <p>1) Know that the food is swallowed and passes down the oesophagus to the stomach. Here the food is broken down further by being churned around and other chemicals are added.</p> <p>1) Know that the food passes into the small intestine. Here nutrients are removed from the food and leave the digestive system to be used elsewhere in the body.</p> <p>1) Know that the rest of the food then passes into the large intestine. Here the water is removed for use elsewhere in the body.</p> <p>1) Know that what is left is then stored in the rectum until it leaves the body through the anus when you go to the toilet.</p> <p>2) Know humans have four types of teeth: incisors for cutting; canines for tearing; and molars and premolars for grinding (chewing).</p> <p>2) Know that different animals have teeth depending on their diet carnivore, omnivore, herbivore (Y3.LT predator)</p> <p>3) Living things can be classified as producers, predators and prey according to their place in the food chain.</p> <p>3) Know that a food chain traces the path of energy through a habitat</p> <p>3) Know that the arrows in a food chain show the direction that energy is travelling through a habitat</p> <p>3) Know that consumers take in energy by eating</p> <p>3) Know that an animal that is eaten by another is called prey, and that an animal that eats other animals is called a predator</p>	
Progression	Prior Learning	Future Learning
	<ul style="list-style-type: none"> <li>• Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans)</li> <li>• Observe and describe weather associated with the seasons and how day length varies. (Y1 - Seasons)             <ul style="list-style-type: none"> <li>• Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). (Y2 - Animals, including humans)</li> </ul> </li> <li>• Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans)             <ul style="list-style-type: none"> <li>• 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 (Y4 - Living things and their habitats)</li> </ul> </li> <li>• 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. (Y3 - Animals, including humans)</li> </ul>	<ul style="list-style-type: none"> <li>• Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. (Y6 - Animals, including humans)</li> <li>• Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (Y6 - Animals, including humans)</li> <li>• Describe the ways in which nutrients and water are transported within animals, including humans. (Y6 - Animals, including humans)</li> </ul>
Vocabulary	<p><b>As for previous years, plus:</b> absorption of food into blood stream, canines, cavities, chemical breakdown by enzymes, chewing, churning in stomach, dentine, digestion, digestive system, enamel, faeces, fluoride toothpaste, gastric juice, gums, incisors, intestine, molars, nerves, oesophagus, plaque, premolars, pulp cavity, predators, prey, producers, reabsorption of water from waste, saliva, swallowing, tooth decay.</p>	

Working Scientifically	Building on their work in Year 3, children will find out more about the human digestive system, identifying the parts of the body involved and the functions performed by each part. They will focus in particular on teeth, and will learn about the roles and functions of the different types of teeth, making observations to compare the teeth of herbivores, carnivores and omnivores and discussing possible reasons for the differences. They construct and interpret a variety of food chains, identifying producers, predators and prey.	
Misconceptions	<ul style="list-style-type: none"> <li>• arrows in a food chains mean 'eats'</li> <li>• the death of one of the parts of a food chain or web has no, or limited, consequences on the rest of the chain</li> <li>• there is always plenty of food for wild animals</li> <li>• your stomach is where your belly button is</li> <li>• food is digested only in the stomach</li> <li>• when you have a meal, your food goes down one tube and your drink down another</li> <li>• the food you eat becomes "poo" and the drink becomes "wee".</li> </ul>	
<b>States of matter</b>		
NC Objectives	<ol style="list-style-type: none"> <li>1) Compare and group materials together, according to whether they are solids, liquids or gases.</li> <li>2) 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 (<math>^{\circ}\text{C}</math>).</li> <li>3) Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</li> </ol>	
Key Knowledge	<ol style="list-style-type: none"> <li>1) Know that things are composed of a matter commonly in one of three states of matter: solid, liquid or gas</li> <li>1) Know that a solid keeps its shape and has a fixed volume.</li> <li>1) Know that a liquid has a fixed volume but changes in shape to fit the container. A liquid can be poured and keeps a level, horizontal surface.</li> <li>1) Know that a gas fills all available space; it has no fixed shape or volume.</li> <li>1) Know that granular and powdery solids like sand can be confused with liquids because they can be poured, but when poured they form a heap and they do not keep a level surface when tipped. Each individual grain demonstrates the properties of a solid.</li> <li>2) Know that melting is a state change from solid to liquid.</li> <li>2) Know that freezing is a state change from liquid to solid. The freezing point of water is <math>0^{\circ}\text{C}</math>.</li> <li>2) Know that boiling is a change of state from liquid to gas that happens when a liquid is heated to a specific temperature and bubbles of the gas can be seen in the liquid. Water boils when it is heated to <math>100^{\circ}\text{C}</math>.</li> <li>3) Know that evaporation is the same state change as boiling (liquid to gas), but it happens slowly at lower temperatures and only at the surface of the liquid.</li> <li>3) Know evaporation happens more quickly if the temperature is higher, the liquid is spread out or it is windy.</li> <li>3) Know that condensation is the change back from a gas to a liquid caused by cooling.</li> <li>3) Know that water at the surface of seas, rivers etc. evaporates into water vapour (a gas). This rises, cools and condenses back into a liquid forming clouds. When too much water has condensed, the water droplets in the cloud get too heavy and fall back down as rain, snow, sleet etc. and drain back into rivers etc. This is known as precipitation. This is the water cycle. (Y3 LT rivers)</li> </ol>	
Progress	Prior Learning	Future Learning

	<ul style="list-style-type: none"> <li>• Distinguish between an object and the material from which it is made. (Y1 - Everyday materials) <ul style="list-style-type: none"> <li>• Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials)</li> </ul> </li> <li>• Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials)</li> <li>• Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials) <ul style="list-style-type: none"> <li>• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials)</li> <li>• Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• 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. (Y5 - Properties and changes of materials)</li> <li>• Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. (Y5 - Properties and changes of materials)</li> <li>• Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. (Y5 - Properties and changes of materials)</li> <li>• Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. (Y5 - Properties and changes of materials)</li> <li>• Demonstrate that dissolving, mixing and changes of state are reversible changes. (Y5 - Properties and changes of materials)</li> <li>• 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. (Y5 - Properties and changes of materials)</li> </ul>
Vocabulary	boiling, condensation, degrees Celsius (°C), energy transfer solid, evaporation, fixed shape and volume, forces of attraction, freezing, gaseous, liquid, melting, particles, rate of evaporation, solidifying, temperature, thermometer, vibrate, water cycle.	
Working Scientifically	Children will learn how to group materials according to whether they are solids, liquids or gases. They will work scientifically when they do simple experiments with water to show its different properties in solid, liquid and gaseous form. They will also look at how different materials change when heated or cooled (i.e. chocolate and butter). They will learn about the role of evaporation and condensation in the water cycle, and will do simple experiments to identify the effect of temperature on the rate of evaporation. This links to Year 5, when they will study the properties of everyday materials and the concept of reversible change.	
Misconceptions	<ul style="list-style-type: none"> <li>• 'solid' is another word for hard or opaque</li> <li>• solids are hard and cannot break or change shape easily and are often in one piece</li> <li>• substances made of very small particles like sugar or sand cannot be solids</li> <li>• particles in liquids are further apart than in solids and they take up more space</li> <li>• when air is pumped into balloons, they become lighter</li> <li>• water in different forms – steam, water, ice – are all different substances</li> <li>• all liquids boil at the same temperature as water (100 degrees)</li> <li>• melting, as a change of state, is the same as dissolving</li> <li>• steam is visible water vapour (only the condensing water droplets can be seen)</li> <li>• clouds are made of water vapour or steam</li> <li>• the substance on windows etc. is condensation rather than water</li> <li>• the changing states of water (illustrated by the water cycle) are irreversible</li> <li>• evaporating or boiling water makes it vanish</li> <li>• evaporation is when the Sun sucks up the water, or when water is absorbed into a surface/material.</li> </ul>	
<b>Sound</b>		
NC Objectives	<ol style="list-style-type: none"> <li>1) Identify how sounds are made, associating some of them with something vibrating.</li> <li>2) Recognise that vibrations from sounds travel through a medium to the ear.</li> <li>3) Find patterns between the pitch of a sound and features of the object that produced it.</li> <li>4) Find patterns between the volume of a sound and the strength of the vibrations that produced it.</li> <li>5) Recognise that sounds get fainter as the distance from the sound source increases.</li> </ol>	

Key Knowledge	<p>1) Know sound is a form of energy</p> <p>2) Know a sound produces vibrations which travel through a medium from the source to our ears.</p> <p>2) Know different mediums such as solids, liquids and gases can carry sound, but sound cannot travel through a vacuum (an area empty of matter).</p> <p>2) Know the vibrations cause parts of our body inside our ears to vibrate, allowing us to hear (sense) the sound.</p> <p>3) Pitch is the highness or lowness of a sound and is affected by features of objects producing the sounds. For example, smaller objects usually produce higher pitched sounds.</p> <p>4) Know the volume is how loud or quiet a sound is. Know this depends on the strength (size) of vibrations which decreases as they travel through the medium. (e.g. how hard or soft a percussion instrument is hit)</p> <p>5) Know sounds decrease in volume as you move away from the source. A sound insulator is a material which blocks sound effectively.</p>	
Progression	Prior Learning	Future Learning
	<ul style="list-style-type: none"> <li>Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans)</li> </ul>	<ul style="list-style-type: none"> <li>Waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition. (KS3)</li> <li>Frequencies of sound waves, measured in Hertz (Hz); echoes, reflection and absorption of sound. (KS3)</li> <li>Sound needs a medium to travel, the speed of sound in air, in water, in solids. (KS3)</li> <li>Sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal. (KS3)</li> <li>Auditory range of humans and animals. (KS3) <ul style="list-style-type: none"> <li>Pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound. (KS3)</li> </ul> </li> <li>Waves transferring information for conversion to electrical signals by microphone. (KS3)</li> </ul>
Vocabulary	<p>Children will learn about how sounds are made, and through simple tests and experiments (including with musical instruments) they will notice the link between vibration and sound. They will conduct tests to explore how different factors can change pitch and volume.</p>	
Working Scientifically	<p>echo, frequency of vibration, pitch (higher, lower), reflection of sound, sound insulation, sound wave, tuning fork, vacuum, vibration, volume (louder, softer).</p>	
Misconceptions	<ul style="list-style-type: none"> <li>sound is only heard by the listener</li> <li>sound only travels in one direction from the source</li> <li>sound can't travel through solids and liquids</li> <li>high sounds are loud and low sounds are quiet.</li> </ul>	

## Electricity

<b>NC Objectives</b>	<p>1) Identify common appliances that run on electricity.</p> <p>2) Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.</p> <p>3) Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery.</p> <p>4) Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.</p> <p>5) Recognise some common conductors and insulators, and associate metals with being good conductors.</p>	
<b>Key Knowledge</b>	<p>1) Know many household devices and appliances run on electricity.</p> <p>1) Know some plug in to the mains and others run on batteries.</p> <p>2) Know an electrical circuit consists of a cell or battery connected to a component using wires.</p> <p>2) Know if there is a break in the circuit, a loose connection or a short circuit, the component will not work.</p> <p>3) Know when an electricity flows through a circuit, components within that circuit, such as lamp will begin to work.</p> <p>4) Know a switch can be added to the circuit to turn the component on and off.</p> <p>5) Know metals are good conductors so they can be used as wires in a circuit (<u>Y3 LT Mighty metals</u>).</p> <p>5) Know non-metallic solids are insulators except for graphite (pencil lead).</p> <p>5) Know water, if not completely pure, also conducts electricity.</p>	
<b>Progression</b>	<b>Prior Learning</b>	<b>Future Learning</b>
	<ul style="list-style-type: none"> <li>Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes. (Early Learning Goal)</li> </ul>	<ul style="list-style-type: none"> <li>Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. (Y6 - Electricity)</li> <li>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. (Y6 - Electricity)</li> <li>Use recognised symbols when representing a simple circuit in a diagram. (Y6 - Electricity)</li> </ul>
<b>Vocabulary</b>	<p>battery, bulbs, buzzers, cell, closed circuit, conductor, crocodile clips, electrical appliances, insulator, motors, open circuit, simple series circuit, switches, wires.</p>	
<b>Working Scientifically</b>	<p>Children will learn to make a simple electrical circuit using different components, including bulbs, buzzers, motors and switches. They will record their circuits pictorially (building on this in Year 6 when they learn the conventional circuit symbols). Children will conduct observations to work out the effects of adding a switch to a circuit, and will find out how to arrange a circuit in order for a bulb to light. They will learn about conductors and insulators, and in particular that metals tend to be good conductors. They will do some simple tests to show whether different materials can fill a gap in an electrical circuit</p>	
<b>Misconceptions</b>	<ul style="list-style-type: none"> <li>electricity flows to bulbs, not through them</li> <li>electricity flows out of both ends of a battery</li> <li>electricity works by simply coming out of one end of a battery into the component.</li> </ul>	



# Year 5



## Living Things and their Habitats

<p>NC Objectives</p>	<p>1) Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. 2) Describe the life process of reproduction in some plants and animals.</p>	
<p>Key Knowledge</p>	<p>1) 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 1) 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 1) 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 1&amp;2) Know as part of their life cycle, plants and animals reproduce. Most animals reproduce sexually. 2) Know this involves two parents where the sperm from the male fertilises the female egg. 2) Know animals, including humans, have offspring which grow into adults. 2) Know in humans and some animals, these offspring will be born live, such as babies or kittens, and then grow into adults. 2) Know plants reproduce both sexually and asexually. Bulbs, tubers, runners and plantlets are examples of asexual plant reproduction which involves only one parent. 3) Gardeners may force plants to reproduce asexually by taking cuttings. 4) Sexual reproduction occurs through pollination, usually involving wind or insects.</p>	
<p>Progression</p>	<p>Prior Learning</p> <ul style="list-style-type: none"> <li>• Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans)</li> <li>• Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)</li> </ul>	<p>Future Learning</p> <ul style="list-style-type: none"> <li>• Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta. (KS3)</li> <li>• Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. (KS3)</li> </ul>
<p>Vocabulary</p>	<p><b>As for previous years, plus:</b> anther, asexual reproduction animal behaviourist, birth, bud, carpel, chromosomes, cross-pollination, death, egg cell (ovum), embryo, fallopian tubes, female gamete, fertilization, filament, gestation, growth, hormones, life cycles, male gamete, menstrual cycle, microorganisms, naturalist, ovaries, ovary, ovulation, penis, petals, placenta, puberty, sepals, sexual reproduction, sperm, stamens, stigma, style, testes, uterus, vagina, vertebrates (reptiles, fish, amphibians, birds, mammals), zygote</p>	
<p>Working Scientifically</p>	<p>Children will build on their Year 2 and 4 work, studying the life cycles of animals (mammals, amphibians, insects and birds) and plants in greater depth (focusing on birth, growth, development, reproduction and death in animals, and growth, reproduction and death in plants). They will make observations of plant and animal reproduction by growing plants, or rearing and caring for baby animals, and will work scientifically when they make observations of animal and plant life cycles in the local environment. They will extend this by finding out about the work of naturalists and animal behaviourists, making comparisons and beginning to think about possible reasons for similarities and differences.</p>	

Misconceptions	<ul style="list-style-type: none"> <li>• all plants start out as seeds</li> <li>• all plants have flowers</li> <li>• plants that grow from bulbs do not have seeds</li> <li>• only birds lay eggs.</li> </ul>	
<b>Animals including humans</b>		
NC Objectives	1) Describe the changes as humans develop to old age.	
Key Knowledge	<p>1) 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.</p> <p><i>This needs to be taught alongside PSHE. The new statutory requirements for relationships and health education can be found below:</i></p> <ul style="list-style-type: none"> <li>• statutory guidance on Physical health and mental wellbeing (primary and secondary). Other useful guidance includes:</li> <li>• Joint briefing on teaching about puberty in KS2 from PHSE Association and Association for Science Education</li> <li>• Briefing on humans development and reproduction in the Primary Curriculum from PHSE Association and Association for Science Education.</li> </ul> <p><a href="https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/612222/Physical_health_and_mental_wellbeing_(Primary_and_secondary).pdf">Physical health and mental wellbeing (Primary and secondary) - GOV.UK (www.gov.uk)</a></p> <p><a href="https://www.pshe-association.org.uk/teaching-about-puberty-in-ks2/">PSHE Association and ASE: Teaching about puberty in KS2 (pshe-association.org.uk)</a></p> <p><i>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 backgrounds and must reflect the PSHE curriculum</i></p>	
Progression	Prior Learning	Future Learning
	<ul style="list-style-type: none"> <li>• Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans)</li> </ul>	<ul style="list-style-type: none"> <li>• Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta. (KS3)</li> </ul>
Vocabulary	anther, asexual reproduction animal behaviourist, birth, bud, carpel, chromosomes, cross-pollination, death, egg cell (ovum), embryo, fallopian tubes, female gamete, fertilization, filament, gestation, growth, hormones, life cycles, male gamete, menstrual cycle, microorganisms, naturalist, ovaries, ovary, ovulation, penis, petals, placenta, puberty, sepals, sexual reproduction, sperm, stamens, stigma, style, testes, uterus, vagina, vertebrates (reptiles, fish, amphibians, birds, mammals), zygote	
Working Scientifically	Developing from their work on life cycles in Year 2, children will learn about changes in humans as they develop from birth to death. They will draw timelines to indicate stages in the growth and development of humans and learn about changes experienced in puberty.	
Misconceptions	<ul style="list-style-type: none"> <li>• a baby grows in a mother's tummy</li> <li>• a baby is "made".</li> </ul>	

## Properties and changes of materials

<b>NC Objectives</b>	<p>1) 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>2) Know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution.</p> <p>3) Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.</p> <p>4) Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.</p> <p>5) Demonstrate that dissolving, mixing and changes of state are reversible changes.</p> <p>6) 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>	
<b>Key Knowledge</b>	<p>1) Know materials have different uses depending on their properties and state (liquid, solid, gas).</p> <p>1) Know properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets.</p> <p>2) Know some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment.</p> <p>3) Know mixtures can be separated by filtering, sieving and evaporation.</p> <p>4) Know what a fair test means</p> <p>5) Know some changes to materials such as dissolving, mixing and changes of state are reversible</p> <p>6) Know some changes such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials and these are not reversible.</p>	
<b>Progression</b>	<b>Prior Learning</b>	<b>Future Learning</b>
	<ul style="list-style-type: none"> <li>• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials)</li> <li>• Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)</li> <li>• Observe how magnets attract or repel each other and attract some materials and not others. (Y3 – Forces and Magnets)</li> <li>• Compare and group materials together, according to whether they are solids, liquids or gases. (Y4 - States of matter)</li> <li>• 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). (Y4 - States of matter)</li> <li>• Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. (Y4 - States of matter)</li> </ul>	<ul style="list-style-type: none"> <li>• Chemical reactions as the rearrangement of atoms. (KS3)</li> <li>• Representing chemical reactions using formulae and using equations. (KS3)</li> <li>• Combustion, thermal decomposition, oxidation and displacement reactions. (KS3) <ul style="list-style-type: none"> <li>• Defining acids and alkalis in terms of neutralisation reactions. (KS3)</li> </ul> </li> <li>• The pH scale for measuring acidity/alkalinity; and indicators. (KS3)</li> </ul>
<b>Vocabulary</b>	buoyancy, burning, change of state, chemical changes, chemical reaction, density, dissolving, elasticity, electrical conductivity, evaporating, filtering, filtrate, gas, hardness, irreversible or hard-to-reverse change, liquid, melting, magnetism, polymer, residue, reversible change, rusting (oxidisation), sieving, solid, solubility, solute, solution, solvent, stiffness, strength, suspension, thermal conductivity, toughness	

Working Scientifically	This links with Year 3 and 4 work on magnetism and electricity and the states of matter. Children conduct tests to identify the properties of everyday materials (hardness, solubility, conductivity and magnetism) and experiment with different materials to find out about reversible changes (melting, dissolving and evaporating). They learn how to recover substances from solution, through evaporation, and explore ways of separating mixtures into solids and liquids by filtering and sieving. Children will experiment with heating, cooling, dissolving and mixing different substances to understand the concepts of reversible change and changes of state. This will enable them to draw connections to irreversible or hard to reverse changes (burning, rusting or other chemical reactions). With support, they will observe the effect of burning, or the irreversible chemical changes involved in cooking. Children will find out about scientists who helped to create new materials with advantageous properties through chemical change, and learn how these materials can be used.	
Misconceptions	<ul style="list-style-type: none"> <li>• thermal insulators keep cold in or out</li> <li>• thermal insulators warm things up</li> <li>• solids dissolved in liquids have vanished and so you cannot get them back</li> <li>• lit candles only melt, which is a reversible change.</li> </ul>	
<b>Earth and space</b>		
NC Objectives	<ol style="list-style-type: none"> <li>1) Describe the movement of the Earth, and other planets, relative to the Sun in the solar system.</li> <li>2) Describe the movement of the Moon relative to the Earth.</li> <li>3) Describe the Sun, Earth and Moon as approximately spherical bodies.</li> <li>4) Use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky.</li> </ol>	
Key Knowledge	<ol style="list-style-type: none"> <li>1) Know the planets travel around the Sun in fixed orbits.</li> <li>1) Know earth takes 365¼ days to complete its orbit around the Sun.</li> <li>2) Know the Moon orbits the Earth. It takes about 28 days to complete its orbit.</li> <li>2) Know that the moon has different phases depending on where it is on its orbit.</li> <li>3) Know the Sun, Earth and Moon are approximately spherical.</li> <li>3) Know the Sun is a star.</li> <li>3) Know it is at the centre of our solar system.</li> <li>3) Know that there are eight major planets in our solar system (it is not necessary to recall the name the planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune).</li> <li>4) Know the Earth rotates (spins) on its axis every 24 hours.</li> <li>4) Know as Earth rotates faces the Sun (day) and is facing away from the Sun (night).</li> <li>4) Know as the Earth rotates, the Sun appears to move across the sky.</li> </ol>	
Progression	Prior Learning	Future Learning
	<ul style="list-style-type: none"> <li>• Observe changes across the four seasons. (Y1 - Seasonal changes)</li> <li>• Observe and describe weather associated with the seasons and how day length varies. (Y1 - Seasonal changes)</li> </ul>	<ul style="list-style-type: none"> <li>• Gravity force, weight = mass x gravitational field strength (g), on Earth <math>g=10 \text{ N/kg}</math>, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only). (KS3)</li> <li>• Our Sun as a star, other stars in our galaxy, other galaxies. (KS3)</li> <li>• The seasons and the Earth's tilt, day length at different times of year, in different hemispheres. (KS3)</li> <li>• The light year as a unit of astronomical distance. (KS3)</li> </ul>
Vocabulary	asteroids, axis, celestial body, comets, Earth, Earth's rotation, elliptical orbit, gravitational force, heliocentric model of the solar system, galaxy, geocentric model, hemisphere, Jupiter, light year, Mars, Mercury, meteors, moon, Neptune, phases of the moon, Saturn, shadow clock, shooting stars, Sun, sundial, time zones, Uranus, Venus	

Working Scientifically	Children will learn about the solar system and the way that the Earth moves relative to the Sun, and the Moon relative to the Earth. They will create and use simple models of the solar system and use these to demonstrate why we experience day and night on Earth. They will find out about different time zones and understand why it isn't the same time all over Earth simultaneously. They will also learn about how our heliocentric (Sun-centred) model of the solar system differs from the geocentric (Earth-centred) model used in the past.	
Misconceptions	<ul style="list-style-type: none"> <li>• the Earth is flat</li> <li>• the Sun is a planet</li> <li>• the Sun rotates around the Earth</li> <li>• the Sun moves across the sky during the day</li> <li>• the Sun rises in the morning and sets in the evening</li> <li>• the Moon appears only at night</li> <li>• night is caused by the Moon getting in the way of the Sun or the Sun moving further away from the Earth.</li> </ul>	
<b>Forces</b>		
NC Objectives	<ol style="list-style-type: none"> <li>1) Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.</li> <li>2) Identify the effects of air resistance, water resistance and friction that act between moving surfaces.</li> <li>3) Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.</li> </ol>	
Key Knowledge	<ol style="list-style-type: none"> <li>1) Know a force causes an object to start moving, stop moving, speed up, slow down or change direction.</li> <li>1) Know gravity is a force that acts at a distance.</li> <li>1) Know gravity is a force that act between all objects in the universe, but that it acts much more strongly on objects that have more mass and are closer together.</li> <li>1) Everything is pulled to the Earth by gravity. This causes unsupported objects to fall.</li> <li>1) Know that force is measured in a unit called Newtons.</li> <li>1) Know that the amount of matter in a object is its mass.</li> <li>2) Know air resistance, water resistance and friction are contact forces that act between moving surfaces.</li> <li>2) Know the object may be moving through the air or water, or the air and water may be moving over a stationary object.</li> <li>3) Know mechanism is a device that allows a small force to be increased to a larger force. The pay back is that it requires a greater movement.</li> <li>3) Know the small force moves a long distance and the resulting large force moves a small distance, e.g. a crowbar or bottle top remover.</li> <li>3) Know pulleys, levers and gears are all mechanisms, also known as simple machines (<a href="#">Link to DT</a>).</li> <li>3) Know that gears, levers and pulleys are simple machines that are 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 force over a small distance at the other end.</li> </ol>	
Progression	Prior Learning	Future Learning
	<ul style="list-style-type: none"> <li>• Compare how things move on different surfaces. (Y3 - Forces and magnets)</li> <li>• Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 - Forces and magnets)</li> <li>• Observe how magnets attract or repel each other and attract some materials and not others. (Y3 - Forces and magnets) <ul style="list-style-type: none"> <li>• 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. (Y3 - Forces and magnets)</li> </ul> </li> <li>• Describe magnets as having two poles. (Y3 - Forces and magnets)</li> <li>• Predict whether two magnets will attract or repel each other, depending on which poles are facing. (Y3 - Forces and magnets)</li> </ul>	<ul style="list-style-type: none"> <li>• Forces as pushes or pulls, arising from the interaction between two objects. (KS3)</li> <li>• Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces. (KS3)</li> <li>• Moment as the turning effect of a force. (KS3)</li> <li>• Forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water. (KS3)</li> <li>• Forces measured in Newtons, measurements of stretch or compression as force is changed. (KS3)</li> </ul>

<p>Vocabulary</p>	<p>As for Year 3, plus: drag forces, gears, levers, pulleys, springs, transference of force and motion</p>
<p>Working Scientifically</p>	<p>Building on their Year 3 work on forces and magnets, children learn about the effects of gravity and drag forces, such as friction and air and water resistance. They will find out how and why drag forces slow moving objects down, devising experiments to show air resistance, or look at how friction works to slow down a wheeled vehicle when a brake is applied. Children will learn how levers, pulleys, gears and springs work, and how they transfer force and motion. They will look at the work of scientists such as Galileo and Isaac Newton.</p>
<p>Misconceptions</p>	<ul style="list-style-type: none"> <li>• the heavier the object the faster it falls, because it has more gravity acting on it</li> <li>• forces always act in pairs which are equal and opposite</li> <li>• smooth surfaces have no friction</li> <li>• objects always travel better on smooth surfaces</li> <li>• a moving object has a force which is pushing it forwards and it stops when the pushing force wears out</li> <li>• a non-moving object has no forces acting on it</li> <li>• heavy objects sink and light objects float.</li> </ul>



# Year 6



## Living Things and their Habitats

NC Objectives	<p>1) Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals.</p> <p>2) Give reasons for classifying plants and animals based on specific characteristics.</p>	
Key Knowledge	<p>1) Know living things can be formally grouped according to characteristics.</p> <p>1) Know plants and animals are two main groups but there are other living things that do not fit into these groups. Know they are micro-organisms, there are 3 types: fungi, viruses and bacteria.</p> <p>1) Know that germs are disease-causing micro-organisms.</p> <p>1) Know animals can be divided into two main groups: those that have backbones (vertebrates); and those that do not have backbones (invertebrates).</p> <p>1) Know vertebrates can be divided into five small groups: fish; amphibians; reptiles; birds; and mammals. Each group has common characteristics.</p> <p>1) Know invertebrates can be divided into a number of groups, including insects, spiders, snails and worms.</p> <p>1) Know plants can be divided broadly into two main groups: flowering plants; and non-flowering plants.</p> <p>2) Know plants can make their own food whereas animals cannot.</p>	
Progression	Prior Learning	Future Learning
	<ul style="list-style-type: none"> <li>Recognise that living things can be grouped in a variety of ways. (Y4 - Living things and their habitats)</li> <li>Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. (Y4 - Living things and their habitats)</li> <li>Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats)</li> <li>Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats)</li> </ul>	<ul style="list-style-type: none"> <li>Differences between species. (KS3)</li> </ul>
Vocabulary	<p><b>As for previous years, plus):</b> classification, classification keys, dichotomous/binary keys, five kingdoms (bacteria, protists, animals, plants, fungi), genetic variation, invertebrates, vertebrates (reptiles, fish, amphibians, birds, mammals)</p>	
Working Scientifically	<p>Extending the work in Year 4 on classification, children learn about classifying living things into five 'kingdoms' and animals into vertebrates (reptiles, fish, amphibians, birds and mammals) and invertebrates, using direct observation and explaining their choices. They use classification keys to help with (and to demonstrate) the decision-making process involved.</p>	
Misconceptions	<ul style="list-style-type: none"> <li>all micro-organisms are harmful</li> <li>mushrooms are plants.</li> </ul>	

## Animals including humans

<b>NC Objectives</b>	<p>1) Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.</p> <p>2) Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.</p> <p>3) Describe the ways in which nutrients and water are transported within animals, including humans.</p>	
<b>Key Knowledge</b>	<p>1) Know the heart pumps blood in the blood vessels around to the lungs.</p> <p>1) Know oxygen goes into the blood and carbon dioxide is removed.</p> <p>1) Know the blood goes back to the heart and is then pumped around the body.</p> <p>1) Know as they are used, they produce carbon dioxide and other waste products.</p> <p>1) Know carbon dioxide is carried by the blood back to the heart and then the cycle starts again as it is transported back to the lungs to be removed from the body.</p> <p>1) Know this is the human circulatory system.</p> <p>2) Know diet, exercise, drugs and lifestyle have an impact on the way our bodies function (Y2 &amp; Y3 eat well plate).</p> <p>2) 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.</p> <p>2) Know they can affect how well our heart and lungs work, how likely we are to suffer from conditions such as diabetes, how clearly we think, and generally how fit and well we feel.</p> <p>2) Know some conditions are caused by deficiencies in our diet e.g. lack of vitamins.</p> <p>3) Know nutrients, water and oxygen are transported in the blood to the muscles and other parts of the body where they are needed.</p> <p><i>This content is also included in PSHE. The new statutory requirements for relationships and health education can be found below:</i></p> <p><a href="http://www.gov.uk">Physical health and mental wellbeing (Primary and secondary) - GOV.UK (www.gov.uk)</a></p>	
<b>Progression</b>	<b>Prior Learning</b>	<b>Future Learning</b>
	<ul style="list-style-type: none"> <li>• Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans)</li> <li>• 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. (Y3 - Animals, including humans)</li> <li>• Describe the simple functions of the basic parts of the digestive system in humans. (Y4 - Animals, including humans)</li> <li>• Identify the different types of teeth in humans and their simple functions. (Y4 - Animals, including humans)</li> </ul>	<ul style="list-style-type: none"> <li>• The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases. (KS3)</li> <li>• The effects of recreational drugs (including substance misuse) on behaviour, health and life processes. (KS3)</li> <li>• The structure and functions of the gas exchange system in humans, including adaptations to function. (KS3)</li> <li>• The mechanism of breathing to move air in and out of the lungs. (KS3)</li> <li>• The impact of exercise, asthma and smoking on the human gas exchange system. (KS3)</li> </ul>
<b>Vocabulary</b>	<p><b>As for previous years plus:</b> adrenaline, aerobic respiration, alveoli, aorta, arteries, atrium, blood, blood vessels, bronchi, bronchioles, capillaries, carotid artery, circulatory system, clotting, deoxygenated, diaphragm, gills, haemoglobin, heart, heart rate, intercostal muscles, lungs, oxygenated, plasma, platelets, pulmonary artery, pulmonary vein, pulse, red blood cells, veins, ventricles, white blood cells, wind pipe (trachea)</p>	
<b>Working Scientifically</b>	<p>Building on their work in Years 3 and 4 on human digestion, circulation, muscles and skeleton, children will learn about the human circulatory system (identifying the functions of the heart, blood vessels and blood) and look at how diet, exercise, drugs and lifestyle impact on health. They will compare and contrast the needs of different animals (including humans), and find out about how nutrients and water are transported within our (and animals') bodies. They work scientifically to make drawings and models to show ideas about the circulatory system, and compare these with images from secondary sources. They may also conduct experiments and tests to show the effect of different activities on pulse and breathing rate, suggesting reasons for their findings. They will have an opportunity to learn about scientists whose work has contributed to our understanding of the circulatory system, including Harvey and Galen.</p>	

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Misconceptions</p>	<ul style="list-style-type: none"> <li>• your heart is on the left side of your chest</li> <li>• the heart makes blood</li> <li>• the blood travels in one loop from the heart to the lungs and around the body</li> <li>• when we exercise, our heart beats faster to work the muscles more</li> <li>• some blood in our bodies is blue and some blood is red</li> <li>• we just eat food for energy</li> <li>• all fat is bad for you</li> <li>• all dairy is good for you</li> <li>• protein is good for you, so you can eat as much as you want</li> <li>• foods only contain fat if you can see it</li> <li>• all drugs are bad for you.</li> </ul>	
<p><b>Evolution and inheritance</b></p>		
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">NC Objectives</p>	<p>1) Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.</p> <p>2) Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.</p> <p>3) Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.</p>	
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Key Knowledge</p>	<p>1) Know fossils give us evidence of what lived on the Earth millions of year ago and provide evidence to support the theory of evolution.</p> <p>2) Know all living things have offspring of the same kind, as features in the offspring are inherited from the parents.</p> <p>2) Know due to sexual reproduction, the offspring are not identical to their parents and vary from each other.</p> <p>3) Know plants and animals have characteristics that make them suited (adapted) to their environment.</p> <p>3) Know if the environment changes rapidly, some variations of a species may not suit the new environment and will die.</p> <p>3) Know if the environment changes slowly, animals and plants with variations that are best suited survive (natural selection) in greater numbers to reproduce and pass their characteristics on to their young.</p> <p>3) Know over time, these inherited characteristics become more dominant within the population.</p> <p>3) Know over a very long period of time, these characteristics may be so different to how they were originally that a new species is created. This is evolution.</p> <p>3) Know more recently, scientists such as Darwin and Wallace observed how living things adapt to different environments to become distinct varieties with their own characteristics.</p>	
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Progression</p>	<p>Prior Learning</p>	<p>Future Learning</p>
	<ul style="list-style-type: none"> <li>• 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. (Y2 - Living things and their habitats)</li> <li>• Describe in simple terms how fossils are formed when things that have lived are trapped within rock. (Y3 - Rocks)</li> <li>• Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats)</li> </ul>	<ul style="list-style-type: none"> <li>• Heredity as the process by which genetic information is transmitted from one generation to the next. (KS3)</li> <li>• A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model. (KS3)</li> <li>• The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection. (KS3)</li> <li>• Changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction. (KS3)</li> </ul>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Vocabulary</p>	<p>adaptation, chromosomes, competition, DNA, environmental conditions, environmental variations, evolution, evolutionary change, features, fossil records, genes, genetic variation, inheritance, natural selection, palaeontologist, survival of the fittest, variation over time</p>	

Working Scientifically	Children will be introduced to the idea that characteristics are passed from parent to child, in plants and animals, including humans. They build on their fossil work from Year 3, and look at how plants and animals on Earth adapt to their environment, gradually change over time, and how living things evolve. They learn that offspring are not identical to their parents, and that this variation can give rise to characteristics that help or hinder animals' chances of survival, leading over long periods of time to evolutionary change. Children may also start to learn about Charles Darwin's work and its contribution to our understanding of evolution.	
Misconceptions	<ul style="list-style-type: none"> <li>• adaptation occurs during an animal's lifetime: giraffes' necks stretch during their lifetime to reach higher leaves and animals living in cold environments grow thick fur during their life</li> <li>• offspring most resemble their parents of the same sex, so that sons look like fathers</li> <li>• all characteristics, including those that are due to actions during the parent's life such as dyed hair or footballing skills, can be inherited</li> <li>• cavemen and dinosaurs were alive at the same time.</li> </ul>	
<b>Light</b>		
NC Objectives	<ol style="list-style-type: none"> <li>1) Recognise that light appears to travel in straight lines.</li> <li>2) 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>3) 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>4) Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.</li> </ol>	
Key Knowledge	<p>1&amp;2) Know light appears to travel in straight lines, and we see objects when light from them goes into our eyes.</p> <p>1&amp;2) 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.</p> <p>1&amp;2) 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</p> <p>3) Know the light may come directly from light sources, but for other objects some light must be reflected from the object into our eyes for the object to be seen.</p> <p>3) Know that white light comprises all the colours of light.</p> <p>3) 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 that constitute white light travel at different speeds.</p> <p>4) Know objects that block light (are not fully transparent) will cause shadows. Because light travels in straight lines the shape of the shadow will be the same as the outline shape of the object.</p>	
Progression	Prior Learning	Future Learning
	<ul style="list-style-type: none"> <li>• Recognise that they need light in order to see things and that dark is the absence of light. (Y3 - Light)</li> <li>• Notice that light is reflected from surfaces. (Y3 - Light)</li> <li>• Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 - Light)</li> <li>• Recognise that shadows are formed when the light from a light source is blocked by an opaque object. (Y3 - Light)</li> <li>• Find patterns in the way that the size of shadows change. (Y3 - Light)</li> </ul>	<ul style="list-style-type: none"> <li>• The similarities and differences between light waves and waves in matter. (KS3)</li> <li>• Light waves travelling through a vacuum; speed of light. (KS3) <ul style="list-style-type: none"> <li>• The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface. (KS3)</li> </ul> </li> <li>• Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye. (KS3)</li> <li>• Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras. (KS3) <ul style="list-style-type: none"> <li>• Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection. (KS3)</li> </ul> </li> </ul>

Vocabulary	As for Year 3, plus: absorption, lenses, light source, optics, periscope, prism, rainbow, reflection, refraction, spectrum, transmission
Working Scientifically	Extending their work in Year 3, children do practical experiments and make observations of the way light travels, looking at different effects of light in phenomena such as rainbows, rays of light split by prisms, objects appearing bent in water, etc. They look at how light appears to travel in straight lines, and understand that we can see objects because they reflect light into our eyes. They know that shadows are the same shape as the object that cast them and experiment with shadows by placing objects at different distances from a light source.
Misconceptions	<ul style="list-style-type: none"> <li>we see objects because light travels from our eyes to the object.</li> </ul>

### Electricity

NC Objectives	1) Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. 2) 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. 3) Use recognised symbols when representing a simple circuit in a diagram.	
Key Knowledge	1&2) Know adding more cells to a complete circuit will make a bulb brighter, a motor spin faster or a buzzer make a louder sound. If you use a battery with a higher voltage, the same thing happens. 1&2) Know adding more bulbs to a circuit will make each bulb less bright. 1&2) know using more motors or buzzers, each motor will spin more slowly and each buzzer will be quieter. 2) Know turning a switch off (open) breaks a circuit so the circuit is not complete and electricity cannot flow. 2) Know any bulbs, motors or buzzers will then turn off as well. 3) Know you can use recognised circuit symbols for battery, bulb, motor, buzzer, wire. 3) Know how to draw simple circuit diagrams.	
Progression	Prior Learning	Future Learning
	<ul style="list-style-type: none"> <li>Identify common appliances that run on electricity. (Y4 - Electricity)</li> <li>Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. (Y4 - Electricity)</li> <li>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. (Y4 - Electricity)</li> <li>Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. (Y4 - Electricity)             <ul style="list-style-type: none"> <li>Recognise some common conductors and insulators, and associate metals with being good conductors. (Y4 - Electricity)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge. (KS3)</li> <li>Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current. (KS3)</li> <li>Differences in resistance between conducting and insulating components (quantitative). (KS3)             <ul style="list-style-type: none"> <li>Static electricity. (KS3)</li> </ul> </li> </ul>

Vocabulary	circuits, circuit diagrams, components, series circuit, voltage
Working Scientifically	To develop their work from Year 4, children construct simple electrical series circuits using a range of components (switches, buzzers, motors etc). They can name the parts of a circuit and draw diagrams using recognised symbols. They experiment by adding cells to a circuit, or using cells with a higher voltage, to make a lamp shine brighter, or a buzzer buzz louder.
Misconceptions	<ul style="list-style-type: none"><li>• larger-sized batteries make bulbs brighter</li><li>• a complete circuit uses up electricity</li><li>• components in a circuit that are closer to the battery get more electricity.</li></ul>