Year 1 Science Knowledge Organiser
Biology – Seasonal Changes

What should I already know?

- There are times when it is hot outside and there are times when it is cold outside.
- The **months** of the **year.**

What should I already know?

- There are times when it is hot outside and there are times when it is cold outside.
- The **months** of the **year.**
- What happens in **autumn** and **winter** (key events, what people do, what people wear)
- What the **weather** is like in **autumn** and **winter.**
- In **autumn** and **winter,** the days become shorter, and the nights become longer.

Key Vocabulary	
seasons	There are four seasons each year, autumn, winter, spring and summer.
autumn	In autumn, the weather begins to get colder. The leaves start to fall from the trees. The amount of daylight becomes less. This means the daytimes are shorter and the night times are longer.
winter	In winter, the weather is much colder. Sometimes it is cold enough to freeze, leaving frost and ice on the ground. It sometimes snows. Many trees have bare branches as all their leaves have fallen off. The daytimes are the shortest in the year and the night times are the longest.
weather	The weather includes the temperature outside, the wind direction and strength, as well as rain, cloud, snow and sun.
daylight	Daylight is when it is light outside. The amount of daylight changes with each season.

autumn

winter

The Four Seasons

autumn	winter
September	December
October	January
November	February
spring	**summer**
March	June
April	July
May	August

Daylight hours each month:

Month	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug
Hours of Daylight	13	11	9	8	8	10	12	14	15	16	16	14

Key Vocabulary	
seasons	There are four seasons each year, autumn, winter, spring and summer.
spring	In spring, the weather starts to get warmer. The leaves begin to grow on the trees and some trees may blossom (have flowers). Plants begin to grow and you may see baby animals like lambs around. The daytimes start to get longer.
summer	In summer, the weather gets hotter. The daytime is long and the nights are short. Summer has the longest days. The trees are full of leaves and there are lots of flowers, bees, butterflies and other insects.
weather	The weather includes the temperature outside, the wind direction and strength, as well as rain, cloud, snow and sun.
daylight	Daylight is when it is light outside. The amount of daylight changes with each season.

spring

summer

The Four Seasons

autumn	winter
September	December
October	January
November	February

spring	summer
March	June
April	July
May	August

Daylight hours each month:

Month	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug
Hours of Daylight	13	11	9	8	8	10	12	14	15	16	16	14

Year 2 Science Knowledge Organiser
Biology – Living Things and Their Habitats

What should I already know?

- Which things are living, dead and things which have never been alive.
- The names of some common **plants** and types of **trees**..
- Some animals are suitable to be kept as pets but others are not.
- All animals need water, air and food to **survive**
- Animals can be grouped into **vertebrates** and **invertebrates**
- Animals can be grouped into **carnivores, herbivores** and **omnivores**
- Animals, including humans, have **offspring** which grow into adults.
- Different **vegetation** belts and **biomes** around the world.

Key Vocabulary	
life processes	These are the things that all living things do. They move, breathe, sense, grow, make babies, get rid of waste and get their energy from food.
living	Things that are living have all the life processes.
dead	Things that are dead were once living. They did have all the life processes but don't now.
never living	Things made out of metal, plastic or rock were never living. They never had the life processes.
food chain	A food chain shows how each animal gets its food. Food chains are one of the ways that living things depend on each other to stay alive.
food sources	This is the place a living thing's food comes from.

Key Knowledge


living


dead


never living

Food chains. The arrows mean 'is eaten by'.

Key Vocabulary	
habitat	A habitat is the natural place something lives. A habitat provides living things with everything they need to **survive** such as food, shelter and water.
microhabitat	A microhabitat is a very small habitat in places like under a rock, under leaves or on a branch. Minibeasts live in microhabitats. The microhabitats have everything they need to **survive**.
depend	Many living things in a habitat depend on each other. This means they need each other for different things.
survive	This means to stay alive.

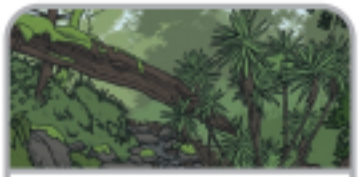
Key Knowledge

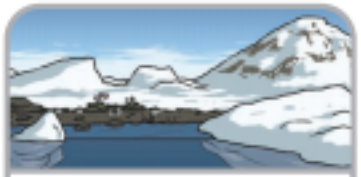
Examples of habitats:


woodland


urban


coastal


rainforest


arctic


desert


ocean


river


mountain

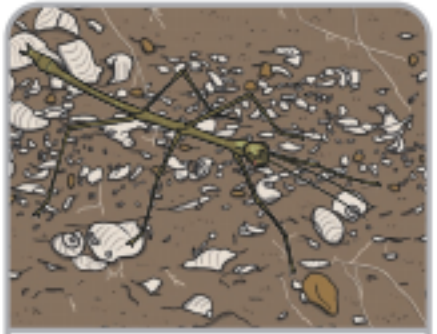
Examples of microhabitats:


short grass


flowers


inside rotting wood


under leaves


in and on soil

Year 3 Science Knowledge Organiser
Physics – Light

What should I already know?

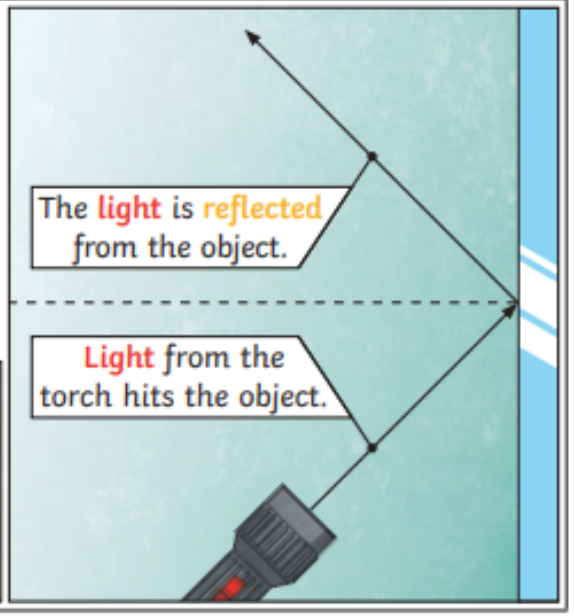
- Certain things produce **light**, usually by burning (e.g. the Sun) or **electricity** (e.g. street **lights**)
- Shiny materials do not make **light** but do reflect it.
- **Shadows** are caused when certain materials block **light**.

Key Vocabulary

light	A form of energy that travels in a wave from a source.
light source	An object that makes its own light.
dark	Dark is the absence of light.
reflection	The process where light hits the surface of an object and bounces back into our eyes.
reflect	To bounce off.
reflective	A word to describe something which reflects light well.
ray	Waves of light are called light rays. They can also be called beams.

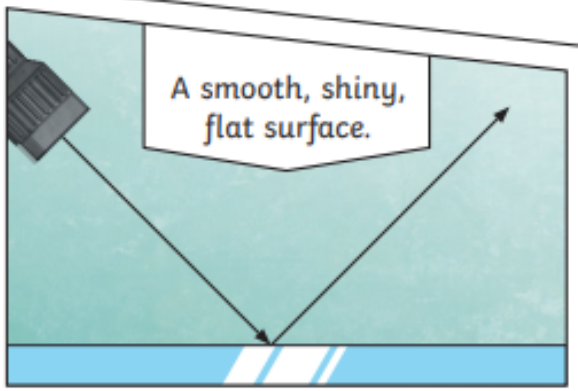
Key Knowledge

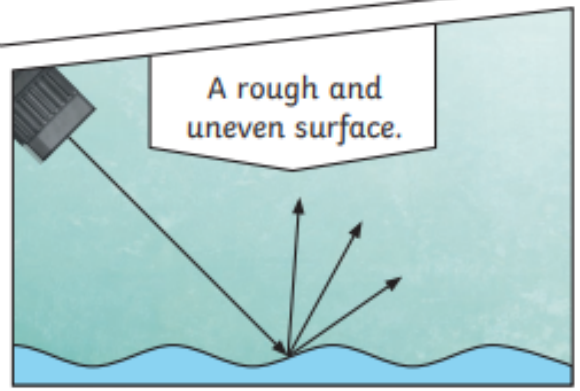
We need light to be able to see things. Light travels in a straight line. When light hits an object, it is reflected (bounces off). If the reflected light hits our eyes, we can see the object. Some surfaces and materials reflect light well. Other materials do not reflect light well. Reflective surfaces and materials can be very useful...



Mirrors reflect light very well, so they create a clear image. An image in a mirror appears to be reversed. For example, if you look in a mirror and raise your right hand, the mirror image appears to raise its left hand.

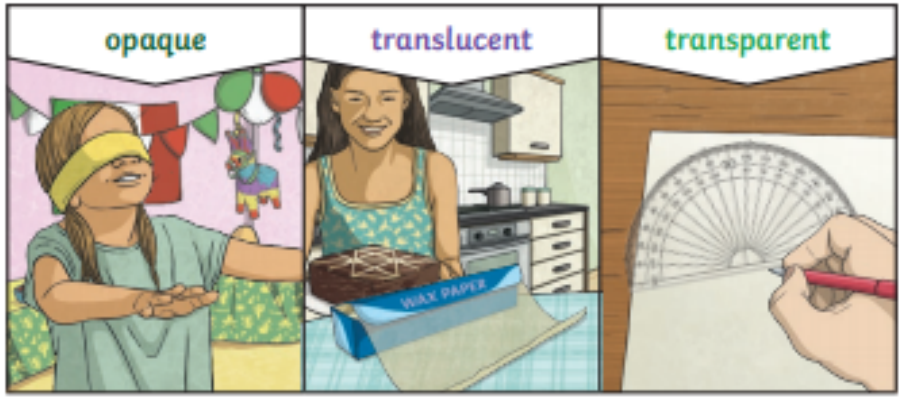
The surfaces that reflect light best are smooth, shiny and flat.



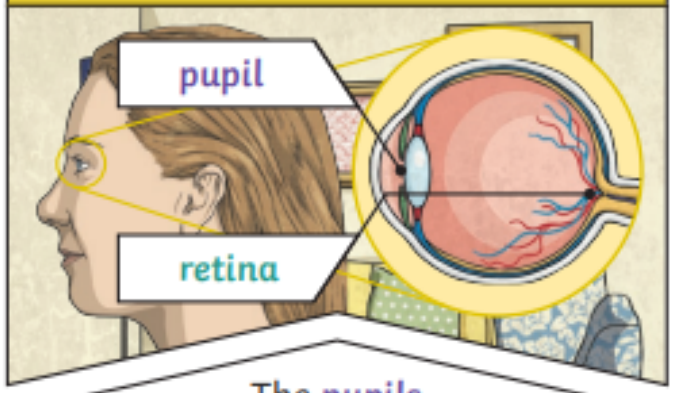


Key Vocabulary

pupil	The black part of the eye which lets light in.
retina	A layer at the very back of the eye. The retina takes the light the eye receives. It then changes it into nerve signals to send to the brain.
shadow	An area of darkness where light has been blocked.
opaque	Describes objects that do not let any light pass through them.
translucent	Describes objects that let some light through, but scatter the light so we can't see through them properly.
transparent	Describes objects that let light travel through them easily, meaning that you can see through the object.

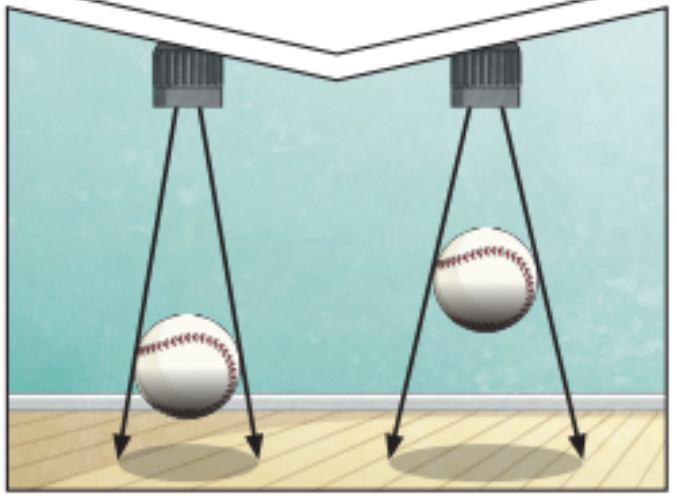


Key Knowledge



The **pupils** control the amount of light entering the eyes. If too much light enters, then it can damage the retina. To help protect the eyes, you can wear a hat with a wide brim and sunglasses with a UV rating.

A **shadow** is caused when light is blocked by an **opaque** object. A **shadow** is larger when an object is closer to the light source. This is because it blocks more of the light.



When the light source is directly above the object, the **shadow** will be directly underneath.

When a light source is to one side of an object, the **shadow** will appear on the opposite side. The **shadow** will also be longer.

Year 4 Science Knowledge Organiser
Physics – Sound

What should I already know?

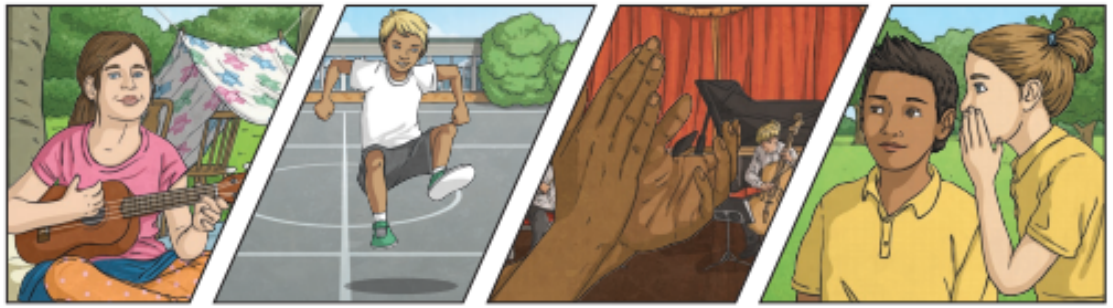
- Hearing is one of my five senses.
- Sounds can be combined using musical instruments.
- What the word **vibration** means.

Key Vocabulary

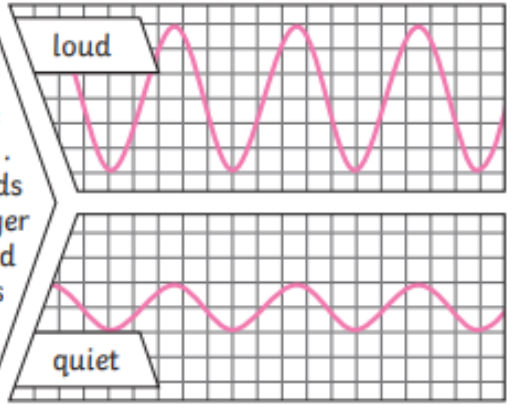
vibration	A movement backwards and forwards.
sound wave	Vibrations travelling from a sound source.
volume	The loudness of a sound.
amplitude	The size of a vibration. A larger amplitude = a louder sound.
pitch	How low or high a sound is.

Key Knowledge

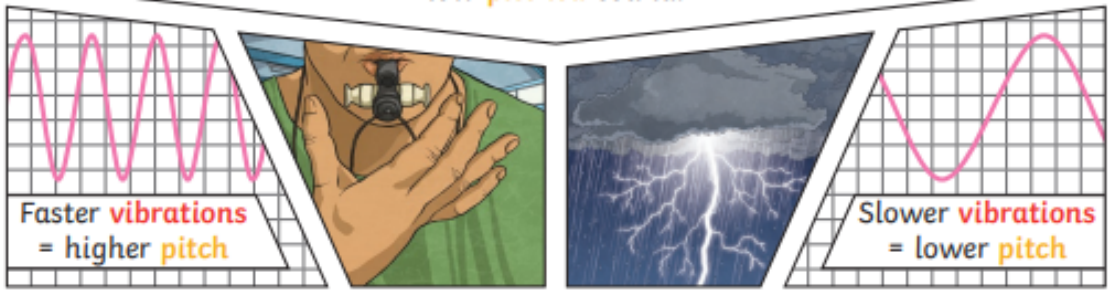
Sound is a type of energy. Sounds are created by vibrations. The louder the sound, the bigger the vibration.



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.

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.

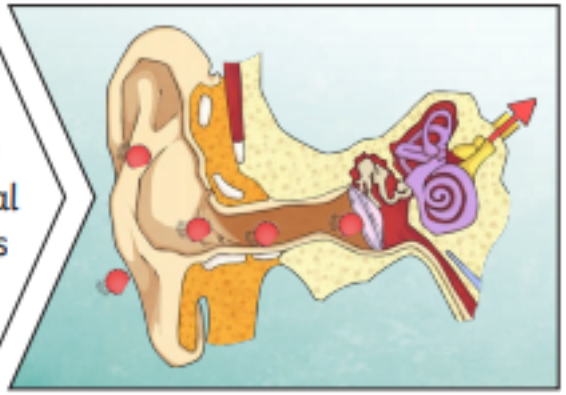
Key Knowledge

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.

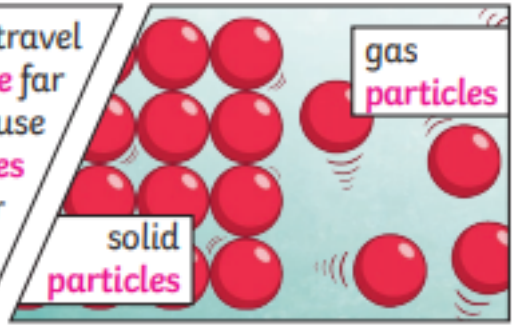
When you hit the drum, the drum skin vibrates. This makes the air particles closest to the drum start to vibrate as well.

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.

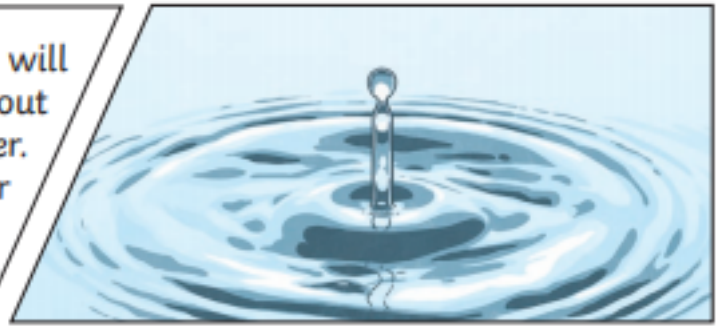
Inside your ear, the vibrations hit the eardrum and are then passed to the middle and then the inner ear. They are then changed into electrical signals and sent to your brain. Your brain tells you that you are hearing a sound.



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 Science Knowledge Organiser
Physics – Electricity

What should I already know?
• **Electricity** is a form of **energy** that can be carried by wires and is used for heating and lighting, and to provide **power** for **devices**. • **Sources** of light and sound may need **electricity** to work.

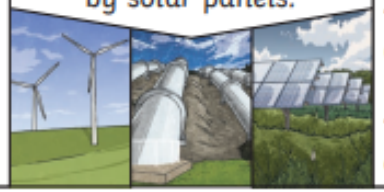
Key Vocabulary	
electricity	The flow of an electric current or charge through a material, e.g. from a power source through wires to an appliance.
generate	To make or produce.
renewable	A source of electricity that will not run out. These include solar, nuclear, geothermal, hydro and wind.
non-renewable	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.

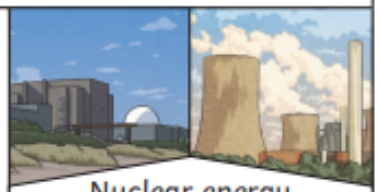
Key Knowledge

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

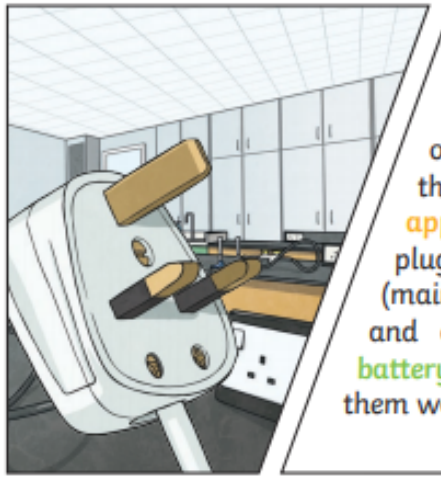
Coal, oil and natural gases are fossil fuels which, when burnt, produce heat which can be used to generate electricity.

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.

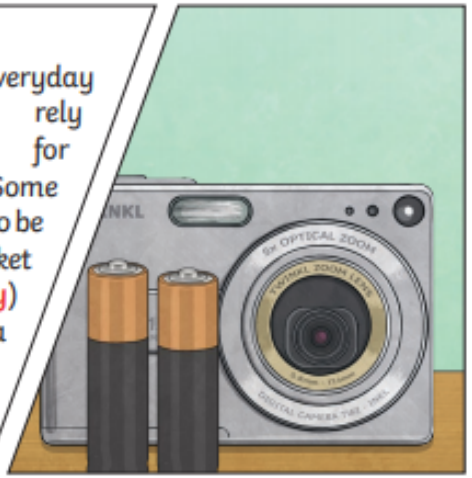




Nuclear energy is created when atoms are split. This creates heat which can be used to generate electricity. Geothermal energy is heat from the Earth that is converted into electricity.



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.

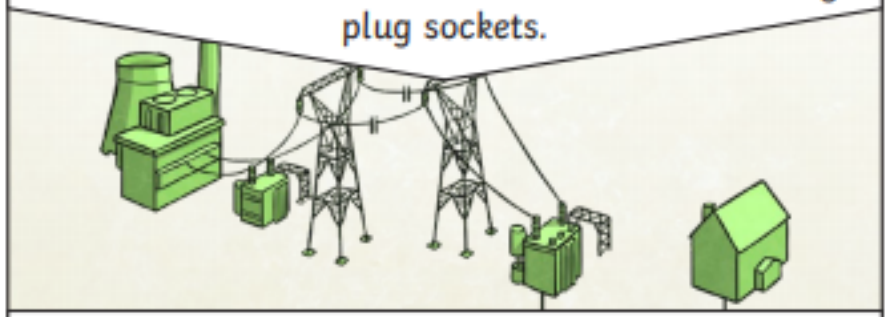


Key Vocabulary

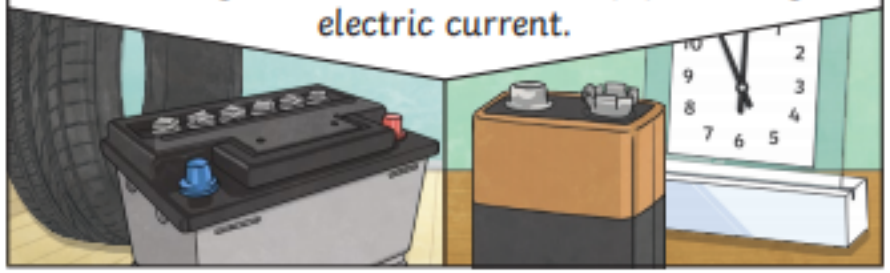
circuit	A pathway that **electricity** can flow around. It includes wires and a power supply and may include bulbs, switches or buzzers.
electrons	Small particles with an electric charge.

There are two types of electric current.

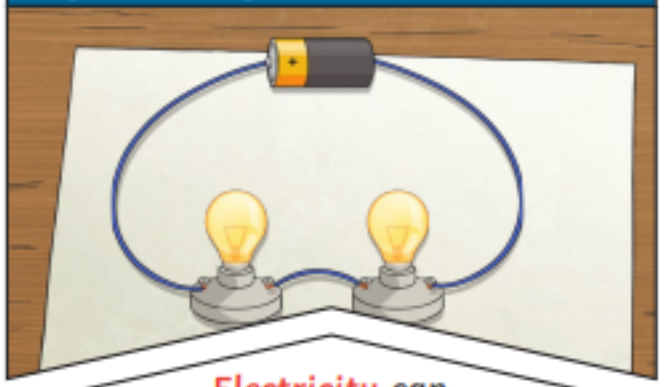
Mains **electricity**: power stations send an electric charge through wires to transformers and pylons. Then, underground wires carry the electricity into our homes via wires in the walls and out through plug sockets.



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



Key Knowledge

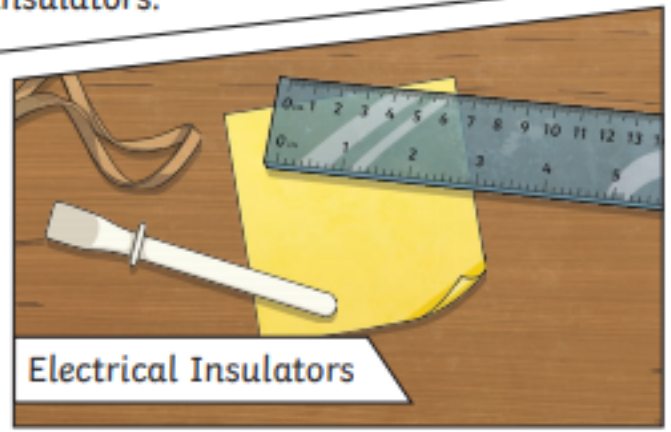


Electricity can only flow around a complete **circuit** that has no gaps. There must be wires connected to both the positive and negative end of the power supply/**battery**.

Switches can be used to open or close 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 5 Science Knowledge Organiser
Physics – Earth and Space

What should I already know?

- We have four seasons (autumn, winter, spring and summer).
- The Sun is a source of light but the Moon is not.
- Know that a **shadow** is caused when an object blocks light from passing through it.
- To know the history of space travel.
- The properties of a **sphere**.

Key Vocabulary

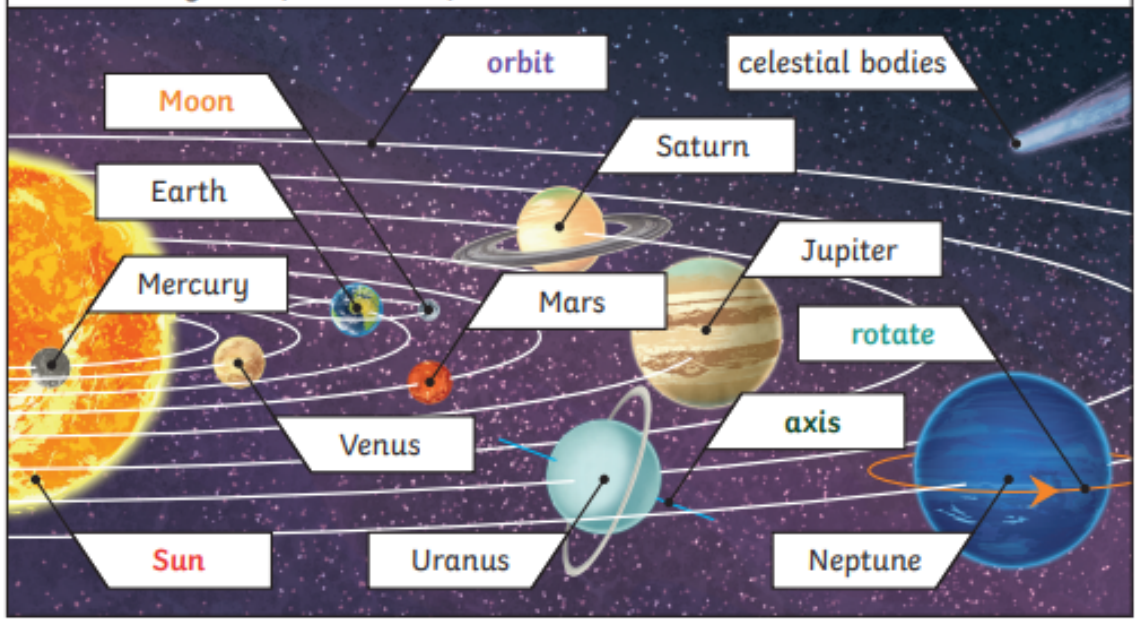
Sun	A huge star that Earth and the other planets in our solar system orbit around.
star	A giant ball of gas held together by its own gravity.
moon	A natural satellite which orbits Earth or other planets.
planet	A large object, round or nearly round, that orbits a star.
sphere	A round 3D shape in the shape of a ball.
spherical bodies	Astronomical objects shapes like spheres.
satellite	Any object or body in space that orbits something else, for example: the Moon is a satellite of Earth.

Pluto used to be considered a planet but was reclassified as a dwarf planet in 2006.

Key Knowledge

Mercury, Venus, Earth and Mars are rocky planets. They are mostly made up of metal and rock. Jupiter, Saturn, Uranus and Neptune are mostly made up of gases (helium and hydrogen) although they do have cores made up of rock and metal.

Our Solar System (not to scale)

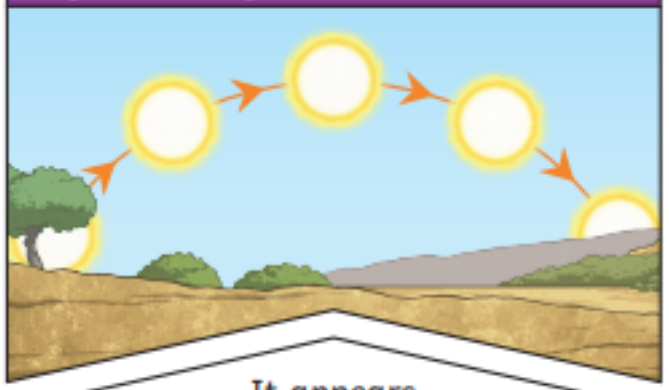


The Moon orbits Earth in an oval-shaped path while spinning on its **axis**. At various times in a month, the Moon appears to be different shapes. This is because as the Moon rotates round Earth, the Sun lights up different parts of it.

Key Vocabulary

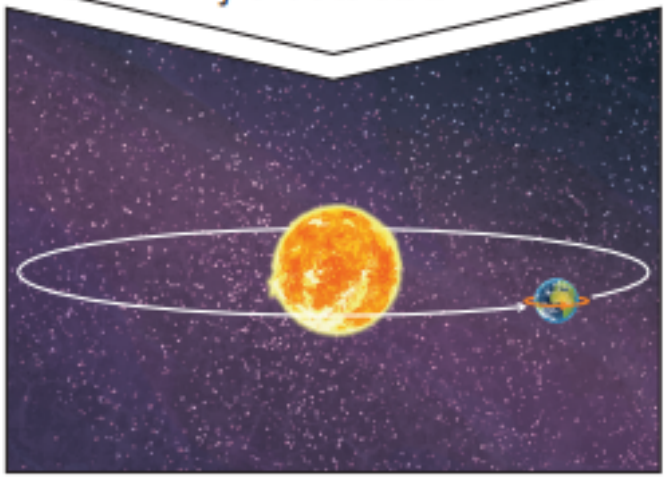
orbit	To move in a regular, repeating curved path around another object.
rotate	To spin. E.g. Earth rotates on its own **axis**.
axis	An imaginary line that a body rotates around. E.g. Earth's **axis** (imaginary line) runs from the North Pole to the South Pole.
geocentric model	A belief people used to have that other planets and the Sun orbited around Earth.
heliocentric model	The structure of the Solar System where the planets orbit around the Sun.
astronomer	Someone who studies or is an expert in astronomy (space science).

Key Knowledge



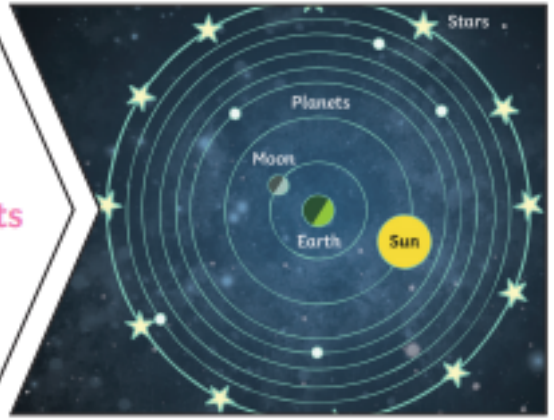
It appears to us that the Sun moves across the sky during the day but the Sun does not move at all. It seems to us that the Sun moves because of the movements of Earth.

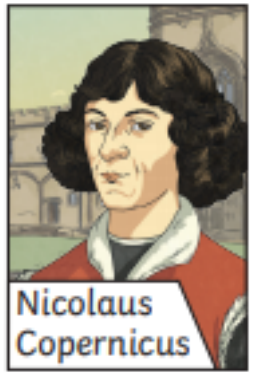
Earth rotates (spins) on its **axis**. It does a full rotation once in every 24 hours. At the same time that Earth is rotating, it is also orbiting (revolving) around the Sun. It takes a little more than 365 days to orbit the Sun. Daytime occurs when the side of Earth is facing towards the Sun. Night occurs when the side of Earth is facing away from the Sun.



Geocentric model

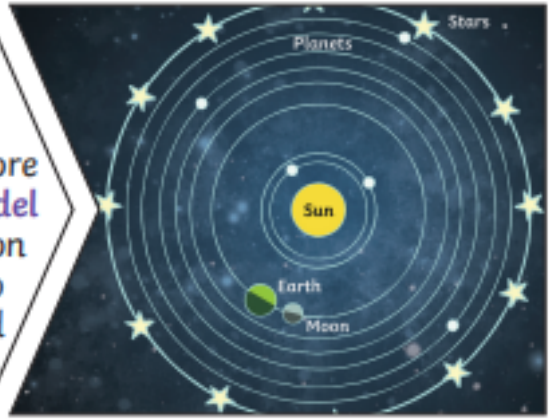
Years ago people believed that planets moved around the Earth.





Nicolaus Copernicus

The work and ideas of many astronomers (such as Copernicus and Kepler) combined over many years before the idea of the heliocentric model was developed. Galileo's work on gravity allowed astronomers to understand how planets stayed in orbit.



Year 6 Science Knowledge Organiser
Physics – Light

What should I already know?

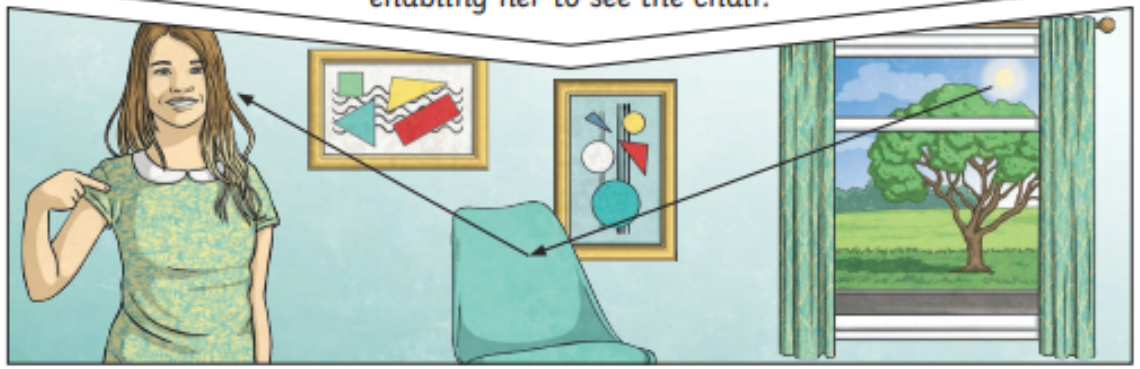
- Certain things produce **light**, usually by burning (e.g. the Sun) or **electricity** (e.g. street **lights**)
- Shiny materials do not make **light** but do reflect it.
- **Shadows** are caused when certain materials block **light.**
- **Light** travels in straight lines. When **light** is blocked by an **opaque** object, a **dark shadow** is formed.
- The further away the **light source** is, the smaller the **shadow** is. The closer the **source** of the light, the bigger the shadow.

Key Vocabulary	
light	A form of energy that travels in a wave from a source.
light source	An object that makes its own light.
reflection	Reflection is when light bounces off a surface, changing the direction of a ray of light.
incident ray	A ray of light that hits a surface.
reflected ray	A ray of light that has bounced back after hitting a surface.
the law of reflection	The law states that the angle of the incident ray is equal to the angle of the reflected ray.

Key Knowledge

We need light to be able to see things. Light waves travel out from sources of light in straight lines. These lines are often called rays or beams of light.

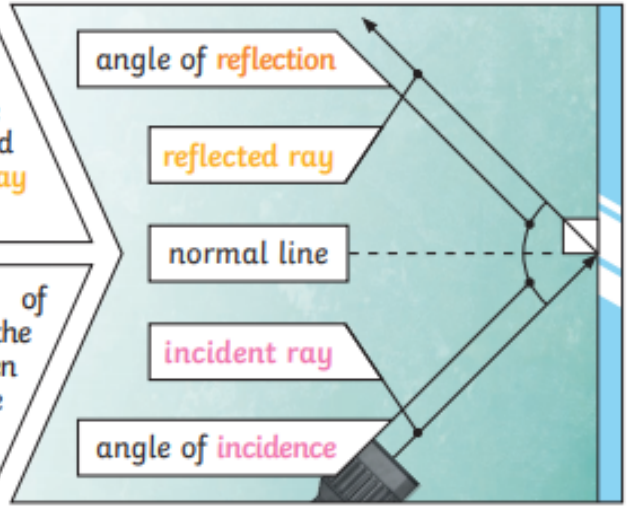
Light from the sun travels in a straight line and hits the chair. The light ray is then reflected off the chair and travels in a straight line to the girl's eye, enabling her to see the chair.



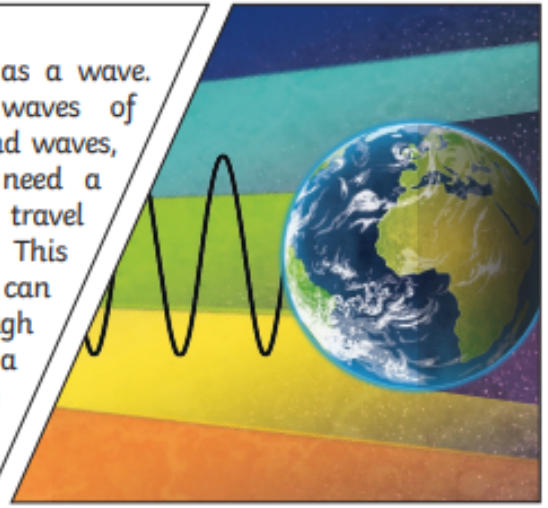
The law of reflection states that the angle of incidence is equal to the angle of reflection. Whenever light is reflected from a surface, it obeys this law.

The angle of reflection is the angle between the normal line and the reflected ray light.

The angle of incidence is the angle between the normal line and the incident ray of light.



Light travels as a wave. But unlike waves of water or sound waves, it does not need a medium to travel through. This means light can travel through a vacuum - a completely airless space.

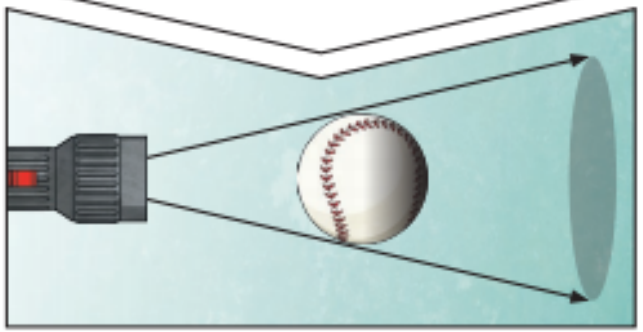


Key Vocabulary	
refraction	This is when light bends as it passes from one medium to another. E.g. Light bends when it moves from air into water.
visible spectrum	Light that is visible to the human eye. It is made up of a colour spectrum.
prism	A prism is a solid 3D shape with flat sides. The two ends are an equal shape and size. A **transparent** prism separates out visible light into all the colours of the spectrum.
shadow	An area of darkness where light has been blocked.
transparent	Describes objects that let light travel through them easily, meaning you can see through the object.
translucent	Describes objects that things let some light through, but scatters the light so we can't see through them properly.
opaque	Describes objects that do not let any light pass through them.

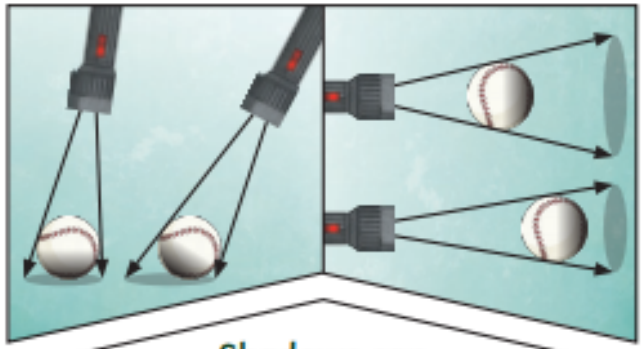
Key Knowledge

The spoon in this water looks as if it is bent. This is because light bends when it moves from air to water. When light bends in this way, it is called refraction.

A **shadow** is always the same shape as the object that casts it. This is because when an opaque object is in the path of light travelling from a light source, it will block the light rays that hit it, while the rest of the light can continue travelling.



Isaac Newton shone a light through a transparent prism, separating out light into the colours of the rainbow (red, orange, yellow, green, blue, indigo and violet) - the colours of the spectrum. All the colours together merge and make visible light.



Shadows can also be elongated or shortened depending on the angle of the light source. A **shadow** is also larger when the object is closer to the light source. This is because it blocks more of the light.

Year 6 Science Knowledge Organiser
Physics – Electricity

What should I already know?

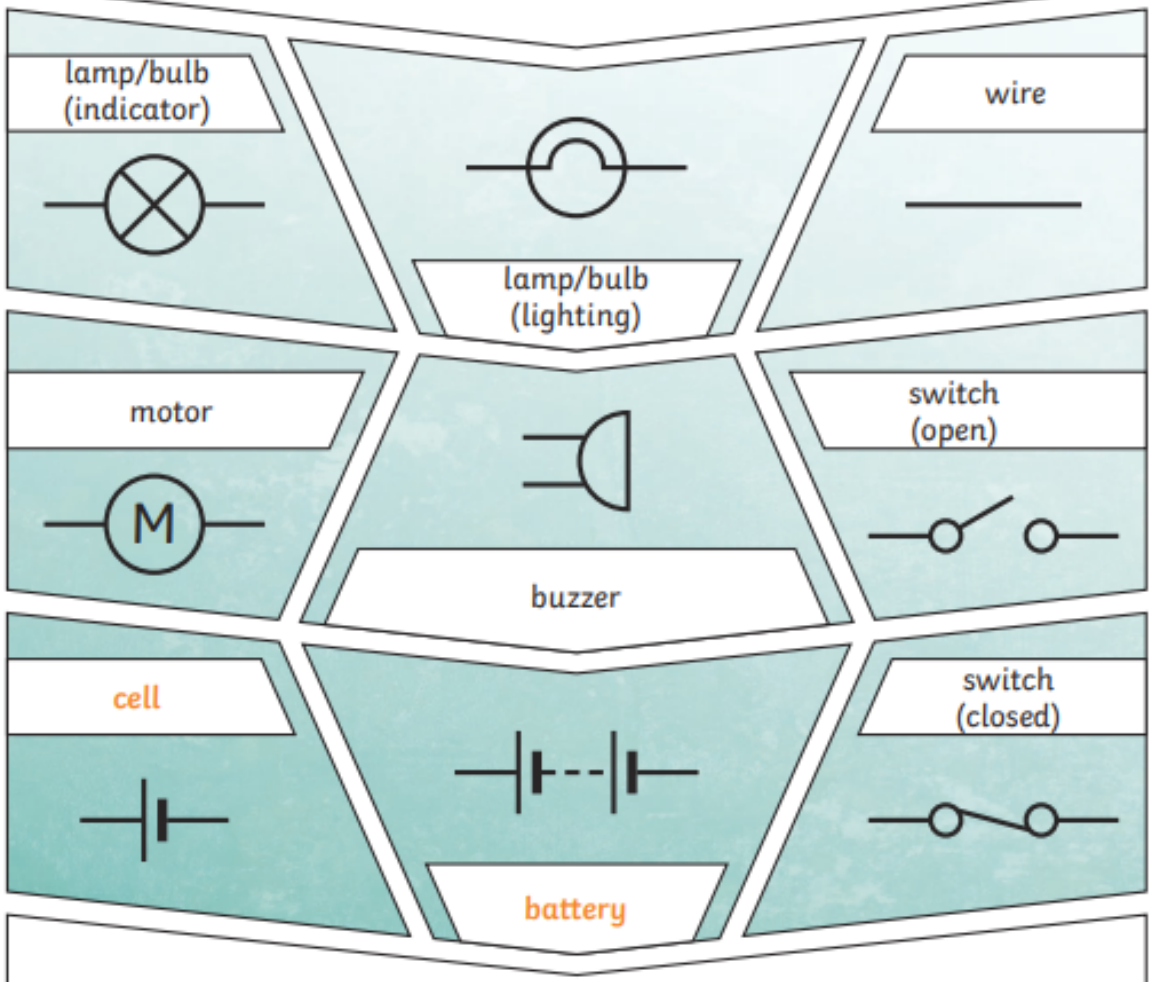
- **Electricity** is a form of **energy** that can be carried by wires and is used for heating and lighting, and to provide **power** for **devices**.
- **Sources** of light and sound may need **electricity** to work.
- Where **electricity** comes from
- Which **appliances** need **electricity**
- What a **circuit** is, the **components** of a circuit and how it works.
- What **electrical conductors** and **insulators** are.
- What happens when a **switch** is added to a circuit.
- What **forces** and **resistance** are.

Key Vocabulary

circuit	A path that an electrical current can flow around.
symbol	A visual picture that stands for something else.
cell/battery	A device that stores energy as a chemical until it is needed. A cell is a single unit. A battery is a collection of cells.
current	The flow of electrons, measured in amps.
amps	How electric current is measured.
voltage	The force that makes the electric current move through the wires. The greater the voltage, the more current will flow.
resistance	The difficulty that the electric current has when flowing around a circuit.
electrons	Very small particles that travel around an electrical circuit.

Key Knowledge

Components of a Circuit and Their Symbols

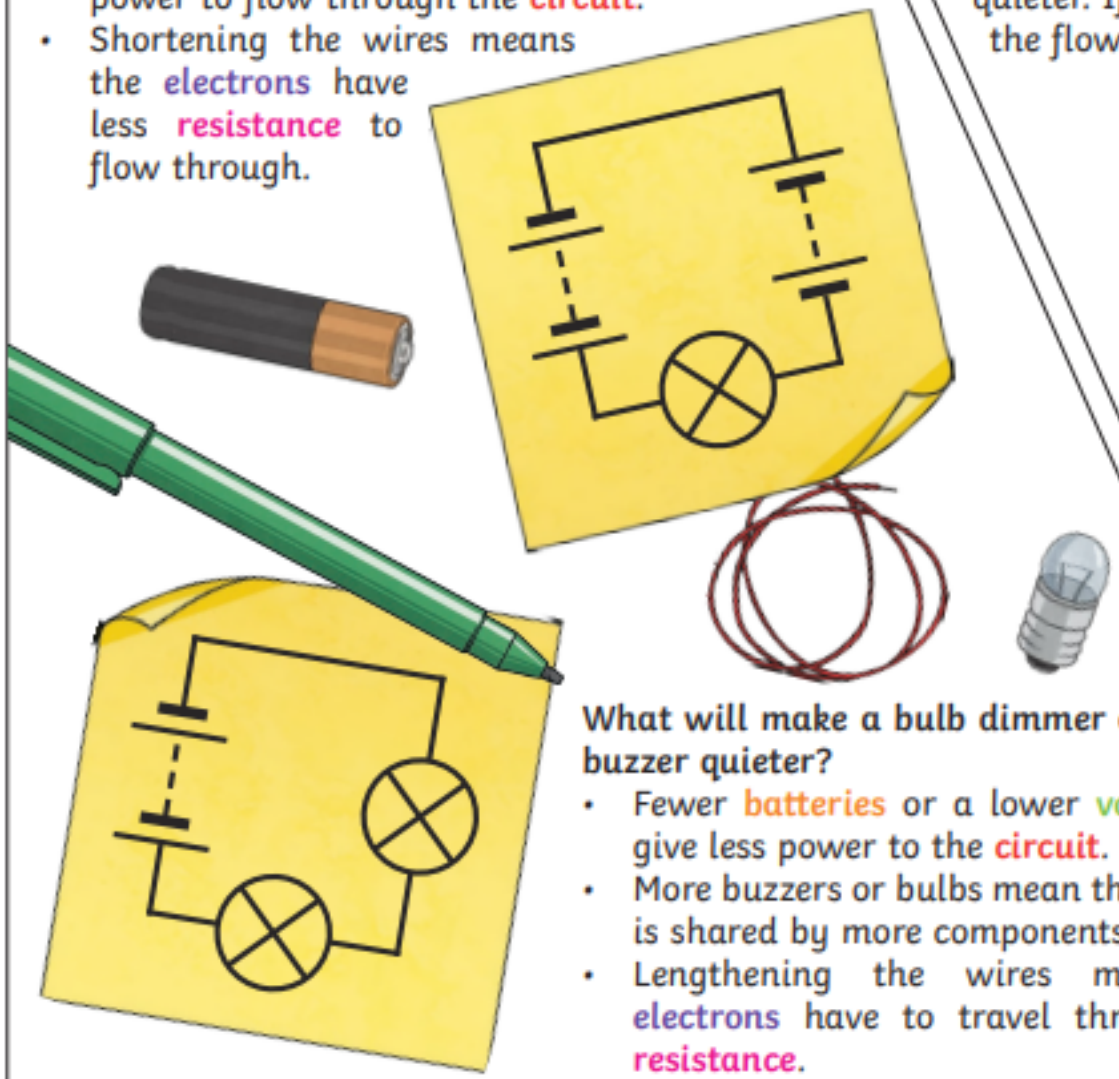


These symbols can be used to create electrical circuit diagrams.

Key Knowledge

What will make a bulb brighter or a buzzer louder?

- More batteries or a higher voltage create more power to flow through the circuit.
- Shortening the wires means the electrons have less resistance to flow through.



What will make a bulb dimmer or a buzzer quieter?

- Fewer batteries or a lower voltage give less power to the circuit.
- More buzzers or bulbs mean the power is shared by more components.
- Lengthening the wires means the electrons have to travel through more resistance.

Series Circuit

A circuit that has only one route for the current to take. If more bulbs or buzzers are added, the power has to be shared and so they will be dimmer or quieter. If just one part of this series circuit breaks, the circuit is broken and the flow of current stops.