

Year 4 Science Curriculum

Living things

Prior learning:

Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants)

Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants)

Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (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)

Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 - Living things and their habitats)

Common misconceptions

Some children may think:

- the death of one of the parts of a food chain or web has no or limited consequences on the rest of the chain
- there is always plenty of food for wild animals
- animals are only land-living creatures
- animals and plants can adapt to their habitats, however they change
- all changes to habitats are negative.

Reading Opportunities:

There's a Rang Tan in my bedroom - James Sellick

The Vanishing Rainforest - Richard Platt





The Morning I Met a Whale - Michael Morpurgo

Journey to the River Sea - Eva Ibbotson

Vocabulary

Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate

Living things

National Curriculum Principles	Knowledge and key Vocabulary	Activities and Working Scientifically
<p>Recognise that living things can be grouped in a variety of ways</p>	<p>Living things can be grouped (classified) in different ways according to their features.</p> <p>Birds - have feathers, have wings, lay eggs Fish - gills, fins Mammals - have hair/fur, live young Reptiles - scales, usually lay eggs Amphibians - Moist skin, usually lay eggs. Live in water and on land</p>	<p>Children to use features to identify whether animals are birds, fish, reptiles, amphibians or mammals</p>
<p>Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment</p>	<p>Classification keys can be used to identify and name living things.</p>	<p>Children to use classification keys to identify unknown animals </p>
		<p>Children to create a simple classification key based on observable features </p>
<p>Recognise that environments can change and that this can sometimes pose dangers to living things</p>	<p>Living things live in a habitat which provides an environment to which they are suited. 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>	<p>Observe plants and animals in the school grounds throughout the year </p>
		<p>Record using tally charts and maps the living things found at different times of year</p>
		<p>Compare and contrast the living things observed</p>
		<p>Research how environments change </p>

Animals inc humans

Prior learning

Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (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)

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)

Common misconceptions

Some children may think:

- arrows in a food chains mean 'eats'
- the death of one of the parts of a food chain or web has no, or limited, consequences on the rest of the chain
- there is always plenty of food for wild animals
- your stomach is where your belly button is
- food is digested only in the stomach
- when you have a meal, your food goes down one tube and your drink down another
- the food you eat becomes "poo" and the drink becomes "wee".

Reading Opportunities

Human Body Odyssey - Werner Holzwarth

Crocodiles Don't Brush Their Teeth - Colin Fancy)

Wolves - Emily Gravett








Horrid Henry Tricks the Tooth Fairy - Francesca Simon

The Story of the Little Mole Who Knew it was None of His Business - Werner Holzwarth

Vocabulary

Digestive system, digestion, mouth, teeth, saliva, oesophagus, stomach, small intestine, nutrients, large intestine, rectum, anus, teeth, incisor, canine, molar, premolars, herbivore, carnivore, omnivore, producer, predator, prey, food chain

Animals inc humans

National Curriculum Principles	Knowledge and key Vocabulary	Activities and Working Scientifically
Describe the simple functions of the basic parts of the digestive system in humans	<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 added.</p> <p>The food passes into the small intestine. Here nutrients are removed from the food 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. What is left is then stored in the rectum until it leaves the body through the anus when you go to the toilet.</p>	Children to label the main parts of the digestive system - mouth, tongue, saliva, oesophagus, stomach, large intestine, small intestine, rectum, anus. 
		Research and present the functions of the different parts of the digestive system e.g by modelling 
Identify the different types of teeth in humans and their simple functions	Humans have four types of teeth: incisors for cutting; canines for tearing; and molars and premolars for grinding (chewing).	Explore eating different food to id which teeth are used for cutting, tearing and chewing. 
		Use mirror to observe own teeth - how many teeth do they have? Id similarities and diffs.
		Label four different types of teeth
		Research how to look after teeth 
		Compare the effects of different drinks on our teeth. Focus: asking questions 
Construct and interpret a variety of food chains, identifying producers, predators and prey	Living things can be classified as producers, predators and prey according to their place in the food chain.	Use research to create their own food chains - identify producers, predators and prey. within a habitat. 
		Explore consequences when no. of predator and prey change
		Explore pictures of teeth and skulls to classify if animals are herbivore, omnivore or carnivore 

States of Matter

Prior learning

Distinguish between an object and the material from which it is made. (Y1 - Everyday materials)

Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials)

Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials)

Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials)

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)

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)

Common misconceptions

Some children may think:

- 'solid' is another word for hard or opaque
- solids are hard and cannot break or change shape easily and are often in one piece
- substances made of very small particles like sugar or sand cannot be solids
- particles in liquids are further apart than in solids and they take up more space
- when air is pumped into balloons, they become lighter
- water in different forms - steam, water, ice - are all different substances
- all liquids boil at the same temperature as water (100 degrees)
- melting, as a change of state, is the same as dissolving
- steam is visible water vapour (only the condensing water droplets can be seen)

Reading Opportunities

Once Upon a Raindrop: The Story of Water - James Carter

Sticks - Diane Alber

Charlie and the Chocolate factory - Roald Dahl

Bartholomew and the Oobleck - Dr Seuss






Itch - Simon Mayo

Stormbreaker - Anthony Horowitz

Vocabulary

solid, liquid, gas, heating, cooling, state change, melting, freezing, melting point, boiling, boiling point, evaporation, condensation, temperature, water cycle

States of Matter

National Curriculum Principles	Knowledge and key Vocabulary	Activities and Working Scientifically
<p>Pupils should be taught to compare and group materials together according to whether they are solids, liquids, gases</p>	<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>Use observation to classify a section of solids, liquids and gases according to their state </p>
		<p>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.</p>
<p>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</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.</p>	<p>Children to carry out a comparative test to investigate the melting points of different materials eg chocolate, butter, ice, margarine </p>
		<p>Teach how to use a thermometer. Use a thermometer to measure temperatures e.g. icy water (melting), tap water, hot water, boiling water (demonstration).</p>
		<p>What happens to the temperature and state of an ice cube over time? Focus: measuring temperature </p>
		<p>Comparative test - how to speed up the melting of ice. Present results (table, bar chart) and explain what they found out. </p>
<p>Identify the part played by evaporation and condensation and condensation in the water cycle and associate the rate of evaporation with temperature</p>	<p>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>	<p>Evaluate results from investigation - evaluate success of the enquiry and id further questions.</p>
		<p>Research and present learning about the water cycle </p>

Sound

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)

Common misconceptions

Pitch and volume are frequently confused, as both can be described as high or low.

Some children may think:

- sound is only heard by the listener
- sound only travels in one direction from the source
- sound can't travel through solids and liquids
- high sounds are loud and low sounds are quiet.

Reading Opportunities

Horrid Henry Rocks - Francesca Simon




Moonbird - Joyce Dunbar

The Pied Piper of Hamelin - Natalia Vasquez

Vocabulary

Sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation

Sound

National Curriculum Principles	Knowledge and key Vocabulary	Activities and Working Scientifically
To identify how sounds are made, associating some of them with something vibrating	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.	<p>Children to conduct a sound walk throughout the school - what can they hear and where do they hear it? - predict what/where is the loudest? Where is the quietest? Classify sound sources. </p> <p>Observe movement of grains on a drum, observe a tuning fork in water. Explain what happens</p>
Recognise that vibrations from sounds travel through a medium to the ear	Therefore, sounds decrease in volume as you move away from the source. A sound insulator is a material which blocks sound effectively.	Explore how string telephones work to show how vibrations travel to the ear. Explore how ear gongs using slinkys or coat hangers work.
Find patterns between the pitch of a sound and features of the object that produced it	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>Pattern seeking - Children to explore how instruments produce sounds of different pitch. Make own musical instruments (sources) which produce different pitches. </p>
Find patterns between the volume of a sound and the strength of the vibrations that produced it	The loudness (volume) of the sound depends on the strength (size) of vibrations which decreases as they travel through the medium.	Teach children how to use data loggers. Children to measure the loudness of a drum using the data logger.
Recognise that sounds get fainter as the distance from the sound sources increases.	Sounds decrease in volume as you move away from the source. A sound insulator is a material which blocks sound effectively.	<p>Problem solving - How can you protect your ears from loud noises?</p> <p>Focus - setting up test </p>

Electricity

Prior Learning

Explore how things work. (Nursery - Electricity)

Common misconceptions

Some children may think:

- electricity flows to bulbs, not through them
- electricity flows out of both ends of a battery
- electricity works by simply coming out of one end of a battery into the component.

Reading Opportunities

Until I Met Dudley - Roger McGough

Oscar and the Bird: A Book about Electricity - Geoff Waring




Vocabulary

Electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol

N.B.

Children in Year 4 do not need to use standard symbols for electrical components, as this is taught in Year 6.

Electricity

National Curriculum Principles	Knowledge and key Vocabulary	Activities and Working Scientifically
To identify common appliances that run on electricity.	Many household devices and appliances run on electricity. Some plug in to the mains and others run on batteries.	Classify appliances by whether they run on mains electricity or battery, 
To construct a simple series circuit, identifying and naming its basic parts including cells, wires, bulbs, switches and buzzer	An electrical circuit consists of a cell or battery connected to components using wires.	To construct a simple circuit using battery, wires, bulbs, crocodile clips and other components and name each part. Talk through vocabulary - positive, negative, terminal
		Change circuit to include a buzzer.
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	Circuit needs two condition to work: 1. A power source 2. It must be a complete loop with no breaks	Be able to identify and explain if a circuit will work. 
Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit	A switch can be added to the circuit to turn the component on and off. The switch must be closed for the component to work.	Explore how to use different switches and investigate how they function.
		Children to build their own switch and add it to the circuit
Recognise some common conductors and insulators, and associate metals with being good conductors	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.	Test materials to find out if they are conductors or insulators
		Use results to classify materials according to if they are good conductors or not 

Working scientifically in Year 3 and 4

Asking questions

The children consider their prior knowledge when asking questions. They independently use a range of question stems. Where appropriate, they answer these questions. The children answer questions posed by the teacher. Given a range of resources, the children decide for themselves how to gather evidence to answer the question. They recognise when secondary sources can be used to answer questions that cannot be answered through practical work. They identify the type of enquiry that they have chosen to answer their question

Set up enquiries

The children select from a range of practical resources to gather evidence to answer questions generated by themselves or the teacher. • They follow their plan to carry out different types of enquiry inc. observations and tests to classify; comparative and simple fair tests; observations over time; and pattern seeking

Explanatory note A comparative test is performed by changing a variable that is qualitative e.g. the type of material, shape of the parachute. This leads to a ranked outcome. A fair test is performed by changing a variable that is quantitative e.g. the thickness of the material or the area of the canopy. This leads to establishing a causative relationship.

Making observations and measurements

The children make systematic and careful observations. They use a range of equipment for measuring length, time, temperature and capacity inc thermometers and data loggers. They use standard units for their measurements.

Recording evidence

The children sometimes decide how to record and present evidence. They record their observation e.g. using photographs, videos, pictures, labelled diagrams or writing. They record their measurements e.g. using tables, tally charts and bar charts (given templates, if required, to which they can add headings). They record classifications e.g. using tables, Venn diagrams, Carroll diagrams. Children are supported to present the same data in different ways in order to help with answering the question.

Interpret and report

Ch can identify differences, similarities or changes related to simple scientific ideas and processes. Children interpret their data to generate simple comparative statements based on their evidence. They begin to identify naturally occurring patterns and causal relationships.

Evaluate

Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. They identify ways in which they adapted their method as they progressed or how they would do it differently if they repeated the enquiry.

Working Scientifically Skills



Science Enquiry Types

Comparative and fair testing	
Research	
Observation over time	
Pattern seeking	
Identifying and classifying	
Problem solving	