

Subject - Science

Topic name - Animals, including humans

Year group 4

Term - Autumn

Prior Knowledge 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)

Skills to be taught

Asking relevant questions and using different types of scientific enquiries to answer them
 Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and dataloggers
 Setting up simple practical enquiries, comparative and fair tests

Key Knowledge

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.

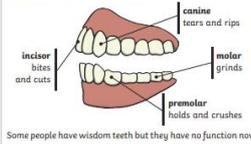
The food passes into the small intestine. Here nutrients are removed from the food and leave the digestive system to be used elsewhere in the body. The rest of the food then passes into the large intestine. Here the water is removed for use elsewhere in the body. What is left is then stored in the rectum until it leaves the body through the anus when you go to the toilet.

Humans have four types of teeth: incisors for cutting; canines for tearing; and molars and premolars for grinding (chewing). Living things can be classified as producers, predators and prey according to their place in the food chain.

Key Vocabulary

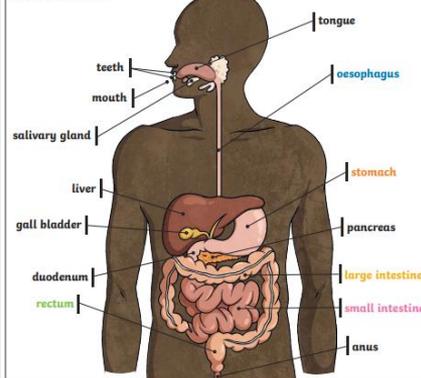
digest	Break down food so it can be used by the body.
oesophagus	A muscular tube which moves food from the mouth to the stomach.
stomach	An organ in the digestive system where food is broken down with stomach acid and by being churned around.
small intestine	Part of the intestine where nutrients are absorbed into the body.
large intestine	Part of the intestine where water is absorbed from remaining waste food. Stools are formed in the large intestine.
rectum	Part of the digestive system where stools are stored before leaving the body through the anus.

Human Teeth and Their Functions



Key Knowledge

The Digestive System

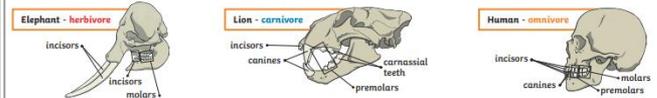


Possible experiences

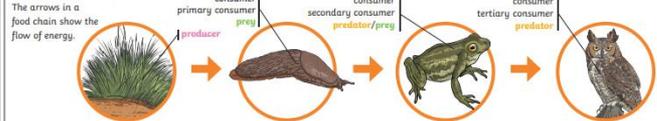
Research the function of the parts of the digestive system.
 Create a model of the digestive system using household objects.
 Explore eating different types of food to identify which teeth are being used for cutting, tearing and grinding (chewing).
 Classify animals as herbivores, carnivores or omnivores 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.

Key Knowledge

The teeth of an animal are designed to eat different foods depending on the diet of the animal. Examples of a **herbivore**, a **carnivore** and an **omnivore** skull:



An Example of a Food Chain



Key Vocabulary

herbivore	An animal that eats plants.
carnivore	An animal that feeds on other animals.
omnivore	An animal that eats plants and animals.
producer	A plant that produces its own food.
predator	An animal that hunts and eats other animals.
prey	An animal that gets hunted and eaten by another animal.

To help prevent tooth decay:

- limit sugary food and drink;
- brush teeth twice daily using a fluoride toothpaste;
- visit your dentist regularly.



Subject - Science	Topic name - Electricity	Year group 4	Term - Autumn
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Prior Knowledge

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)

Skills to be taught

Asking relevant questions and using different types of scientific enquiries to answer them
 Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and dataloggers
 Setting up simple practical enquiries, comparative and fair tests

Key Knowledge

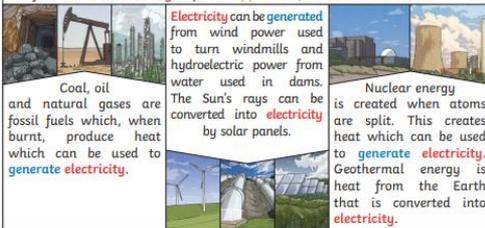
Many household devices and appliances run on electricity. Some plug in to the mains and others run on batteries. An electrical circuit consists of a cell or battery connected to a component using wires. If there is a break in the circuit, a loose connection or a short circuit, the component will not 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.

Key Vocabulary	Key Vocabulary
electricity The flow of an electric current through a material, e.g. from a power source through wires to an appliance.	circuit A pathway that electricity can flow around. It includes wires and a power supply and may include bulbs, switches or buzzers.
generate To make or produce.	There are two types of electric current. Mains electricity: power stations send an electric charge through wires to transformers and pylons. Then, underground wires carry the electricity into our homes via wires in the walls and out through plug sockets.
renewable A source of electricity that will not run out. These include solar, nuclear, geothermal, hydro and wind.	
non-renewable This source of energy will eventually run out and so will no longer be able to be used to make electricity . These include fossil fuels - coal, oil and natural gas.	Battery electricity: batteries store chemicals which produce an electric current. Eventually, even rechargeable batteries will stop producing an electric current.
appliances A piece of equipment or a device designed to perform a particular job, such as a washing machine or mobile phone.	
battery A device that stores electrical energy as a chemical.	

Pictures/maps/images

Key Knowledge

Lightning and static **electricity** are examples of **electricity** occurring naturally but for us to use **electricity** to power **appliances**, we need to make it.



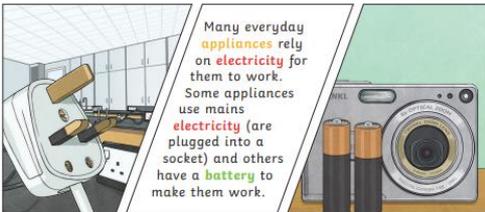
Coal, oil and natural gases are fossil fuels which, when burnt, produce heat which can be used to **generate electricity**.

Electricity can be generated from wind power used to turn windmills and hydroelectric power from water used in dams. The Sun's rays can be converted into **electricity** by solar panels.

Nuclear energy is created when atoms are split. This creates heat which can be used to **generate electricity**. Geothermal energy is heat from the Earth that is converted into **electricity**.

Possible experiences

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. Make circuits that can be controlled as part of a DT project. **N.B.** Children should be given one component at a time to add to circuits.



Many everyday **appliances** rely on **electricity** for them to work. Some appliances use mains **electricity** (are plugged into a socket) and others have a **battery** to make them work.

Key Knowledge

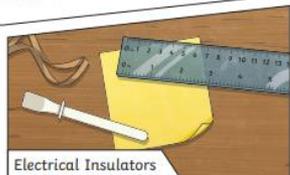


Electricity can only flow around a complete **circuit** that has no gaps. There must be wires connected to both the positive and negative end of the power supply/**battery**.

Switches can be used to open or close a **circuit**. When off, a switch 'breaks' the **circuit** to stop the flow of **electricity**. When on, a switch 'completes' the circuit and allows the **electricity** to flow.



A conductor of **electricity** is a material that will allow **electricity** to flow through it. Metals are good conductors. Materials that are electrical insulators do not allow **electricity** to flow through them. Wood, plastic and glass are good insulators



Subject - Science	Topic name - Living things and their habitats	Year group 4	Term - Spring
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Prior Knowledge 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)

Skills to be taught

Asking relevant questions and using different types of scientific enquiries to answer them
 Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and dataloggers
 Setting up simple practical enquiries, comparative and fair tests

Key Knowledge

Living things can be grouped (classified) in different ways according to their features. Classification keys can be used to identify and name living things.

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.

Key Vocabulary	
classification	This is where plants or animals are placed into groups according to their similarities.
vertebrates	Animals with a backbone.
invertebrates	Animals without a backbone.
specimen	A particular plant or animal that scientists study to find out about its species.
characteristics	The distinguishing features or qualities that are specific to a species.

Animals can be grouped in lots of different ways based upon their **characteristics**.

vertebrates	invertebrates

Vertebrates can be separated into five broad groups.

You could sort **invertebrates** you might see around school in different ways, such as in this example. The vast majority of living things on the planet are **invertebrates**.

You can use **classification** keys to help group, identify and name a variety of living things. Here is an example of a **classification key**:

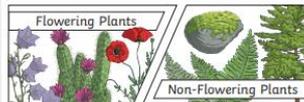
Invertebrate Classification Key

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  Does it have legs?
  - yes: How many legs does it have?
    - many legs: Does it have an oval body?
      - yes: woodlouse
      - no: spider
    - 8 legs: Does it have a two part body?
      - yes: harvestman
      - no: centipede
    - 6 legs: Does it have wing cases?
      - yes: earwig
      - no: millipede
  - no: Does it have a segmented body?
    - yes: earthworm
    - no: Does it have a long, thin body?
      - yes: larvae
      - no: Does it have a shell?
        - yes: snail
        - no: slug
  
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Possible experiences Observe plants and animals in different habitats throughout the year. 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. 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.

Plants can be sorted into many different groups. For example:



Key Vocabulary	
organisms	This is another word that can be used to mean 'living things'.
life processes	The things living things do to stay alive.
respiration	A process where plants and animals use oxygen gas from the air to help turn their food into energy.
sensitivity	The way living things react to changes in their environment .
reproduction	The process through which young are produced.
excretion	The process by which living things get rid of waste products.
nutrition	The process of obtaining food to provide living things with energy to live and stay healthy.
habitat	The specific area or place in which particular animals or plants may live.
environment	An environment contains many habitats and these include areas where there are both living and non-living things.
endangered species	A plant or animal where there are not many of their species left and scientists are concerned that the species may become extinct .
extinct	When a species has no more members alive on the planet, it is extinct .

Life Processes	
Life Processes:	To stay alive and healthy, all living things need certain conditions that let them carry out the seven life processes :
Movement	Growth
Respiration	Reproduction
Sensitivity	Excretion
	Nutrition



Changes to an **environment** can be natural or caused by humans. Changes to an **environment** can have positive as well as negative effects. Here are some examples of things that can change an **environment**.

Nature	<ul style="list-style-type: none"> • earthquakes • storms • floods • droughts • wildfires • the seasons 	Human-Made	<ul style="list-style-type: none"> • deforestation • pollution • urbanisation • the introduction of new animal or plant species to an environment • creating new nature reserves
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Plants and animals rely on the **environment** to give them everything they need. Therefore, when **habitats** change, it can be very dangerous to the plants and animals that live there.

Subject - Science

Topic name - Sound

Year group 4

Term - Spring

Prior Knowledge

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)

Key Vocabulary	
ear	An organ used for hearing.
particles	Solids, liquids and gases are made of particles . They are so small we are unable to see them.
distance	A measurement of length between two points.
soundproof	To prevent sound from passing.
absorb sound	To take in sound energy. Absorbent materials have the effect of muffling sound.
vacuum	A space where there is nothing. There are no particles in a vacuum.
eardrum	A part of the ear which is a thin, tough layer of tissue that is stretched out like a drum skin. It separates the outer ear from the middle and inner ear . Sound waves make the eardrum vibrate .

Key Vocabulary	
vibration	A movement backwards and forwards.
sound wave	Vibrations travelling from a sound source.
volume	The loudness of a sound.
amplitude	The size of a vibration . A larger amplitude = a louder sound.
pitch	How low or high a sound is.

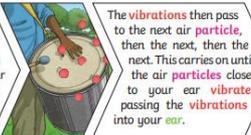
Skills to be taught

Asking relevant questions and using different types of scientific enquiries to answer them
 Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and dataloggers
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Key Knowledge

Sound can travel through solids, liquids and gases. Sound travels as a **wave**, **vibrating the particles** in the medium it is travelling in. Sound cannot travel through a **vacuum**.

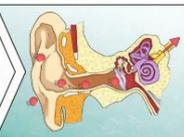
When you hit the drum, the drum skin **vibrates**. This makes the air **particles** closest to the drum start to **vibrate** as well.



The **vibrations** then pass to the next air **particle**, then the next, then the next. This carries on until the air **particles** closest to your ear **vibrate**, passing the **vibrations** into your **ear**.



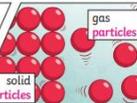
Inside your **ear**, the **vibrations** hit the eardrum and are then passed to the middle and then the inner **ear**. They are then changed into electrical signals and sent to your brain. Your brain tells you that you are hearing a sound.



If you throw a stone in a pond, it will produce ripples. As the ripples spread out across the pond, they become smaller. When sound **vibrations** spread out over a distance, the sound becomes quieter, just like ripples in a pond.



Sound energy can travel from **particle to particle** far easier in a solid because the **vibrating particles** are closer together than in other states of matter.



Key Knowledge

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.

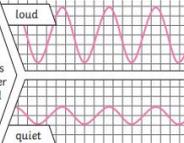
Pitch is the highness or lowness of a sound and is affected by features of objects producing the sounds. For example, smaller objects usually produce higher pitched sounds.

Key Knowledge

Sound is a type of energy. Sounds are created by **vibrations**. The louder the sound, the bigger the **vibration**.



The size of the **vibration** is called the **amplitude**. Louder sounds have a larger **amplitude**, and quieter sounds have a smaller **amplitude**.



Pitch is a measure of how high or low a sound is. A whistle being blown creates a high-pitched sound. A rumble of thunder is an example of a low-pitched sound.



You can change the **pitch** of a sound in different ways depending on the type of instrument you are playing.

For example, if you are playing a xylophone, striking the smaller bars with the beater causes faster **vibrations** and so a higher pitched note. Striking the larger bars causes slower **vibrations** and produces a lower note.



Possible experiences

- 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.

Subject - Science	Topic name - States of matter	Year group 4	Term - Summer
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Prior Knowledge

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)

Skills to be taught

Asking relevant questions and using different types of scientific enquiries to answer them
 Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and dataloggers
 Setting up simple practical enquiries, comparative and fair tests

Key Knowledge

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.

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°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°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.

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.

Key Vocabulary	
states of matter	Materials can be one of three states: solids, liquids or gases. Some materials can change from one state to another and back again.
solids	These are materials that keep their shape unless a force is applied to them. They can be hard, soft or even squashy. Solids take up the same amount of space no matter what has happened to them.
liquids	Liquids take the shape of their container. They can change shape but do not change the amount of space they take up. They can flow or be poured.
gases	Gases can spread out to completely fill the container or room they are in. They do not have any fixed shape but they do have a mass.
water vapour	This is water that takes the form of a gas. When water is boiled, it evaporates into a water vapour.

Pictures/maps/images

Key Knowledge		
There are three states of matter.		
Particles in a solid are close together and cannot move. They can only vibrate.	Particles in a liquid are close together but can move around each other easily.	Particles in a gas are spread out and can move around very quickly in all directions.

When water and other liquids reach a certain temperature, they change state into a **solid** or a **gas**. The temperatures that these changes happen at are called the boiling, **melting** or **freezing** point.

solid → **heat** → **liquid**

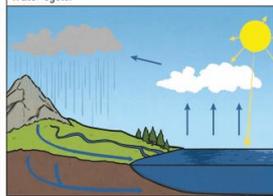
liquid → **cold** → **solid**

If a **solid** is heated to its **melting** point, it **melts** and changes to a **liquid**. This is because the particles start to move faster and faster until they are able to move over and around each other.

When **freezing** occurs, the particles in the **liquid** begin to slow down as they get colder and colder. They can then only move gently on the spot, giving them a **solid** structure.

Key Vocabulary		Evaporation	Condensation
melt	This is when a solid changes to a liquid .	Evaporation occurs when water turns into water vapour . This happens very quickly when the water is hot, like in a kettle, but it can also happen slowly, like a puddle evaporating in the warm air.	Condensation is when water vapour is cooled down and turns into water. You can see this when droplets of water form on a window. The water vapour in the air cools when it touches the cold surface.
freeze	Liquid turns to a solid during the freezing process.		
evaporate	Turn a liquid into a gas .		
condense	Turn a gas into a liquid .		
precipitation	Liquid or solid particles that fall from a cloud as rain, sleet, hail or snow.		

Condensation and evaporation occur within the water cycle.



- Water from lakes, puddles, rivers and seas is evaporated by the sun's heat, turning it into **water vapour**.
- This **water vapour** rises, then cools down to form water droplets in clouds (**condensation**).
- When the droplets get too heavy, they fall back to the earth as rain, sleet, hail or snow (**precipitation**).



Possible experiences

Observe closely and classify a range of solids. Observe closely and classify a range of 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. 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. Observe the changes when making rocky road cakes or ice-cream 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.