

Year 4 Knowledge Organisers

Science

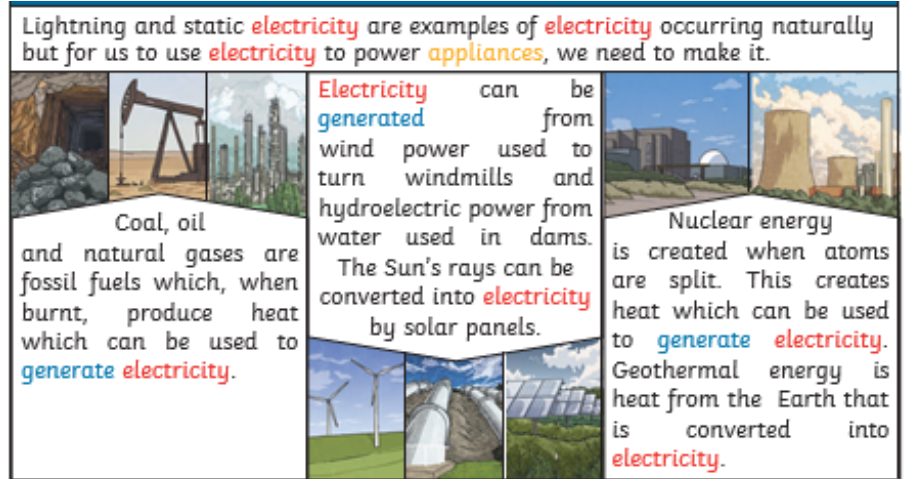
Year 4

Electricity

Key vocabulary

electricity	The flow of an electric current or charge through a material, e.g. from a power source through wires to an appliance.
generate	To make or produce.
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.
appliances	A piece of equipment or 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.
electricity	The flow of an electric current or charge through a material, e.g. from a power source through wires to an appliance.

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

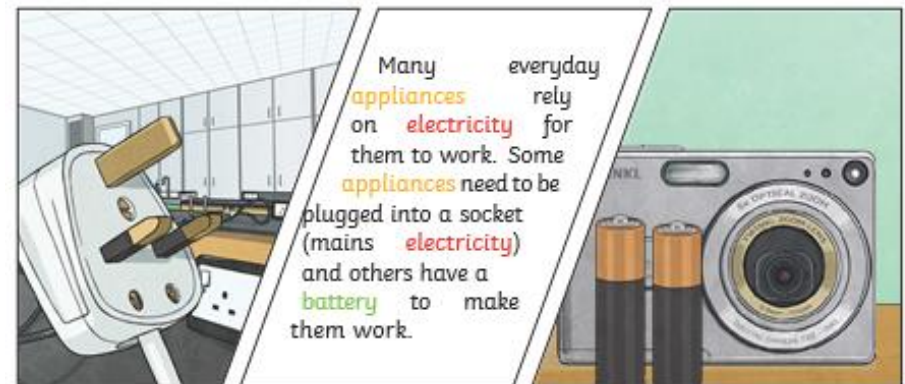


Electricity can be **generated** from wind power used to turn windmills and hydroelectric power from water used in dams.

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

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**.



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

Year 4

Electricity

Key vocabulary

circuit

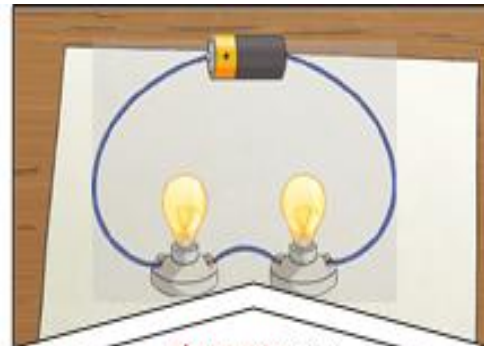
A pathway that electricity can flow around. It includes wires and a power supply and may include bulbs, switches or buzzers.

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.



Battery electricity: batteries store chemicals which produce an electric current. Eventually, even rechargeable batteries will stop producing an electric current.

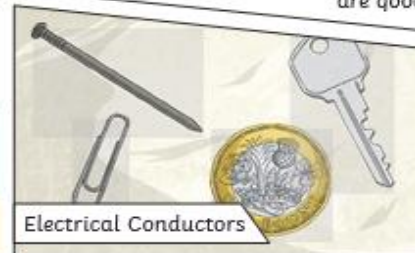


Electricity can only flow around a complete circuit that has no gaps. There must be wires connected to both the positive and negative end of the power supply/battery.

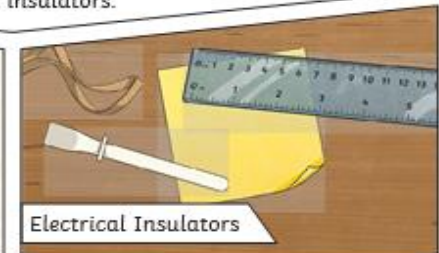
Switches can be used to open or close the circuit. When off, a switch 'breaks' the circuit to stop the flow of electrons. When the switch is on, the circuit is complete and the electrons are able to flow around the circuit.



A conductor of electricity is a material that is made up of free electrons which can be made to move in one direction, creating an electric current. Metals are good conductors. Electrical insulators have no free electrons and so no electric current can be made. Wood, plastic and glass are good insulators.



Electrical Conductors



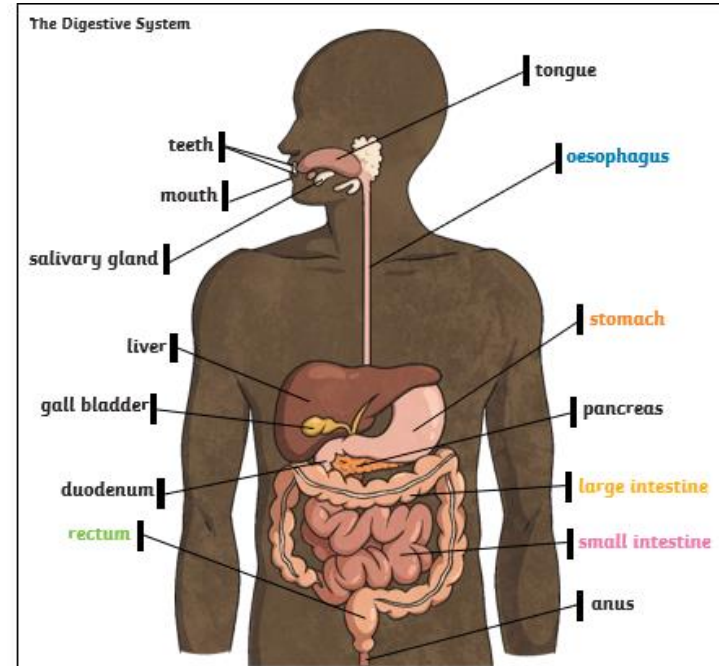
Electrical Insulators

Year 4

Animals Including Humans

Key vocabulary

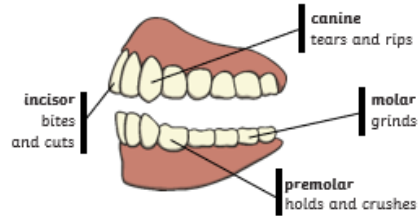
Digest	Break down food so it can be used by the body.
Oesophagus	A muscular tube which moves food from the mouth to the stomach.
Stomach	An organ in the digestive system where food is broken down with stomach acid and by being churned around.
Small intestine	Part of the intestine where nutrients are 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.
Salivary gland	Can be found in the mouth and helps to break down the food.



Year 4

Animals Including Humans

Human Teeth and Their Functions



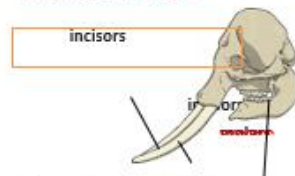
Some people have wisdom teeth but they have no function now.

To help prevent tooth decay:

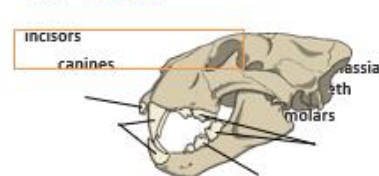
- limit sugary food and drink;
- brush teeth twice daily using a fluoride toothpaste;
- visit your dentist regularly.

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:

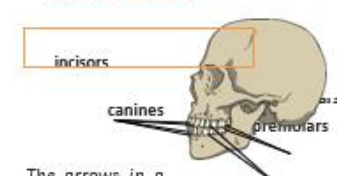
Elephant - herbivore



Lion - carnivore

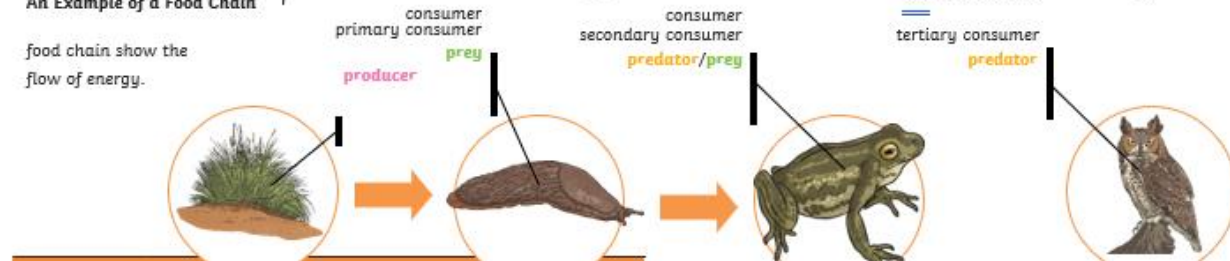


Human - omnivore



An Example of a Food Chain

food chain show the flow of energy.



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.

Year 4

Living things and their habitats

Life Processes

To stay alive and healthy, all living things need certain conditions that let them carry out the seven **life processes**:

Movement **G**rowth
Respiration **R**eproduction
Sensitivity **E**xcretion
 Nutrition

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	Food which provides 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 .

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**.

Natural

- earthquakes
- storms
- floods
- droughts
- wildfires
- the seasons

Human-Made

- deforestation
- pollution
- urbanisation
- the introduction of new animal or plant species to an environment
- wildfires

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.

Year 4

Living things and their habitats

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.

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



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

vertebrates

mammals fish birds reptiles amphibians

invertebrates

insects spiders worms slugs and snails

Vertebrates can be separated into five broad groups.

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

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**.

Invertebrate Classification Key

```

graph TD
    Q1{Does it have legs?} -- yes --> Q2{How many legs does it have?}
    Q1 -- no --> Q3{Does it have a segmented body?}
    
    Q2 -- many legs --> W{Does it have an oval body?}
    W -- yes --> WL[woodlouse]
    W -- no --> S{Does it have very short legs?}
    S -- yes --> M[millipede]
    S -- no --> C[centipede]
    
    Q2 -- 8 legs --> Q4{Does it have a two part body?}
    Q4 -- yes --> SP[spider]
    Q4 -- no --> H[harvestman]
    
    Q2 -- 6 legs --> Q5{Does it have wing cases?}
    Q5 -- yes --> E[earwig]
    Q5 -- no --> Q6{Does it have pincers on its tail?}
    Q6 -- yes --> BE[beetle]
    Q6 -- no --> Q7{Does it have a long, thin body?}
    Q7 -- yes --> CA[caterpillar]
    Q7 -- no --> AN[ant]
    
    Q3 -- yes --> Q8{Does it have a long, thin body?}
    Q8 -- yes --> EW[earthworm]
    Q8 -- no --> L[larvae]
    
    Q3 -- no --> Q9{Does it have a shell?}
    Q9 -- yes --> SN[snail]
    Q9 -- no --> SL[slug]
    
```

Year 4

Sound

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.

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



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.



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

loud

quiet

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.

Faster vibrations - higher pitch

slower vibrations - lower pitch

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.

Year 4

Sound

Key vocabulary

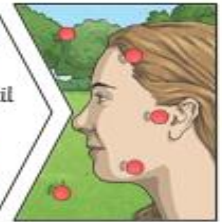
ear	An organ used for hearing.
particles	Solids, liquids and gases are made of particles. They are so small we are unable to see them.
distance	A measurement of length between two points.
soundproof	To prevent sound from passing.
absorb sound	To take in sound energy. Absorbent materials have the effect 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.

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.

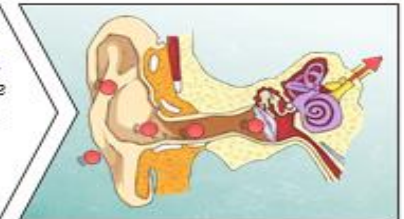
When you hit the drum, the drum skin **vibrates**. This makes the air **particles** closest to the drum start to **vibrate** as well.



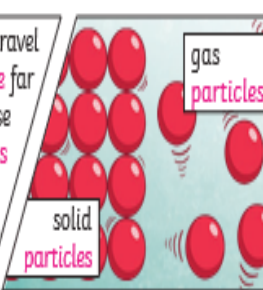
The **vibrations** then pass to the next air **particle**, then the next, then the next. This carries on until the air **particles** closest to your ear **vibrate**, passing the **vibrations** into your **ear**.



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.



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.




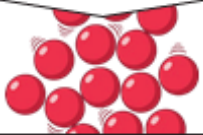
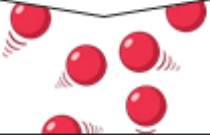
If you throw a stone in a pond, it will produce ripples. As the ripples spread out across the pond, they become smaller. When sound **vibrations** spread out over a **distance**, the sound becomes quieter, just like ripples in a pond.

Year 4

States of Matter


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.

There are three states of matter.


Solid	Liquid	Gas
		
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

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.

liquid



cold →



solid

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.


Year 4

States of Matter

Key vocabulary


melt	This is when a solid changes to a liquid.
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.

Evaporation



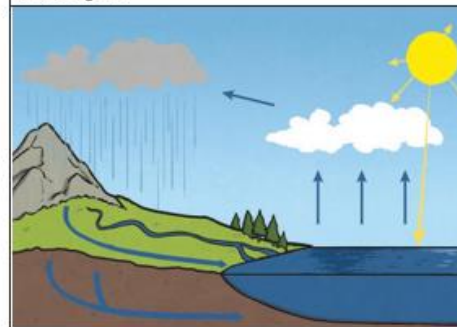
Evaporation occurs when water turns into **water vapour**. This happens very quickly when the water is hot, like in a kettle, but it can also happen slowly, like a puddle evaporating in the warm air.

Condensation



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.

Condensation and evaporation occur within the water cycle.



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