



### Biology – Animals including humans

<b>EYFS</b> Early Learning Goals	<b>KS1</b> National Curriculum	<b>KS2</b> National Curriculum
<p>Creating with Materials</p> <ul style="list-style-type: none"> <li>- Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function.</li> </ul> <p>The Natural World</p> <ul style="list-style-type: none"> <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>	<p><b>Year 1 Animals, including humans</b> <b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>• identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals</li> <li>• identify and name a variety of common animals that are carnivores, herbivores and omnivores</li> <li>• describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)</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.</li> </ul> <p><b>Year 2 Animals, including humans</b> <b>Pupils should be taught to:</b></p> <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)</li> <li>• notice that animals, including humans, have offspring which grow into adults</li> <li>• describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.</li> </ul> <p><b>Year 2 Living things and their habitats</b> <b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>• explore and compare the differences between things that are living, dead, and things that have never been alive</li> <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</li> <li>• identify and name a variety of plants and animals in their habitats, including micro-habitats</li> <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.</li> </ul>	<p><b>Year 3 Animals, including humans</b> <b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>• identify that humans and some other animals have skeletons and muscles for support, protection and movement.</li> <li>• identify that animal, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat</li> </ul> <p><b>Year 4 Animals, including humans</b> <b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>• describe the simple functions of the basic parts of the digestive system in humans</li> <li>• identify the different types of teeth in humans and their simple functions</li> <li>• construct and interpret a variety of food chains, identifying producers, predators and prey.</li> </ul> <p><b>Year 5 Animals, including humans</b> <b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>• describe the changes as humans develop to old age. (taught alongside PSHE curriculum in Years 5 and 6)</li> </ul> <p><b>Year 6 Animals, including humans</b> <b>Pupils should be taught to:</b></p> <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</li> <li>• recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function</li> <li>• describe the ways in which nutrients and water are transported within animals, including humans.</li> </ul>

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<b>Animals including humans</b>	Understand the key features of the life cycle of a plant and an animal.  Begin to understand the need to respect and care for the	<u><b>Animal Survival</b></u> <b>Knowledge Block 1: Feeding for survival</b> <ul style="list-style-type: none"> <li>• Animals are groups of <b>organisms</b> that need to consume food to survive.</li> <li>• Food provides <b>energy</b></li> </ul>	<u><b>Animal Life Cycles</b></u> <b>Knowledge Block 1: Animal timelines</b> <ul style="list-style-type: none"> <li>• Things that are <b>living</b>, move, feed, grow, <b>reproduce</b> and use their senses</li> <li>• Animals grow until</li> </ul>	<u><b>Animals, skeletons and movement</b></u> <b>Knowledge Block 1: Skeletons protect vital organs</b> <ul style="list-style-type: none"> <li>• All <b>vertebrates</b> have internal <b>skeletons</b> that protect <b>vital organs</b>.</li> </ul>	<u><b>Digestion</b></u> <b>Knowledge Block :- Food groups</b> <ul style="list-style-type: none"> <li>○ Animals need a variety of foods to help them grow and survive. The main food groups are:</li> </ul>	<u><b>Circulation</b></u> <b>Knowledge Block 1: Getting oxygen into the blood</b> <ul style="list-style-type: none"> <li>• All animals need <b>oxygen</b> to survive.</li> <li>• Air is breathed into the <b>lungs</b> where the</li> </ul>	

<p>natural environment and all living things</p> <p>Explore the natural world around them.</p>	<p>and the building blocks of <b>growth</b>.</p> <ul style="list-style-type: none"> <li>• There are many different groups of animals including <b>fish, amphibians, reptiles, birds and mammals</b>. They have different structures, and they eat different types of foods.</li> <li>• The structure of a variety of common animals varies <b>Mammals</b> have hair/fur and give birth to live young, <b>fish</b> can breathe underwater using gills, <b>birds</b> have feathers, beaks and wings. Females lay eggs. Most birds can fly, <b>reptiles</b> are air breathing and have scaly skin and lays eggs, and <b>amphibians</b> have smooth slimy skin and live on land and in water.</li> <li>• Some eat other animals (<b>carnivores</b>), and others only eat vegetables (<b>herbivores</b>), and some like to eat both plants and meat (<b>omnivores</b>)</li> <li>• Common animals that are <b>carnivores</b> include lions, cats, sharks and snakes</li> <li>• Common animals that are <b>herbivores</b> include cows, horses, sheep, elephants and deer</li> <li>• Common animals that are <b>omnivores</b> include humans, bears, monkeys and seagulls</li> </ul>	<p>they reach <b>maturity</b> and then don't grow any larger</p> <ul style="list-style-type: none"> <li>• Animals <b>reproduce</b> when they reach maturity (adulthood)</li> <li>• All animals eventually, <b>die</b></li> <li>• Different animals live to different ages</li> <li>• Different animals reach different sizes before they are able to reproduce</li> <li>• Different animals reproduce at different ages</li> <li>• Animals, including humans, have <b>offspring</b> which grow into adults</li> <li>• Exercise, eating the right amounts of different types of food and <b>hygiene</b> are important to maintain good <b>health</b> and <b>wellbeing</b></li> </ul> <p><b>Knowledge Block 2: How animals get their food</b></p> <ul style="list-style-type: none"> <li>• <b>Habitats</b> are places where animals and plants live (from Year 1)</li> <li>• Animals live in habitats in which they are suited.</li> <li>• Different kinds of animals and plants depend on each other within <b>habitat</b>.</li> <li>• Animals get their food from plants and other animals. This can be shown in a <b>food chain</b>.</li> <li>• A food chain begins with a <b>producer</b>. This is</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Invertebrates</b> have <b>exoskeletons</b> that protect <b>vital organs</b>.</li> </ul> <p><b>Knowledge Block 2: Skeletons support weight</b></p> <ul style="list-style-type: none"> <li>• Skeletons support the weight of land animals.</li> <li>• Stronger bones can <b>support</b> a greater <b>mass</b>.</li> </ul> <p><b>Knowledge Block 3: Skeletons support movement</b></p> <ul style="list-style-type: none"> <li>• Bones are <b>connected</b> (but can move relative to each other) at joints.</li> <li>• <b>Muscles</b> connect to bones and move them when they <b>contract</b>.</li> <li>• Stronger bones can <b>anchor</b> stronger muscles.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Meat, dairy</b> and pulses provide <b>protein</b> for muscles.</li> <li>• <b>Grains</b> and <b>root vegetables</b> provide <b>carbohydrates</b> for energy.</li> <li>• <b>Fat</b> for <b>insulation</b> and energy.</li> <li>• <b>Fruit</b> and <b>vegetables</b> for <b>minerals, vitamins and fibre</b>. These are essential to keep our bodies working well and protect us from illnesses.</li> </ul> <p><b>Knowledge Block 2: Variation in animals' diet</b></p> <ul style="list-style-type: none"> <li>• Different animals require different foods to survive.</li> <li>• Animals get their food from plants and other animals. This can be shown in a <b>food chain</b>. (From Year 2)</li> <li>• A food chain begins with a <b>producer</b>. This is often a green plant because plants can make their own food. (From Year 2)</li> <li>• A living thing that eats other plants is called a <b>consumer</b>. (From Year 2)</li> <li>• Humans require a balanced diet to remain <b>healthy</b> but healthy diets vary depending upon the type of activity that humans do.</li> <li>• Humans have 2 sets of teeth in their lifetimes</li> <li>• Humans have three main types of teeth-incisors, canines and molars.</li> </ul>	<p>oxygen in the air is passed into the blood.</p> <ul style="list-style-type: none"> <li>• Every part of animals' bodies need oxygen, especially <b>muscles</b>.</li> <li>• Muscles need a supply of oxygen and <b>sugar (glucose)</b> to make them work, they are supplied by the blood.</li> </ul> <p><b>Knowledge Block 2: The blood circulation model</b></p> <ul style="list-style-type: none"> <li>• The heart is a vital organ pumps blood through the blood vessels.</li> <li>• Blood Vessels are the tubes that blood flows through.</li> <li>• The blood <b>circulates</b> around the body in a way that ensures all muscles in the body get a supply of oxygen and sugar.</li> <li>• The <b>heart</b> pumps blood to every muscle in the body. The circulatory route must allow the blood to collect oxygen from the lungs, sugar from the intestines and visit muscles.</li> <li>• The blood then returns to the heart where it is pumped again.</li> <li>• Exercise helps the heart to work more efficiently.</li> <li>• Eating a healthy diet helps to keep the blood vessels from getting blocked.</li> <li>• Avoiding smoking and alcohol puts less stress on the whole system and keeps it healthier.</li> </ul>	
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**Knowledge Block 2:  
Moving for survival**

- Animals must move to get their food
- They will move in different ways to get their food
- Animals that eat other animals are called **predators**
- Animals that are eaten by other animals are called **prey**
- Animals feeding relationships can be illustrated in a **food chain**

**Knowledge Block 3:  
Sensing for survival**

- The five sense organs are the **eyes** (for seeing), **nose** (for smelling), **ears** (for hearing), **tongue** (for tasting), and **skin** (for touching or feeling).
- Animals have senses to help them survive  
Animals have developed a range of ways to find prey or avoid being eaten

- often a green plant because plants can make their own food.
- A living thing that eats other plants is called a **consumer**.

- Incisors help to bite off and chew pieces of food.
- Canines are used for tearing and ripping food.
- Molars help to crush and grind food.

**Knowledge Block 3:  
How humans digest food**

- The **nutrients** in food have to get to every part of the body. The **blood** transports them.
- The role of **digestion** is to get the nutrients in food to dissolve in the blood, if it doesn't dissolve it can't enter the blood and be transported.

## Biology – Plants

EYFS Early Learning Goals	KS1 National Curriculum	KS2 National Curriculum
<p>Creating with Materials</p> <ul style="list-style-type: none"> <li>- Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function.</li> </ul> <p>The Natural World</p> <ul style="list-style-type: none"> <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> </ul> <p>Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.</p>	<p><b>Year 1 Plants</b> <b>Notes and guidance (non-statutory)</b></p> <p>Pupils should use the local environment throughout the year to explore and answer questions about plants growing in their habitat. Where possible, they should observe the growth of flowers and vegetables that they have planted. They should become familiar with common names of flowers, examples of deciduous and evergreen trees, and plant structures (including leaves, flowers (blossom), petals, fruit, roots, <b>bulb, seed</b>, trunk, branches, stem).</p> <p><b>Year 2 Plants</b> <b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>• observe and describe how seeds and bulbs grow into mature plants</li> <li>• find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.</li> </ul> <p><b>Notes and guidance (non-statutory)</b></p> <p>Pupils should use the local environment throughout the year to observe how different plants grow. Pupils should be introduced to the requirements of plants for <b>germination</b>, growth and survival, as well as to the processes of <b>reproduction</b> and growth in plants.</p> <p>Note: Seeds and bulbs need water to grow but most do not need light; seeds and bulbs have a store of food inside them.</p>	<p><b>Year 3 Plants</b> <b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>• identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers</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</li> <li>• investigate the way in which water is transported within plants</li> <li>• explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</li> </ul>

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<b>Plants</b>	<p>Explore how things work.</p> <p>Plant seeds and care for growing plants.</p> <p>Understand the key features of the life cycle of a plant and an animal.</p> <p>Begin to understand the need to respect and care for the natural environment and all living things.</p> <p>Explore the natural world around them.</p> <p>Describe what they see, hear and feel whilst outside.</p>	<p style="text-align: center;"><u>Plants</u></p> <p><b>Knowledge Block 1: Where do plants come from</b></p> <ul style="list-style-type: none"> <li>• A <b>seed</b> contains a miniature plant that can develop into a fully grown plant.</li> <li>• A <b>bulb</b> has underground vertical shoots which already has modified <b>leaves</b></li> <li>• Seeds and bulbs need water to grow but most do not need light (<b>germination</b>)</li> <li>• Seeds and bulbs have food stores inside them to help the plant start to grow.</li> </ul>	<p style="text-align: center;"><u>New Plants</u></p> <p><b>Knowledge Block 1: What flowers are for</b></p> <ul style="list-style-type: none"> <li>• All <b>flowering plants</b> make seeds (<b>reproduction</b>) that can grow (<b>germinate</b>) into new plants</li> <li>• Plants need water, light and a suitable temperature to grow and stay healthy</li> </ul> <p><b>Knowledge Block 2: What happens after a plant has produced seeds</b></p> <p>Some plants die after it has produced its seed and sometimes the plant lives for many <b>generations</b> producing seeds each year</p>	<p style="text-align: center;"><u>Plants and their food production</u></p> <p><b>Knowledge Block 1: Plants don't go to McDonalds</b></p> <ul style="list-style-type: none"> <li>• Plants do not eat food so have to make their own.</li> <li>• This food provides them with energy, and materials to grow</li> <li>• To make the food (sugar) plants need water from the ground, <b>carbon dioxide</b> from the air and light from the sun.             <ul style="list-style-type: none"> <li>○ The water is taken up through the <b>roots</b> from the <b>soil</b></li> <li>○ The carbon dioxide is taken</li> </ul> </li> </ul>	<p style="text-align: center;"><u>Plant reproduction</u></p> <p><b>Knowledge Block 1: The reproductive parts of a flowering plant</b></p> <ul style="list-style-type: none"> <li>• Flowering plants <b>reproduce</b> by the process of <b>pollination</b></li> <li>• Pollination leads to the formation of a <b>seed</b> which can grow into a new plant</li> <li>• Flowering plants have evolved specific parts to carry out pollination and seed growth</li> <li>• Those parts are <b>stamen</b> where pollen is produced, <b>stigma</b> where pollen is collected, and the <b>ovaries</b> which contains the eggs that become a seed when the pollen</li> </ul>		

	<p>Recognise some environments that are different to the one in which they live.</p> <p>Understand the effect of changing seasons on the natural world around them.</p>	<p><b>Knowledge Block 2: Plant survival</b></p> <ul style="list-style-type: none"> <li>• To survive plants, need to get water, light, and avoid being eaten</li> </ul> <p><b>Knowledge Block 3: How plants get what they need to survive</b></p> <ul style="list-style-type: none"> <li>• A seed produces <b>roots</b> to allow water to get into the plant.</li> <li>• A seed produces <b>shoots</b> to produce leaves to collect the sunlight.</li> </ul> <p>A basic plant structure can include leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem</p>		<p>in through the <b>leaves</b></p> <p>As well as food, plants also make <b>oxygen</b> which is given out back into the air through the leaves</p>	<p>travels down the stigma and meets the egg</p> <ul style="list-style-type: none"> <li>• Flowers have <b>petals</b> also are a range of colours, patterns, and smells to attract insects</li> </ul> <p><b>Knowledge Block 2: All flowers are similar but different</b></p> <ul style="list-style-type: none"> <li>• Plants and flowers look different because they pollinate in different ways.</li> <li>• There are two types of pollination Insect and wind</li> <li>• Insect pollinated flowers are usually bright coloured and strong scents</li> <li>• Wind pollinated flowers have less colourful petals and much less scent</li> </ul> <p><b>Knowledge Block 3: Seed dispersal</b></p> <ul style="list-style-type: none"> <li>• Plants have evolved many different ways to <b>disperse</b> their seeds</li> <li>• Seed dispersal increases the chances of seeds <b>germinating</b> and growing into a mature plant</li> </ul> <p><b>Knowledge Block 4: What a seed does</b></p> <ul style="list-style-type: none"> <li>• A seed contains a miniature, undeveloped version of the plant</li> <li>• They contain a food store for the first stage of growth (until the plant can make its own food)</li> <li>• They are surrounded with a protective coat.</li> </ul>		
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## Biology – Variation and Evolution

EYFS Early Learning Goals	KS1 National Curriculum	KS2 National Curriculum
<p>Creating with Materials</p> <ul style="list-style-type: none"> <li>- Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function.</li> </ul> <p>The Natural World</p> <ul style="list-style-type: none"> <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>	<p><b>Year 1 Plants</b> <b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>• identify and describe the basic structure of a variety of common flowering plants, including trees.</li> <li>• identify and name a variety of common wild and garden plants, including deciduous and evergreen trees</li> </ul> <p><b>Year 1 Seasonal Changes</b> <b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>• observe changes across the four seasons</li> <li>• observe and describe weather associated with the seasons and how day length varies</li> </ul>	<p><b>Year 4 Living things and their habitats</b> <b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>• recognise that living things can be grouped in a variety of ways</li> <li>• explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment</li> <li>• recognise that environments can change and that this can sometimes pose dangers to living things.</li> </ul> <p><b>Year 5 Living things and their habitats</b> <b>Pupils should be taught to:</b></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</li> <li>• describe the life process of reproduction in some plants and animals.</li> </ul> <p><b>Year 5 Evolution and inheritance</b> <b>Pupils should be taught to:</b></p> <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</li> <li>• recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents</li> <li>• identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution</li> </ul> <p><b>Year 6 Living things and their habitats</b> <b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>• 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</li> <li>• give reasons for classifying plants and animals based on specific characteristics.</li> </ul>

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<b>Variation and Evolution</b>	<p>Begin to understand the need to respect and care for the natural environment and all living things. Explore and talk about different forces they can feel.</p> <p>Explore the natural world around them.</p>	<p style="text-align: center;"><b><u>Habitats</u></b></p> <p><b>Knowledge Block 1: Adapted to survive</b></p> <ul style="list-style-type: none"> <li>• There is variation in all living things</li> <li>• Animals and plants live in a variety of different places called habitats</li> <li>• Animals and plants have adapted to survive in different</li> </ul>			<p style="text-align: center;"><b><u>Living things</u></b></p> <p><b>Knowledge Block 1: Classifying living things</b></p> <ul style="list-style-type: none"> <li>• Living things can be divided into groups based upon their characteristics</li> <li>• <b>Classification keys</b> help group, identify and name living things</li> <li>• Animals can be classified as <b>vertebrates</b></li> </ul>	<p style="text-align: center;"><b><u>Fossils, geological time and classification</u></b></p> <p><b>Knowledge Block 1: What is evolution and how do we know it happened?</b></p> <ul style="list-style-type: none"> <li>• The Earth is very old. Around <b>4.2 billion</b> years. We know this from dating rocks</li> <li>• Life first appeared on Earth around <b>3.8 billion</b> years ago.</li> </ul>	<p style="text-align: center;"><b><u>Classification and Evolution</u></b></p> <p><b>Knowledge Block 1: Natural selection</b></p> <ul style="list-style-type: none"> <li>• <b>Evolution</b> is the change of physical form in a population over a long-time span</li> <li>• <b>Natural selection</b> is the process which controls that change.</li> <li>• In any <b>population</b> there is <b>variation</b> and</li> </ul>

	<p>Describe what they see, hear and feel whilst outside.</p> <p>Recognise some environments that are different to the one in which they live.</p> <p>Understand the effect of changing seasons on the natural world around them.</p>	<p>habitats</p> <ul style="list-style-type: none"> <li>Wild plants such as ferns, daisies, nettles and dandelions grow randomly.</li> <li>Garden plants such as roses, tulips, poppies, daffodils are planted intentionally.</li> </ul> <p><b>Knowledge Block 2: Plants adaptations for survival</b></p> <ul style="list-style-type: none"> <li>Plants have specific adaptations for survival</li> <li>To survive they need to get water, light, and avoid being eaten</li> </ul> <p style="text-align: center;"><u>Seasons</u></p> <p><b>Knowledge Block 1: Surviving the changing seasons</b></p> <ul style="list-style-type: none"> <li>Animals and plants have adapted ways of surviving the changing seasons</li> <li>These include <b>hibernating</b>, storing food, fattening up, <b>migration</b>, loss of leaves</li> <li>Trees can be either <b>evergreen</b> or <b>deciduous</b>.</li> <li><b>Evergreen</b> trees keep their green leaves all year round.</li> <li><b>Deciduous</b> trees lose their leaves every autumn.</li> </ul> <p>This substantive knowledge appears in the progression within the physics- earth and space:</p> <ul style="list-style-type: none"> <li>There are four seasons, <b>Spring, summer, autumn</b> and <b>winter</b></li> </ul>			<p>(having a spine) or <b>invertebrates</b> (lacking a spine)</p> <ul style="list-style-type: none"> <li>In any habitat there are <b>food chains</b> and webs where <b>nutrients</b> are passed from one <b>organism</b> to another when it is eaten</li> <li>If the population of one organism in the chain or web is affected, it has a knock-on effect to all the others</li> </ul> <p><b>Knowledge Block 2: Life cycles</b></p> <ul style="list-style-type: none"> <li>Mammals, amphibians, insects and birds have different life cycles.</li> <li>Lifecycles vary in time depending on the species of animal- it can be as short as just a few weeks for insects, to up to 200 years for sea urchins. Larger animals often have longer life cycles but not always.</li> <li>All animal life cycles begin with growth and development followed by reproduction.</li> <li>Some animals undergo a complete <b>metamorphosis</b> as they grow. Metamorphosis is a process where animals undergo an abrupt and obvious change in the structure of their body and their behaviour.</li> <li>Some animals are eusocial. This means they live in colonies (groups) with one animal or group producing young and the others working to care for them.</li> </ul>	<ul style="list-style-type: none"> <li>Life was, at first, very simple but over <b>millions</b> and millions of years life became more complex through the process of <b>evolution</b></li> </ul> <p><b>Knowledge Block 2: Evidence for evolution</b></p> <ul style="list-style-type: none"> <li>There are many sources of evidence for evolution</li> <li><b>Fossils</b> are one of the main sources of evidence for evolution. They show when new organisms appear and when they go <b>extinct</b>.</li> <li>Due to the nature of fossil formation and discovery, fossils only provide an incomplete record of evolution.</li> <li>Scientists use fossils along with other pieces of evidence (<i>DNA, Embryology, comparative anatomy, artificial selection</i>) to work out how organisms have evolved</li> <li>Fossils form when dead organisms are rapidly buried or leave an imprint and are turned to stone over a long period of time. If they survive in the Earth, they then have to be found by a <b>palaeontologist</b> who will study them.</li> </ul> <p><b>Knowledge Block 3: Classification of life</b></p> <ul style="list-style-type: none"> <li>All living (and <b>extinct</b>) <b>organisms</b> are classified into groups based upon their physical features.</li> </ul>	<p><b>competition</b> for resources (food, water, mates).</p> <ul style="list-style-type: none"> <li>Within that variation, organisms that have features which make them better <b>adapted</b> at securing food, water, and mates, are more likely to survive and produce <b>offspring</b> which have <b>inherited</b> those same successful features. Those that are not well adapted will eventually go <b>extinct</b>.</li> <li>Over a long enough timeline all organisms in a population will have those successful features.</li> <li>This is known as the <i>Theory of Evolution by Natural Selection</i> and was developed by <b>Charles Darwin</b> in 1859</li> </ul> <p><b>Knowledge Block 2: How Charles Darwin discovered the process of Evolution by Natural selection</b></p> <ul style="list-style-type: none"> <li>Before Darwin, <b>Lamarck's</b> Idea of acquired characteristics was proposed. (Giraffes stretch their necks in life, which made their children have longer necks).</li> <li>Darwin as a young man travelled around the world on the <b>HMS Beagle</b>. On this 5-year voyage he saw lots of things and recorded down lots of evidence which allowed him to work out how organisms change over time by a different mechanism of Natural selection</li> </ul>
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- Each season is about three months long
- In Spring, young animals like lambs and chicks are born, the flowers bloom and the weather starts to become warmer.
- In autumn, the leaves fall off the trees and the amount of time we have in the day becomes less.
- Winter has the shortest amount of time during the day and the weather is at its coldest.
- In summer the trees are full of green leaves and the weather is at its warmest.

**Knowledge Block 3:  
Environmental change**

- **Environmental change** affects different habitats differently
- Human activity significantly affects the environment
- Different organisms are affected differently by environmental change

- This includes animals, plants, fungi, and **microorganisms** like **bacteria**.
- Within each of these broad groups, organisms are classified into small subgroups. Animals- invertebrates, mammals, birds, amphibians, reptiles and fish, Plants- flowering plants, ferns, conifers, moss.
- Bacteria are a group of organisms that are not visible to the naked eye but are very abundant and have distinct physical features we can only see under powerful **microscopes**.



## Chemistry – Materials

EYFS Early Learning Goals	KS1 National Curriculum	KS2 National Curriculum
<p>Creating with Materials</p> <ul style="list-style-type: none"> <li>Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function.</li> </ul> <p>The Natural World</p> <ul style="list-style-type: none"> <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> </ul> <p>Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.</p>	<p><b><u>Year 1 Everyday Materials</u></b> <b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>distinguish between an object and the material from which it is made</li> <li>identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock</li> <li>describe the simple physical properties of a variety of everyday materials</li> <li>compare and group together a variety of everyday materials on the basis of their simple physical properties.</li> </ul> <p><b><u>Year 2 Uses of everyday materials</u></b> <b>Pupils should be taught to:</b></p> <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</li> <li>find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching</li> </ul>	<p><b><u>Year 3 Rocks</u></b> <b>Pupils should be taught to:</b></p> <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</li> <li>describe in simple terms how fossils are formed when things that have lived are trapped within rock</li> <li>recognise that soils are made from rocks and organic matter.</li> </ul> <p><b><u>Year 4 States of matter</u></b> <b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>compare and group materials together, according to whether they are solids, liquids or gases</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)</li> <li>identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</li> </ul> <p><b><u>Year 5 Properties and changes of materials</u></b> <b>Pupils should be taught to:</b></p> <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</li> <li>know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution</li> <li>use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating</li> <li>give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic</li> <li>demonstrate that dissolving, mixing and changes of state are reversible changes</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.</li> </ul>

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<b>Materials</b>	<p>Explore different materials freely, in order to develop their ideas about how to use them and what to make.</p> <p>Develop their own ideas and then</p>	<p style="text-align: center;"><b><u>Describing Materials</u></b></p> <p><b>Knowledge Block 1: The big idea about materials</b></p> <ul style="list-style-type: none"> <li>There are many different materials that have different observable <b>properties</b></li> </ul>	<p style="text-align: center;"><b><u>Changing Materials</u></b></p> <p><b>Knowledge Block 1- How materials can change</b></p> <ul style="list-style-type: none"> <li>The properties of a material determine whether they are <b>suitable</b> for a</li> </ul>	<p style="text-align: center;"><b><u>Solids, liquids and gases</u></b></p> <p><b>Knowledge Block 1: Properties of solids, liquids and gases</b></p> <ul style="list-style-type: none"> <li>Materials can be divided into solids, liquids and gases.</li> </ul>	<p style="text-align: center;"><b><u>Mixtures and separating them</u></b></p> <p><b>Knowledge Block 1: What mixtures are</b></p> <ul style="list-style-type: none"> <li>A <b>substance</b> is an object with the same properties throughout.</li> </ul>	<p style="text-align: center;"><b><u>Making new substances</u></b></p> <p><b>Knowledge Block 1: Reversible and irreversible changes</b></p> <ul style="list-style-type: none"> <li>All matter, including gas, has <b>mass</b>.</li> </ul>	

<p>decide which materials to use to express them.</p> <p>Join different materials and explore different textures.</p> <p>Explore how things work.</p> <p>Talk about the differences between materials and changes they notice.</p> <p>Explore the natural world around them.</p> <p>Describe what they see, hear and feel whilst outside.</p>	<ul style="list-style-type: none"> <li>Materials that have similar properties are grouped into <b>metals, rocks, fabrics, wood, plastic and ceramics</b> (including glass).</li> </ul>	<p><b>purpose.</b></p> <ul style="list-style-type: none"> <li>Materials can be <b>changed by physical force</b> (twisting, bending, squashing and stretching). (The purpose of the activities within this learning journey is for children to understand why we choose certain materials to do certain jobs. Children will plan how to test materials (wood, metal, plastic, glass, brick, paper, rock, cardboard) )</li> </ul>	<ul style="list-style-type: none"> <li><b>Solids</b> hold their shape unless forced to change.</li> <li><b>Liquids</b> flow easily but stay in their container because of <b>gravity</b>. The more <b>viscous</b> a liquid the less runny it is.</li> <li><b>Gases</b> move everywhere and are not held in containers by <b>gravity</b>.</li> </ul> <p><b>Knowledge Block 2: Changing state</b></p> <ul style="list-style-type: none"> <li><b>Heating</b> causes solids to <b>melt</b> into liquids and liquids to <b>evaporate</b> to gases.</li> <li><b>Cooling</b> causes gases to <b>condense</b> to liquids and liquids to <b>freeze</b> to solids.</li> </ul> <p><b>Knowledge Block 3: Melting, freezing, boiling and condensation temperatures</b></p> <ul style="list-style-type: none"> <li>Different substances change <b>state</b> at different temperatures but the temperatures at which given substances changes state is always the same.</li> </ul> <p><b>Knowledge Block 4: All about the water cycle</b></p> <ul style="list-style-type: none"> <li>The temperature at which a substance <b>melts</b> from a solid to a liquid is the same at which it <b>freezes</b> from a liquid to a solid.</li> <li>The temperature at which a substance <b>boils</b> from a liquid to a gas is the same at which it <b>condenses</b> from a gas to a liquid.</li> <li>Liquids <b>evaporate</b> slowly, even below</li> </ul>	<ul style="list-style-type: none"> <li>A <b>mixture</b> is when more than one substance is present in the same container</li> </ul> <p><b>Knowledge Block 2: What dissolving is</b></p> <ul style="list-style-type: none"> <li>When a substance is added to a liquid the substance can disappear- this is called <b>dissolving</b></li> <li>A mixture of a substance that has dissolved in a liquid is called a <b>solution</b></li> <li>Not every substance can dissolve in water</li> </ul> <p><b>Knowledge Block 3: Separating mixtures</b></p> <ul style="list-style-type: none"> <li>Mixtures can be separated if the substances have different properties</li> <li>This is because the substances in the mixture are still present and are unchanged</li> <li>There are different techniques for separating mixtures. <ul style="list-style-type: none"> <li>Filtration requires the substances be one that does not dissolve in a liquid to work.</li> <li>Sieving requires the substances to be of different sizes to work</li> <li>Magnets requires the substances to be some magnetic materials and some non-magnet materials to work.</li> <li>Evaporation requires a solid substance dissolved in water and the solid has a higher boiling point in water to work.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Sometimes, mixed substances <b>react</b> to make a new substance. These changes are usually <b>irreversible</b>.</li> <li>Heating can sometimes cause materials to change permanently. When this happens, a new substance is made. These changes are not reversible.</li> <li>Indicators that something new has been made are the properties of the material are different (colour, state, texture, hardness, smell, temperature)</li> <li>If it is not possible to get the material back easily it is likely that it is not there anymore and something new has been made (irreversible change)</li> </ul>	
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				<p>their boiling temperatures.</p> <ul style="list-style-type: none"><li>• The water cycle is the process by which water is continuously transferred between the surface of the earth and the atmosphere.</li><li>• Liquid water evaporates into water vapor, condenses to form clouds, and precipitates back to earth in the form of rain and snow.</li></ul> <p><b><u>Rocks and soils</u></b></p> <p><b>Knowledge Block 1: The different types of rocks</b></p> <ul style="list-style-type: none"><li>• A <b>rock</b> is a solid material made up of <b>minerals</b> forming part of the surface of the Earth</li><li>• Rocks are exposed on the surface at cliffs, hills and mountains but are also under the surface.</li><li>• Some rocks, called <b>ores</b> contain metals</li><li>• Some rocks are made of <b>grains</b> squashed together and can contain the remains of long-dead organisms, called <b>fossils</b>. This type of rock is called <b>sedimentary</b> rock, an example would be <b>limestone, sandstone</b> or <b>mudstone</b></li><li>• Some rocks are made of <b>crystals</b> that are locked tightly together. These are called <b>igneous</b> and <b>metamorphic</b> rocks; an example of igneous rock is <b>granite</b>, and an example of metamorphic rock is <b>slate</b></li></ul>	<ul style="list-style-type: none"><li>• Floating requires some substances to float and some substances to sink to work.</li></ul>		
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				<p><b>Knowledge Block 2: The properties of rocks</b></p> <ul style="list-style-type: none"><li>• These three types of rocks all have different properties to each other, including <b>porosity, hardness,</b> reaction to chemicals</li><li>• The properties of the rock depend on how the rock was formed, e.g. Some igneous rocks form from lava from volcanoes and cool very quickly leading to very small crystals</li></ul> <p><b>Knowledge Block 3: The structure of soils</b></p> <ul style="list-style-type: none"><li>• <b>Soil</b> is made up of small broken-down pieces of rock.</li><li>• Soil contains a range of different size rock pieces, e.g., sand grains or stones.</li><li>• Soil also contains <b>humus</b> (rotted plant material)</li><li>• Soil made of very fine rock is called <b>silt</b> or <b>clay</b>.</li></ul>			
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## Physics – Earth and Space

EYFS Early Learning Goals	KS1 National Curriculum	KS2 National Curriculum
<p>Creating with Materials</p> <ul style="list-style-type: none"> <li>- Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function.</li> </ul> <p>The Natural World</p> <ul style="list-style-type: none"> <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> </ul> <p style="padding-left: 20px;">Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.</p>	<p><b><u>Year 1 Seasonal Changes</u></b> <b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>• observe changes across the four seasons</li> <li>• observe and describe weather associated with the seasons and how day length varies</li> </ul> <p><b><u>Year 1 Plants</u></b> <b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>• identify and name a variety of common wild and garden plants, including deciduous and evergreen trees</li> </ul>	<p><b><u>Year 5 Earth and space</u></b> <b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>• describe the movement of the Earth, and other planets, relative to the Sun in the solar system</li> <li>• describe the movement of the Moon relative to the Earth</li> <li>• describe the Sun, Earth and Moon as approximately spherical bodies</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.</li> </ul>

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<b>Earth and Space</b>	<p>Explore the natural world around them.</p> <p>Describe what they see, hear and feel whilst outside.</p> <p>Recognise some environments that are different to the one in which they live.</p> <p>Understand the effect of changing seasons on the natural world around them.</p>	<p style="text-align: center;"><b><u>Seasons</u></b></p> <p><b>Knowledge Block 1: Surviving the changing seasons</b></p> <ul style="list-style-type: none"> <li>• There are four seasons, <b>Spring, summer, autumn</b> and <b>winter</b></li> <li>• Each season is about three months long</li> <li>• In Spring, young animals like lambs and chicks are born, the flowers bloom and the weather starts to become warmer.</li> <li>• In autumn, the leaves fall off the trees and the amount of time we have in the day becomes less.</li> <li>• Winter has the shortest amount of</li> </ul>				<p style="text-align: center;"><b><u>Space and Gravity</u></b></p> <p><b>Knowledge Block 1: Our Solar system</b></p> <ul style="list-style-type: none"> <li>• A <b>Solar system</b> is a collection of <b>planets</b>, which <b>orbit</b> (a curved path) a <b>star</b>.</li> <li>• There are huge number of stars in space and therefore a huge number of solar systems</li> <li>• Our solar system consists of 8 planets, many of those planets have <b>moons</b> which orbit around them.</li> <li>• Earth's moon is not a planet but is a satellite which orbits Earth. It is around a quarter of the size of Earth.</li> <li>• As the Moon orbits the Earth, the Sun lights up different parts of it, making it seem as if the Moon is changing</li> </ul>	

		<p>time during the day and the weather is at its coldest.</p> <ul style="list-style-type: none"> <li>• In summer the trees are full of green leaves and the weather is at its warmest.</li> </ul> <p>This substantive knowledge appears in the progression within the biology- variation and evolution:</p> <ul style="list-style-type: none"> <li>• Animals and plants have adapted ways of surviving the changing seasons</li> <li>• These include <b>hibernating</b>, storing food, fattening up, <b>migration</b>, loss of leaves</li> <li>• Trees can be either <b>evergreen</b> or <b>deciduous</b>.</li> <li>• <b>Evergreen</b> trees keep their green leaves all year round.</li> <li>• <b>Deciduous</b> trees lose their leaves every autumn.</li> </ul>				<p>shape. We call these the phases of the moon.</p> <ul style="list-style-type: none"> <li>• The Moon doesn't emit (give off) light itself, the 'moonlight' we see is actually the Sun's light reflected off the lunar surface.</li> <li>• Our solar system can be represented with a model (see diagram), but it isn't possible to draw it to scale.</li> <li>• The planets and moons are <b>rotating</b> (spinning)</li> <li>• The time it takes one planet to rotate is called a <b>day</b>. On Earth this is 24 hours</li> <li>• The time it takes a planet to complete one orbit around its star is called a <b>year</b>. On Earth this is 356.25 days</li> <li>• The solar system is with a massive collection of stars called the <b>galaxy</b> (called the Milky way)</li> <li>• The Milky way is one of billions of galaxies in the <b>Universe</b>.</li> </ul> <p><b>Knowledge Block 2: What else is in the solar system?</b></p> <ul style="list-style-type: none"> <li>• Stars are huge balls of gas that produce vast amounts of light and heat.</li> <li>• <b>Asteroids</b> are lumps of rock that orbit a star (there are millions in between Mars and Jupiter)</li> <li>• <b>Comets</b> are objects that are made of ice, which melts when they get closer to the sun leaving a tail.</li> </ul> <p><b>Knowledge Block 3: Gravity and its effects</b></p>	
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						<ul style="list-style-type: none"><li>• <b>Gravity</b> is force of attraction between two objects with <b>mass</b> (a quantity of matter)</li><li>• The bigger the mass the bigger force it exerts</li><li>• Gravity works over distance but gets weaker as distance increases</li><li>• Stars, planets, moons have a very large amount of mass. They exert a gravitational attraction on each other</li><li>• Differences in gravity result in smaller mass objects orbiting around larger mass objects, e.g., planets around stars and moons around planets</li></ul>	
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## Physics - Electricity

EYFS Early Learning Goals	KS1 National Curriculum	KS2 National Curriculum
<p>Creating with Materials</p> <ul style="list-style-type: none"> <li>- Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function.</li> </ul> <p>The Natural World</p> <ul style="list-style-type: none"> <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> </ul> <p style="padding-left: 20px;">Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.</p>		<p><b>Year 4 Electricity</b> <b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>• identify common appliances that run on electricity</li> <li>• construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers</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</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</li> <li>• recognise some common conductors and insulators, and associate metals with being good conductors.</li> </ul> <p><b>Year 6 Electricity</b> <b>Pupils should be taught to:</b></p> <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</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</li> <li>• use recognised symbols when representing a simple circuit in a diagram.</li> </ul>

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<b>Electricity</b>	<p>Explore different materials freely, in order to develop their ideas about how to use them and what to make.</p> <p>Develop their own ideas and then decide which materials to use to express them.</p> <p>Explore how things work.</p>				<p style="text-align: center;"><u><b>Electricity</b></u></p> <p><b>Knowledge Block 1: Electricity as a power source</b></p> <ul style="list-style-type: none"> <li>• Lots of <b>devices</b> are powered by <b>electricity</b></li> <li>• Electricity comes from a source There are two main sources- <b>batteries and mains</b></li> </ul> <p><b>Knowledge Block 2: What batteries do</b></p> <ul style="list-style-type: none"> <li>• A battery pushes electricity to the device.</li> <li>• To be able to push electricity the battery must be connected to the device using <b>wires</b></li> <li>• This is called a <b>circuit</b></li> </ul>		<p style="text-align: center;"><u><b>Controlling electrical circuits</b></u></p> <p><b>Knowledge Block 1: Pushing electrical current</b></p> <ul style="list-style-type: none"> <li>• Current is the flow of electricity around a circuit.</li> <li>• The power supply in a circuit pushes the current round the circuit</li> <li>• The voltage of the power supply is a measure of this push</li> <li>• Voltage is measure in volts</li> <li>• Batteries have a limited store of energy and when this is gone, they can no longer push the current</li> </ul> <p><b>Knowledge Block 2: Electrical current</b></p>



					<p><b>Knowledge Block 3: Making devices work harder</b></p> <ul style="list-style-type: none"> <li>• If there are more batteries added to a circuit this provides a bigger push on the electricity</li> <li>• This will make the device work harder e.g., brighter bulbs, faster spinning motor, louder buzzer</li> </ul> <p><b>Knowledge Block 4: Insulators and conductors</b></p> <ul style="list-style-type: none"> <li>• Some materials will allow electricity to flow through them- <b>Conductors</b></li> <li>• Metals such as silver, gold and copper are good conductors. Water is also a conductor of electricity.</li> <li>• Other materials will not allow electricity to flow through them- <b>Insulators</b></li> <li>• Plastic, wood, glass and rubber are good electrical insulators. That is why they are used to cover materials that carry electricity.</li> <li>• A switch opens and closes a circuit</li> </ul>		<ul style="list-style-type: none"> <li>• Current is the flow of electricity through a <b>conductor</b></li> <li>• When current passes through a device it makes it work</li> <li>• Increasing the voltage (the number of cells in the battery) increases the current. The larger the flow of current, the harder the device works</li> </ul> <p><b>Knowledge Block 3: Electrical resistance</b></p> <ul style="list-style-type: none"> <li>• All parts of a circuit offer <b>resistance</b> to electrical current including the wires.</li> <li>• Resistance is the slowing down of electrical current</li> <li>• The more devices added into a circuit the greater the resistance This means less current flows around the circuit</li> </ul>
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## Physics – Energy Pathways

EYFS Early Learning Goals	KS1 National Curriculum	KS2 National Curriculum
<p>Creating with Materials</p> <ul style="list-style-type: none"> <li>- Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function.</li> </ul> <p>The Natural World</p> <ul style="list-style-type: none"> <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> </ul> <p style="padding-left: 20px;">Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.</p>	<ul style="list-style-type: none"> <li>•</li> </ul>	<p><b><u>Year 3 Light</u></b>  <b>Pupils should be taught to:</b></p> <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</li> <li>● notice that light is reflected from surfaces</li> <li>● recognise that light from the sun can be dangerous and that there are ways to protect their eyes</li> <li>● recognise that shadows are formed when the light from a light source is blocked by an opaque object</li> </ul> <p>find patterns in the way that the size of shadows change.</p> <p><b><u>Year 6 Light</u></b>  <b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>● recognise that light appears to travel in straight lines</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</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</li> </ul> <p>use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.</p> <p><b><u>Year 4 Sound</u></b>  <b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>● identify how sounds are made, associating some of them with something vibrating</li> <li>● recognise that vibrations from sounds travel through a medium to the ear</li> <li>● find patterns between the pitch of a sound and features of the object that produced it</li> <li>● find patterns between the volume of a sound and the strength of the vibrations that produced it</li> <li>● recognise that sounds get fainter as the distance from the sound source increases.</li> </ul> <p>Note: The learning journeys place this topic in year 6. The ideas that children have to grapple with about sound are very abstract and challenging. They need to learn that when objects vibrate, they produce sounds and sounds move through materials by making that material vibrate in turn. None of these vibrations can be seen by the naked eye and so they are abstract concepts. It gets even trickier because children also have to learn how changes in the way an object vibrates can lead to changes in pitch and volume. Dylan Williams says that some ideas are more troublesome than others; this is a very troublesome idea and so the more mature a child is when they have to understand and use it the better.</p>

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<b>Energy Pathways</b>	<p>Explore how things work.</p> <p>Explore the natural world around them.</p> <p>Describe what they see, hear and feel whilst outside.</p>			<p style="text-align: center;"><u>Light</u></p> <p><b>Knowledge Block 1: Light and sight</b></p> <ul style="list-style-type: none"> <li>• There must be light for us to see.</li> <li>• Light comes from a <b>source</b>.</li> <li>• We need light to see things, even <b>shiny</b> things.</li> <li>• Light from the sun can be dangerous and that there are ways to protect their eyes</li> </ul> <p><b>Knowledge Block 2: What light does when it hits materials</b></p> <ul style="list-style-type: none"> <li>• If an object is <b>transparent</b> light will go through it and we will be able to see through it.</li> <li>• If an object is <b>opaque</b>, it will block the light and no light will get through. This is what forms shadows.</li> <li>• The closer to the light source an object is, the bigger the shadow will be. This is because the object blocks more of the light.</li> <li>• The further away from the light source an object is, the smaller the shadow will be. This is because the object blocks less of the light.</li> <li>• If an object is perfectly <b>reflective</b>, light will bounce back off it and we will see reflections of objects.</li> <li>• If the material is <b>translucent</b>, it will allow light through, but we won't be able to see through it.</li> </ul>			<p style="text-align: center;"><u>How light behaves</u></p> <p><b>Knowledge Block 1: How light travels</b></p> <ul style="list-style-type: none"> <li>• When light is emitted from a light source, it travels in straight lines until it hits an object. This can be represented by an arrow.</li> <li>• <b>Shadows</b> form when light hits an <b>opaque</b> object. The area behind the object is in darkness because light can only travel in straight lines.</li> <li>• Shadows have the same shape as the objects that cast them.</li> </ul> <p><b>Knowledge Block 2: How light behaves when it hits objects</b></p> <ul style="list-style-type: none"> <li>• When light hits a <b>transparent</b> object, it goes through it in a straight line so we can see a clear image through it.</li> <li>• When light hits a <b>translucent</b> material, it goes through it but is scattered, this means light can pass through, but we can't see an image through it.</li> <li>• When light hits a mirrored surface, it reflects off it in straight lines, so we can see an image in the reflective material.</li> <li>• Sometimes when light hits a material it <b>reflects</b> off it in many different directions (it is scattered). In this case light will be reflected but no image will be seen in the material.</li> </ul>

- Shiny surfaces are better reflectors and rough surfaces scatter light more. Opaque objects don't allow any light to pass through them

**Knowledge Block 3: How we see**

- Animals see objects when light is reflected off the object and enters the eye through the **pupil**.
- The pupil changes its size to allow enough, but not too much light into the eye.
- Too much light damages the eye and too little results in poor quality images.

**Sound**

**Knowledge Block 1: Describing Sound**

- Sounds can be produced in a variety of ways.
- Sounds have the properties of **pitch** and **volume**.
- When a sound is produced it spreads out from its source in all directions

**Knowledge Block 2: How sound is made and travels**

- Sound is caused by **vibration** (objects move rapidly back and forth or up and down)
- When objects vibrate it makes the objects in contact with it also vibrate. This includes the air.
- The vibration travels through the air and makes other objects it is in contact with vibrate

							<p>including your <b>ear drum</b>.</p> <p><b>Knowledge Block 3: Pitch and Volume changes</b></p> <ul style="list-style-type: none"><li>• Pitch and volume are caused by how the material vibrates</li><li>• The pitch of a sound is caused by how fast an object vibrates. This is called the <b>frequency</b> of vibration. Higher the frequency, higher the pitch</li><li>• Smaller objects or tighter strings tend to vibrate with a higher frequency</li><li>• The volume of sound is caused by how big each vibration is. This is called the <b>amplitude</b> of vibration. The bigger the amplitude the higher the volume.</li><li>• Sounds get fainter as the distance from the sound source increases.</li></ul>
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## Physics - Forces

EYFS Early Learning Goals	KS1 National Curriculum	KS2 National Curriculum
<p>Creating with Materials</p> <ul style="list-style-type: none"> <li>Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function.</li> </ul> <p>The Natural World</p> <ul style="list-style-type: none"> <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> </ul> <p style="padding-left: 20px;">Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.</p>		<p><b><u>Year 3 Forces and Magnets</u></b> <b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>compare how things move on different surfaces</li> <li>notice that some forces need contact between two objects</li> </ul> <p>Note: The first-time forces are mentioned in the National Curriculum is in year 3 in the topic on magnets. Magnets are a non-contact force which may appear almost magical if children have not first had a firm grounding in the idea that objects can be made to move differently through the physical acts of pushing and pulling. For this reason, a topic has been constructed to be taught in key stage one that teaches the idea of contact forces changing how things move.</p> <p><b><u>Year 3 Forces and Magnets</u></b> <b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>compare how things move on different surfaces</li> <li>notice that some forces need contact between two objects, but magnetic forces can act at a distance</li> <li>observe how magnets attract or repel each other and attract some materials and not others</li> <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</li> <li>describe magnets as having two poles</li> <li>predict whether two magnets will attract or repel each other, depending on which poles are facing.</li> </ul> <p><b><u>Year 5 Forces and Magnets</u></b> <b>Pupils should be taught to:</b></p> <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</li> <li>identify the effects of air resistance, water resistance and friction, that act between moving surfaces</li> <li>recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.</li> </ul>

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<b>Forces</b>	<p>Explore how things work.</p> <p>Explore and talk about different forces they can feel.</p> <p>Explore the natural world around them.</p> <p>Describe what they see, hear and feel whilst outside.</p>		<p><b><u>Pushes and pulls</u></b></p> <p><b>Knowledge Block 1:</b></p> <ul style="list-style-type: none"> <li>Objects can move (be in Motion) in various ways-roll, slide and bounce</li> </ul> <p><b>Knowledge Block 2:</b></p> <ul style="list-style-type: none"> <li>The pushing or pulling of an object can affect its motion.</li> <li>Pushing or pulling can do three things, slow</li> </ul>	<p><b><u>Magnets</u></b></p> <p><b>Knowledge Block 1: What magnets do</b></p> <ul style="list-style-type: none"> <li>Magnets exert <b>attractive forces</b> on some <b>metals</b></li> </ul> <p><b>Knowledge Block 2: Magnets don't need to touch</b></p>		<p><b><u>Forces that oppose motion</u></b></p> <p><b>Knowledge Block 1: Water and air resistance.</b></p> <ul style="list-style-type: none"> <li>When objects move through air and water, they have to push it out of the way. The water and air push back with forces called <b>water resistance</b> and <b>air resistance</b>. The harder it is to push the material</li> </ul>	

			<p>down, speed up or change the direction of an object.</p> <p><b>Knowledge Block 3</b></p> <ul style="list-style-type: none"> <li>The larger the push/pull the bigger the effect on motion</li> </ul>	<ul style="list-style-type: none"> <li>Magnetic forces work through other materials including air, so magnets don't need to be touching to <b>exert</b> their force. It is called a <b>non-contact force</b></li> </ul> <p><b>Knowledge Block 3: Magnets attract and repel</b></p> <ul style="list-style-type: none"> <li>Each end of a magnet is called a <b>pole</b>, opposite poles are called north and south.</li> <li>Magnets exert <b>attractive</b> forces on each other when the poles facing each other are north and south (opposites).</li> <li>Magnets exert <b>repulsive</b> forces on each other when the poles facing each other are the same.</li> </ul> <p><b>Knowledge Block 4: what affects magnetic strength</b></p> <ul style="list-style-type: none"> <li>The strength of magnetic forces is affected by: <ul style="list-style-type: none"> <li>The strength of the magnet.</li> <li>The distance between the magnet and the object.</li> <li>The material the object is made from.</li> </ul> </li> </ul>		<p>out of the way the greater the resistance.</p> <ul style="list-style-type: none"> <li>Gases weigh less than liquids and so water resistance is greater than air resistance.</li> </ul> <p><b>Knowledge Block 2: Friction</b></p> <ul style="list-style-type: none"> <li><b>Friction</b> is a <b>force against motion</b> caused by two surfaces <b>rubbing</b> against each other. It occurs because no surfaces are perfectly smooth; they have bumps and <b>undulations</b> that can <b>interlock</b> when placed on top of each other.</li> <li>To move one <b>interlocking</b> surface over another, one of three things must happen: <ul style="list-style-type: none"> <li>The surfaces must rise slightly</li> <li>The bumps on the surface must bend</li> <li>The bumps on the surface must break</li> <li>All of these actions require a force, this is what causes friction</li> </ul> </li> </ul> <p><b>Knowledge Block 3: Managing Forces</b></p> <ul style="list-style-type: none"> <li>Some objects require large forces to make them move; <b>gears</b>, <b>pulley</b> and <b>levers</b> can reduce the force needed to make things move.</li> <li>The use of levers can reduce the force needed to move things. The object you are lifting is called the <b>load</b>, and the force you apply to the arm to make the object move is called the <b>effort</b>.</li> </ul>	
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						<ul style="list-style-type: none"><li>• The use of pulleys can reduce the force needed to move things</li></ul>	
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## Disciplinary Knowledge – Scientific Skills

<b>EYFS</b> Early Learning Goals	<b>KS1</b> National Curriculum	<b>KS2</b> National Curriculum
<p>Creating with Materials</p> <ul style="list-style-type: none"> <li>- Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function.</li> </ul> <p>The Natural World</p> <ul style="list-style-type: none"> <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> </ul> <p>Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.</p>	<p>During years 1 and 2, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:</p> <ul style="list-style-type: none"> <li>• asking simple questions and recognising that they can be answered in different ways</li> <li>• observing closely, using simple equipment</li> <li>• performing simple tests</li> <li>• identifying and classifying</li> <li>• using their observations and ideas to suggest answers to questions</li> <li>• gathering and recording data to help in answering questions.</li> </ul>	<p>During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:</p> <ul style="list-style-type: none"> <li>• asking relevant questions and using different types of scientific enquiries to answer them</li> <li>• setting up simple practical enquiries, comparative and fair tests</li> <li>• making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers</li> <li>• gathering, recording, classifying and presenting data in a variety of ways to help in answering questions</li> <li>• recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables</li> <li>• reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</li> <li>• using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions</li> <li>• identifying differences, similarities or changes related to simple scientific ideas and processes</li> <li>• using straightforward scientific evidence to answer questions or to support their findings.</li> </ul> <p>During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:</p> <ul style="list-style-type: none"> <li>• planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</li> <li>• taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate</li> <li>• recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs</li> <li>• using test results to make predictions to set up further comparative and fair tests</li> <li>• reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations</li> <li>• identifying scientific evidence that has been used to support or refute ideas or arguments.</li> </ul>

	<b>EYFS</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>	<b>Year 6</b>
<b>Knowledge of scientific methods</b>	What a scientific question is How scientific question can be answered Variables in practical work (change & measure)	<b>Year 1 and 2 are the same to allow for a depth of understanding for the scientific skills.</b> <ul style="list-style-type: none"> <li>• What a scientific question is</li> <li>• How scientific question can be answered</li> <li>• Using simple secondary sources</li> <li>• Variables in practical work (change &amp; measure)</li> </ul>		<b>Year 3 and 4 are the same to allow for a depth of understanding for the scientific skills.</b> <ul style="list-style-type: none"> <li>• Scientific hypotheses</li> <li>• Scientific models</li> <li>• Scientific theories</li> <li>• Variables in science-change and measure</li> <li>• Control variables- (keep the same)</li> </ul>		<b>Year 5 and 6 are the same to allow for a depth of understanding for the scientific skills.</b> <ul style="list-style-type: none"> <li>• Scientific hypotheses</li> <li>• Developing Scientific models</li> <li>• Distinguishing Pseudoscience from science</li> <li>• Variables in science-change (independent) and measure (dependent)</li> </ul>	

	Comparing objects Identify patterns		<ul style="list-style-type: none"> <li>Observing</li> <li>Classifying</li> <li>Identify patterns and relationships</li> <li>Scientific drawing including labels</li> <li>Identifying similarities and differences</li> </ul>	<ul style="list-style-type: none"> <li>Control variables- (keep the same)</li> <li>Classifying</li> <li>Identifying patterns in nature</li> <li>Scientific drawing including labels</li> <li>The double-blind methodology</li> <li>The placebo effect</li> </ul>
<b>Knowledge of apparatus and techniques</b>	Use of simple equipment Observe changes over time Measuring Identifying objects Sorting objects	<ul style="list-style-type: none"> <li>Use of simple equipment</li> <li>Observe changes over time</li> <li>Measuring</li> <li>Identifying objects</li> <li>Sorting objects</li> </ul>	<ul style="list-style-type: none"> <li>Taking accurate measurements</li> <li>Awareness of scale and a range of units</li> <li>Correct use of apparatus including thermometer</li> <li>Safety in science</li> <li>Scientific drawing including labels</li> </ul>	<ul style="list-style-type: none"> <li>Making accurate observations</li> <li>Taking accurate measurements</li> <li>Awareness of scale and a range of units</li> <li>Correct use of a range of apparatus</li> <li>Safety in science</li> <li>Repeatability</li> <li>Awareness of sources of error in investigations</li> <li>Scientific drawing including labels</li> </ul>
<b>Knowledge of data analysis and presentation</b>	Recording of data What data is What a table is How to place data into a table That data in a table can be clearer when displayed as a graph	<ul style="list-style-type: none"> <li>Recording of data</li> <li>What data is</li> <li>What a table is</li> <li>How to place data into a table</li> <li>That data in a table can be clearer when displayed as a graph</li> </ul>	<ul style="list-style-type: none"> <li>Table design and construction</li> <li>Creating keys</li> <li>Creating bar charts from data</li> <li>Oral presentations on findings</li> <li>Visual displays of findings</li> </ul>	<ul style="list-style-type: none"> <li>Complex table design and construction</li> <li>Create classification keys</li> <li>Creating bar charts from data</li> <li>Creating scatter graphs from data</li> <li>Ascertain the level of uncertainty in collected results</li> <li>Validity of results</li> <li>Oral presentations on findings</li> <li>Illustrated presentations of research, techniques/methods and findings</li> </ul>
<b>Knowledge of how science uses evidence to develop explanations</b>	What a scientific question is How scientific question can be answered Using simple secondary sources What scientific evidence is What scientific evidence is not What conclusions are used for What a scientific conclusion should include	<ul style="list-style-type: none"> <li>What a scientific question is</li> <li>How scientific question can be answered</li> <li>Using simple secondary sources</li> <li>What scientific evidence is</li> <li>What scientific evidence is not</li> <li>What conclusions are used for</li> <li>What a scientific conclusion should include</li> </ul>	<ul style="list-style-type: none"> <li>Scientific hypotheses</li> <li>Scientific models</li> <li>Scientific theories</li> <li>Use of secondary sources</li> <li>Written explanations</li> <li>Writing a scientific conclusion linking to theory</li> <li>Improvements to procedures</li> <li>Posing further questions based on data</li> <li>Use substantive knowledge alongside evidence from investigations</li> </ul>	<ul style="list-style-type: none"> <li>Scientific hypotheses</li> <li>Developing Scientific models</li> <li>Scientific theories</li> <li>Use of high quality and reliable secondary sources</li> <li>Interpreting relationships from scatter graphs</li> <li>Posing further questions based on data</li> <li>Improvements to procedures</li> <li>Reproducibility</li> <li>Constructing a scientific conclusion linking collected evidence to substantive knowledge</li> <li>Evolution of scientific ideas and models</li> <li>The double-blind methodology</li> <li>The placebo effect</li> </ul>