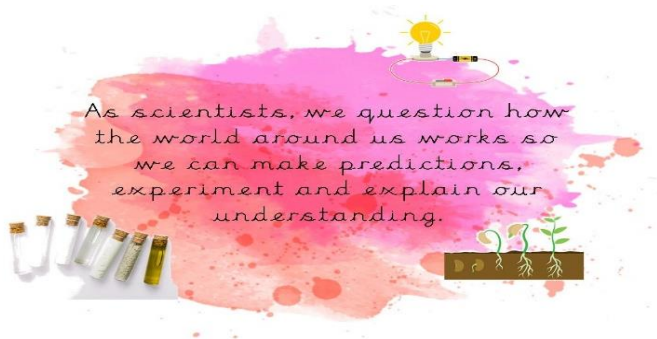


## Science Knowledge and Skills Progression

**'As Scientists, we question how the world around us works so we can make predictions, experiment and explain our understanding.'**

*question, predict, experiment, observe, analyse, classify*



*question, predict, experiment,  
observe, analyse, classify*

### **Science Intent**

Science provides pupils with the chance to develop an understanding and curiosity about the world around them while they acquire the skills and knowledge to think scientifically. We aim to introduce pupils to the uses and possibilities of science in today's world and for the future.

Throughout our school science is embedded in each year group. Pupils have the opportunity to use their enquiry skills and develop them as they progress through the school. Combined with specialist vocabulary, the pupils are enabled to communicate their scientific ideas effectively.

Pupils are encouraged to question the world around them and develop and use a range of skills including observation, pattern seeking, researching, planning and investigating. This allows them to become independent learners who have the skills to explore possible answers to their science-based questions.

## Science Knowledge and Skills Progression

### **Science at Pye Green Academy**

At Pye Green, Science is taught through topics where relevant links can be made as well as in discrete Science Units. This document shows the progression of skills in knowledge and enquiry for each of the science topics and, in bold, how we address the National Curriculum statements.

The Knowledge section is arranged with Years 1-6 adjacent to show progression in each topic area across both Key Stages.

### **EYFS**

At Pye Green, we recognise the fundamental role a child's early years has in shaping the person and learner they become. Our curriculum is designed to build upon the strong foundations set down in our Early Years Foundation Stage. Each curriculum subject takes note of its predecessors in the EYFS, building upon and making links with prior learning.

#### **Science in EYFS**

Pupils have daily access to practical activities which are carefully planned to allow pupils to learn and explore the foundations of Science in fun and engaging ways. The activities allow them to explore the world around them and encourage them to problem solve, observe and make simple predications whilst starting to introduce age-appropriate vocabulary. They are encouraged to ask questions about why things happen and how things work and pupils have the freedom and encouragement to be as creative as they can!

#### **Understanding the world - The world**

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

#### **Physical Development - Health and Self-Care**

Children know the importance for good health of physical exercise, and a healthy diet, and talk about ways to keep healthy and safe. They manage their own basic hygiene and personal needs successfully, including dressing and going to the toilet independently.

## Science Knowledge and Skills Progression

NC Science – pupils should be taught:	Knowledge & Skills	Y1	Y2
Working Scientifically	<ul style="list-style-type: none"> <li>- asking simple questions and recognising that they can be answered in different ways</li> <li>- observing closely, using simple equipment</li> <li>- performing simple tests</li> <li>- identifying and classifying</li> </ul>	<p><i>Research 'what does each sense do?'</i></p> <p><i>Identify common plants and where to find them in the local environment (school grounds and gardens)</i></p> <p><i>Grow, observe and draw a plant (runner bean / pea shoot)</i></p> <p><i>Which materials are least absorbent?</i></p> <p><i>Find out which materials would be suitable for making bag for a particular purpose?</i></p> <p><i>Which materials can be recycled? – Discussion: use of plastics</i></p> <p><i>Sorting animals: Zoo or pet animals? Herbivore/ carnivore?</i></p> <p><i>Sorting plants: Deciduous / evergreen. Collect and sort leaves</i></p>	<p><i>Research different local habitats and compare living things found there</i></p> <p><i>Measure the growth of a plant they have grown over time.</i></p> <p><i>Testing materials for a purpose</i></p> <p><i>Which materials can bend, stretch, twist etc?</i></p> <p><i>Sorting materials in a variety of ways</i></p>

## Science Knowledge and Skills Progression

	<ul style="list-style-type: none"> <li>- using their observations and ideas to suggest answers to questions</li> <li>- gathering and recording data to help in answering questions</li> </ul>	<p><i>Name parts of the body - Percy Park Keeper labelled body.</i></p> <p><i>Which season does it rain the most?</i></p> <p><i>Do all animals have similar skeleton structure?</i></p> <p><i>What does a plant need to grow?</i></p> <p><i>Research seasons to create a postcard</i></p>	<p><i>Which material will make the best sculpture?</i></p> <p><i>Do bigger seeds grow into bigger plants?</i></p>
Vocabulary		<p>question</p> <p>answer</p> <p>observe</p> <p>equipment</p> <p>test</p>	<p>Year 1 words plus:</p> <p>identify</p> <p>classify</p> <p>gather</p> <p>record</p>

## Science Knowledge and Skills Progression

NC Science – pupils should be taught:	Skill	Y3	Y4
	<ul style="list-style-type: none"> <li>- asking relevant questions and using different types of scientific enquiries to answer them</li> <li>- setting up simple practical enquiries, comparative and fair tests</li> <li>- making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers</li> <li>- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions</li> <li>- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables</li> <li>- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions</li> <li>- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions</li> <li>- identifying differences, similarities or changes related to simple scientific ideas and processes</li> <li>- using straightforward scientific evidence to answer questions or to support their findings.</li> </ul>	<p><i>What colour flowers do insects prefer? How do seeds disperse?</i></p> <p><i>How much force is needed to move different masses? How does distance affect shadow size?</i></p> <p><i>How does water travel in a plant (celery)? Does the length of the stem affect the time it takes?</i></p> <p><i>When is the classroom darkest? How does the size of a magnet affect the strength?</i></p> <p><i>Use a key to identify rocks</i></p> <p><i>Which magnet is the strongest? Which materials are magnetic?</i></p> <p><i>How could we make seeds germinate faster?</i></p>	<p><i>How does the ear work? Can people with longer legs jump further?</i></p> <p><i>Look at patterns – How long does it take different sized ice-cubes to melt?</i></p> <p><i>How does mass of ice cube change over time? volume</i></p> <p><i>Use classification keys to ID creatures on the Chase.</i></p> <p><i>How does length affect pitch?</i></p> <p><i>Making switches – which is most effective?</i></p> <p><i>Which room has the most/least electrical sockets? Why?</i></p> <p><i>How does the level of water change when left on windowsill?</i></p>

## Science Knowledge and Skills Progression

Vocabulary		<p>All Y2 words plus:</p> <p>Enquiry</p> <p>Practical</p> <p>Compare</p> <p>Fair</p> <p>Accurate</p> <p>Standard units</p> <p>Thermometer</p> <p>Data-logger</p> <p>Present</p> <p>Predict</p>	<p>All Y2 and 3 words plus:</p> <p>Explanation</p> <p>conclusion</p> <p>Similarities</p> <p>differences</p> <p>processes</p> <p>evidence</p>
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## Science Knowledge and Skills Progression

NC Science – pupils should be taught:	Skill	Y5	Y6
	<ul style="list-style-type: none"> <li>- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary</li> <li>- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate</li> <li>- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs</li> <li>- using test results to make predictions to set up further comparative and fair tests</li> <li>- reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations</li> <li>- identifying scientific evidence that has been used to support or refute ideas or arguments</li> </ul>	<p><i>Parachute investigation</i></p> <p><i>Scatter graphs – are oldest children the tallest?</i></p> <p><i>Dissolving – water / salt experiments</i></p> <p><i>Plant germination rates</i></p> <p><i>Study moon phases over time. What does this suggest about how the Earth and moon move in space?</i></p> <p><i>Flat Earth Society – explore their beliefs</i></p>	<p><i>How does exercise affect our heart rates?</i></p> <p><i>Measure pulse rate, angles</i></p> <p><i>Produce labelled diagrams include the eye and heart; light diagrams; classification keys; circuit diagrams; changes in heart rate over time</i></p> <p><i>Heart rate response to exercise</i></p> <p><i>Explaining links between exercise, heartrate, lungs, oxygen and links between exercise and diet to maintain a healthy lifestyle</i></p> <p><i>Newton's spectrum of light; Darwin's theory of evolution;</i></p>
Vocabulary		<p>All previous vocabulary plus</p> <p>Variables</p> <p>Precision</p> <p>Refute</p>	<p>All previous vocabulary plus</p> <p>Classification keys</p> <p>Causal relationships</p>

## Science Knowledge and Skills Progression

PLANTS			
Prior Learning	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)		
	Y1 (Term 1)	Y2 (Term 3)	Y3 (Term 2)
Knowledge & Skills	<ul style="list-style-type: none"> <li>Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees.</li> <li>Identify and describe the basic structure of a variety of common flowering plants, including trees.</li> </ul>	<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 describe the functions of different parts of flowering plants: roots; stem/trunk; leaves; and flowers.</li> <li>Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant.</li> <li>Investigate the way in which water is transported within plants.</li> <li>Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.</li> </ul>



## Science Knowledge and Skills Progression

<p>Knowledge</p>	<p>Growing locally, there will be a vast array of plants which all have specific names. These can be identified by looking at the key characteristics of the plant. Plants have common parts, but they vary between the different types of plants. Some trees keep their leaves all year while other trees drop their leaves during autumn and grow them again during spring.</p> <ul style="list-style-type: none"> <li>• Make close observations of leaves, seeds, flowers etc.</li> <li>• Compare two leaves, seeds, flowers etc.</li> <li>• Classify leaves, seeds, flowers etc. using a range of characteristics.</li> <li>• Identify plants by matching them to named images.</li> <li>• Make observations of how plants change over a period of time.</li> <li>• When further afield, spot plants that are the same as those in the local area studied regularly, describing the key features that helped them.</li> </ul>	<p>Plants may grow from either seeds or bulbs. These then germinate and grow into seedlings which then continue to grow into mature plants. These mature plants may have flowers which then develop into seeds, berries, fruits etc. Seeds and bulbs need to be planted outside at particular times of year and they will germinate and grow at different rates. Some plants are better suited to growing in full sun and some grow better in partial or full shade. Plants also need different amounts of water and space to grow well and stay healthy.</p> <ul style="list-style-type: none"> <li>• Make close observations of seeds and bulbs.</li> <li>• Classify seeds and bulbs.</li> <li>• Research and plan when and how to plant a range of seeds and bulbs.</li> <li>• Look after the plants as they grow - weeding, thinning, watering etc.</li> <li>• Make close observations and measurements of their plants growing from seeds and bulbs.</li> <li>• Make comparisons between plants as they grow.</li> </ul>	<p>Many plants, but not all, have roots, stems/trunks, leaves and flowers/blossom. The roots absorb water and nutrients from the soil and anchor the plant in place. The stem transports water and nutrients/minerals around the plant and holds the leaves and flowers up in the air to enhance photosynthesis, pollination and seed dispersal. The leaves use sunlight and water to produce the plant's food. Some plants produce flowers which enable the plant to reproduce. Pollen, which is produced by the male part of the flower, is transferred to the female part of other flowers (pollination). This forms seeds, sometimes contained in berries or fruits which are then dispersed in different ways. Different plants require different conditions for germination and growth.</p> <ul style="list-style-type: none"> <li>• Observe what happens to plants over time when the leaves or roots are removed.</li> <li>• Observe the effect of putting cut white carnations or celery in coloured water.</li> <li>• Investigate what happens to plants when they are put in different conditions e.g. in darkness, in the cold, deprived of air, different types of soil, different fertilisers, varying amount of space.</li> <li>• Spot flowers, seeds, berries and fruits outside throughout the year.</li> <li>• Observe flowers carefully to identify the pollen.</li> <li>• Observe flowers being visited by pollinators e.g. bees and butterflies in the summer.</li> <li>• Observe seeds being blown from the trees e.g. sycamore seeds.</li> <li>• Research different types of seed dispersal.</li> <li>• Classify seeds in a range of ways, including by how they are dispersed. <ul style="list-style-type: none"> <li>• Create a new species of flowering plant.</li> </ul> </li> </ul>
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## Science Knowledge and Skills Progression

Vocabulary	plant flower root stem seeds seedlings leaf weed water feeding living	non-living dead healthy alive not alive garden wild common tree deciduous evergreen	As Year 1 +  bulbs mature temperature light	All Year 1 and 2 + flowering oxygen carbon dioxide nutrients support pollen pollination stigma fertilisation dispersed explosion
Future Learning	Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats) Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. (KS3)			

Animals	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)	
Prior Learning	Y1 (Term 1)	Y2 (Term 1,2 and3)
Knowledge & Skills	<ul style="list-style-type: none"> <li>• A identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals</li> <li>• identify and name a variety of common animals that are carnivores, herbivores and omnivores</li> <li>• describe and compare the structure of a variety of common animals (fish, amphibians ,reptiles, birds and mammals including pets)</li> </ul>	<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>

## Science Knowledge and Skills Progression

	<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</li> </ul>	
How it will be taught	<p>Animals vary in many ways having different structures e.g. wings, tails, ears etc. They also have different skin coverings e.g. scales, feathers, hair. These key features can be used to identify them. Animals eat certain things - some eat other animals, some eat plants, some eat both plants and animals.</p> <p>Humans have key parts in common, but these vary from person to person. Humans (and other animals) find out about the world using their senses. Humans have five senses - sight, touch, taste, hearing and smelling. These senses are linked to particular parts of the body.</p> <ul style="list-style-type: none"> <li>Make first-hand, close observations of animals from each of the groups.</li> <li>Compare two animals from the same or different groups.</li> <li>Classify animals using a range of features - zoo animals / pets</li> <li>Identify animals by matching them to named images.</li> <li>Classify animals according to what they eat.</li> <li>Make first-hand close observations of parts of the body e.g. hands, eyes, skeletons 'Percy'</li> <li>Compare two people.</li> <li>Take measurements of parts of their body.</li> <li>Compare parts of their own body. What does each sense do?</li> <li>Look for patterns between people e.g. Do people with big hands have big feet?</li> <li>Classify people according to their features.</li> <li>Investigate human senses e.g. Which part of my body is good for feeling, which is not? Which food/flavours can I identify by taste? Which smells can I match?</li> </ul>	<p>Animals, including humans, have offspring which grow into adults. In humans and some animals, these offspring will be young, such as babies or kittens, that grow into adults. In other animals, such as chickens or insects, there may be eggs laid that hatch to young or other stages which then grow to adults. The young of some animals do not look like their parents e.g. tadpoles.</p> <p>All animals, including humans, have the basic needs of feeding, drinking and breathing that must be satisfied in order to survive. To grow into healthy adults, they also need the right amounts and types of food and exercise. Good hygiene is also important in preventing infections and illnesses.</p> <ul style="list-style-type: none"> <li>Ask people questions and use secondary sources to find out about the life cycles of some animals.</li> <li>Observe animals growing over a period of time e.g. chicks, caterpillars, a baby.</li> <li>Ask questions of a parent about how they look after their baby.</li> <li>Ask pet owners questions about how they look after their pet.</li> <li>Explore the effect of exercise on their bodies.</li> <li>Classify food in a range of ways, including using a food wheel</li> <li>Create a 'mining pastie'</li> <li>Investigate washing hands, using glitter gel.</li> </ul>
Vocabulary		As Year 1 +

## Science Knowledge and Skills Progression

	senses eye sight see ear hearing smell nose touch feel	leg wing arm human animal beak similar different	describe fish amphibian reptile bird mammal carnivore omnivore herbivore	child adult exercise diet hygiene healthy air food water
Future Learning	Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. (Y3 - Animals, including humans) Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats) Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats) Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (Y6 - Animals, including humans)			

<b>Animals</b>		
Prior Learning	Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals, including humans) Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans) Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 - Animals, including humans) Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). (Y2 - Animals, including humans) Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans)	
	Y3 (Term 2)	Y4 (Term 1)
Knowledge & Skills	<ul style="list-style-type: none"> <li>identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat</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>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>

## Science Knowledge and Skills Progression

How it will be taught	<p>Animals, unlike plants which can make their own food, need to eat in order to get the nutrients they need. Food contains a range of different nutrients - carbohydrates (including sugars), protein, vitamins, minerals, fats, sugars, water - and fibre that are needed by the body to stay healthy. A piece of food will often provide a range of nutrients.</p> <p>Humans, and some other animals, have skeletons and muscles which help them move and provide protection and support.</p> <p>Classify food in a range of ways.</p> <ul style="list-style-type: none"><li>• Use food labels to explore the nutritional content of a range of food items.</li><li>• Use secondary sources to find out the types of food that contain the different nutrients.</li><li>• Use food labels to answer enquiry questions e.g. How much fat do different types of pizza contain? How much sugar is in soft drinks?</li><li>• Plan a daily diet to contain a good balance of nutrients.</li><li>• Explore the nutrients contained in fast food.</li><li>• Use secondary sources to research the parts and functions of the skeleton.</li><li>• Investigate patterns asking questions such as:<ul style="list-style-type: none"><li>▪ Can people with longer legs run faster?</li><li>▪ Can people with bigger hands catch a ball better?</li></ul></li><li>• Compare, contrast and classify skeletons of different animals.</li></ul>	<p>Food enters the body through the mouth. Digestion starts when the teeth start to break the food down. Saliva is added and the tongue rolls the food into a ball. The food is swallowed and passes down the oesophagus to the stomach. Here the food is broken down further by being churned around and other chemicals are added.</p> <p>The food passes into the small intestine. Here nutrients are removed from the food and leave the digestive system to be used elsewhere in the body. The rest of the food then passes into the large intestine. Here the water is removed for use elsewhere in the body. What is left is then stored in the rectum until it leaves the body through the anus when you go to the toilet.</p> <p>Humans have four types of teeth: incisors for cutting; canines for tearing; and molars and premolars for grinding (chewing).</p> <p>Living things can be classified as producers, predators and prey according to their place in the food chain.</p> <p>Research the function of the parts of the digestive system.</p> <ul style="list-style-type: none"><li>• Create a model of the digestive system using household objects.</li><li>• Explore eating different types of food to identify which teeth are being used for cutting, tearing and grinding (chewing).</li><li>• Classify animals as herbivores, carnivores or omnivores according to the type of teeth they have in their skulls.</li><li>• Use food chains to identify producers, predators and prey within a habitat.</li><li>• Use secondary sources to identify animals in a habitat and find out what they eat.</li></ul>																
Vocabulary	<p>As Year 1 and Year 2 +</p> <p>skeleton balanced protect muscle</p>	<p>All Year 1 , 2 and 3 +</p> <table><tr><td>tongue</td><td>molars</td></tr><tr><td>teeth</td><td>canines</td></tr><tr><td>oesophagus</td><td>incisors</td></tr><tr><td>stomach</td><td>permanent</td></tr><tr><td>intestines</td><td>producers</td></tr><tr><td>digestive</td><td>consumers</td></tr><tr><td>system</td><td>predators</td></tr><tr><td></td><td>prey</td></tr></table>	tongue	molars	teeth	canines	oesophagus	incisors	stomach	permanent	intestines	producers	digestive	consumers	system	predators		prey
tongue	molars																	
teeth	canines																	
oesophagus	incisors																	
stomach	permanent																	
intestines	producers																	
digestive	consumers																	
system	predators																	
	prey																	
Future Learning	<p>Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. (Y6 - Animals, including humans)</p> <p>Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (Y6 - Animals, including humans)</p>																	

## Science Knowledge and Skills Progression

Describe the ways in which nutrients and water are transported within animals, including humans. (Y6 - Animals, including humans)

<b>Animals</b>  <b>Prior Learning</b>	<p>Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans)</p> <p>Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans)</p> <p>Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. (Y3 - Animals, including humans)</p> <p>Describe the simple functions of the basic parts of the digestive system in humans. (Y4 - Animals, including humans)</p> <p>Identify the different types of teeth in humans and their simple functions. (Y4 - Animals, including humans)</p>	
	Y5 (Term 2)	Y6 (Term 1)
<b>Knowledge &amp; Skills</b>	<ul style="list-style-type: none"> <li>describe the changes as humans develop to old age</li> </ul> <p>THIS TOPIC IS LINKED TO LIVING THINGS AND THEIR HABITATS</p>	<ul style="list-style-type: none"> <li>identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood</li> <li>recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function</li> <li>describe the ways in which nutrients and water are transported within animals, including humans</li> </ul>
<b>How it will be taught</b>	<p>When babies are young, they grow rapidly. They are very dependent on their parents. As they develop, they learn many skills. At puberty, a child's body changes and develops primary and secondary sexual characteristics. This enables the adult to reproduce.</p> <p>This needs to be taught alongside PSHE.</p> <p>This unit is likely to be taught through direct instruction due to its sensitive nature, although children can carry out a research enquiry by asking an expert e.g. school nurse to provide answers to questions that have been filtered by the teacher.</p>	<p>The heart pumps blood in the blood vessels around to the lungs. Oxygen goes into the blood and carbon dioxide is removed. The blood goes back to the heart and is then pumped around the body. Nutrients, water and oxygen are transported in the blood to the muscles and other parts of the body where they are needed. As they are used, they produce carbon dioxide and other waste products. Carbon dioxide is carried by the blood back to the heart and then the cycle starts again as it is transported back to the lungs to be removed from the body. This is the human circulatory system.</p> <p>Diet, exercise, drugs and lifestyle have an impact on the way our bodies function. They can affect how well our heart and lungs work, how likely we are to suffer from conditions such as diabetes, how clearly we think, and generally how fit and well we feel. Some conditions are caused by deficiencies in our diet e.g. lack of vitamins. This content is also included in PSHE.</p> <ul style="list-style-type: none"> <li>Create a model for the circulatory system.</li> <li>Carry out a range of pulse rate investigations: <ul style="list-style-type: none"> <li>fair test - effect of different activities on my pulse rate</li> <li>pattern seeking - exploring which groups of people may have higher or lower resting pulse rates</li> <li>observation over time - how long does it take my pulse rate to return to my resting pulse rate (recovery rate)</li> <li>pattern seeking - exploring recovery rate for different groups of people.</li> </ul> </li> <li>Research the negative effects of drugs (e.g. tobacco) and the benefits of a healthy diet and regular exercise by asking an expert or using carefully selected secondary sources</li> </ul>



## Science Knowledge and Skills Progression

Vocabulary	<p>All Y1 to 4 +</p> <p>puberty</p>	<p>All Y1 to 5 +</p> <p>blood vessels heart circulatory</p> <p>artery vein capillary drugs</p>
Future Learning	<p>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)</p> <p>The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases. (KS3)</p> <p>The effects of recreational drugs (including substance misuse) on behaviour, health and life processes. (KS3)</p> <p>The structure and functions of the gas exchange system in humans, including adaptations to function. (KS3)</p> <p>The mechanism of breathing to move air in and out of the lungs. (KS3)</p> <p>The impact of exercise, asthma and smoking on the human gas exchange system. (KS3)</p>	

<b>Materials</b>		
Prior Learning	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)	
	Y1 (Term 3 ) Everyday Materials	Y2 (Term 1,2 and3) Uses of Everyday Materials
Knowledge & Skills	<ul style="list-style-type: none"> <li>• Distinguish between an object and the material from which it is made.</li> <li>• Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock.</li> <li>• Describe the simple physical properties of a variety of everyday materials.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.</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>

## Science Knowledge and Skills Progression

	<ul style="list-style-type: none"> <li>• Compare and group together a variety of everyday materials on the basis of their simple physical properties.</li> </ul>	
How it will be taught	<p>All objects are made of one or more materials. Some objects can be made from different materials e.g. plastic, metal or wooden spoons. Materials can be described by their properties e.g. shiny, stretchy, rough etc. Some materials e.g. plastic can be in different forms with very different properties.</p> <ul style="list-style-type: none"> <li>• Classify objects made of one material in different ways e.g. a group of object made of metal.</li> <li>• Classify in different ways one type of object made from a range of materials e.g. a collection of spoons made of different materials.</li> <li>• Classify materials based on their properties.</li> <li>• Test the properties of objects e.g. absorbency of cloths, strength of party hats made of different papers, stiffness of paper plates, waterproofness of shelters. Bug City - Umbrella</li> </ul>	<p>All objects are made of one or more materials that are chosen specifically because they have suitable properties for the task. For example, a water bottle is made of plastic because it is transparent allowing you to see the drink inside and waterproof so that it holds the water. When choosing what to make an object from, the properties needed are compared with the properties of the possible materials, identified through simple tests and classifying activities. A material can be suitable for different purposes and an object can be made of different materials.</p> <p>Objects made of some materials can be changed in shape by bending, stretching, squashing and twisting. For example, clay can be shaped by squashing, stretching, rolling, pressing etc. This can be a property of the material or depend on how the material has been processed e.g. thickness.</p> <ul style="list-style-type: none"> <li>• Classify materials. Which would make the best sculpture?</li> <li>• Make suggestions about alternative materials for a purpose that are both suitable and unsuitable</li> <li>• Test the properties of materials for particular uses e.g. compare the stretchiness of fabrics to select the most appropriate for a purpose.</li> </ul>
Vocabulary	<p style="text-align: center;">material wood plastic glass metal water rock</p>	<p style="text-align: center;">As Y1 + objects paper cardboard purpose shape squash bend twist stretch</p>
Future Learning	<p>Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. (Y3 - Rocks)</p> <p>Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 - Forces and magnets)</p>	



## Science Knowledge and Skills Progression

	<p>Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. (Y5 - Properties and changes of materials)</p> <p>Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. (Y5 - Properties and changes of materials)</p>
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Materials			
Prior Learning	<p>Distinguish between an object and the material from which it is made. (Y1 - Everyday materials)</p> <p>Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials)</p> <p>Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials)</p> <p>Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials)</p> <p>Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials)</p>		
	Y3 Rocks (Term 1)	Y4 States of Matter (Term 3)	Y5 Properties and changes of Materials (Term 3)
Knowledge & Skills	<ul style="list-style-type: none"> <li>• Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.</li> <li>• Describe in simple terms how fossils are formed when things that have lived are trapped within rock.</li> <li>• Recognise that soils are made from rocks and organic matter.</li> </ul>	<ul style="list-style-type: none"> <li>• Compare and group materials together, according to whether they are solids, liquids or gases.</li> <li>• Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C).</li> <li>• Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</li> </ul>	<p>Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.</p> <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.</li> <li>• Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.</li> <li>• Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.</li> <li>• Demonstrate that dissolving, mixing and changes of state are reversible changes.</li> <li>• Explain that some changes result in the formation of new materials, and that this kind of change is not</li> </ul>

## Science Knowledge and Skills Progression

			usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.
How it will be taught	<p>Rock is a naturally occurring material. There are different types of rock e.g. sandstone, limestone, slate etc. which have different properties. Rocks can be hard or soft. They have different sizes of grain or crystal. They may absorb water. Rocks can be different shapes and sizes (stones, pebbles, boulders). Soils are made up of pieces of ground down rock which may be mixed with plant and animal material (organic matter). The type of rock, size of rock pieces and the amount of organic matter affect the property of the soil.</p> <p>Some rocks contain fossils. Fossils were formed millions of years ago. When plants and animals died, they fell to the seabed. They became covered and squashed by other material. Over time the dissolving animal and plant matter is replaced by minerals from the water.</p> <ul style="list-style-type: none"> <li>• Observe rocks closely.</li> <li>• Classify rocks in a range of ways, based on their appearance.</li> </ul>	<p>A solid keeps its shape and has a fixed volume. A liquid has a fixed volume but changes in shape to fit the container. A liquid can be poured and keeps a level, horizontal surface. A gas fills all available space; it has no fixed shape or volume. Granular and powdery solids like sand can be confused with liquids because they can be poured, but when poured they form a heap and they do not keep a level surface when tipped. Each individual grain demonstrates the properties of a solid.</p> <p>Melting is a state change from solid to liquid. Freezing is a state change from liquid to solid. The freezing point of water is 0oC. Boiling is a change of state from liquid to gas that happens when a liquid is heated to a specific temperature and bubbles of the gas can be seen in the liquid. Water boils when it is heated to 100oC. Evaporation is the same state change as boiling (liquid to gas), but it happens slowly at lower temperatures and only at the surface of the liquid. Evaporation happens more quickly if the temperature is higher, the liquid is spread out or it is windy. Condensation is the change back from a gas to a liquid caused by cooling. Water at the surface of seas, rivers etc. evaporates into water vapour (a gas). This rises, cools and condenses back into a liquid forming clouds. When too much water has condensed, the water droplets in the cloud get too heavy and fall back down as rain, snow, sleet etc. and drain back into rivers etc. This is known as precipitation. This is the water cycle.</p> <ul style="list-style-type: none"> <li>• Observe closely and classify a range of solids. Explore making gases visible e.g. squeezing sponges under water to see bubbles, and showing their effect e.g. using straws to blow objects, trees moving in the wind.</li> </ul>	<p>Materials have different uses depending on their properties and state (liquid, solid, gas). Properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets. Some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment.</p> <p>Mixtures can be separated by filtering, sieving and evaporation.</p> <p>Some changes to materials such as dissolving, mixing and changes of state are reversible, but some changes such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials and these are not reversible.</p> <ul style="list-style-type: none"> <li>• Investigate the properties of different materials in order to recommend materials for particular functions depending on these properties e.g. test waterproofness and thermal insulation to identify a suitable fabric for a coat.</li> <li>• Explore adding a range of solids to water and other liquids e.g. cooking oil, as appropriate.</li> <li>• Investigate rates of dissolving by carrying out comparative and fair test.</li> </ul> <p>Separate mixtures by sieving, filtering and evaporation, choosing the most suitable method and equipment for each mixture.</p> <ul style="list-style-type: none"> <li>• Explore a range of non-reversible changes e.g. rusting, adding fizzy tablets to water, burning.</li> <li>• Carry out comparative and fair tests involving non-reversible changes e.g. What affects the rate of rusting? What affects the amount of gas produced?</li> </ul>

## Science Knowledge and Skills Progression

	<ul style="list-style-type: none"> <li>• Devise a test to investigate the hardness of a range of rocks.</li> <li>• Devise a test to investigate how much water different rocks absorb.</li> <li>• Observe how rocks change over time e.g. gravestones or old building.</li> <li>• Research using secondary sources how fossils are formed.</li> <li>• Observe soils closely.</li> <li>• Classify soils in a range of ways based on their appearance.</li> <li>• Devise a test to investigate the water retention of soils.</li> <li>• Observe how soil can be separated through sedimentation.</li> <li>• Research the work of Mary Anning.</li> </ul>	<ul style="list-style-type: none"> <li>• Classify materials according to whether they are solids, liquids and gases. Observe a range of materials melting e.g. ice, chocolate, butter. Investigate how to melt ice more quickly.</li> <li>• Observe the changes when making rocky road cakes or ice-cream.</li> <li>• Investigate the melting point of different materials e.g. ice, margarine, butter and chocolate.</li> <li>• Explore freezing different liquids e.g. tomato ketchup, oil, shampoo. Use a thermometer to measure temperatures e.g. icy water (melting), tap water, hot water, boiling water (demonstration).</li> <li>• Observe water evaporating and condensing e.g. on cups of icy water and hot water.</li> <li>• Set up investigations to explore changing the rate of evaporation e.g. washing, puddles, handprints on paper towels, liquids in containers.</li> <li>• Use secondary sources to find out about the water cycle.</li> </ul>	<ul style="list-style-type: none"> <li>• Research new materials produced by chemists e.g. Spencer Silver (glue of sticky notes) and Ruth Benerito (wrinkle free cotton).</li> </ul>
Vocabulary	properties fossils organic matter millions sieve remains	solid liquid gas properties state degrees evaporation condensation rate water cycle	All above + transparent conduct insulate dissolve solution separated sieving filtering evaporating reversible irreversible acid

## Science Knowledge and Skills Progression

			reaction
Future Learning	Chemical reactions as the rearrangement of atoms. (KS3) Representing chemical reactions using formulae and using equations. (KS3) Combustion, thermal decomposition, oxidation and displacement reactions. (KS3) Defining acids and alkalis in terms of neutralisation reactions. (KS3) The pH scale for measuring acidity/alkalinity; and indicators. (KS3)		

<b>Seasonal Change / Earth in Space</b>	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)	
Prior Learning		
	<b>Year 1 Seasonal Change (All Year)</b>	<b>Year 5 Earth and Space (Term 1)</b>
Knowledge & Skills	<ul style="list-style-type: none"> <li>• Observe changes across the four seasons.</li> <li>• Observe and describe weather associated with the seasons and how day length varies.</li> </ul>	<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>
How it will be taught	<p>In the UK, the day length is longest at mid-summer (about 16 hours) and gets shorter each day until mid-winter (about 8 hours) before getting longer again.</p> <p>The weather also changes with the seasons. In the UK, it is usually colder and rainier in winter, and hotter and dryer in the summer. The change in weather causes many other changes. Some examples are: numbers of minibeasts found outside; seed and plant growth; leaves on trees; and type of clothes worn by people.</p> <ul style="list-style-type: none"> <li>• Collect information about the weather regularly throughout the year.</li> <li>• Present this information in tables and charts to compare the weather across the seasons.</li> </ul>	<p>The Sun is a star. It is at the centre of our solar system. There are 8 planets (can choose to name them, but not essential). These travel around the Sun in fixed orbits. Earth takes <math>365\frac{1}{4}</math> days to complete its orbit around the Sun. The Earth rotates (spins) on its axis every 24 hours. As Earth rotates half faces the Sun (day) and half is facing away from the Sun (night). As the Earth rotates, the Sun appears to move across the sky. The Moon orbits the Earth. It takes about 28 days to complete its orbit. The Sun, Earth and Moon are approximately spherical.</p> <ul style="list-style-type: none"> <li>• Use secondary sources to help create a model e.g. role play or using balls to show the movement of the Earth around the Sun and the Moon around the Earth.</li> <li>• Use secondary sources to help make a model to show why day and night occur.</li> <li>• Make first-hand observations of how shadows caused by the Sun change through the day.</li> <li>• Make a sundial.</li> <li>• Research time zones.</li> </ul>

## Science Knowledge and Skills Progression

	<ul style="list-style-type: none"> <li>• Collect information, regularly throughout the year, of features that change with the seasons e.g. plants, animals, humans.</li> <li>• Present this information in different ways to compare the seasons.</li> <li>• Gather data about day length regularly throughout the year and present this to compare the seasons.</li> </ul>	<ul style="list-style-type: none"> <li>• Consider the views of scientists in the past and evidence used to deduce shapes and movements of the Earth, Moon and planets before space travel.</li> </ul>
Vocabulary	season weather day rain windy snow sunshine cloudy	solar system planet Earth sphere spherical rotation orbit satellite
Future Learning	Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 - Light)	Gravity force, weight = mass x gravitational field strength (g), on Earth $g=10 \text{ N/kg}$ , different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only). (KS3) <ul style="list-style-type: none"> <li>• Our Sun as a star, other stars in our galaxy, other galaxies. (KS3)</li> <li>• The seasons and the Earth's tilt, day length at different times of year, in different hemispheres. (KS3)</li> <li>• The light year as a unit of astronomical distance. (KS3)</li> </ul>

## Science Knowledge and Skills Progression

<b>Living things and their habitats</b>	<p>Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants)</p> <p>Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants)</p> <p>Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals including humans)</p> <p>Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals including humans)</p> <p>Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 - Animals, including humans)</p> <p>Observe changes across the four seasons. (Y1 - Seasonal changes)</p>	
Prior Learning		
	Year 2 (Term 2 and 3)	Year 4 (Term 1)
<b>Knowledge &amp; Skills</b>	<ul style="list-style-type: none"> <li>• Explore and compare the differences between things that are living, dead, and things that have never been alive</li> <li>• Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other</li> <li>• Identify and name a variety of plants and animals in their habitats, including micro-habitats</li> <li>• Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food</li> </ul>	<ul style="list-style-type: none"> <li>• Recognise that living things can be grouped in a variety of ways.</li> <li>• Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.</li> <li>• Recognise that environments can change and that this can sometimes pose dangers to living things.</li> </ul>
<b>How it will be taught</b>	<p>All objects are either living, dead or have never been alive. Living things are plants (including seeds) and animals. 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, but appropriate for Year 2 children.)</p> <p>An object made of wood is classed as dead. Objects made of rock, metal and plastic have never been alive (again ignoring that plastics are made of fossil fuels).</p> <p>Animals and plants live in a habitat to which they are suited, which means that animals have suitable features that help them move and find food and plants have suitable features that help them to grow well. The habitat provides the basic needs of the animals and plants – shelter, food and water. Within a habitat there are different micro-habitats e.g. in a woodland – in the leaf litter, on the bark of trees, on the leaves. These micro-habitats</p>	<p>Living things can be grouped (classified) in different ways according to their features. Classification keys can be used to identify and name living things.</p> <p>Living things live in a habitat which provides an environment to which they are suited (Year 2 learning). These environments may change naturally e.g. through flooding, fire, earthquakes etc. Humans also cause the environment to change. This can be in a good way (i.e. positive human impact, such as setting up nature reserves) or in a bad way (i.e. negative human impact, such as littering). These environments also change with the seasons; different living things can be found in a habitat at different times of the year.</p> <ul style="list-style-type: none"> <li>• Observe plants and animals in different habitats throughout the year.</li> </ul>



## Science Knowledge and Skills Progression

	<p>have different conditions e.g. light or dark, damp or dry. These conditions affect which plants and animals live there. The plants and animals in a habitat depend on each other for food and shelter etc. The way that animals obtain their food from plants and other animals can be shown in a food chain.</p> <ul style="list-style-type: none"> <li>• Explore the outside environment regularly to find objects that are living, dead and have never lived.</li> <li>• Classify objects found in the local environment.</li> <li>• Observe animals and plants carefully, drawing and labelling diagrams.</li> <li>• Create simple food chains for a familiar local habitat from first-hand observation and research.</li> <li>• Create simple food chains from information given e.g. in picture books (Gruffalo etc.).</li> </ul>	<ul style="list-style-type: none"> <li>• Compare and contrast the living things observed.</li> <li>• Use classification keys to name unknown living things.</li> <li>• Classify living things found in different habitats based on their features.</li> <li>• Create a simple identification key based on observable features.</li> <li>• Use fieldwork to explore human impact on the local environment e.g. litter, tree planting.</li> <li>• Use secondary sources to find out about how environments may naturally change.</li> <li>• Use secondary sources to find out about human impact, both positive and negative, on environments.</li> </ul>
Vocabulary	<p>As Y1 Plants + similar different habitat survive chain</p>	<p>All Y2 + micro-organism classification environment pollution species endangered extinct</p>
Future Learning	<p>Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats)</p> <p>Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats)</p> <p>Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals. (Y6 - Living things and their habitats)</p> <p>Give reasons for classifying plants and animals based on specific characteristics. (Y6 - Living things and their habitats)</p>	

## Science Knowledge and Skills Progression

<b>Living things and their habitat</b>	<p>Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans)</p> <p>Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)</p>	
Prior Learning	<p>Recognise that living things can be grouped in a variety of ways. (Y4 - Living things and their habitats)</p> <p>Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. (Y4 - Living things and their habitats)</p>	
	Year 5 (Term 2)	Year 6 (Term 2)
Knowledge & Skills	<ul style="list-style-type: none"> <li>Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.</li> <li>Describe the life process of reproduction in some plants and animals.</li> </ul>	<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>
How it will be taught	<p>As part of their life cycle, plants and animals reproduce. Most animals reproduce sexually. This involves two parents where the sperm from the male fertilises the female egg. Animals, including humans, have offspring which grow into adults. In humans and some animals, these offspring will be born live, such as babies or kittens, and then grow into adults. In other animals, such as chickens or snakes, there may be eggs laid that hatch to young which then grow to adults. Some young undergo a further change before becoming adults e.g. caterpillars to butterflies. This is called a metamorphosis.</p> <p>Plants reproduce both sexually and asexually. Bulbs, tubers, runners and plantlets are examples of asexual plant reproduction which involves only one parent. Gardeners may force plants to reproduce asexually by taking cuttings. Sexual reproduction occurs through pollination, usually involving wind or insects.</p> <ul style="list-style-type: none"> <li>Use secondary sources and, where possible, first-hand observations to find out about the life cycle of a range of animals. Kapoc Tree, Poison Dart Frog</li> <li>Compare the gestation times for mammals and look for patterns e.g. in relation to size of animal or length of dependency after birth.</li> <li>Look for patterns between the size of an animal and its expected life span.</li> </ul>	<p>Living things can be formally grouped according to characteristics. Plants and animals are two main groups but there are other living things that do not fit into these groups e.g. micro-organisms such as bacteria and yeast, and toadstools and mushrooms. Plants can make their own food whereas animals cannot.</p> <p>Animals can be divided into two main groups: those that have backbones (vertebrates); and those that do not (invertebrates). Vertebrates can be divided into five small groups: fish; amphibians; reptiles; birds; and mammals. Each group has common characteristics. Invertebrates can be divided into a number of groups, including insects, spiders, snails and worms.</p> <p>Plants can be divided broadly into two main groups: flowering plants; and non-flowering plants.</p> <ul style="list-style-type: none"> <li>Use secondary sources to learn about the formal classification system devised by Carl Linnaeus and why it is important.</li> <li>Use first-hand observation to identify characteristics shared by the animals in a group.</li> <li>Use secondary sources to research the characteristics of animals that belong to a group.</li> <li>Use information about the characteristics of an unknown animal or plant to assign it to a group.</li> <li>Classify plants and animals, presenting this in a range of ways e.g. Venn diagrams, Carroll diagrams and keys.</li> <li>Create an imaginary animal which has features from one or more groups.</li> </ul>



## Science Knowledge and Skills Progression

	<ul style="list-style-type: none"> <li>• Grow and observe plants that reproduce asexually e.g. strawberries, spider plants, potatoes.</li> <li>• Take cuttings from a range of plants e.g. African violet, mint.</li> <li>• Plant bulbs and then harvest to see how they multiply.</li> <li>• Use secondary sources to find out about pollination.</li> </ul>	
Vocabulary	All previous (and from Plants) + reproduce reproduction	All previous + characteristics vertebrates invertebrates grasses cereals shrubs deciduous coniferous ferns mosses algae
Future Learning	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) • Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. (KS3) • Differences between species. (KS3)	

<b>Light</b>	Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans)	
Prior Learning		
	Year 3 (Term 1)	Year 6 (Term 1)
Knowledge & Skills	<ul style="list-style-type: none"> <li>• Recognise that they need light in order to see things, and that dark is the absence of light.</li> <li>• Notice that light is reflected from surfaces.</li> <li>• Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.</li> <li>• Recognise that shadows are formed when the light from a light source is blocked by an opaque object.</li> <li>• Find patterns in the way that the size of shadows change.</li> </ul>	<ul style="list-style-type: none"> <li>• Recognise that light appears to travel in straight lines.</li> <li>• Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye.</li> <li>• Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes.</li> <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>

## Science Knowledge and Skills Progression

How it will be taught	<p>We see objects because our eyes can sense light. Dark is the absence of light. We cannot see anything in complete darkness. Some objects, for example, the sun, light bulbs and candles are sources of light. Objects are easier to see if there is more light. Some surfaces reflect light. Objects are easier to see when there is less light if they are reflective. The light from the sun can damage our eyes and therefore we should not look directly at the sun and can protect our eyes by wearing sunglasses or sunhats in bright light. Shadows are formed on a surface when an opaque or translucent object is between a light source and the surface and blocks some of the light. The size of the shadow depends on the position of the source, object and surface.</p> <ul style="list-style-type: none"> <li>• Explore how different objects are more or less visible in different levels of lighting.</li> <li>• Explore how objects with different surfaces, e.g. shiny vs matt, are more or less visible.</li> <li>• Explore how shadows vary as the distance between a light source and an object or surface is changed.</li> <li>• Explore shadows which are connected to and disconnected from the object e.g. shadows of clouds and children in the playground.</li> <li>• Choose suitable materials to make shadow puppets.</li> <li>• Create artwork using shadows.</li> </ul>	<p>Light appears to travel in straight lines, and we see objects when light from them goes into our eyes. The light may come directly from light sources, but for other objects some light must be reflected from the object into our eyes for the object to be seen. Objects that block light (are not fully transparent) will cause shadows. Because light travels in straight lines the shape of the shadow will be the same as the outline shape of the object.</p> <ul style="list-style-type: none"> <li>• Explore different ways to demonstrate that light travels in straight lines e.g. shining a torch down a bent and straight hose pipe, shining a torch through different shaped holes in card.</li> <li>• Explore the uses of the behaviour of light, reflection and shadows, such as in periscope design, rear view mirrors and shadow puppets.</li> </ul>
Vocabulary	<div>light</div> <div>eyes</div> <div>source</div> <div>reflect</div> <div>bounce</div> <div>surface</div> <div>solid</div> <div>shadow</div> <div>shiny</div> <div>mirror</div> <div>reflection</div>	<div>All previous+</div> <div>straight</div> <div>prism</div> <div>lens</div> <div>image</div> <div>pupil</div> <div>retina</div>
Future Learning	<p>The similarities and differences between light waves and waves in matter. (KS3)</p> <ul style="list-style-type: none"> <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>	

## Science Knowledge and Skills Progression

<b>Forces and Magnets</b>		
Prior Learning	Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)	
	Year 3 (Term 2 and 3)	Year 5 Forces (Term 1)
<b>Knowledge &amp; Skills</b>	<ul style="list-style-type: none"> <li>• Compare how things move on different surfaces.</li> <li>• Notice that some forces need contact between two objects, but magnetic forces can act at a distance.</li> <li>• Observe how magnets attract or repel each other and attract some materials and not others.</li> <li>• Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials.</li> <li>• Describe magnets as having two poles.</li> <li>• Predict whether two magnets will attract or repel each other, depending on which poles are facing.</li> </ul>	<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>
<b>How it will be taught</b>	<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. It may help the object to move better or it may hinder its movement e.g. ice skater compared to walking on ice in normal shoes. A magnet attracts magnetic material. Iron and nickel and other materials containing these, e.g. stainless steel, are magnetic. The strongest parts of a magnet are the poles. Magnets have two poles - a north pole and a south pole. If two like poles, e.g. two north poles, are brought together they will push away from each other - repel. If two unlike poles, e.g. a north and south, are brought together they will pull together - attract.</p>	<p>A force causes an object to start moving, stop moving, speed up, slow down or change direction. Gravity is a force that acts at a distance. Everything is pulled to the Earth by gravity. This causes unsupported objects to fall. Air resistance, water resistance and friction are contact forces that act between moving surfaces. The object may be moving through the air or water, or the air and water may be moving over a stationary object. A mechanism is a device that allows a small force to be increased to a larger force. The pay back is that it requires a greater movement. The small force moves a long distance and the resulting large force moves a small distance, e.g. a crowbar or bottle top remover. Pulleys, levers and gears are all mechanisms, also known as simple machines.</p> <ul style="list-style-type: none"> <li>• Investigate the effect of friction in a range of contexts e.g. trainers, bathmats, mats for a helter-skelter.</li> </ul>

## Science Knowledge and Skills Progression

	<ul style="list-style-type: none"> <li>• Carry out investigations to explore how objects move on different surfaces e.g. spinning tops/coins, rolling balls/cars, clockwork toys, soles of shoes etc.</li> <li>• Explore what materials are attracted to a magnet.</li> <li>• Classify materials according to whether they are magnetic.</li> <li>• Explore the way that magnets behave in relation to each other.</li> <li>• Use a marked magnet to find the unmarked poles on other types of magnets.</li> <li>• Explore how magnets work at a distance e.g. through the table, in water, jumping paper clips up off the table.</li> <li>• Devise an investigation to test the strength of magnets.</li> </ul>	<ul style="list-style-type: none"> <li>• Investigate the effects of water resistance in a range of contexts e.g. dropping shapes through water and pulling shapes, such as boats, along the surface of water.</li> <li>• Investigate the effects of air resistance in a range of contexts e.g. parachutes, spinners, sails on boats.</li> <li>• Explore how levers, pulleys and gears work.</li> <li>• Make a product that involves a lever, pulley or gear.</li> <li>• Create a timer that uses gravity to move a ball.</li> <li>• Research how the work of scientists such as Galileo Galilei and Isaac Newton helped to develop the theory of gravitation.</li> </ul>
Vocabulary	<p>force</p> <p>pole</p> <p>contact</p> <p>magnet</p> <p>push</p> <p>pull</p> <p>iron</p> <p>steel</p> <p>opposite</p> <p>attract</p> <p>repel</p> <p>surface</p>	<p>All above +</p> <p>gravity</p> <p>friction</p> <p>energy</p> <p>grip</p> <p>resistance</p> <p>mechanism</p> <p>lever</p> <p>pulley</p> <p>gear</p>
Future Learning	<p>Forces as pushes or pulls, arising from the interaction between two objects. (KS3)</p> <p>Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces. (KS3)</p> <p>Moment as the turning effect of a force. (KS3)</p> <p>Forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water. (KS3)</p> <p>Forces measured in Newtons, measurements of stretch or compression as force is changed. (KS3)</p>	

## Science Knowledge and Skills Progression

<b>Sound</b>	
Prior Learning	Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans)
	Year 4 (Term 2)
Knowledge & 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>
How it will be taught	<p>A sound produces vibrations which travel through a medium from the source to our ears. Different mediums such as solids, liquids and gases can carry sound, but sound cannot travel through a vacuum (an area empty of matter). The vibrations cause parts of our body inside our ears to vibrate, allowing us to hear (sense) the sound. The loudness (volume) of the sound depends on the strength (size) of vibrations which decreases as they travel through the medium. Therefore, sounds decrease in volume as you move away from the source. A sound insulator is a material which blocks sound effectively. Pitch is the highness or lowness of a sound and is affected by features of objects producing the sounds. For example, smaller objects usually produce higher pitched sounds.</p> <ul style="list-style-type: none"> <li>• Classify sound sources.</li> <li>• Explore making sounds with a range of objects, such as musical instruments and other household objects.</li> <li>• Explore how string telephones or ear gongs work.</li> <li>• Explore altering the pitch or volume of objects, such as the length of a guitar string, amount of water in bottles, size of tuning forks.</li> <li>• Measure sounds over different distances.</li> <li>• Measure sounds through different insulation materials.</li> </ul>
Vocabulary	<div>vibrate</div> <div>vibrations</div> <div>medium</div> <div>pitch</div> <div>volume</div>
Future Learning	<p>Waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel - superposition. (KS3)</p> <p>Frequencies of sound waves, measured in Hertz (Hz); echoes, reflection and absorption of sound. (KS3)</p> <p>Sound needs a medium to travel, the speed of sound in air, in water, in solids. (KS3)</p> <p>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)</p> <p>Auditory range of humans and animals. (KS3)</p> <p>Pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound. (KS3)</p> <p>Waves transferring information for conversion to electrical signals by microphone. (KS3)</p>

## Science Knowledge and Skills Progression

<b>Electricity</b>	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)	
Prior Learning		
	Year 4 (Term 2)	Year 6 (Term 3)
Knowledge & Skills	<ul style="list-style-type: none"> <li>• Identify common appliances that run on electricity.</li> <li>• Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.</li> <li>• Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery.</li> <li>• Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.</li> <li>• Recognise some common conductors and insulators, and associate metals with being good conductors.</li> </ul>	<ul style="list-style-type: none"> <li>• Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.</li> <li>• Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.</li> <li>• Use recognised symbols when representing a simple circuit in a diagram.</li> </ul>
How it will be taught	<p>Many household devices and appliances run on electricity. Some plug in to the mains and others run on batteries. An electrical circuit consists of a cell or battery connected to a component using wires. If there is a break in the circuit, a loose connection or a short circuit, the component will not work. A switch can be added to the circuit to turn the component on and off. Metals are good conductors so they can be used as wires in a circuit. Non-metallic solids are insulators except for graphite (pencil lead). Water, if not completely pure, also conducts electricity.</p> <p>Construct a range of circuits.</p> <ul style="list-style-type: none"> <li>• Explore which materials can be used instead of wires to make a circuit.</li> <li>• Classify the materials that were suitable/not suitable for wires.</li> <li>• Explore how to connect a range of different switches and investigate how they function in different ways.</li> <li>• Choose switches to add to circuits to solve particular problems, such as a pressure switch for a burglar alarm.</li> </ul>	<p>Adding more cells to a complete circuit will make a bulb brighter, a motor spin faster or a buzzer make a louder sound. If you use a battery with a higher voltage, the same thing happens. Adding more bulbs to a circuit will make each bulb less bright. Using more motors or buzzers, each motor will spin more slowly and each buzzer will be quieter. Turning a switch off (open) breaks a circuit so the circuit is not complete and electricity cannot flow. Any bulbs, motors or buzzers will then turn off as well. You can use recognised circuit symbols to draw simple circuit diagrams.</p> <ul style="list-style-type: none"> <li>• Explain how a circuit operates to achieve particular operations, such as to control the light from a torch with different brightnesses or make a motor go faster or slower.</li> <li>• Make circuits to solve particular problems, such as a quiet and a loud burglar alarm.</li> <li>• Carry out fair tests exploring changes in circuits.</li> <li>• Make circuits that can be controlled as part of a DT project.</li> </ul>

## Science Knowledge and Skills Progression

	<ul style="list-style-type: none"> <li>• Apply their knowledge of conductors and insulators to design and make different types of switch.</li> <li>• Make circuits that can be controlled as part of a DT project.</li> </ul>	
Vocabulary	electrical circuit appliances device cells batteries bulbs switches buzzer series wires conductor insulator	All Above + voltage series parallel component circuit diagram symbols motor
Future Learning	Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge. (KS3) Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current. (KS3) Differences in resistance between conducting and insulating components (quantitative). (KS3) Static electricity. (KS3)	

<b>Evolution and Inheritance</b>	Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. (Y2 - Living things and their habitats) Describe in simple terms how fossils are formed when things that have lived are trapped within rock. (Y3 - Rocks) Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats)
Prior Learning	
	Year 6 (Term 2)
Knowledge & 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>
How it will be taught	All living things have offspring of the same kind, as features in the offspring are inherited from the parents. Due to sexual reproduction, the offspring are not identical to their parents and vary from each other. Plants and animals have characteristics that make them suited (adapted) to their environment. If the environment changes rapidly, some variations of a species may not suit the new environment and will die. If the environment changes slowly, animals and plants with variations that are best suited survive in greater numbers to reproduce and pass their characteristics on to their young. Over time, these inherited characteristics become



## Science Knowledge and Skills Progression

	<p>more dominant within the population. Over a very long period of time, these characteristics may be so different to how they were originally that a new species is created. This is evolution.</p> <ul style="list-style-type: none"> <li>• Design a new plant or animal to live in a particular habitat.</li> <li>• Use models to demonstrate evolution e.g. 'Darwin's finches' bird beak activity.</li> <li>• Use secondary sources to find out about how the population of peppered moths changed during the industrial revolution.</li> <li>• Make observations of fossils to identify living things that lived on Earth millions of years ago.</li> <li>• Identify features in animals and plants that are passed on to offspring and explore this process by considering the artificial breeding of animals or plants e.g. dogs.</li> <li>• Compare the ideas of Charles Darwin and Alfred Wallace on evolution.</li> <li>• Research the work of Mary Anning and how this provided evidence of evolution.</li> </ul>
Vocabulary	<p>offspring variation adaptation habitat evolution</p>
Future Learning	<p>Heredity as the process by which genetic information is transmitted from one generation to the next. (KS3)</p> <p>A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model. (KS3)</p> <p>The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection. (KS3)</p> <p>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)</p>

Science Vocabulary	Y1	Y2	Y3	Y4	Y5	Y6
Working Scientifically	<p>Question</p> <p>answer</p> <p>observe</p> <p>equipment</p> <p>test</p>	<p>Question</p> <p>answer</p> <p>observe</p> <p>equipment</p> <p>test</p>	<p><b>All Y2 words plus:</b></p> <p>Enquiry</p> <p>Practical</p> <p>Compare</p>	<p><b>All Y2 words plus:</b></p> <p>Enquiry</p> <p>Practical</p> <p>Compare</p> <p>Fair</p>	<p><b>All Y1 to Y4 words plus:</b></p> <p>Variables</p> <p>Precision</p> <p>Refute</p>	<p><b>All Y1 to Y4 words plus:</b></p> <p>Variables</p> <p>Precision</p> <p>Classification keys</p> <p>Causal relationships</p>



## Science Knowledge and Skills Progression

		identify classify gather record	Fair Accurate Standard units Thermometer Data-logger Present Predict	Accurate Standard units Thermometer Data-logger Present Predict Explanation conclusion Similarities differences processes evidence		Refute
Plants	plant flower root stem seeds seedlings leaf weed water feeding	<b>As Year 1</b> + bulbs mature temperature light	<b>All Year 1</b> <b>and 2 +</b> flowering oxygen carbon dioxide nutrients support pollen pollination stigma fertilisation			

## Science Knowledge and Skills Progression

	living non-living dead healthy alive not alive garden wild common tree deciduous evergreen		dispersed explosion			
<b>Animals</b>	senses eye sight see ear hearing smell nose touch feel leg wing arm human animal	<b>As Year 1 +</b> child adult exercise diet hygiene healthy air food water	<b>As Year 1 and Year 2 +</b> skeleton balanced protect muscle	<b>All Year 1 , 2 and 3 +</b> tongue teeth oesophagus stomach intestines digestive system molars canines incisors permanent producers	<b>All Y1 to 4 +</b> puberty	<b>All Y1 to 5 +</b> blood vessels heart circulatory artery vein capillary drugs

## Science Knowledge and Skills Progression

	beak similar different describe fish amphibian reptile bird mammal carnivore omnivore herbivore			consumers predators prey		
Materials	material wood plastic glass metal water rock	<b>As Y1 +</b> objects paper cardboard purpose shape squash bend twist stretch			<b>All above +</b> transparent conduct insulate dissolve solution separated sieving filtering evaporating reversible irreversible acid reaction	

## Science Knowledge and Skills Progression

Seasonal changes	season weather day rain windy snow sunshine cloudy					
Living things and their habitats		<b>As Y1</b> <b>Plants +</b> similar different habitat survive chain		<b>All Y2 +</b> micro- organism classification environment pollution species endangered extinct	<b>All previous</b> <b>(and from</b> <b>Plants) +</b> reproduce reproduction	<b>All previous +</b> characteristics vertebrates invertebrates grasses cereals shrubs deciduous coniferous ferns mosses algae
Rocks			properties fossils organic matter millions			

## Science Knowledge and Skills Progression

			sieve remains			
Light			light eyes source reflect bounce surface solid shadow shiny mirror reflection			<b>All previous+</b> straight prism lens image pupil retina
Forces and Magnets			force pole contact magnet push pull iron steel opposite attract repel surface		<b>All above +</b> gravity friction energy grip resistance mechanism lever pulley gear	
States of matter				solid liquid gas properties state		

## Science Knowledge and Skills Progression

				degrees evaporation condensation rate water cycle		
Sound				vibrate vibrations medium pitch volume		
Electricity				electrical circuit appliances device cells batteries bulbs switches buzzer series wires conductor insulator		<b>All Above</b> + voltage series parallel component circuit diagram symbols motor
Earth and Space					<b>All</b> <b>above +</b> solar system planet Earth	

## Science Knowledge and Skills Progression

					sphere spherical rotation orbit satellite	
Evolution and Inheritance						offspring variation adaptation habitat evolution