Year	4	Topic	Living things and their habitats

National Curriculum aims

- Recognise that living things can be grouped in a variety of ways.
- Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.
- Recognise that environments can change and that this can sometimes pose dangers to living things.

Prior learning	Key vocabulary
• 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)	Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate, vertebrate, invertebrate

Key vocabulary with definitions			
classification	Putting things into groups based on their similarities and differences.	**positive impact**	A good and worthwhile impact.
classification keys	A set of questions used to identify a living thing or decode what group it belongs to.	**negative impact**	A bad or damaging impact.
environment	Refers to the surrounding or conditions a living thing finds themselves in.	**migrate**	The movement of people or animals from one place to another.
habitat	The place a plant or animal lives.	**hibernate**	A deep or prolonged sleep to allow animals to survive during the winter.
human impact	The changes made to an environment due to the action of humans.	**vertebrate**	An animal with a backbone.
invertebrate	An animal without a backbone.		

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Key learning

- Living things live in a habitat which provides an environment to which they are suited. A habitat is where a plant or animal lives.
- 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, ecologically planned parks and garden ponds) or in a bad way (i.e. negative human impact, such as littering, deforestation and population development).
- These environments also change with the seasons; different living things can be found in a habitat at different times of the year.

How to classify

Animals can be put into 2 groups – vertebrates or invertebrates

Vertebrates are animals that have a backbone and there are 5 ways vertebrates can be grouped:

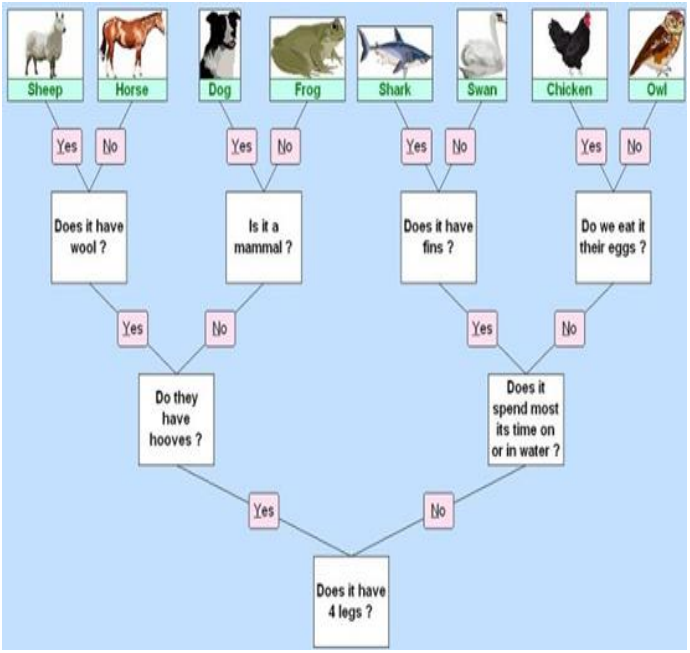
- **Fish** (Fish live and lay their eggs in water. They have fins instead of legs and gills instead of lungs.)
- **Amphibians** (Amphibians live on land and in water, however, they lay their eggs in water. They are cold-blooded and have smooth skin. Examples of amphibians include frogs, toads and salamanders.)
- **Reptiles** (Reptiles live in water and on land. They have scales and are cold-blooded. This means that they cannot keep warm by themselves and need to be in a warm place. They lay their eggs on land. Examples of reptiles include lizards, snakes and turtles.)
- **Birds** (Birds are warm-blooded and have beaks, feathers, wings and two legs. They lay their eggs on land.)
- **Mammals** (Mammals have warm blood and usually have hair or fur on their bodies. Mammals are born alive and the mothers feed their babies with milk. Humans are mammals, but other examples of mammals include lions, cats and sheep.)

Invertebrates are animals that do not have a backbone. The children should be able to group invertebrates into snails, slugs, worms, spiders and insects.

Plants can be grouped into flowering (grass) and non-flowering plants (ferns and mosses).

Living things can be grouped (classified) in different ways according to their features. We can group living things based on how they are similar.

Classification keys can be used to identify, name and classify living things.



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.

Activities

- Observe plants and animals in different habitats.
- Compare and contrast the living things observed.
- Use classification keys to name unknown living things.
- Classify living things found in different habitats based on their features.
- Group animals into the different vertebrate groups.
- Classify plants into flowering and non-flowering plants.
- Create a simple identification key based on observable features.
- Use fieldwork to explore human impact on the local environment e.g. litter, tree planting.
- Use secondary sources to find out about how environments may naturally change.
- Use secondary sources to find out about human impact, both positive and negative, on environments.

Future learning

- 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)
- 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)
- Give reasons for classifying plants and animals based on specific characteristics. (Y6 - Living things and their habitats)

Possible evidence

For ARE

- Can use classification keys to identify unknown plants and animals
- Can present their learning about changes to the environment in different ways e.g. campaign video, persuasive letter
- Can name living things living in a range of habitats, giving the key features that helped them to identify them
- Can give examples of how an environment may change both naturally and due to human impact

For GD

- Use food chains to predict what might happen to the numbers of an organism if there are suddenly more predators or less prey
- Explain why it is necessary to use a reasonably large sample When investigating the preferences of small invertebrates
- Describe how humans have negatively impacted environments (e.g. pollution, deforestation, introduction of invasive species)
- Explain why some animals are hard to classify (e.g. platypus, echidna, bat, flightless birds)

Working scientifically skills covered in this topic

Asking questions	➢ Asking questions about our local habitat and the impact we have on it.
Observing	➢ Observe living things in the local habitat. ➢ Observe human impact on our local environment.
Using other sources of information	➢ Use secondary sources to find out about human impact on environments (positive and negative).
Recording	➢ Venn diagram to group living things based on characteristics. ➢ Classification key based on characteristics of animals. ➢ Information about animals on a Carroll diagram.
Identifying and classifying	➢ Classify living things in different ways. ➢ Classify vertebrates – reptiles, fish, amphibians, mammals, birds ➢ Classify invertebrates - snails, slugs, worms, spiders and insects ➢ Classify plants into flowering and non-flowering plants.

Year	4	Topic	Animals, including humans

National Curriculum aims

- Describe the simple functions of the basic parts of the digestive system in humans.
- Identify the different types of teeth in humans and their simple functions.
- Construct and interpret a variety of food chains, identifying producers, predators and prey.

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

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

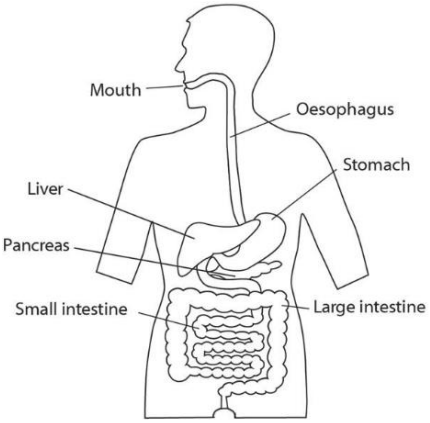
Key learning

Digestion is the way the body breaks down the food we eat into smaller parts that can be used to give the body energy.

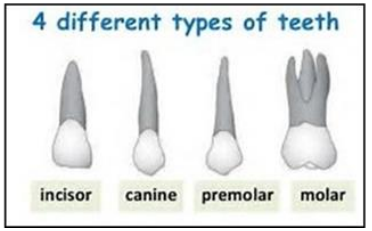
The mains parts of the digestive system are the mouth, oesophagus, stomach, liver, pancreas, small intestine and large intestine.

The journey of food

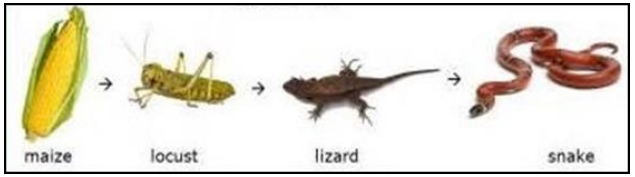
Food enters the body through the mouth. Digestion starts when the teeth start to break the food down. Saliva is added and the tongue rolls the food into a ball. The food is swallowed and passes down the oesophagus to the stomach. Here the food is broken down further by being churned around and other chemicals are added. 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.



Teeth grow in babies when they are about 6 months old and 20 teeth grow by the time you are about 2.5 years old. From about age 6 you start to lose baby teeth until about the age 12.These teeth are replaced by 32 permanent teeth. Humans have four types of teeth: incisors for cutting; canines for tearing; and molars and premolars for grinding (chewing).
Tooth decay happens when bacteria create a sticky layer called plaque over your teeth. Tooth decay is often caused by having too much sugary food and drink and not cleaning your teeth and gums.



Living things can be classified as producers, predators and prey according to their place in the food chain.
A food chain is a diagram that shows a producer and consumers. The arrow means 'food is for'. A consumer can be a predator, prey or both.
Food chains start with a producer (usually a green plant or algae). Consumers get their food by eating plants or other animals. Animals which eat other animals are called predators and animals that are eaten by other animals are called prey.



Key vocabulary with definitions			
digestive system	The digestive system consists of the parts of the body that work together to turn food and liquids into the building blocks and fuel that the body needs.	**incisor**	Teeth that help us chew and cut food.
digestion	How the body breaks down food so it can be taken in and used.	**canine**	The sharp, pointy teeth in mammal's mouths.
oesophagus	A tube made of muscle through which chewed food passes for digestion.	**molar**	Large, square teeth with a rough edge, used for grinding and chewing food.
nutrients	Nutrients are important substances you get from food that help your body survive and grow.	**premolar**	The teeth between the canines and the molars.
small intestine	A tube that runs from the stomach to the beginning of the large intestine and breaks down food from the stomach.	**herbivore**	An animal that feeds mostly on plants.
large intestine	It connects the small intestine to the rectum and anus and changes the waste from liquid to stool.	**carnivore**	An animal that eats only meat.
		omnivore	An animal that will eat both plants and meat.
anus	The opening where your bowel movements come out.	**producer**	The name given to a living thing that produces its own food.
saliva	A clear liquid that's made in your mouth 24 hours a day, every day. It's made up mostly of water, with a few other chemicals.	**prey**	An animal that is hunted by another for food. Prey are hunted by predators.
food chain	A diagram that shows how animals are linked by what they eat.	**predator**	An animal that hunts, kills and eats other animals for food.

Activities

- Research the parts and function of the parts of the digestive system.
- Create a model of the digestive system using household objects.
- Identify the different types of teeth on a model.
- Explore eating different types of food to identify which teeth are being used for cutting, tearing and grinding (chewing).
- Classify animals as herbivores, carnivores or omnivores according to the type of teeth they have in their skulls.
- Use food chains to identify producers, predators and prey within a habitat.
- Use secondary sources to identify animals in a habitat and find out what they eat.

Future learning

- 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)
- Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (Y6 - Animals, including humans)
- Describe the ways in which nutrients and water are transported within animals, including humans. (Y6 - Animals, including humans)

Possible evidence

For ARE

- Can use diagrams or a model to describe the journey of food through the body explaining what happens in each part
- Can record the teeth in their mouth (make a dental record)
- Can explain the role of the different types of teeth
- Can point to the three different types of teeth in their mouth and talk about their shape and what they are used for
- Can explain how the teeth in animal skulls show they are carnivores, herbivores or omnivores
- Can sequence the main parts of the digestive system
- Can draw the main parts of the digestive system onto a human outline
- Can describe what happens in each part of the digestive system
- Can name producers, predators and prey within a habitat
- Can construct food chains
- Can create food chains based on research

For GD

- Explain why humans do not have a full set of adult teeth at birth
- Explain why food needs to be broken down
- Explain why dentists are concerned about the amount of sugar children have
- Explain how fossilised teeth give us clues about an animals' diet
- Explain why the teeth of certain types of animals need to be different

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".

Working scientifically skills covered in this topic

Asking questions	➢ Asking questions about our digestive system and what impacts our teeth.
Setting up fair tests	➢ How do different liquids affect our teeth? (eggs in different liquids).
Observing	➢ Observe what happens to the eggs in the different liquids.
Using other sources of information	➢ Use secondary sources to identify animals in a habitat and find out what they eat.
Recording	➢ Recording what happens to the egg in the different liquids in a table. ➢ Construct a food chain.
Identifying and classifying	➢ Identify the parts and functions of the digestive system. ➢ Identify the different teeth and their functions. ➢ Classify animals as herbivores, carnivores or omnivores according to the type of teeth they have in their skulls. ➢ Use food chains to identify producers, predators and prey within a habitat.
Explaining results	➢ Explaining why certain liquids affect our teeth in different ways.

Year	4	Topic	States of matter

National Curriculum aims

- Compare and group materials together, according to whether they are solids, liquids or gases.
- 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).
- Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

Prior learning	Key vocabulary
• 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)	solid, liquid, gas, heating, cooling, state change, melting, freezing, melting point, boiling, boiling point, evaporation, condensation, temperature, water cycle

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)
- clouds are made of water vapour or steam
- the substance on windows etc. is condensation rather than water
- the changing states of water (illustrated by the water cycle) are irreversible
- evaporating or boiling water makes it vanish
- evaporation is when the Sun sucks up the water, or when water is absorbed into a surface/material.

What pupils need to know or do to be secure

Key learning

What is a solid like?	• A solid keeps its shape • It has a fixed volume. • They do not flow. • They take up the same amount of space because they do not spread.
What is a liquid like?	• A liquid has a fixed volume • It changes in shape to fit the container. • A liquid can be poured. • It keeps a level, horizontal surface.
What is a gas like?	• A gas fills all available space. • They are often invisible. • It has no fixed shape or volume.

What are the changes of state?

- Melting is a state change from solid to liquid.
- Freezing is a state change from liquid to solid (The freezing point of water is $0^{o}C$).
- 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 $100^{o}C$.
- 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.

<u>What is the water cycle?</u>

Water on the earth is constantly moving. It is recycled over and over again. This recycling process is called the **water cycle**.

A) Water evaporates into the air.

The sun heats up water on land and in rivers, lakes and seas and turns it into water vapour. The water vapour rises into the air.

B) Water vapour condenses into clouds.

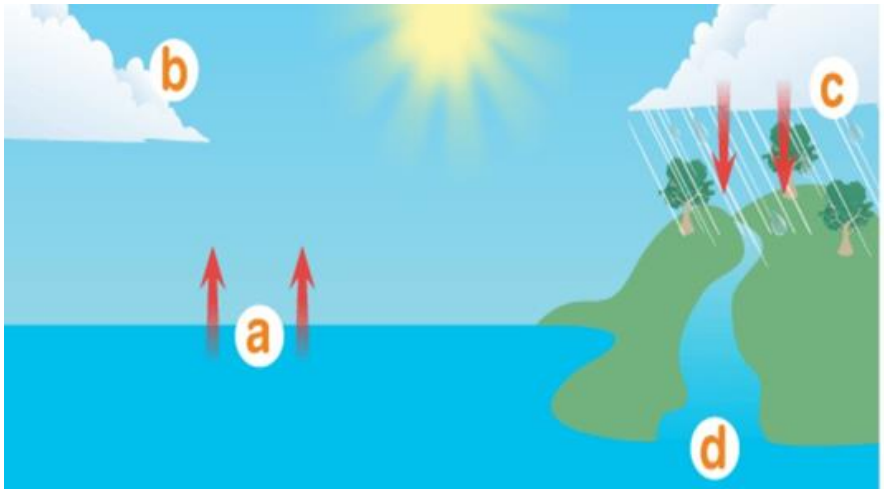
Water vapour in the air cools down and changes back into tiny drops of liquid water, forming clouds.

C) Water falls as rain.

The clouds get heavy and water falls back to the Earth in the form of rain or snow.

D) Water returns to the sea

Rain water runs over the land and collects in lakes or rivers, which take it back to the sea. The cycle starts all over again.



Key vocabulary with definitions			
solid	A state of matter that keeps its shape.	**boiling point**	The temperature at which the substance boils.
liquid	A state of matter that flows and fills a container.	**freezing point**	The temperature at which the substance freezes.
gas	A state of matter that has no fixed shape or volume.	**melting point**	The temperature at which the substance melts.
state change	To describe the process of one state of matter changing to another.	**temperature**	Temperature is how hot or cold something is.
melting	The change of a solid into a liquid when heat is applied.	**water cycle**	The water cycle is the path that all water follows as it moves around Earth in different states.
freezing	The change when a liquid turns into a solid when its temperature is lowered below its freezing point.	**evaporation**	The change when a liquid changes into a gas after heat is applied.
boiling	The change that occurs when a liquid becomes gas throughout the substance.	**condensation**	The change when gas turns into a liquid when it touches a cooler surface.

Activities

- Observe closely and classify a range of solids and liquids.
- 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.
- Investigate whether gas weighs anything.
- Classify materials according to whether they are solids, liquids and gases.
- Observe a range of materials melting e.g. ice, chocolate, butter.
- Investigate which type of chocolate melts the quickest.
- Investigate the melting point of different materials e.g. ice, margarine, butter and chocolate.
- 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).
- Observe water evaporating and condensing e.g. on cups of icy water and hot water.
- Set up investigations to explore changing the rate of evaporation e.g. washing, puddles, handprints on paper towels, liquids in containers.
- Use secondary sources to find out about the water cycle.

Future learning

- 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)
- Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. (Y5 - Properties and changes of materials)
- Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. (Y5 - Properties and changes of materials)
- 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)
- Demonstrate that dissolving, mixing and changes of state are reversible changes. (Y5 - Properties and changes of materials)
- Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda. (Y5 - Properties and changes of materials)

Possible evidence

For ARE

- Can name properties of solids, liquids and gases
- To group materials together based on whether they are a solid, liquid or gas
- Can give examples of things that melt/freeze and how their melting points vary
- Can give everyday examples of melting and freezing
- From their observations, can give the melting points of some materials
- Using their data, can explain what affects how quickly a solid melts
- Can measure temperatures using a thermometer
- Can give everyday examples of evaporation and condensation
- Can explain why there is condensation on the inside the hot water cup but on the outside of the icy water cup
- From their data, can explain how to speed up or slow down evaporation
- Can present their learning about the water cycle in a range of ways e.g. diagrams, explanation text, story of a water droplet
- Can create a concept map, including arrows linking the key vocabulary
- Can describe the water cycle

For GD

- Describe the behaviour and properties of gases
- Make clear distinctions between the properties of solids, liquids and gases
- Explain why granular solids have some of the properties associated with liquids
- Explain why some substances are hard to classify as solids, liquids and gases (e.g. whipped cream, mousse, mayonnaise, muddy water, fizzy drinks, cornflour and water)
- Compare the boiling point of different liquids
- Explore the effect of salt on ice
- Explain why salt is put on the roads in winter

Working scientifically skills covered in this topic

Asking questions	➢ Asking questions in investigations (see below tests carried out)
Setting up fair tests	➢ Do gases weigh anything? ➢ Which chocolate melts the quickest (milk, white or dark)? ➢ Do all liquids freeze? ➢ Which is the best dish for a bird's water bowl? (evaporation)
Choosing and using equipment	➢ Using scales to measure weight of the lemonade, ➢ Using a thermometer to measure temperature.
Observing	➢ Observe the changes when different solids are added to water. ➢ Observing which chocolate melted first, ➢ Observe water evaporating. ➢ Observe water condensing.
Measuring	➢ Measuring the weight of the lemonade before and after removing the gas. ➢ Measuring the amount of water to begin with and left in the dish (evaporation) ➢ Measure the temperature of the chocolate.
Using other sources of information	➢ Using secondary sources to find out about the water cycle.
Recording	➢ Recording the melting points of different materials in a bar chart, ➢ Recording which liquids froze in a table.
Identifying and classifying	➢ Identifying and classifying different solids, liquids and gases.
Explaining results	➢ Explaining why chocolates melt at different rates. ➢ Explaining why some liquids do not freeze ➢ Explaining why evaporation happens quicker in dishes with a larger surface area. .

Year	4	Topic	Sound

National Curriculum aims

- Identify how sounds are made, associating some of them with something vibrating.
- Recognise that vibrations from sounds travel through a medium to the ear.
- Find patterns between the pitch of a sound and features of the object that produced it.
- Find patterns between the volume of a sound and the strength of the vibrations that produced it.
- Recognise that sounds get fainter as the distance from the sound source increases.

Prior learning	Key vocabulary
• Explore how things work. (Nursery – Sound) • Describe what they see, hear and feel whilst outside. (Reception – Sound) • 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)	Sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation

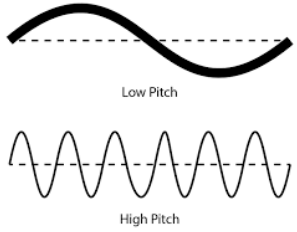
WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Key learning

Sound is a noise that can be heard by someone. 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 hit our ear drums and cause them to vibrate. This vibration is picked up by our brain, allowing us to hear (sense) the sound.

The loudness of a sound is called volume. The closer we are to the sound source, the louder the sound will appear to us. The further away we are from the sound source, the quieter the sound will appear. The more energy in the initial vibration, the louder the sound will be. For example, if you tap a hammer on a desk the sound will be quiet, but if you smash a hammer on a desk it would be much louder.



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.

A sound insulator is a material which blocks sound effectively.

Key vocabulary with definitions			
sound	A noise that can be heard.	**low pitch**	A low sound.
source	Something that produces sound.	**volume**	How loud or quiet a sound is.
vibrate/vibration	The rapid back-and-forth motion of a physical object.	**faint**	A sound that is very quiet and has little strength.
travel	The movement of sound from a source to your ear.	**loud**	The level of sound is very high and can be easily heard.
high pitch	A high sound.	**insulation**	Materials that do not let sound travel through easily so they are not heard as loud.

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 load and low sounds are quiet.

Activities

- Classify sound sources.
- Explore making sounds with a range of objects, such as musical instruments and other household objects.
- Explore how string telephones or ear gongs work.
- 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.
- Measure sounds over different distances.
- Measure sounds through different insulation materials.

Future learning

- Waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition. (KS3)
- Frequencies of sound waves, measured in Hertz (Hz); echoes, reflection and absorption of sound. (KS3)
- Sound needs a medium to travel, the speed of sound in air, in water, in solids. (KS3)
- 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)
- Auditory range of humans and animals. (KS3)
- Pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound. (KS3)
- Waves transferring information for conversion to electrical signals by microphone. (KS3)

Possible evidence

For ARE

- Can explain what happens when you strike a drum or pluck a string and use a diagram to show how sounds travel from an object to the ear
- Can demonstrate how to increase or decrease pitch and volume using musical instruments or other objects
- Can use data to identify patterns in pitch and volume
- Can explain how loudness can be reduced by moving further from the sound source or by using a sound insulating medium
- Can give examples to demonstrate that sounds get fainter as the distance from the sound source increases
- Can give examples of how to change the volume of a sound e.g. increase the size of vibrations by hitting or blowing harder
- Can give examples to demonstrate how the pitch of a sound are linked to the features of the object that produced it
- Can name sound sources and state that sounds are produced by the vibration of the object Can state that sounds travel through different mediums such as air, water, metal

For GD

- Describe ways in which the pitch of a sound made by a particular instrument or vibrating object can be raised or lowered
- Generalise the effects of changes on sound (e.g. the tighter the tension the higher the pitch)
- Group instruments independently by the way sounds are produced
- Recognise that sounds travel through solids, water and air
- Explore how sound travels through a variety of materials
- Identify suitable materials to use for sound insulation
- Recognise that sound can be reflected from a surface which can cause an echo
- Describe how some animals use echo-location

Working scientifically skills covered in this topic

Asking questions	➢ Asking questions about how sound travels and what affects the volume of sound.
Setting up fair tests	➢ Testing insulators for sound.
Choosing and using equipment	➢ Using a noise meter to measure volume of sound.
Observing	➢ Observe what happens to the pitch and volume of sound when things are changed e.g length of a guitar string.
Measuring	➢ Measure volume of sound. ➢ Measure sound through different insulator materials.
Recording	➢ Recording sound levels in a bar chart.
Identifying and classifying	➢ Identify and classify sound sources. ➢ Identify how sound travels. ➢ Identify how a string telephone works.
Explaining results	➢ Explaining why some materials are good insulators and others are not.

Year	4	Topic	Electricity

National Curriculum aims

- Identify common appliances that run on electricity.
- Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.
- 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.
- Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.
- Recognise some common conductors and insulators, and associate metals with being good conductors.

Prior learning	Key vocabulary
• Explore how things work. (Nursery - Electricity)	Electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol

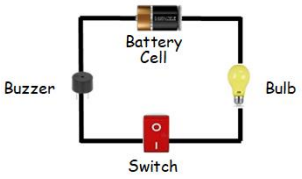
Key vocabulary with definitions			
electricity	Electricity is the presence or flow of charged particles.	**crocodile clips**	Toothed clips on the ends of electric wires that are used to connect the wire to other components.
appliance	An electrical device or machine that is used for a particular purpose.	**bulb**	A component that produces lights when powered with electricity.
mains	The electricity that is delivered to homes and businesses through an electric grid/wires.	**switch**	A component within an electrical Circuit which enables the flow of electricity to be turned on and off.
plug	A plug connects a device to the mains electricity supply.	**buzzer**	A buzzer is a component in a circuit that makes a sound when electricity goes through it.
circuit	A circuit is a complete path around which electricity can flow.	**motor**	An electric motor converts electrical energy into physical movement.
component	An electric element that can be connected together to make circuits.	**conductor**	Materials that let electricity pass through them easily.
cell	A device used to generate electricity.	**insulator**	Materials that do not allow electricity to pass through them.
battery	A power source with one or more cells.		

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE

Key learning

Many household devices and appliances run on electricity which means they have to be powered with electricity to work (e.g toaster, kettle, TV, computer, washing machine). Electrical energy can be converted into other types of energy such as light, heat, movement or sound.
Some appliances plug in to the mains electricity and others run on batteries.

Electricity can be dangerous so we have to be careful when using it. There are rules we have to follow when using electricity e.g do not put your finger in a plug socket, do not use water around electricity, unplug appliances if you are not using them.



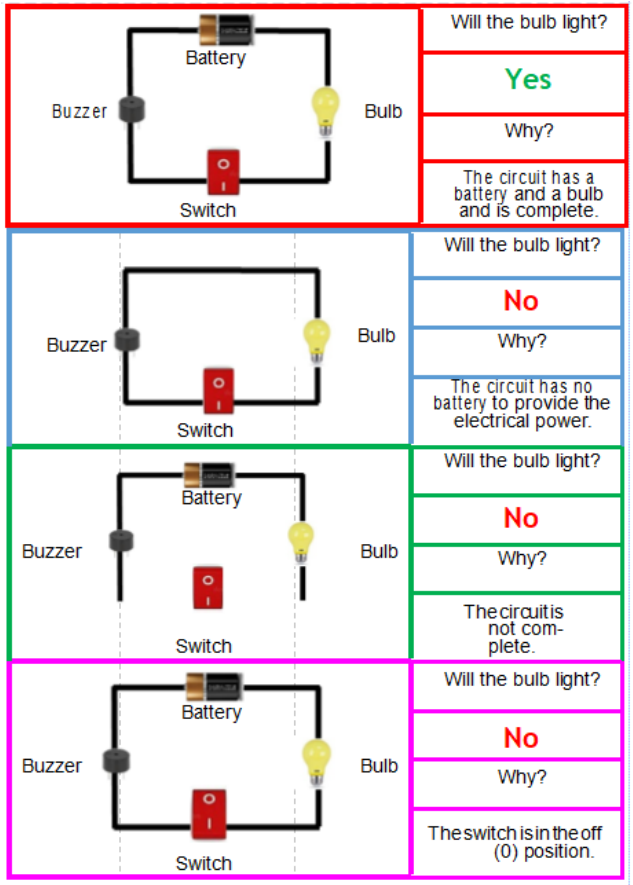
Electricity can flow through the components in a complete electrical circuit. A circuit always needs a power source, such as a battery, with wires connected to both the positive (+) and negative (-) ends. A circuit can also contain other electrical components, such as bulbs, buzzers or motors, which allow electricity to pass through.
A lamp will only light if it is part of a complete loop with a battery. 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. When a switch is open (off), there is a gap in the circuit so electricity cannot travel around the circuit. When a switch is closed (on), it makes the circuit complete so electricity can travel around the circuit.

A conductor is a material that let electricity pass through them easily. Metals are good conductors so they can be used as wires in a circuit.
An insulator is a material that does not allow electricity to pass through them. Non-metallic solids are insulators except for graphite (pencil lead).
Water, if not completely pure, also conducts electricity.

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

Children should investigate which circuits work and which do not and why.



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.

Activities

- Construct a range of circuits.
- Explore which materials can be used instead of wires to make a circuit.
- Classify the materials that were suitable/not suitable for wires.
- Explore how to connect a range of different switches and investigate how they function in different ways.
- Choose switches to add to circuits to solve particular problems, such as a pressure switch for a burglar alarm.
- Apply their knowledge of conductors and insulators to design and make different types of switch.

N.B.
Children should be given one component at a time to add to circuits.

Future learning

- Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. (Y6 - Electricity)
- Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. (Y6 - Electricity)
- Use recognised symbols when representing a simple circuit in a diagram. (Y6 - Electricity)

Possible evidence

For ARE

- Can communicate structures of circuits using drawings which show how the components are connected
- Use classification evidence to identify that metals are good conductors and non-metals are insulators
- Can incorporate a switch into a circuit to turn it on and off
- Can connect a range of different switches identifying the parts that are insulators and conductors
- Can add a circuit with a switch to a DT project and can demonstrate how it works
- Can give reasons for choice of materials for making different parts of a switch
- Can describe how their switch works
- Can name the components in a circuit
- Can make electric circuits
- Can control a circuit using a switch
- Can name some metals that are conductors
- Can name materials that are insulators

For GD

- Are methodical in tracing faults in simple circuits
- Relate knowledge about conductors and insulators to their use in electrical appliances
- Describe the use of conductors and insulators in components including connecting wires
- Identify graphite and playdough as non-metal conductors and explain why this is unusual

Working scientifically skills covered in this topic

Asking questions	➢ Asking questions about where electricity comes from and which electrical circuits will work.
Setting up fair tests	➢ Testing which circuits will work. ➢ Which materials are conductors and which are insulators?
Choosing and using equipment	➢ Using batteries, wires, lightbulbs, switches, buzzers in electrical circuits.
Observing	➢ Observing which circuits will work and which will not.
Recording	➢ Recording which circuits work and why in a table.
Identifying and classifying	➢ Classifying what is powered by mains electricity or batteries. ➢ Classifying materials into conductors and insulators.
Explaining results	➢ Explaining why some circuits do not work.