

## Science Progression - Knowledge and Skills

Year 1	Animals including Humans	Seasonal Changes	Plants	Everyday Materials			
Year 2	Animals including Humans	Living things and their habitats	Plants	Use of Everyday Materials			
Year 3	Animals including Humans		Plants	Rocks	Forces and Magnets	Light	
Year 4	Animals including Humans	Living things and their habitats		States of Matter	Electricity		Sound
Year 5	Animals including Humans	Living things and their habitats		Properties and Changes of Materials	Forces		Earth and Space
Year 6	Animals including Humans	Living things and their habitats			Electricity	Light	Evolution and inheritance

### National Curriculum Unit – Year 1 Animals including Humans

<p><b>National Curriculum</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</li> </ul>	<p><b>Previous Learning</b></p> <p>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)</p>	<p><b>Future Learning</b></p> <p>In year 2, children will:</p> <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. (yr 2 Living things and their habitats)</li> <li>Describe how living things are classified into broad groups</li> </ul>	<p><b>Key Vocabulary</b></p> <p>Human Animal Mammal Reptile Amphibian Bird Fish Carnivore Herbivore Omnivore</p>
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## Science Progression - Knowledge and Skills

<p>animals (fish, amphibians, reptiles, birds and mammals, including pets.)</p> <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 which sense.</li> </ul>		<p>according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals. (yr 6 living things and their habitats)</p> <ul style="list-style-type: none"> <li>Give reasons for classifying plants and animals based on specific characteristics. (Yr 6 Living things and their habitats)</li> </ul>	<p>Head Body Eyes Ears Mouth Teeth Leg Tail Wing Claw Fin Scales Feathers Fur Beak Claw Hooves</p>
<p><b>Key Concepts</b> Animals vary in different ways and have different structures.</p> <ul style="list-style-type: none"> <li>Wings, tails, ears, shells,</li> </ul> <p>Animals have different skin coverings, including:</p> <ul style="list-style-type: none"> <li>Hair, feathers, fur</li> </ul> <p>These are considered key identifying features of animals.</p> <p>Animals have different diets:</p> <ul style="list-style-type: none"> <li>Herbivores – eat plants</li> <li>Carnivores – eat animals</li> <li>Omnivores – eat animals and plants.</li> </ul> <p>Humans have basic parts of the body, which are common for everyone. However, these can vary:</p> <ul style="list-style-type: none"> <li>Hair colour/length, eye colour, skin colour,</li> </ul> <p>Humans have five senses. Each sense is linked to a basic part of the body</p> <ul style="list-style-type: none"> <li>Sight – (eyes)</li> <li>Touch – (any part of the body can touch, but we usually take things with our hands)</li> <li>Smell – (nose)</li> <li>Taste – (mouth)</li> <li>Hear – (ears)</li> </ul>			<p>Names of animals experienced first-hand from each of the animal groups.</p> <p>Parts of the human body (this could link to year 1 PSHE list of vocabulary)</p> <p>Sight, touch, smell, taste, hear</p> <p><b>Key Scientist</b></p>

## Science Progression - Knowledge and Skills

<p><b>Common Misconceptions</b> Some children may think that:</p> <ul style="list-style-type: none"> <li>• Only four legged animals, such as pets, are mammals.</li> <li>• Humans are not animals</li> <li>• Insects are not animals</li> <li>• All ‘bugs’ or ‘creepy crawlies’ are part of the insect group.</li> <li>• Amphibians and reptiles are the same.</li> <li>• Although we often use our fingers to feel things, all parts of our bodies (e.g. when we fall over, we feel pain when we land on our knees).</li> </ul>	
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### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
Is our sense of smell better when we can't see?	How can we sort animals according to what they eat?	Make first hand observations of different animals.	Look for patterns between people – e.g. do people with the biggest hands have the biggest feet?	Do animals in the different animal groups have the same senses as humans?
Can we use our sense of touch to identify objects when we can't see?	How can we classify animals using a range of features?	How does my height change over the year?	What happens to the length of my arms when I grow taller?	
What foods can I identify by taste?				

### National Curriculum Unit – Year 2 Animals including Humans

<b>National Curriculum</b>	<b>Previous Learning</b>	<b>Future Learning</b>	<b>Key Vocabulary</b>
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## Science Progression - Knowledge and Skills

<ul style="list-style-type: none"> <li>• Notice that animals, including humans, have offspring, which grow into adults.</li> <li>• Find out about and describe the basic needs of animals, including humans, for survival (water, food and air.)</li> <li>• Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (yr 1 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 which sense. (Yr 1 Animals including humans.)</li> </ul>	<ul style="list-style-type: none"> <li>• Identify that animals, including humans, need the right types and amounts of nutrition, and that they cannot make their own food; they get nutrition from what they eat. (yr 3 Animals including Humans)</li> <li>• Describe the differences in the lifestyles of a mammal, an insect and a bird (yr 5 Living things and their Habitats.)</li> <li>• Describe the life process of reproduction in some plants and animals (yr 5 Living things and their habitats)</li> <li>• Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function (yr 6 Animals, including Humans)</li> </ul>	<p>Offspring Growth Child Baby Young Egg spawn</p> <p>Young and old stages of different animals Human: Baby Toddler Child Teenager Adult</p> <p>(Chicken/hen) (Caterpillar/Butterfly)</p>
<p><b>Key Concepts.</b></p> <p>All animals, including humans, have offspring which grow into adults</p> <ul style="list-style-type: none"> <li>• Some animals given birth to live young, such as humans, cats, dogs etc</li> <li>• Some animals will lay eggs which will hatch, such as chickens, insects, snakes</li> <li>• Some will look different to their parents, such as tadpoles and caterpillars.</li> </ul> <p>All animals, including humans, have the basic needs of feeding, drinking and breathing in order to survive.</p> <p>To grow into healthy adults, they need the right amounts and types of food and exercise. (In year 2, children <b>do not</b> need to know about carbohydrates, fibre, vitamins, protein fats etc as this is taught in year 3. Children should make links to food by using meat, fish, vegetables, fruit, bread, rice, pasta etc)</p>			<p>Exercise Heartbeat Breathing Hygiene Germs Disease</p> <p>Food types Meat Fish Vegetables</p>

## Science Progression - Knowledge and Skills

Good hygiene is important in preventing infections and illnesses.	Bread Rice Pasta
<p><b>Common Misconceptions</b> Some children may think that:</p> <ul style="list-style-type: none"> <li>• An animals habitat is like its 'home'</li> <li>• All animals that live in the sea are fish</li> <li>• Respiration is breathing Breathing is respiration</li> </ul>	

### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
What is the best out of hand gel, soap or hot water to wash our hands?	Which offspring belong to which animal?	How does a tadpole/caterpillar/baby change over a period of time?		<p>What food do you need for a healthy diet and why?</p> <p>Ask questions to a parent about how they look after their baby.</p> <p>Ask questions to a pet owner about how they look after the animal.</p>

### National Curriculum Unit – Year 3 Animals including Humans

<b>National Curriculum</b>	<b>Previous Learning</b>	<b>Future Learning</b>	<b>Key Vocabulary</b>
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## Science Progression - Knowledge and Skills

<ul style="list-style-type: none"> <li>Identify that animals, including humans, need the right types and amounts of nutrition, and that they cannot make their own food; they get nutrition from what they eat.</li> <li>Identify that humans and some other animals have skeletons and muscles for support, protection and movement.</li> </ul>	<ul style="list-style-type: none"> <li>Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Yr 1 animals including Humans.)</li> <li>Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Yr 1 Animals including Humans.)</li> <li>Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Yr 1 Animals including Humans)</li> <li>Find out about and describe the basic needs of animals, including humans, for survival (water, food and air.) (Yr 2 Animals including Humans)</li> <li>Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. Yr 2 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. (Yr 4 Animals including Humans)</li> <li>Identify the different types of teeth in humans and their simple functions. (Yr 4 Animals including Humans)</li> <li>Construct and interpret a variety of food chains, identifying producers, predators and prey. (Yr 4 Animals including Humans)</li> <li>Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function (Yr 6 Animals including Humans)</li> </ul>	<p>Nutrition Nutrients Carbohydrates Sugars Fats Minerals Vitamins Protein Fibre Water Skeleton Endoskeleton Exoskeleton Hydrostatic skeleton Muscles Bones Support Protect Move Skull Ribs Spine (other names of bones of skeleton) joints</p>
<p><b>Key Concepts</b> Unlike plants, which make their own food, animals need to eat to get the nutrients they need. Different foods contain different nutrients</p> <ul style="list-style-type: none"> <li>Carbohydrates (including sugars), protein, vitamins, minerals, fats, sugars, water, fibre</li> <li>These help the body to stay healthy</li> </ul>			

## Science Progression - Knowledge and Skills

<ul style="list-style-type: none"> <li>• Sometimes a food item can have more than one different nutrient.</li> </ul> <p>Humans and some other animals, have skeletons and muscles Skeletons have 3 main jobs:</p> <ul style="list-style-type: none"> <li>• Movement</li> <li>• Protection</li> <li>• Support</li> </ul> <p>Different animals have different types of skeleton:</p> <ul style="list-style-type: none"> <li>• Endoskeleton</li> <li>• Exoskeleton</li> <li>• Hydrostatic skeleton</li> </ul>	
<p><b>Common Misconceptions</b> Some children may think that:</p> <ul style="list-style-type: none"> <li>• Certain whole food groups like fats are ‘bad’ for you.</li> <li>• Certain specific food, 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> </ul> <p>Invertebrates have no form of skeleton.</p>	

### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
<p>What happens to the circumference of the forearm, when the elbow is bent at different angles?</p>	<p>How can you sort animals into different groups based on the skeletons that they have?</p> <p>How can we sort food into a range of different groups?</p>	<p>How does the human skeleton change over time? (from birth to adulthood)</p>	<p>Can people with longer legs run faster? Can people with bigger hands catch a ball better? Can people with longer arms hold more weight?</p>	<p>Use food labels to research the nutritional content of a range of different foods.</p> <p>Use food labels to answer enquiry questions</p>

## Science Progression - Knowledge and Skills

				<p>E.g. How much fat do different types of pizza contain? How much sugar are in different fizzy drinks?</p> <p>Research functions and different types of skeleton.</p>
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### National Curriculum Unit – Year 4 Animals including Humans

<b>National Curriculum</b>	<b>Previous Learning</b>	<b>Future Learning</b>	<b>Key Vocabulary</b>
<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>	<ul style="list-style-type: none"> <li>Identify and name a variety of common animals that are carnivores, herbivores and omnivores (Yr 1 Animals including Humans)</li> <li>Find out about and describe the basic needs of animals including humans, for survival (food, water, air) (Yr 2 Animals including Humans)</li> <li>Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Yr 2 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. (Yr 6 Animals including Humans)</li> <li>Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function (Yr 6 Animals including Humans)</li> <li>Describe the ways in which nutrients and water are transported within animals, including humans. (Yr 6 Animals including Humans)</li> </ul>	<p>Digestive system Digestion Mouth Tongue Saliva Oesophagus Stomach Stomach acid Small intestines Large intestines Rectum Anus Nutrients Teeth Incisors</p>

## Science Progression - Knowledge and Skills

	<ul style="list-style-type: none"> <li>Identify that animals, including humans, need the right types and amounts of nutrition, and that they cannot make their own food; they get nutrition from what they eat. (Yr 3 Animals including Humans)</li> </ul>		Canines Premolars Molars Wisdom teeth Herbivore Carnivore Omnivore
<p><b>Key Concepts</b></p> <p>These are the stages of the human digestive system:</p> <ul style="list-style-type: none"> <li>Food enters the body through the mouth</li> <li>Teeth tear, rip and chew food, breaking it down.</li> <li>Saliva is mixed with the food.</li> <li>The tongue rolls food into a ball.</li> <li>When swallowed, food goes down the oesophagus and into the stomach.</li> <li>Stomach acid is mixed with the food</li> <li>The stomach churns the food, breaking it down further.</li> <li>Food then travels into the small intestine.</li> <li>Nutrients from the food are removed in the small intestines.</li> <li>The nutrients leave the digestive system, for use elsewhere in the body.</li> <li>Food remaining in the small intestine travels to the large intestine.</li> <li>In the large intestine, water is removed and used elsewhere in the body.</li> <li>All remaining waste is then stored in the rectum.</li> <li>Waste then leaves the body through the anus.</li> </ul> <p>Humans have four types of teeth:</p> <ul style="list-style-type: none"> <li>incisors for cutting</li> <li>canines for tearing</li> <li>molars for grinding or chewing</li> <li>premolars for grinding or chewing.</li> </ul> <p>(wisdom teeth are another type of molar, which come through later in life).</p>			Food chain Food web Producer Predator Prey

## Science Progression - Knowledge and Skills

<p>Living things can be classified as producers, predators and prey according to their place in the food chain.</p>	
<p><b>Common Misconceptions</b> Some children may think that:</p> <ul style="list-style-type: none"> <li>• Arrows in a food chain means ‘eats’</li> <li>• The death of one of the parts of the food chain or web has no, or limited, effect on the rest of the food 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, food goes down one tube and drink goes down another tube.</li> <li>• All the food you eat becomes ‘poo’ and all the liquid you drink turns to ‘wee’.</li> </ul>	

### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
<p>How do eggshells change over time when they are left in different liquids (orange juice, coke, water, milk)?</p>	<p>Do the types of teeth an animal have suggest whether they are herbivores, carnivores or omnivores?</p> <p>Can you identify animals within a habitat by using food chains to identify prey, predators and producers?</p>	<p>How do eggshells change over time when they are left in different liquids (orange juice, coke, water, milk)?</p>	<p>Does being an omnivore, rather than a vegetarian, make a difference to our height?</p>	<p>Research the different parts of the digestive system. And make a model of the different processes using household objects as models for this.</p>

## Science Progression - Knowledge and Skills

<p><b>National Curriculum</b></p> <ul style="list-style-type: none"> <li>Describe the changes as humans develop to old age.</li> </ul>	<p><b>Previous Learning</b></p> <ul style="list-style-type: none"> <li>Notice that animals, including humans, have offspring, which grow into adults. (Yr 2 Animals including Humans)</li> </ul>	<p><b>Future Learning</b></p> <p>Learning in KS3</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 cycles (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta.</li> </ul>	<p><b>Key Vocabulary</b></p> <p><b>Foetus</b> <b>Embryo</b> <b>Womb</b> <b>Pregnancy</b> <b>Gestation</b> <b>Baby</b> <b>Toddler</b> <b>Teenager</b> <b>Adult</b> <b>Elderly</b> <b>Growth</b> <b>Development</b> <b>Puberty</b> <b>Hormones</b> <b>Physical</b> <b>Emotional</b></p>
<p><b>Key Concepts</b></p> <p>Children should be able to explain that when a baby is young it will grow and change quickly.</p> <ul style="list-style-type: none"> <li>Baby – new born, smiling, crawling, walking etc</li> <li>Toddler</li> <li>Child</li> <li>Teenager</li> <li>Adult</li> <li>Old age</li> </ul> <p>Babies are dependent on their parents to grow. As they grow and develop, they learn new skills At puberty, a child’s body changes and develops primary and secondary sexual characteristics. This enables the adult to reproduce.</p> <p>Compare how humans change as they grow with how other animals change, particularly looking at how long the young are dependent on their parents.</p> <ul style="list-style-type: none"> <li>Different gestation periods</li> <li>When the animals hunt for themselves etc</li> </ul>			

## Science Progression - Knowledge and Skills

### Common Misconceptions

Some children may think that:

- A baby grows in the mothers 'tummy'
- Babies are 'made'

### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
	Can you identify all the stages in a human's life?	How have we changed in appearance in our lives?  How quickly do babies grow? (length and mass of a baby)	Do larger or heavier animals have longer gestation periods?	How do our bodies change during puberty?

### National Curriculum Unit – Year 6 Animals including Humans

National Curriculum	Previous Learning	Future Learning	Key Vocabulary
<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> </ul>	<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. (Yr 2 Animals including Humans)</li> <li>• Identify that animals, including humans, need the right types and</li> </ul>	<p>In KS3 children will learn:</p> <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</li> </ul>	<ul style="list-style-type: none"> <li>Heart</li> <li>Pulse</li> <li>Rate</li> <li>Pumps</li> <li>Blood</li> <li>Blood vessels</li> <li>Transported</li> </ul>

## Science Progression - Knowledge and Skills

<ul style="list-style-type: none"> <li>Describe the ways in which nutrients and water are transported within animals, including humans.</li> </ul>	<p>amounts of nutrition, and that they cannot make their own food; they get nutrition from what they eat. (Yr 3 Animals, including Humans)</p> <ul style="list-style-type: none"> <li>Describe the simple functions of the basic parts of the digestive system in humans (Yr 4 Animals including Humans)</li> <li>Identify the different types of teeth in humans and their simple functions. (Yr 4 Animals including Humans)</li> </ul>	<p>behaviour, health and life processes. (KS3)</p> <ul style="list-style-type: none"> <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>	<p>Lungs Oxygen Carbon dioxide Nutrients Water Muscles Cycle Circulatory system Artery Vein Capillary Pulmonary Alveoli Diet Exercise Drugs Alcohol Tobacco Lifestyle</p>
<p><b>Key Concepts</b> The human circulatory system:</p> <ul style="list-style-type: none"> <li>The heart pumps blood in the blood vessels to the lungs.</li> <li>Oxygen goes into the blood when it is in the lungs.</li> <li>Carbon dioxide is removed from the blood in the lungs.</li> <li>Blood goes back to the heart.</li> <li>The heart then pumps the oxygenated blood around the body.</li> <li>Nutrients, water and oxygen are transported in the blood to muscles and other parts of the body where they are needed.</li> <li>As the body uses these nutrients, water and oxygen, carbon dioxide is produced as a waste product.</li> <li>Carbon dioxide is carried back to the heart in the blood.</li> <li>The cycle then starts again.</li> </ul> <p>Diet, exercise, drugs and lifestyle have an impact on the way our bodies function. For instance:</p> <ul style="list-style-type: none"> <li>How our heart and lungs work</li> <li>The likelihood of suffering from conditions like diabetes</li> <li>How fit we are</li> <li>How we feel mentally</li> </ul>			

## Science Progression - Knowledge and Skills

### Common Misconceptions

Some children may think that:

- Your heart is on the left side of your chest
- The heart makes blood
- Blood travels from the heart to the lungs and around the body in one loop.
- When we exercise, the heart beats faster to work the muscles more.
- Some blood in the body is blue and some is red.
- We only eat food to give us energy
- All fat is bad for you
- All dairy is good for you
- Protein is good for you, so you can eat as much of it as you want to.
- Foods only contain fat if you can see it.
- All drugs are bad for you.

### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
How does the amount of time we exercise affect our heartbeat?  Which type of exercise has the greatest effect on our heartrate?		How does my heart rate change throughout the day?	Does our heart beat faster the longer we have been doing exercise?	How does the circulatory system work?  How are poor diets and drugs bad for us?

### National Curriculum Unit – Year 1 Seasonal Changes

National Curriculum	Previous Learning	Future Learning	Key Vocabulary
<ul style="list-style-type: none"> <li>• Observe changes across the four seasons</li> </ul>	<ul style="list-style-type: none"> <li>• Children know about similarities and differences in relation to</li> </ul>	<ul style="list-style-type: none"> <li>• Recognise that light from the sun can be dangerous and that there</li> </ul>	<b>Seasons</b>

## Science Progression - Knowledge and Skills

<ul style="list-style-type: none"> <li>Observe and describe weather associated with the seasons and how day length varies.</li> </ul>	<p>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).</p>	<p>are ways to protect their eyes. (Yr 3 Light).</p> <ul style="list-style-type: none"> <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 season’s and the Earth’s tilt, day length at different times of year, in different hemispheres. (KS3)</li> </ul>	<p>Spring Summer Autumn Winter</p> <p><b>Weather</b> Sunny Rainy Windy Snowy Hot Cold Thunder and lightning Stormy</p> <p>Sun Sunrise Sunset Day length</p>
<p><b>Key Concepts</b> In the UK:</p> <ul style="list-style-type: none"> <li>Daylight hours is longest in midsummer (about 16 hours)</li> <li>Daylight hours get shorter each day from midsummer to midwinter</li> <li>There are about 8 hours of daylight in midwinter.</li> <li>Daylight hours get longer each day from midwinter to midsummer.</li> </ul> <p>There are four different seasons: spring, summer, autumn and winter.</p> <p>The weather in the UK changes in the different seasons.</p> <ul style="list-style-type: none"> <li>Winter is usually colder and rainier</li> <li>Summer is usually hotter and dryer</li> </ul> <p>Other changes caused by these changes of weather include:</p> <ul style="list-style-type: none"> <li>Numbers or minibeasts and insects outside</li> <li>Seed and plant growth</li> <li>Leaves on trees</li> <li>Types of clothes worn by people</li> </ul>			
<p><b>Common Misconceptions</b> Some children may think that:</p>			

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<ul style="list-style-type: none"> <li>• It always snows in winter</li> <li>• It is always sunny in the summer but not sunny in the winter</li> <li>• There are only flowers in spring and summer</li> <li>• It rains most in the winter</li> <li>• It only snows in winter, no other season</li> </ul>	
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### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
Does the wind always blow in the same direction?	<p>What clothes would we wear in different seasons?</p> <p>What weather would we expect more of in different seasons?</p>	<p>What is the weather like? Record the weather regularly throughout the year.</p> <p>What do trees or plants look like at different points in the year?</p>	Do more flowers grow when there has been a long period of sunshine?	Are there plants that are in flower in every season?

### National Curriculum Unit – Year 2 Living things and their habitats

National Curriculum	Previous Learning	Future Learning	Key Vocabulary
<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</li> </ul>	<ul style="list-style-type: none"> <li>• Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Yr 1 Plants)</li> <li>• Identify and describe the basic structure of a variety of common flowering plants, including trees. (Yr 1 Plants)</li> </ul>	<ul style="list-style-type: none"> <li>• Recognise that living things can be grouped in a variety of ways. (Yr 4 Living things and their habitats)</li> <li>• Explore and use classification keys to help group, identify and name a variety of living in their</li> </ul>	<p>Living</p> <p>Dead</p> <p>Never been alive</p> <p>Suited</p> <p>Suitable</p> <p>Basic needs</p> <p>Food</p> <p>Food chain</p>

## Science Progression - Knowledge and Skills

<p>needs of different kinds of animals and plants, and how they depend on each other.</p> <ul style="list-style-type: none"> <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>	<ul style="list-style-type: none"> <li>Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Yr 1 Animals including humans).</li> <li>Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Yr 1 Animals including humans).</li> <li>Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets) (Yr 1 Animals including humans)</li> <li>Observe changes across the four seasons (Yr 1 Seasonal Changes)</li> </ul>	<p>local and wider environment. (Yr 4 Living things and their habitats)</p> <ul style="list-style-type: none"> <li>Recognise that environments can change and that this can sometimes pose dangers to living things. (Yr 4 Living things and their habitats).</li> <li>Construct and interpret a variety of food chains, identifying producers, predators and prey. (Yr 4 Animals including humans)</li> </ul>	<p>Shelter Move feed</p> <p>Names of local habitats e.g. field, woodland, pond, coast, ocean,</p> <p>Names of micro-habitats e.g. under logs, in bushes, under stones, in leaves etc.</p> <p>Herbivore Carnivore Omnivore</p>
<p><b>Key Concepts</b></p> <p>All objects are either living, dead or have never been alive.</p> <ul style="list-style-type: none"> <li>Living things are plants (including seeds) and animals.</li> <li>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. (This is a simplification of what is meant by dead things, but is appropriate at this level for year 2 children to then be built on).</li> <li>An object, which is made of wood, is classed as dead.</li> <li>Objects made of plastic, rock and metal have never been alive.</li> </ul> <p>Animals and plants live in a habitat, which is suited to their needs.</p> <ul style="list-style-type: none"> <li>Animals have suitable features to help them move/find food in the habitat</li> <li>Plants have suitable features to help them to grow well.</li> <li>Animals and plants need their habitat to provide:</li> </ul>			

## Science Progression - Knowledge and Skills

<ul style="list-style-type: none"> <li>- Food</li> <li>- Water</li> <li>- Shelter</li> </ul> <p>Habitat contain different micro-habitats</p> <ul style="list-style-type: none"> <li>• in a woodland there is:             <ul style="list-style-type: none"> <li>- a leaf litter</li> <li>- the bark of trees</li> <li>- in leaves on trees</li> </ul> </li> </ul> <p>Different micro-habitats have different conditions.</p> <ul style="list-style-type: none"> <li>• light or dark,</li> <li>• damp or dry.</li> </ul> <p>Differing conditions in these micro-habitats will effect what animals and plants will live there. Animals and plants that live within a habitat are interdependent for food and shelter. The way that animals obtain their food from plants and other animals can be shown in a food chain.</p>	
<p><b>Common Misconceptions</b></p> <p>Some children may think that:</p> <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 as the flames move and it requires oxygen</li> <li>• Arrows in a food chain means ‘eats’</li> </ul>	

### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
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## Science Progression - Knowledge and Skills

<p>What types of habitats do woodlice prefer? Damp, cold, warm</p>	<p>Are things in our outdoor environment living, dead or never been alive?</p> <p>How would you group these animals and plants based on the habitat you would expect to find them in?</p>	<p>Can we always find insects in the same place outside throughout the year?</p>	<p>What conditions do woodlice prefer to live in?</p>	<p>What do different animals eat? Create simple food chains from research and first hand observations.</p>
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### National Curriculum Unit – Year 4 Living things and their habitats

National Curriculum	Previous Learning	Future Learning	Key Vocabulary
<ul style="list-style-type: none"> <li>Recognise that living things can be grouped in a variety of ways.</li> <li>Explain and use classification keys to help group, identify and name a variety of living things in their local and wider environments.</li> <li>Recognise that environments can change and that this can sometimes pose dangers to living things.</li> </ul>	<ul style="list-style-type: none"> <li>Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Yr 1 Plants)</li> <li>Identify and describe the basic structure of a variety of common flowering plants, including trees. (Yr 1 Plants)</li> <li>Identify and name a variety of common animals including fish, amphibians, reptiles birds and mammals. (Yr 1 Animals including humans).</li> <li>Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) (Yr 1 Animals including humans)</li> </ul>	<ul style="list-style-type: none"> <li>Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird (Yr 5 Living things and their habitats).</li> <li>Describe the process of reproduction in some plants and animals. (Yr 5 – living things and their habitat).</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. (Yr 6 Living things and their habitats)</li> <li>Give reasons for classifying plants and animals based on specific</li> </ul>	<p>Classification Classification keys Environment Habitat Human impact Positive Negative Migrate Hibernate Organism Variation Vertebrates Invertebrates Reptile Bird Amphibian Fish Mammal</p>

## Science Progression - Knowledge and Skills

	<ul style="list-style-type: none"> <li>Identify and name a variety of plants and animals in their habitats, including micro-habitats. *Yr 2 Living things and their habitats)</li> </ul>	<p>observations. (Yr 6 Living things and their habitats).</p>	<p>Wildlife Endangered Extinct Conservation</p>
<p><b>Key Concepts</b> Living things can be grouped or classified in different ways according to their features. Classification keys can be used to help us to identify and name living things.</p> <p>Living things will live in a habitat suited to their needs and adaptations (yr 2 learning) These different environments may change naturally</p> <ul style="list-style-type: none"> <li>through flooding</li> <li>fire</li> <li>earthquakes.</li> </ul> <p>Humans can change the environment</p> <ul style="list-style-type: none"> <li>cutting down trees</li> <li>building roads</li> <li>houses.</li> </ul> <p>Sometimes human change can help animals and plants</p> <ul style="list-style-type: none"> <li>setting up extra nature reserves and protecting these</li> <li>developing ponds</li> </ul> <p>Sometimes human change can be a negative thing</p> <ul style="list-style-type: none"> <li>litter</li> <li>cutting down trees</li> <li>pollution</li> </ul> <p>Environments also change as a result of the seasons e.g. leaves fall off trees, different flowers grow, more water, ice etc.</p>			
<p><b>Common Misconceptions</b> Some children may think that:</p> <ul style="list-style-type: none"> <li>The death of one of the parts of the food chain or web has no or limited consequences on the rest of the food chain.</li> <li>There is always plenty of food for wild animals</li> </ul>			

## Science Progression - Knowledge and Skills

<ul style="list-style-type: none"> <li>Animals only live on land</li> <li>Animals and plants can adapt to their habitats, however these habitats change</li> <li>All changes to habitats are negative.</li> </ul>	
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### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
	How would you make or use a classification key to identify vertebrates/invertebrates and microorganisms (and those found in the local area)?	How do plants and animals change and behave differently at different points in the year?  How has human impact affected the environment?	What happens to the number of woodlice (other insect) in an environment if stones are taken away?	How does the environment change, both positively and negatively, from human impact and from natural impact?

### National Curriculum Unit – Year 5 Living things and their habitats

National Curriculum	Previous Learning	Future Learning	Key Vocabulary
<ul style="list-style-type: none"> <li>Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird (Yr 5 Living things and their habitats).</li> <li>Describe the life process of reproduction in some plants and animals. (Yr 5 – living things and their habitat).</li> </ul>	<ul style="list-style-type: none"> <li>Notice that animals, including humans, have offspring, which grow into adults. (Yr 2 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. (Yr 3 Plants)</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> <li>Reproduction in plants, including flower structure, wind and insect</li> </ul>	Life Life cycle Reproduction Sexual Asexual Sperm Fertilisation Egg Live young Metamorphosis Plantlets Runners

## Science Progression - Knowledge and Skills

		<p>pollination, fertilisation, seed and fruit pollination and dispersal, including quantitative investigation of some dispersal mechanisms. (KS3)</p>	<p>Bulbs Cuttings Fertilisation Pollination Pregnant Gestation Egg Male Female Mammal Amphibian Insect Bird</p>
<p><b>Key Concepts</b> As part of their life cycle, animals and plants reproduce.</p> <ul style="list-style-type: none"> <li>• Most animals reproduce sexually (two parents).</li> <li>• The sperm from the male fertilises the egg of the female.</li> </ul> <p>Animals, including humans, have offspring, which grow into adults.</p> <ul style="list-style-type: none"> <li>• Young - In humans, and other animals, offspring are born as young and will grow into adults (e.g. babies, kittens, puppies etc)</li> <li>• Eggs - birds and snakes, lay eggs which will hatch, and then the young will grow into adults.</li> <li>• Metamorphosis - caterpillars and tadpoles, will go through a further change before they become adults.</li> </ul> <p>Plants reproduce both sexually and asexually.</p> <p>Asexual plant reproduction</p> <ul style="list-style-type: none"> <li>• Bulbs, tubers, runners and plantlets – only one parent plant</li> <li>• Taking cuttings of a plant</li> </ul> <p>Sexual plant reproduction</p> <ul style="list-style-type: none"> <li>• Occurs through pollination</li> <li>• Pollen carried from plant to plant by insects or the wind</li> </ul>		<p>Jane Goodall?</p>	
<p><b>Common Misconceptions</b> Some children may think that:</p> <ul style="list-style-type: none"> <li>• All plants start 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>			

## Science Progression - Knowledge and Skills

### Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
	How can we compare and identify differences between a range of lifecycles? (butterfly, human, chicken, frog)	What happens when I take a cutting from a plant? (e.g. mint, African violet)  How do asexual plants change over time? (Spider plants, strawberries)	Do larger animals have longer periods of gestation?  Do larger animals have shorter life spans?	How does pollination occur?

### National Curriculum Unit – Year 6 Living things and their habitats

National Curriculum	Previous Learning	Future Learning	Key Vocabulary
<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>	<ul style="list-style-type: none"> <li>Recognise that living things can be grouped in a variety of ways. (Yr 4 Living things and their habitats)</li> <li>Explain and use classification keys to help group, identify and name a variety of living things in their local and wider environments. Yr 4 Living things and their habitats)</li> <li>Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird (Yr 5 Living things and their habitats.</li> </ul>	<ul style="list-style-type: none"> <li>Differences between different species (KS3)</li> </ul>	Vertebrates Mammals Fish Reptiles Amphibians Birds Invertebrates Insects Spiders Snails Worms Flowering Non-flowering Classify

## Science Progression - Knowledge and Skills

	<ul style="list-style-type: none"> <li>Describe the life process of reproduction in some plants and animals. (Yr 5 – living things and their habitat).</li> </ul>		Classification Compare Organism Micro-organism Characteristics Species  Carl Linnaeus Linnaean
<p><b>Key Concepts</b></p> <p>Living things can be formally grouped according to their characteristics.</p> <ul style="list-style-type: none"> <li>Plants and animals are two main groups</li> <li>Microorganisms, such as bacteria, yeast, toadstools and mushrooms do not fit into either of these groups.</li> </ul> <p>Plants can make their own food but animals cannot.</p> <p>Animals can be divided into two main groups</p> <ul style="list-style-type: none"> <li>Vertebrates</li> <li>Invertebrates</li> </ul> <p>Vertebrates can be divided into five groups</p> <ul style="list-style-type: none"> <li>Fish</li> <li>Amphibians</li> <li>Reptiles</li> <li>Birds</li> <li>Mammals</li> </ul> <p>Invertebrates can be divided into a number of groups including:</p> <ul style="list-style-type: none"> <li>Insects</li> <li>Spiders</li> <li>Snails</li> <li>worms</li> </ul> <p>Plants can be divided broadly into two main groups</p> <ul style="list-style-type: none"> <li>flowering plants</li> <li>non-flowering plants.</li> </ul>			
<p><b>Common Misconceptions</b></p>			

## Science Progression - Knowledge and Skills

<p>Some children may think that:</p> <ul style="list-style-type: none"> <li>• All micro-organisms are harmful</li> <li>• Mushrooms are plants</li> </ul>	
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### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
How does the temperature effect how yeast behaves?	<p>How can we group and classify different animals and present our information?</p> <p>How can we identify and classify a plant or animal that we have no prior knowledge about?</p> <p>Create an animal that has features from more than one group. How would you classify it?</p>	<p>What happens to bread if you leave it on the windowsill for 2 weeks?</p> <p>How does it change over time?</p>		Who is Carl Linnaeus and what is his classification system?

### National Curriculum Unit – Year 1 Plants

National Curriculum	Previous Learning	Future Learning	Key Vocabulary
<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>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</p>	<ul style="list-style-type: none"> <li>• Observe and describe how seeds and bulbs grow into mature plants. (Yr 2 Plants)</li> <li>• Find out and describe how plants need water, light and a suitable</li> </ul>	<p>Leaf</p> <p>Flower</p> <p>Blossom</p> <p>Petal</p> <p>Fruit</p>

## Science Progression - Knowledge and Skills

<ul style="list-style-type: none"> <li>Identify and describe the basic structure of a variety of common flowering plants, including trees.</li> </ul>	<p>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)</p>	<p>temperature to grow and stay healthy. (Yr 2 Plants)</p> <ul style="list-style-type: none"> <li>Identify and name a variety of plants and animals in their habitats, including micro-habitats. (Yr 2 Living things and their habitats)</li> <li>Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flower. (Yr 3 Plants)</li> <li>Investigate the way in which water is transported within plants. (Yr 3 Plants)</li> </ul>	<p>Berry Root Seed Trunk Branch Stem Bark Stalk Bud</p> <p>Names of trees in the local area</p> <p>Names of flowers and plants in the local area</p>
<p><b>Key Concepts</b></p> <p>Plants</p> <ul style="list-style-type: none"> <li>Name plants in local area</li> <li>Identify common parts of plants (leaf, flower, petal)</li> <li>Look for similarities and differences between these common parts</li> <li>Look at key characteristics to find out names             <ul style="list-style-type: none"> <li>Colour of petals</li> <li>Size</li> <li>Shape of flower etc.</li> </ul> </li> </ul> <p>Trees</p> <ul style="list-style-type: none"> <li>Evergreen – keep their leaves all year</li> <li>Deciduous – lose their leaves in autumn and regrow in the spring.</li> </ul> <p>Name types of trees in local area.</p>			
<p><b>Common Misconceptions</b></p> <p>Some children may think that:</p>			

## Science Progression - Knowledge and Skills

<ul style="list-style-type: none"> <li>• Plants are only grown in pots and have coloured flowers and petals and have 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>	
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### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
Which soil type helped the sunflower to grow the tallest?	How can we sort different leaves/seeds/flowers?	<p>How does a tree change over the year?</p> <p>How does a daffodil bulb change over the year?</p> <p>How has my sunflower changed each week?</p>	Do trees with the biggest leaves lose their leaves first in autumn?	What are the names of the most common British plants?

### National Curriculum Unit – Year 2 Plants

National Curriculum	Previous Learning	Future Learning	Key Vocabulary
<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>	<ul style="list-style-type: none"> <li>• Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Yr 1 Plants)</li> <li>• Identify and describe the basic structure of a variety of common flowering plants, including trees. (Yr 1 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. (Yr 3 Plants)</li> <li>• Explore the requirements of plants for life and growth (air, light, water, nutrients from soil,</li> </ul>	<p>Leaf</p> <p>Flower</p> <p>Blossom</p> <p>Petal</p> <p>Fruit</p> <p>Berry</p> <p>Root</p> <p>Seed</p>

## Science Progression - Knowledge and Skills

		<p>and room to grow) and how they vary from plant to plant. (Yr 3 Plants)</p> <ul style="list-style-type: none"> <li>Investigate the way in which water is transported within plants. (Yr 3 Plants)</li> <li>Explore the parts that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Yr 3 Plants)</li> </ul>	<p>Trunk Branch Stem Bark Stalk Bud Germinate</p> <p>Names of trees in the local area</p>
<p><b>Key Concepts</b></p> <p>Plants may grow from either seeds or bulbs.</p> <ul style="list-style-type: none"> <li>They germinate and turn into seedlings.</li> <li>These then grow into the mature plant.</li> <li>These plants may have flowers, which can develop into seeds, berries or fruit.</li> <li>Seeds and bulbs need to be planted in order for them to grow.</li> <li>Different plants will germinate and grow at different rates.</li> </ul> <p>Pollination and seed dispersal is taught in year 3 – children should be given the opportunity to explore planting and growing different types of plants from different seeds, berries and fruits.</p> <p>Some plants grow and survive in different conditions</p> <ul style="list-style-type: none"> <li>grow in the full sun</li> <li>partial sun</li> <li>shade.</li> <li>Some need more water than others</li> <li>some need more space to grow and stay healthy</li> </ul>		<p>Names of flowers and plants in the local area</p> <p>Light Shade Sun Warm Cool Water Grow Healthy</p>	
<p><b>Common Misconceptions</b></p> <p>Some children may think that:</p> <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> </ul>			

## Science Progression - Knowledge and Skills

<ul style="list-style-type: none"> <li>All plants start out as seeds</li> <li>Seeds and bulbs need sunlight to germinate</li> </ul>	
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### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
<p>Which temperature/location/amount of water is best for growing cress/beans/sunflowers?</p> <p>What is similar and different about the different plants we are growing?</p> <p>How tall have our different plants grown?</p>	<p>How can we classify seeds and bulbs?</p>	<p>What happens to my bean when I plant it to when it is fully grown?</p>	<p>Do bigger seeds grow into bigger plants?</p>	<p>When is it best to plant different types of plants?</p> <p>What do plants need in order to grow and be healthy?</p>

### National Curriculum Unit – Year 3 Plants

National Curriculum	Previous Learning	Future Learning	Key Vocabulary
<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,</li> </ul>	<ul style="list-style-type: none"> <li>Observe and describe how seeds and bulbs grow into mature plants. (Yr 2 Plants)</li> <li>Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. (Yr 2 Plants)</li> </ul>	<ul style="list-style-type: none"> <li>Describe the life process of reproduction in some plants and animals. (Yr 5 Living things and their habitats)</li> <li>Reproduction in plants, including some flower structure, wind and insect pollination, fertilisation,</li> </ul>	<p>Photosynthesis</p> <p>Pollen</p> <p>Insect/wind pollination</p> <p>Seed formation</p> <p>Seed dispersal</p>

## Science Progression - Knowledge and Skills

<p>and room to grow) and how they vary from plant to plant.</p> <ul style="list-style-type: none"> <li>Investigate the way in which water is transported within plants.</li> <li>Explore the parts that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</li> </ul>		<p>seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. (KS3)</p>	<p>Wind, animal and water dispersal. Fertilisation Germination</p> <p>Ovary Ovule Sepal Stamen Anther Filament Style</p> <p>Flower Leaf Stem Roots Trunk Petal Seed</p> <p>Nutrients Absorb Air Light Water Soil</p>
<p><b>Key Concepts</b></p> <p>Many plants, but not all of them, have</p> <ul style="list-style-type: none"> <li>Roots – which anchor the plant into the soil and absorb nutrients and water.</li> <li>stems/trunks – supports the plant. Transports water, nutrients and minerals around the plant.</li> <li>leaves – produce food for the plant, using sunlight and water</li> <li>flowers/blossom – enables the plant to reproduce</li> </ul> <p>These parts have different jobs to help the plants survive (stated above)</p> <p>Flowers enable the plant to reproduce</p> <ul style="list-style-type: none"> <li>the male part of the plant produces pollen</li> <li>pollen is transferred to the female part of the plant during pollination</li> <li>Seeds then form</li> <li>Seeds can also be found in berries and fruit.</li> <li>Seeds, berries or fruit are then dispersed.</li> <li>The seeds are then ready to germinate and the cycle starts again.</li> </ul> <p>Seeds can be dispersed by:</p> <ul style="list-style-type: none"> <li>The wind</li> <li>Water</li> <li>Animals</li> </ul>			

## Science Progression - Knowledge and Skills

<ul style="list-style-type: none"> <li>Explosions (pods)</li> </ul>	
<p><b>Common Misconceptions</b></p> <p>Some children may think that:</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 just decorative and have no other function other than to make the plant look pretty.</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>	

### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
<p>What happens to plants when they are put into different conditions? E.g. dark, light, deprived of air, types of soil, varying amounts of space.</p> <p>Which shape seed travels the furthest during seed dispersal?</p>	<p>How many different ways can you group our seed collection, including how they could be dispersed?</p>	<p>What happens to white carnations or celery when they are put in coloured water?</p> <p>What different flowers, fruits, berries grow outside in our local environment throughout the year?</p>	<p>Does it change how quickly the petals change colour on a white carnation depending on how long the stem is?</p>	<p>Research the different types of seed dispersal</p>

### National Curriculum Unit – Year 1 Everyday Materials.

National Curriculum	Previous Learning	Future Learning	Key Vocabulary
<ul style="list-style-type: none"> <li>Distinguish between an object and the material from which it is made.</li> </ul>	<p>Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own</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</li> </ul>	<p>Object Material Wood Plastic</p>

## Science Progression - Knowledge and Skills

<ul style="list-style-type: none"> <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>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)</p>	<p>and cardboard for particular uses. (Yr 2 Uses of Everyday Materials).</p> <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. (Yr 2 Uses of Everyday Materials).</li> </ul>	<p>Glass Metal Water Rock Brick Paper Fabric Elastic Foil Card Rubber Wool</p>
<p><b>Key Concepts</b> All objects are made from at least one material. These materials can include</p> <ul style="list-style-type: none"> <li>Wood</li> <li>Plastic</li> <li>Metal</li> <li>Glass</li> <li>Water</li> <li>rock.</li> </ul> <p>Different materials have different properties which we can describe them using</p> <ul style="list-style-type: none"> <li>shiny</li> <li>stretchy</li> <li>rough</li> <li>hard</li> <li>smooth</li> </ul> <p>(see vocabulary list)</p> <p>Materials can sometimes come in different forms and are then used for very different reasons, for instance plastic.</p>			<p>Clay Hard Soft Stretchy Stiff Bendy Floppy Waterproof Absorbent Rough Smooth Shiny Dull See-through Not see-through</p>

## Science Progression - Knowledge and Skills

<ul style="list-style-type: none"> <li>• Bag</li> <li>• Water bottle</li> <li>• Plastic wallet etc</li> </ul>	
<p><b>Common Misconceptions</b> Some children may think that:</p> <ul style="list-style-type: none"> <li>• Only fabrics are materials</li> <li>• The word 'rock' describes an object rather than a material.</li> <li>• 'solid' is another word for hard.</li> </ul>	

### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
<p>How can we test the properties of different materials for suitability for a specific job?</p> <ul style="list-style-type: none"> <li>• Absorbency of different cloths</li> <li>• Strength of paper party hats made from different types of paper</li> <li>• How waterproof a shelter or a different jacket might be.</li> </ul>	<p>Can we identify the materials different objects are made from?</p> <p>How can we classify objects made out of the same material?</p> <p>How can we classify materials based on their properties?</p>		<p>Is the thickest material the most absorbent?</p>	

### National Curriculum Unit – Year 2 Uses of Everyday Materials

<b>National Curriculum</b>	<b>Previous Learning</b>	<b>Future Learning</b>	<b>Key Vocabulary</b>
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## Science Progression - Knowledge and Skills

<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>	<ul style="list-style-type: none"> <li>Distinguish between an object and the material from which it is made. (Yr 1 Everyday Materials)</li> <li>Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock. (Yr 1 Everyday Materials)</li> <li>Describe the simple physical properties of a variety of everyday materials. (Yr 1 Everyday Materials)</li> <li>Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Yr 1 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 (Yr 3 Rocks)</li> <li>Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Yr 3 Forces and Magnet)</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. (Yr 5 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. (Yr 5 Properties and Changes of Materials)</li> </ul>	<p>Wood Metal Plastic Glass Brick Rock Paper Cardboard</p> <p>Opaque Transparent Translucent Reflective Non-reflective Flexible Rigid (and properties of materials taught in year 1)</p> <p>Shape Push/pushing Pull/pulling Twist/twisting Squash/squashing Bend/bending Stretch/stretching</p>
<p><b>Key Concepts</b> All objects are made of one or more materials that are chosen specifically because they have suitable properties for the task.</p> <ul style="list-style-type: none"> <li>a water bottle is made of plastic             <ul style="list-style-type: none"> <li>it is transparent (allowing the liquid to be seen in the bottle).</li> <li>waterproof (allowing the water to be held)</li> </ul> </li> </ul>			

## Science Progression - Knowledge and Skills

<p>Using different materials</p> <ul style="list-style-type: none"> <li>• properties of materials need to be considered when selecting a material for a specific job.</li> <li>• Properties are identified through simple tests and classifying activities. <ul style="list-style-type: none"> <li>- Absorbent</li> <li>- Strength</li> <li>- Waterproof etc</li> </ul> </li> <li>• A material can be used for more than one job based on its properties.</li> <li>• An object can be made of more than one material.</li> </ul> <p>Sometimes the materials used when making an object allow it to change shape</p> <ul style="list-style-type: none"> <li>• Bending, stretching, squashing, twisting etc</li> <li>• E.g. clay can be shaped by squashing, stretching, rolling, pressing</li> </ul> <p>These are all examples of the properties of materials. These properties can vary depending on how the material has been processed (e.g. thickness).</p>	
<p><b>Common Misconceptions</b></p> <p>Some children may think that:</p> <ul style="list-style-type: none"> <li>• Only fabrics are materials</li> <li>• The word 'rock' describes an object rather than a material.</li> <li>• 'solid' is another word for hard.</li> </ul>	

### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
<p>How can we test the properties of different materials for suitability for a specific job?</p> <ul style="list-style-type: none"> <li>• How stretchy fabric is – which would</li> </ul>	<p>How can we classify materials according to their properties?</p> <p>How can we classify different objects made of</p>		<p>Are heavy objects made out of the strongest materials?</p>	

## Science Progression - Knowledge and Skills

<p>make the best gym outfit?</p> <ul style="list-style-type: none"> <li>• Which would make the best waterproof jacket?</li> <li>• Which would make the best house?</li> </ul>	<p>the same material, but with different properties?</p>			
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### National Curriculum Unit – Year 3 Rocks

<b>National Curriculum</b>	<b>Previous Learning</b>	<b>Future Learning</b>	<b>Key Vocabulary</b>
<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 of rocks and organic matter.</li> </ul>	<ul style="list-style-type: none"> <li>• Distinguish between an object and the material from which it is made. (Yr 1 Everyday Materials)</li> <li>• Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock. (Yr 1 Everyday Materials)</li> <li>• Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Yr 1 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. (Yr 2 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. (Yr 6 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, metamorphic and sedimentary rocks. (KS3)</li> </ul>	<p>Rock Stone Pebble Boulder Grain Crystals Layers Hard Soft Texture Absorb water Soil Fossil Marble Chalk Granite Sandstone Slate Soil</p>

## Science Progression - Knowledge and Skills

<p><b>Key Concepts</b></p> <p>Rocks are naturally occurring. There are lots of different types of rocks. These including</p> <ul style="list-style-type: none"> <li>• Sandstone</li> <li>• Limestone</li> <li>• Chalk</li> <li>• Slate</li> </ul> <p>Rocks have a range of properties and appearance.</p> <ul style="list-style-type: none"> <li>• Rocks can be both hard and soft.</li> <li>• Rocks are made up of different sized grains or crystals.</li> <li>• Rocks can absorb water.</li> <li>• Rocks can be different sizes and shapes such as pebbles, stones or boulders.</li> </ul> <p>Soil is a mixture of</p> <ul style="list-style-type: none"> <li>• animal and plant material (organic matter)</li> <li>• small rocks that are found on the ground.</li> </ul> <p>Soils differ depending on</p> <ul style="list-style-type: none"> <li>• the type of rock on the ground where the soil is formed</li> <li>• the amount of animal and plant materials that are in the soil.</li> </ul> <p>All these factors affect the properties of the soil.</p> <p>Sometimes rocks can contain fossils.</p> <ul style="list-style-type: none"> <li>• formed millions of years ago.</li> <li>• both plants and animals.</li> <li>• When plants or animals died, they would have landed on the seabed and eventually been covered and squashed by other material. Over time the dissolving animal and plant matter is replaced by minerals from the water.</li> </ul>	<p>Peat Sandy Chalk Clay Soil Igneous Metamorphic Sedimentary</p>
<p><b>Common Misconceptions</b></p> <p>Some children may think that:</p> <ul style="list-style-type: none"> <li>• Rocks are all hard</li> <li>• Man-made substances like bricks and concrete are rocks</li> </ul>	

## Science Progression - Knowledge and Skills

<ul style="list-style-type: none"> <li>• If a piece of natural rock has been shaped to be used for a specific purpose it is no longer a rock (e.g. granite worktop)</li> <li>• All artefacts found in the soil are fossils (e.g. pottery, coins, bricks)</li> <li>• A fossil is an actual piece of the extinct animal or plant.</li> </ul>	
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### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
<p>What happens to a range of rocks if they are shaken? What does this tell us about the properties of these types of rocks?</p> <p>How much water do different rocks absorb?</p> <p>How well do different types of soil retain water?</p>	<p>How can rocks be classified based on their appearance?</p>	<p>How have rocks changed over time? (children could be taken to look at the gravestones in the churchyard.)</p> <p>How do different rocks appear differently when looked at closely (using magnifiers or microscopes?)</p> <p>How do worms help turn organic matter into soil?</p>	<p>If we hit rocks different types of rocks together, they will erode at the same rate?</p>	<p>What are the different types of fossil and how were they formed?</p> <p>Who was Mary Anning and what is she famous for?</p>

### National Curriculum Unit – Year 4 States of Matter

National Curriculum	Previous Learning	Future Learning	Key Vocabulary
<ul style="list-style-type: none"> <li>• Compare and group materials together, according to whether they are solids, liquids and gases.</li> <li>• Observe that some materials change state when they are heated and cooled, and measure</li> </ul>	<ul style="list-style-type: none"> <li>• Distinguish between an object and the material from which it is made. (Yr 1 Everyday Materials)</li> <li>• Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water</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</li> </ul>	<p>Solid</p> <p>Liquid</p> <p>Gas</p> <p>State change</p> <p>Melting</p> <p>Freezing</p>

## Science Progression - Knowledge and Skills

<p>or research the temperature at which this happens in degree Celsius (°C)</p> <ul style="list-style-type: none"> <li>Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</li> </ul>	<p>and rock. (Yr 1 Everyday Materials)</p> <ul style="list-style-type: none"> <li>Describe the physical simple properties of a variety of everyday materials. (Yr 1 Everyday Materials)</li> <li>Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Yr 1 Everyday Materials)</li> <li>Identify and compare the suitability of a variety of everyday materials, including wood, plastic, metal, glass, brick, rock, paper and cardboard for particular uses. (Yr 2 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. (Yr 2 Uses of everyday materials).</li> </ul>	<p>response to magnets. (Yr 5 Properties and changes of materials)</p> <ul style="list-style-type: none"> <li>Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. (Yr 5 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. (Yr 5 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. (Yr 5 Properties and changes of materials)</li> <li>Demonstrate that dissolving, mixing and changes of state are reversible changes. (Yr 5 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,</li> </ul>	<p>Melting point Boiling point Evaporation Condensation Temperature Water cycle Precipitation Ground water</p>
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## Science Progression - Knowledge and Skills

		<p>including changes associated with burning and the action of acid on bicarbonate of soda. (Yr 5 Properties and changes of materials)</p>	
<p><b>Key Concepts</b> Solids, liquids and gases behave differently to each other.</p> <p><b>Solids</b></p> <ul style="list-style-type: none"> <li>• Keep their shape</li> <li>• Have a fixed volume</li> </ul> <p><b>Liquid</b></p> <ul style="list-style-type: none"> <li>• Has a fixed volume</li> <li>• Change its shape to the shape of the container it is held in</li> <li>• Liquids can be poured</li> <li>• When a liquid is in a container, the surface is flat and horizontal</li> </ul> <p><b>Gas</b></p> <ul style="list-style-type: none"> <li>• Fills all available space</li> <li>• No fixed shape</li> <li>• No fixed volume</li> </ul> <p>Some solids can be made out of small grains, such as sand, and can sometimes be confused with liquids as it appears like they can be poured. However, when they are poured, they do not form a flat surface like a liquid. Each individual grain has the properties of a solid.</p> <p><b>Changing states</b></p> <ul style="list-style-type: none"> <li>• Melting – a change of state from solid to a liquid</li> <li>• Freezing – a change of state from a liquid to a solid</li> <li>• Boiling – a change of state from a liquid to a gas <ul style="list-style-type: none"> <li>- Different liquids boil at different temperatures</li> <li>- Bubbles appear in the liquid when a liquid is starting to boil. This is the gas starting to form.</li> </ul> </li> <li>• Evaporation – a change of state from a liquid to a gas</li> </ul>			

## Science Progression - Knowledge and Skills

- This happens more slowly than boiling
- It occurs on the surface of the liquid
- It occurs at a lower temperature than boiling
- Evaporation will occur quicker if the temperature is higher, the liquid is more spread out or it is windy.
- Condensation – a change of state from a gas to a liquid

### The water cycle

- Water falls to the Earth when it rains
- This water flows into rivers and then seas.
- When it rains it is called precipitation
- When it is warm enough, water evaporates from the seas and rivers.
- It forms a gas and rises.
- As it rises it will cool down and condense.
- This condensed water forms clouds.
- Water droplets start to form in the clouds.
- Eventually, the cloud gets too heavy and bursts, causing the water to fall as rain, snow, sleet.
- Water falls to the Earth when it rains.
- The cycle starts again.

### Common Misconceptions

Some children may think that:

- Solid is another word for hard
- Solids are always hard and cannot break or change shape.
- Substances that are made of very small grains are not solids (e.g. sugar or sand).
- Balloons are lighter when they have been blown up with air.
- Water in different states are different substances (steam, water, ice)
- All liquids boil at the same temperature as water (100°C)
- Melting is the same as dissolving
- Water disappears when it is evaporated or when it is boiled
- The changes in the water cycle are irreversible.
- Evaporation occurs when the Sun sucks up the water, or when water that is on a surface is absorbed into it.

## Science Progression - Knowledge and Skills

### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
How can we get ice to melt quickly?	How can we classify a range of solids?	What happens to a material when it is heated or cooled? (Observation of changing state)	Do larger blocks of ice melt fully quicker than smaller blocks of ice in the same temperature?	Research the water cycle.
What is the melting point of a range of different materials? (Chocolate, butter, ice etc)	How can we classify a range of liquids?	What happens to hot water on cold surfaces and cold water on hot surfaces? (evaporation and condensation).	Do puddles evaporate at the same speed on a warm day and on a cool day?	
Where is the best place to dry washing?	How can we classify materials into solids, liquids or gases?			
What happens to a puddle on a warm day?				

### National Curriculum Unit – Year 5 Properties and Changes of Materials

National Curriculum	Previous Learning	Future Learning	Key Vocabulary
<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</li> </ul>	<ul style="list-style-type: none"> <li>Identify and compare the suitability of a variety of everyday materials, including wood, plastic, glass, brick, rock, paper and cardboard for particular uses. (Yr 2 Uses of everyday materials)</li> <li>Find out how the shapes of solid objects made from some materials can be changed by</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)</li> </ul>	Thermal Electrical Insulator Conductor Change of state Mixture Dissolve Solution Soluble

## Science Progression - Knowledge and Skills

<p>solution, and describe how to recover a substance from a solution.</p> <ul style="list-style-type: none"> <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>	<p>squashing, bending, twisting and stretching. (Yr 2 Uses of everyday materials)</p> <ul style="list-style-type: none"> <li>• Compare and group materials together, according to whether they are solids, liquids or gases. (Yr 4 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). (Yr 4 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. (Yr 4 States of Matter)</li> </ul>	<ul style="list-style-type: none"> <li>• Defining acids and alkalis in terms of neutralisation reactions. (KS3)</li> <li>• The pH scale of measuring acidity/alkalinity; and indicators. (KS3)</li> </ul>	<p>Insoluble Filter Sieve Reversible Irreversible Burning rusting</p>
<p><b>Key Concepts</b> Materials have a variety of different uses which can depend on</p> <ul style="list-style-type: none"> <li>• The state of the material</li> <li>• The properties of the material</li> </ul> <p>Some properties of materials</p> <ul style="list-style-type: none"> <li>• Hardness</li> <li>• Transparency</li> <li>• Electrical and thermal conductivity</li> </ul>			

## Science Progression - Knowledge and Skills

<ul style="list-style-type: none"> <li>• Magnetism</li> </ul> <p>Soluble and insoluble</p> <ul style="list-style-type: none"> <li>• Materials that are soluble will dissolve in a liquid to form a solute.</li> <li>• Materials that are insoluble will not dissolve in a liquid and form a sediment.</li> </ul> <p>Separating mixtures of materials</p> <ul style="list-style-type: none"> <li>• Filtration</li> <li>• Sieving</li> <li>• evaporation</li> </ul> <p>Reversible changes include</p> <ul style="list-style-type: none"> <li>• when a material has been dissolved – e.g. water and salt can be separated by evaporating the water</li> <li>• mixtures – sand and water can be separated by filtration</li> <li>• changed state – chocolate can be heated to make it melt and cooled to make it solid</li> </ul> <p>Changes can also be irreversible</p> <ul style="list-style-type: none"> <li>• burning wood</li> <li>• rusting</li> <li>• vinegar and bicarbonate of soda</li> <li>• burnt toast</li> </ul> <p>These form new materials and are irreversible changes.</p>	
<p><b>Common Misconceptions</b></p> <p>Some children may think that:</p> <ul style="list-style-type: none"> <li>• Melting and dissolving are the same thing</li> <li>• If you dissolve a solid in a liquid it disappears and you cannot get it back.</li> <li>• Misconceptions around reversible and irreversible changes</li> <li>• Misconceptions about whether something is a physical or a chemical change</li> </ul>	

### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
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## Science Progression - Knowledge and Skills

<p>What temperature do materials dissolve fastest in?</p> <p>What liquids does sugar dissolve in?</p> <p>What affects the rate of rusting?</p> <p>Investigate materials by their properties. Which material would make a thermal waterproof coat?</p>	<p>What methods can we use to separate materials from a range of mixtures?</p> <p>Can we identify reversible and irreversible changes?</p>	<p>What affects the rates of rusting?</p>	<p>Does a material dissolve quicker in more of the liquid?</p>	<p>Research different scientists who have invented different materials. (Spencer Silver – the glue for sticky notes, Ruth Benerito wrinkle free cotton)</p>
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### National Curriculum Unit – Year 3 Forces and Magnets

<p><b>National Curriculum</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 surfaces, 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</li> </ul>	<p><b>Previous Learning</b></p> <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. (Yr 2 Uses of Everyday Materials).</li> </ul>	<p><b>Future Learning</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. (Yr 5 Forces)</li> <li>• Identify the effects of air resistance, water resistance and friction, that act between moving surfaces. (Yr 5 Forces)</li> <li>• Recognise that some mechanisms, including levers, pulleys, and gears, allow a</li> </ul>	<p><b>Key Vocabulary</b></p> <p>Force Push Pull Twist Contact force Non contact force Magnetic force Magnet Strength Bar magnet Ring magnet Button magnet Horseshoe magnet</p>
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## Science Progression - Knowledge and Skills

<p>identify some magnetic materials.</p> <ul style="list-style-type: none"> <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>smaller force to have a greater effect. (Yr 5 Forces)</p> <ul style="list-style-type: none"> <li>Magnetic fields by plotting with compass, representation by field lines. (KS3)</li> <li>Earth's magnetism, compass and navigation. (KS3)</li> </ul>	<p>Attract Repel Magnetic material Metal Iron Steel Pole North pole South pole</p>
<p><b>Key Concepts</b></p> <p>A force is a push or a pull. When an object moves on a surface, the texture of the surface and the object affect how it moves, for example</p> <ul style="list-style-type: none"> <li>using ice skates on ice or using trainers on ice.</li> <li>Different surfaces – carpet, wood, glass</li> </ul> <p>Magnetism</p> <ul style="list-style-type: none"> <li>A magnet attracts magnetic material.</li> <li>Iron and nickel and materials containing these (e.g. stainless steel) are magnetic</li> <li>The strongest parts of a magnet are the poles.</li> <li>A magnet has a North pole and a south pole.</li> <li>Like poles repel (e.g. north and south attract),</li> <li>unlike poles attract (e.g. north and north repel)</li> </ul> <p>For some forces to act there will need to be contact</p> <ul style="list-style-type: none"> <li>opening a door</li> <li>the wind pushing the trees</li> </ul> <p>Some forces can act at a distance</p> <ul style="list-style-type: none"> <li>Magnetism.</li> </ul> <p>The magnet does not need to touch an object for it to either attract or repel it (as long as the object is magnetic).</p>			
<p><b>Common Misconceptions</b></p> <p>Some children may think that:</p>			

## Science Progression - Knowledge and Skills

<ul style="list-style-type: none"> <li>The bigger the magnet the stronger it is</li> <li>All metals are magnetic.</li> </ul>	
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### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
<p>Which surface allows an object to travel the furthest?</p> <p>Which magnet can pick up the most paper clips?</p>	Which materials are magnetic?		<p>Does the size and shape of a magnet effect how strong it is?</p> <p>Can a magnet attract magnetic materials through different mediums or at a distance?</p>	How does a compass work?

### National Curriculum Unit – Year 5 Forces

National Curriculum	Previous Learning	Future Learning	Key Vocabulary
<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>	<ul style="list-style-type: none"> <li>Compare how things move on different surfaces. (Yr 3 Forces and Magnets)</li> <li>Notice that some forces need contact between two surfaces, but magnetic forces can act at a distance. (Yr 3 Forces and Magnets)</li> <li>Observe how magnets attract or repel each other and attract some materials and not others. (Yr 3 Forces and Magnets)</li> </ul>	<ul style="list-style-type: none"> <li>Forces as pushes and 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 on a force. (KS3)</li> <li>Forces: associated with deforming objects; stretching and squashing – springs' with rubbing and friction between surfaces,</li> </ul>	Force Gravity Earth Air resistance Water resistance Friction Mechanisms Levers Pulleys Gears

## Science Progression - Knowledge and Skills

	<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. (Yr 3 Forces and Magnets)</li> <li>• Describe magnets as having two poles (Yr 3 Forces and Magnets)</li> <li>• Predict whether two magnets will attract or repel each other, depending on which poles are facing. (Yr 3 Forces and Magnets)</li> </ul>	<p>with pushing things out of the way; resistance to motion of air and water. (KS3)</p> <ul style="list-style-type: none"> <li>• Forces measured in Newton's, measurements of stretch or compression as force is changed (KS3)</li> </ul>	
<p><b>Key Concepts</b></p> <p>When forces act on an object, the force can cause the object to:</p> <ul style="list-style-type: none"> <li>• Start moving</li> <li>• Stop moving</li> <li>• Increase or decrease in speed</li> <li>• Change direction</li> </ul> <p>Gravity acts on all unsupported objects, pulling them to Earth. It acts on objects from a distance.</p> <p>Air resistance</p> <ul style="list-style-type: none"> <li>• A force that acts on an object in the air.</li> <li>• Contact force on an object</li> <li>• Parachute uses air resistance to slow fall</li> <li>• Sail on a boat uses air resistance</li> </ul> <p>Water resistance</p> <ul style="list-style-type: none"> <li>• A force that acts in water to slow things down</li> <li>• Boats are effected by water resistance as they move through water</li> </ul> <p>Objects can be also be stationary for air and water resistance to be acting upon them.</p>			

## Science Progression - Knowledge and Skills

<p>Friction</p> <ul style="list-style-type: none"> <li>• Formed when an object makes contact either with another object or a surface.</li> <li>• This may effect how the object moves or its speed.</li> </ul> <p>Mechanisms</p> <ul style="list-style-type: none"> <li>• Pulleys, levers and gears are all examples of mechanisms.</li> <li>• A device which allows a small force to be increased to a larger force.</li> <li>• The pay back is that it requires a greater movement.</li> <li>• The small force moves a long distance</li> <li>• The resulting large force moves a small distance. <ul style="list-style-type: none"> <li>- A bottle opener</li> <li>- Seasaw</li> <li>- Wheelbarrow etc</li> </ul> </li> </ul>	
<p><b>Common Misconceptions</b></p> <p>Some children may think that:</p> <ul style="list-style-type: none"> <li>• If an object is heavier, then it will fall faster as it has more gravity acting on it.</li> <li>• Forces always act in pairs which are equal and opposite.</li> <li>• If a surface is smooth then it has no friction.</li> <li>• Smooth surfaces mean that objects will always travel more easily.</li> <li>• A stationery object has no forces acting upon it.</li> <li>• Heavy objects will sink and light objects will float.</li> </ul>	

### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
Which material is the best to slow down a person at the bottom of the helter skelter/marble at the bottom of a marble run?	Explore how levers, pulleys and gears work and classify objects depending on whether they use levers, pulleys or gears.		If a large lever/pulley or gear is used, how does the size effect the force?	Research Galileo Galilei and Isaac Newton and their work on the theory of gravitation.

## Science Progression - Knowledge and Skills

How do we get the best grip on trainers?				
Which boat shapes creates the most water resistance?				
How can we keep a parachute in the air the longest?				
Which shape sail makes the boat travel the furthest?				

### National Curriculum Unit – Year 4 Electricity

<b>National Curriculum</b>	<b>Previous Learning</b>	<b>Future Learning</b>	<b>Key Vocabulary</b>
<ul style="list-style-type: none"> <li>Identify common appliance that run on electricity</li> <li>Construct a simple series electrical circuit, identifying and running 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</li> </ul>	<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. (Yr 6 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. (Yr 6 Electricity).</li> <li>Use recognised symbols when representing a simple circuit in a diagram. (Yr 6 Electricity).</li> </ul>	Electricity Electrical appliance Mains Plug Electrical circuit Complete circuit Series circuit Cell Battery Negative Positive Connection Short circuit Crocodile clip

## Science Progression - Knowledge and Skills

<p>this with whether or not a lamp lights in a simple series circuit.</p> <ul style="list-style-type: none"> <li>Recognise some common conductors and insulators, and associate metals with being good conductors.</li> </ul>			<p>Bulb Switch Buzzer Motor Conductor Insulator Metal Non-metal Symbol</p>
<p><b>Key Concepts</b> Electricity in our homes</p> <ul style="list-style-type: none"> <li>Lots of appliances that run on electricity in our homes</li> <li>Some run on the mains(plugged in)</li> <li>Some use a battery (sometimes these batteries can be rechargeable so the battery gets plugged into the mains).</li> </ul> <p>Circuits</p> <ul style="list-style-type: none"> <li>Electrical circuits need cells or batteries</li> <li>Wires are used to connect the batteries to any components in the circuit (e.g. bulbs, buzzers, switches)</li> <li>Circuit needs to be complete for the component to work</li> <li>A circuit is not complete if there is             <ul style="list-style-type: none"> <li>a loose connection</li> <li>a short circuit</li> <li>a break in the circuit.</li> </ul> </li> <li>If the circuit is not complete, the component will not work.</li> <li>Switches can be added to a circuit to turn a component on and off.</li> <li>If the switch is open (off) the component will not work</li> <li>If the switch is closed (on) the component will work.</li> </ul> <p>Conductors and insulators</p> <ul style="list-style-type: none"> <li>Metals are good conductors, therefore are used as wires in electrical circuits.</li> <li>All other materials that are solids are insulators apart from graphite (pencil lead).</li> <li>Water also conducts electricity, unless it is completely pure.</li> </ul> <p>In year 6, children will learn what happens when more batteries or an increase in a specific component is added to a circuit. Circuit symbols are also taught in year 6.</p>			<p>Children in Yr 4 do not need to use the symbols for the different components in an electrical circuit, as this is taught in year 6.</p>

## Science Progression - Knowledge and Skills

<p><b>Common Misconceptions</b></p> <p>Some children may think that:</p> <ul style="list-style-type: none"> <li>• Electricity flows out of both ends of a battery.</li> <li>• Electricity just goes from the battery into the component in the circuit to make it work.</li> <li>• Electricity flows to a bulb to light it up and then stops when it gets to the bulb.</li> </ul>	
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### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
Which materials are conductors or insulators?	Which materials are suitable for wires?		Does the length of a piece of metal (identical metal) effect how well it conducts electricity?	
Which metal is the best conductor?	Which materials are conductors and insulators?  How would you group these appliances for where they get their power?			

### National Curriculum Unit – Year 6 Electricity

National Curriculum	Previous Learning	Future Learning	Key Vocabulary
<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. (Yr 6 Electricity).</li> <li>• Compare and give reasons for variations in how components function, including the brightness</li> </ul>	<ul style="list-style-type: none"> <li>• Identify common appliance that run on electricity (Yr 4 Electricity)</li> <li>• Construct a simple series electrical circuit, identifying and running its basic parts, including cells, wires, bulbs, switches and buzzers. (Yr 4 Electricity)</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, measure in ohms, as</li> </ul>	Circuit Complete circuit Circuit diagram Circuit symbol Cell Battery Bulb Buzzer

## Science Progression - Knowledge and Skills

<p>of bulbs, the loudness of buzzers, and the on/off position of switches. (Yr 6 Electricity).</p> <ul style="list-style-type: none"> <li>Use recognised symbols when representing a simple circuit in a diagram. (Yr 6 Electricity).</li> </ul>	<ul style="list-style-type: none"> <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. (Yr 4 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. (Yr 4 Electricity)</li> <li>Recognise some common conductors and insulators, and associate metals with being good conductors. (Yr 4 Electricity)</li> </ul>	<p>the ratio of potential difference(p.d.) to current. (KS3)</p> <ul style="list-style-type: none"> <li>Differences in resistance between conducting and insulating components (quantitative). (KS3)</li> <li>Static electricity. (KS3)</li> </ul>	<p>Motor Switch Voltage</p> <p>Children do not need a full understanding of volts/voltage, but need to recognise these on a cell or a battery and realise that not all batteries have the same power or voltage.</p>
<p><b>Key Concepts</b></p> <p>By adding more cells or batteries to a circuit</p> <ul style="list-style-type: none"> <li>a bulb brighter</li> <li>a buzzer louder</li> <li>a motor spin faster.</li> </ul> <p>By adding more of the same component to a circuit makes</p> <ul style="list-style-type: none"> <li>bulbs less bright</li> <li>buzzers quieter</li> <li>motors spin slower.</li> </ul> <p>Switches can be used in circuits.</p> <ul style="list-style-type: none"> <li>When a switch is off (open) the circuit is broken</li> <li>electricity cannot flow through the circuit.</li> <li>bulbs, motors and buzzers will not work.</li> <li>If a switch is on (closed) the circuit is complete</li> <li>all components of the circuits will work.</li> </ul>			

## Science Progression - Knowledge and Skills

Learn and use recognised circuit symbols to draw circuits.	
<p><b>Common Misconceptions</b></p> <p>Some children may think that:</p> <ul style="list-style-type: none"> <li>• If a battery is bigger, it will contain more electricity</li> <li>• The components in the circuit that are closest to the battery will get more electricity than those further away.</li> </ul>	

### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
Which make of battery lasts the longest?	How would you group electronic devices based on the job that they do?		<p>What happens to a bulb/motor/buzzer when you put more cells in the circuit?</p> <p>What happens to a bulb/motor/buzzer if you put more of each component into a circuit?</p>	

### National Curriculum Unit – Year 3 Light

National Curriculum	Previous Learning	Future Learning	Key Vocabulary
<ul style="list-style-type: none"> <li>• Recognise that they need light to see things, and that dark is the absence of light.</li> <li>• Notice that light is reflected from surfaces.</li> </ul>	<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. (Yr 1 Animals including humans).</li> </ul>	<ul style="list-style-type: none"> <li>• Recognise that light appears to travel in straight lines. (Yr 6 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. (Yr 6 Light)</li> </ul>	<p>Light</p> <p>Light source</p> <p>Dark</p> <p>Absence of light</p> <p>Transparent</p> <p>Translucent</p> <p>Opaque</p>

## Science Progression - Knowledge and Skills

<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.</li> <li>Recognise that shadows are formed when the light from a light source is blocked by an opaque object.</li> <li>Find patterns in the way that the size of the shadows change.</li> </ul>	<ul style="list-style-type: none"> <li>Describe the simple physical properties of a variety of everyday materials (Yr 1 Everyday Materials)</li> </ul>	<ul style="list-style-type: none"> <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. (Yr 6 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. (Yr 6 Light)</li> </ul>	<p>Shiny Matt Surface Shadow Reflect Mirror Sunlight Dangerous</p>
<p><b>Key Concepts</b></p> <p>We see objects around us because our eyes can see light.</p> <ul style="list-style-type: none"> <li>Dark is the absence of light.</li> <li>In complete darkness we cannot see anything.</li> <li>Light sources give off their own light. (e.g. sun, candles, bulbs etc)</li> <li>If there is more light we can see objects easier.</li> <li>Some objects can be reflective of light, which means even when there is less light, they will be easier to see than other objects because they are reflecting the light that is there (e.g. road signs reflect the light from car headlamps when it is dark.)</li> </ul> <p>Light from the sun</p> <ul style="list-style-type: none"> <li>looking directly at the sun can damage our eyes.</li> <li>We can wear sunglasses and sunhats to help protect our eyes from the sun.</li> </ul> <p>Shadows</p> <ul style="list-style-type: none"> <li>formed when an object blocks the light source.</li> <li>made by an opaque object and a translucent object.</li> <li>The size of a shadow will depend on             <ul style="list-style-type: none"> <li>the size of the object,</li> <li>the position of the object against the light source</li> <li>the surface.</li> </ul> </li> </ul>			
<p><b>Common Misconceptions</b></p>			

## Science Progression - Knowledge and Skills

<p>Some children may think that:</p> <ul style="list-style-type: none"> <li>• The moon and other surfaces which reflect light are light sources.</li> <li>• A transparent object is a light source.</li> <li>• Shadows contain detail – e.g. details of facial features, details on a building.</li> <li>• Shadows are a result of the object creating them creating darkness.</li> </ul>	
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### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
<p>Which objects are still visible as it gets darker?</p> <p>Which materials reflect light more?</p>	<p>Which objects are light sources and which are not light sources?</p>	<p>What do we notice happening to our shadows over the course of a day if we always stand in the same place?</p>	<p>What happens to the size of the shadow if the light source is closer to the object?</p> <p>What happens to the position of the shadow as the angle of the light source is changed?</p> <p>Does the surface the shadow is falling on effect the shadow?</p>	<p>Why is the sun dangerous for our eyes and how can we protect our eyes from the sun?</p>

### National Curriculum Unit – Year 6 Light

<p><b>National Curriculum</b></p> <ul style="list-style-type: none"> <li>• Recognise that light appears to travel in straight lines.</li> </ul>	<p><b>Previous Learning</b></p>	<p><b>Future Learning</b></p>	<p><b>Key Vocabulary</b></p> <p>Light Light source</p>
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## Science Progression - Knowledge and Skills

<ul style="list-style-type: none"> <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> <li>• Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.</li> </ul>	<ul style="list-style-type: none"> <li>• Recognise that they need light to see things, and that dark is the absence of light. (Yr Light)</li> <li>• Notice that light is reflected from surfaces. (Yr 3 Light)</li> <li>• Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Yr 3 Light)</li> <li>• Recognise that shadows are formed when the light from a light source is blocked by an opaque object. (Yr 3 Light)</li> <li>• Find patterns in the way that the size of the shadows change. (Yr 3 Light)</li> </ul>	<ul style="list-style-type: none"> <li>• The similarities and differences between light waves and wave in matter. (KS3)</li> <li>• Light waves travelling through a vacuum; speed of light. (KS3)</li> <li>• The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface. (KS3)</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)</li> <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>	<p>Dark Absence of light Transparent Translucent Opaque Shiny Matt Surface Shadow Reflect Mirror Sunlight Dangerous Straight lines Light rays</p>
<p><b>Key Concepts</b> Light appears to travel in straight lines</p> <ul style="list-style-type: none"> <li>• We see objects when light from them goes into our eyes.</li> <li>• The light may come directly from light sources</li> <li>• If the object is not a light source, it will reflect light from a light source into our eyes.</li> </ul>			

## Science Progression - Knowledge and Skills

<p>Shadows</p> <ul style="list-style-type: none"> <li>• Objects that block light will cause shadows.</li> <li>• Because light travels in straight lines the shape of the shadow will be the same as the outline shape of the object.</li> </ul>	
<p><b>Common Misconceptions</b> Some children may think that:</p> <ul style="list-style-type: none"> <li>• We see objects because light travels from our eyes to the object.</li> </ul>	

### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
Where is the best place to put mirrors on a car to see?	<p>Identify and explore ways that light travels in straight lines.</p> <p>What happens to the light from a torch in a straight tube/in a bent tube?</p> <p>How can you get a beam of light through a maze?</p> <p>How do periscopes work?</p>	What happens to shadows of buildings or other objects in the school grounds throughout the day?	<p>Shadow puppets</p> <p>What happens to the size of the shadow, based on where it is from the light source?</p> <p>What happens to the position of the shadow as the angle of the light source is changed?</p>	Which material is the most reflective and why?

### National Curriculum Unit – Year 4 Sound

<b>National Curriculum</b>	<b>Previous Learning</b>	<b>Future Learning</b>	<b>Key Vocabulary</b>
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## Science Progression - Knowledge and Skills

<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>	<ul style="list-style-type: none"> <li>• Identify, name, draw and label the basic parts of the humans body and say which part of the body is associated with which sense. (Yr 1 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 and 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)</li> <li>• Pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound. (KS3)</li> <li>• Waves transferring information for conversion to electrical signals by microphone. (KS3).</li> </ul>	<p>Sound Source Vibrate Vibration Travel Pitch High Low Volume Loud Quiet Soundproof Wave</p>
<p><b>Key Concepts</b> A sound produces vibrations.</p> <ul style="list-style-type: none"> <li>• vibrations travel through a medium from the source to our ears.</li> <li>• Different mediums such as solids, liquids and gases can carry sound.</li> </ul>			

## Science Progression - Knowledge and Skills

<ul style="list-style-type: none"> <li>• Sound cannot travel through a vacuum (an area empty of matter).</li> <li>• The vibrations cause part of our ears to vibrate, allowing us to hear (sense) the sound.</li> </ul> <p>Volume of sound</p> <ul style="list-style-type: none"> <li>• depends on the strength (size) of the vibrations which decreases as they travel through the mediums.</li> <li>• An instruments produces a loud sound when it is hit, plucked or blown harder.</li> <li>• sound decreases in volume as you move away from the source.</li> <li>• A sound insulator is a material which blocks sound effectively.</li> </ul> <p>Pitch of sound</p> <ul style="list-style-type: none"> <li>• Pitch is how high or low a sound is</li> <li>• Features of objects producing the sounds effect pitch.</li> <li>• Smaller objects usually produce higher pitched sounds</li> <li>• Larger objects usually produce lower pitched sounds.</li> <li>• Instruments can produce a variety of different pitches. <ul style="list-style-type: none"> <li>- Different length notes on a glockenspiel</li> <li>- Holes on a woodwind instrument</li> <li>- Thickness of strings</li> <li>- Length of strings on a piano</li> </ul> </li> </ul>	
<p><b>Common Misconceptions</b></p> <p>Some children may think that:</p> <ul style="list-style-type: none"> <li>• Sound doesn't and can't travel through solids and liquids.</li> <li>• High sounds are loud and low sounds are quiet.</li> <li>• Sound only travels in one direction from the source.</li> </ul>	

### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
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## Science Progression - Knowledge and Skills

<p>How far away can a range of different sounds be heard?</p> <p>How far can I move away from a sound source before it can no longer be heard?</p> <p>What is the best material for the ear pieces of a string telephone?</p> <p>Which material is the best at insulating sounds?</p>	<p>What is making the sound and how can we classify these sound sources?</p>		<p>What happens to the pitch of a glockenspiel as the size of the notes changes?</p> <p>What happens to the pitch of the guitar string the thicker it gets?</p> <p>What happens to the pitch of a bottle when tapped or blown across compared to the amount of water in the bottle?</p> <p>What happens to the pitch of the tuning fork when there are different sized tuning forks?</p> <p>What happens to the drum skin if I hit it harder?</p> <p>What happens to the vibrations of a tuning fork if I hit it harder?</p>	
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National Curriculum Unit – Year 5 Earth and Space

<b>National Curriculum</b>	<b>Previous Learning</b>	<b>Future Learning</b>	<b>Key Vocabulary</b>
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## Science Progression - Knowledge and Skills

<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>	<ul style="list-style-type: none"> <li>Observe changes across the four seasons. (Yr 1 Seasonal changes)</li> <li>Observe and describe weather associated with the seasons and how day length varies. (Yr 1 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. (KS£)</li> </ul>	<p>Earth Sun Moon Planet Mercury Venus Earth Mars Jupiter Saturn Uranus Neptune Dwarf planet Pluto Spherical Solar system Rotates Orbit Star Solar system</p>
<p><b>Key Concepts</b></p> <ul style="list-style-type: none"> <li>The sun is a star. It is at the centre of our solar system.</li> <li>In our solar system there are 8 planets</li> <li>All of these planets orbit the sun</li> <li>They are held in fixed orbits.</li> <li>One orbit is the equivalent to one year for that planet.</li> <li>Earth takes 365 <math>\frac{1}{4}</math> days to orbit the Sun – this is the length of a year on Earth</li> <li>The Earth rotates on its axis. It takes 24 hours to rotate once. This is the length of a day</li> <li>As the Earth rotates, different parts of the Earth will be facing the Sun at different times.</li> <li>The half of the Earth facing the sun is in day and the half of the Earth facing away from the Sun is night.</li> <li>The Moon orbits the Earth.</li> <li>It takes about 28 days for the Moon to orbit the Earth.</li> <li>The Sun, Earth and Moon are approximately spherical.</li> </ul>			
<p><b>Common Misconceptions</b> Some children may think that:</p>			

## Science Progression - Knowledge and Skills

<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>• You can only see the moon at night.</li> <li>• Pluto is a planet in our solar system</li> </ul>	
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### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
	How can we classify the different objects in the solar system into groups?	<p>How do shadows change throughout the day?</p> <p>How does a sundial change throughout the day?</p>	Is there a pattern between the distance a planet is away from the Sun and how long it takes to orbit the Sun?	<p>How does the Earth orbit the Sun and the Moon orbit the Earth?</p> <p>Why does day and night occur?</p> <p>How have our ideas about the solar system changed over time? What evidence do scientists have to back up these theories?</p>

### National Curriculum Unit – Year 6 Evolution and Inheritance

<b>National Curriculum</b>	<b>Previous Learning</b>	<b>Future Learning</b>	<b>Key Vocabulary</b>
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## Science Progression - Knowledge and Skills

<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>	<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. (Yr 2 Living things and their habitats)</li> <li>• Notice that animals, including humans, have offspring which grow into adults. (Yr 2 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. (Yr 3 Plants)</li> <li>• Describe in simple terms how fossils are formed when things that have lived are trapped within a rock. (Yr 3 Rocks)</li> <li>• Recognise that environments can change and that this can sometimes pose dangers to living things. (Yr 4 Living things and their habitats)</li> <li>• Describe the life process of reproduction in some plants and animals (Yr 5 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 in 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>Offspring Sexual reproduction Vary Variation Characteristics Suited Adapted Environment Inherited Species Fossil</p>
<p><b>Key Concepts</b></p>			

## Science Progression - Knowledge and Skills

<p>All living things will have offspring of some kind.</p> <ul style="list-style-type: none"> <li>• Offspring are not identical to their parents</li> <li>• Features will vary but will be similar to their parents.</li> </ul> <p>Plants and animals have features that make them suited to their environment.</p> <ul style="list-style-type: none"> <li>• If an environment changes quickly, some animals and plants will features that are not suited to this environment. This species will die out.</li> <li>• If an environment changes gradually, some animals and plants that have features that are best suited to the environment, survive in greater numbers.</li> <li>• These then reproduce and pass these features on to their young.</li> <li>• These inherited features become more dominant within the population over time.</li> <li>• Over a very long period of time, these changes and inherited features may have changed the animal to the point where a new species is formed.</li> <li>• This is evolution.</li> </ul> <p>Fossils can provide us with evidence of what has lived on Earth millions of years ago. They provide evidence to support the theory of evolution Scientists such as Darwin and Wallace observed how living things adapt to different environments.</p>	
<p><b>Common Misconceptions</b> Some children may think that:</p> <ul style="list-style-type: none"> <li>• Adaptations occur during an animals lifetime</li> <li>• Offspring most resemble their parents of the same sex (father and son or mother and daughter)</li> <li>• All characteristics, likes and skills of the parent are inherited by the child.</li> </ul>	

### Working Scientifically Teaching Ideas for different Enquiry Skills

Comparative/fair tests	Identify and Classify	Observations over time	Pattern Seeking	Research
	How do different breeds of dogs look similar (Labradors) and how are new breeds	How have giraffes changed over time to adapt?	Darwin's finches bird beak activity – How does the	How did Charles Darwin and Alfred Wallace develop their ideas of evolution?

## Science Progression - Knowledge and Skills

	<p>different? (e.g. labradoodle?)</p> <p>Design and explain the features of a new plant or animal to be suited to a specific environment?</p>	<p>How can we use fossils to identify living things that lived on Earth?</p>	<p>shape of a birds beak affect what it eats?</p>	<p>How does the work of Mary Anning support the idea of evolution?</p> <p>How did the species of peppered moths change during the industrial revolution in order for the species to survive?</p>
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