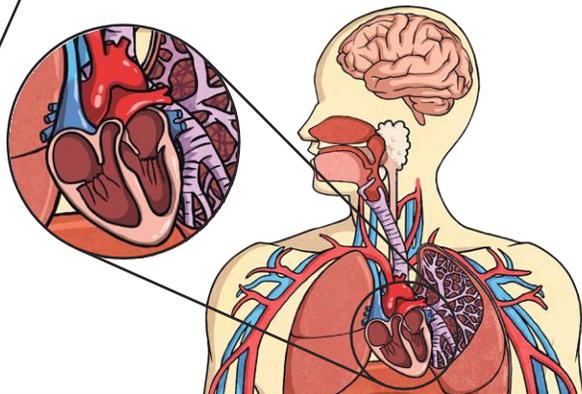


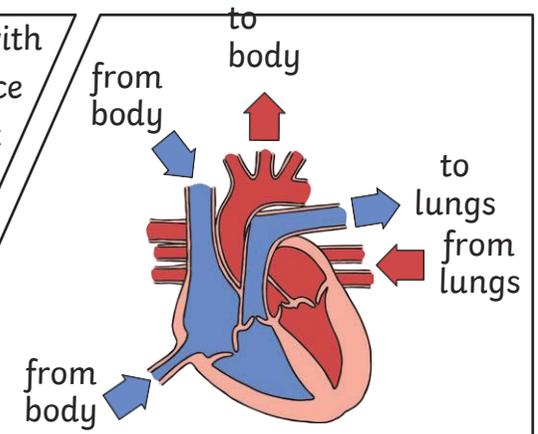
**Key Vocabulary**

<b>circulatory system</b>	A system which includes the heart, veins, arteries and blood transporting substances around the body.
<b>heart</b>	An organ which constantly pumps blood around the <b>circulatory system</b> .
<b>blood vessels</b>	The tube-like structures that carry blood through the tissues and organs. Veins, arteries and capillaries are the three types of blood vessels.
<b>oxygenated blood</b>	<b>Oxygenated blood</b> has more oxygen. It is pumped from the <b>heart</b> to the rest of the body.
<b>deoxygenated blood</b>	<b>Deoxygenated blood</b> is blood where most of the oxygen has already been transferred to the rest of the body.

The **heart** pumps blood to the lungs to get oxygen. It then pumps this **oxygenated blood** around the body.

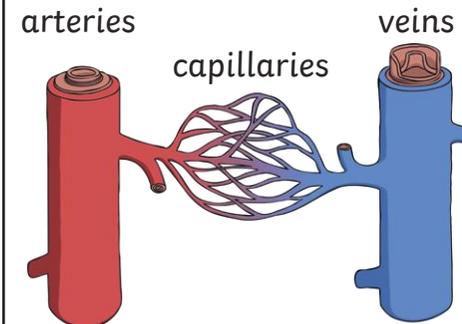


Mammals have **hearts** with four chambers. Notice how the blood that has come from the body is **deoxygenated**, and the blood that has come from the lungs is **oxygenated** again. The blood isn't actually red and blue: we just show it like that on a diagram.



Capillaries are the smallest **blood vessels** in the body and it is here that the exchange of water, nutrients, oxygen and carbon dioxide takes place.

Arteries carry **oxygenated blood** away from the **heart**.



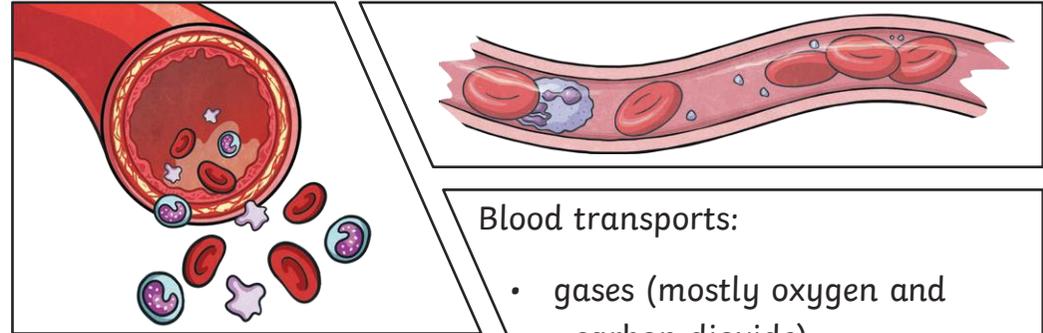
Veins carry **deoxygenated blood** toward the **heart**.

If you linked up all of the body's blood vessels, including arteries, capillaries, and veins, they would measure over 60,000 miles.



**Key Vocabulary**

<b>drug</b>	A substance containing natural or man-made chemicals that has an effect on your body when it enters your system.
<b>alcohol</b>	A <b>drug</b> produced from grains, fruits or vegetables when they are put through a process called fermentation.
<b>nutrients</b>	Substances that animals need to stay alive and healthy.

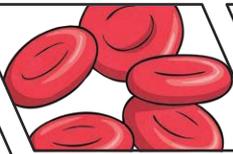


The liquid part of blood contains water and protein. This is called plasma.

Blood transports:

- gases (mostly oxygen and carbon dioxide);
- **nutrients** (including water);
- waste products.

Plasma is liquid. The other parts of your blood are solid.



Red blood cells carry oxygen through your body.

Platelets help you stop bleeding when you get hurt.



White blood cells fight infection when you're sick.



**Drugs, alcohol** and smoking have negative effects on the body.



A healthy diet involves eating the right types of **nutrients** in the right amounts.



Regular exercise:

- strengthens muscles including the heart muscle;
- improves circulation;
- increases the amount of oxygen around the body;
- releases brain chemicals which help you feel calm and relaxed;
- helps you sleep more easily;
- strengthens bones.

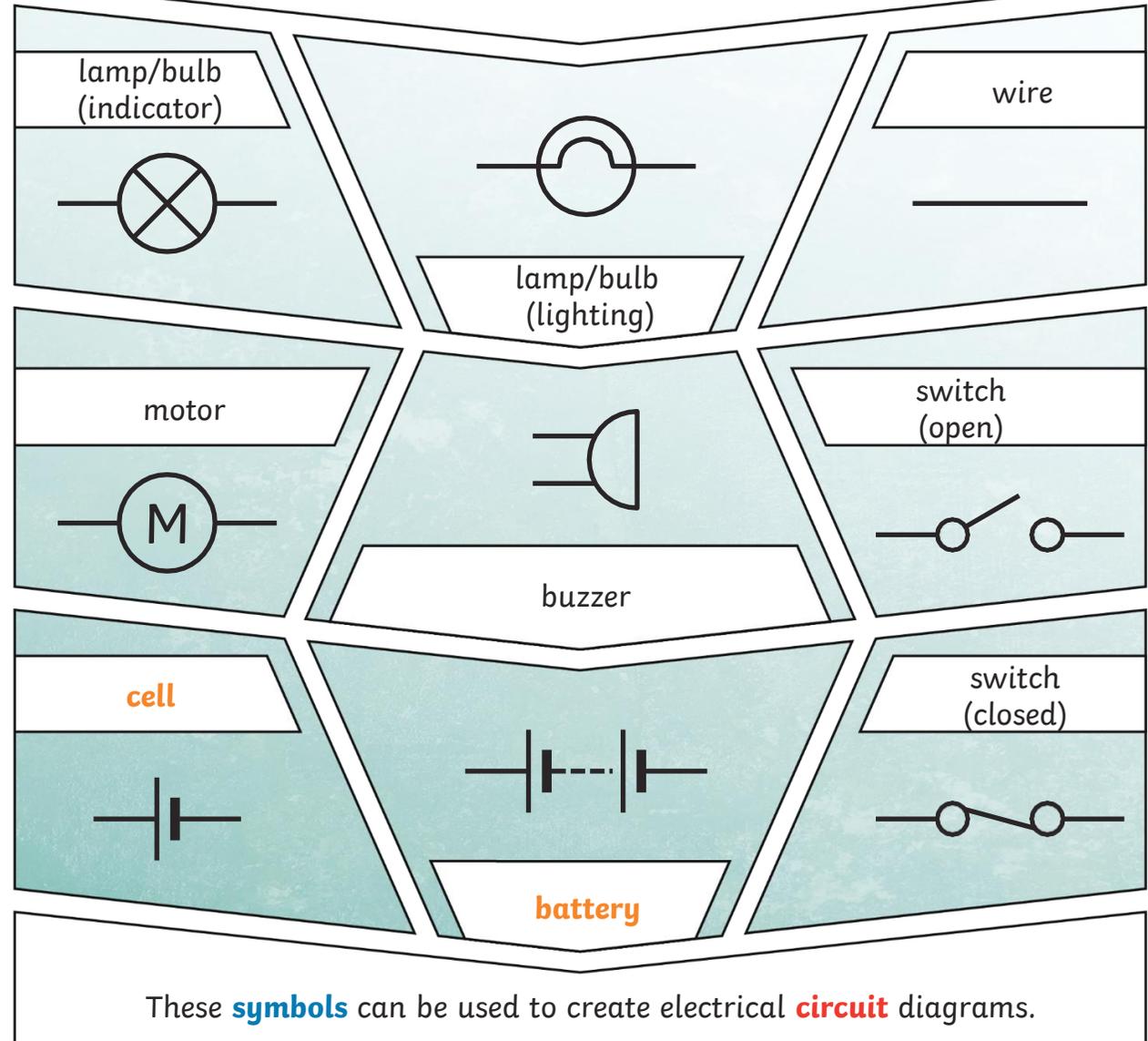
It can even help to stop us from getting ill.



## Key Vocabulary

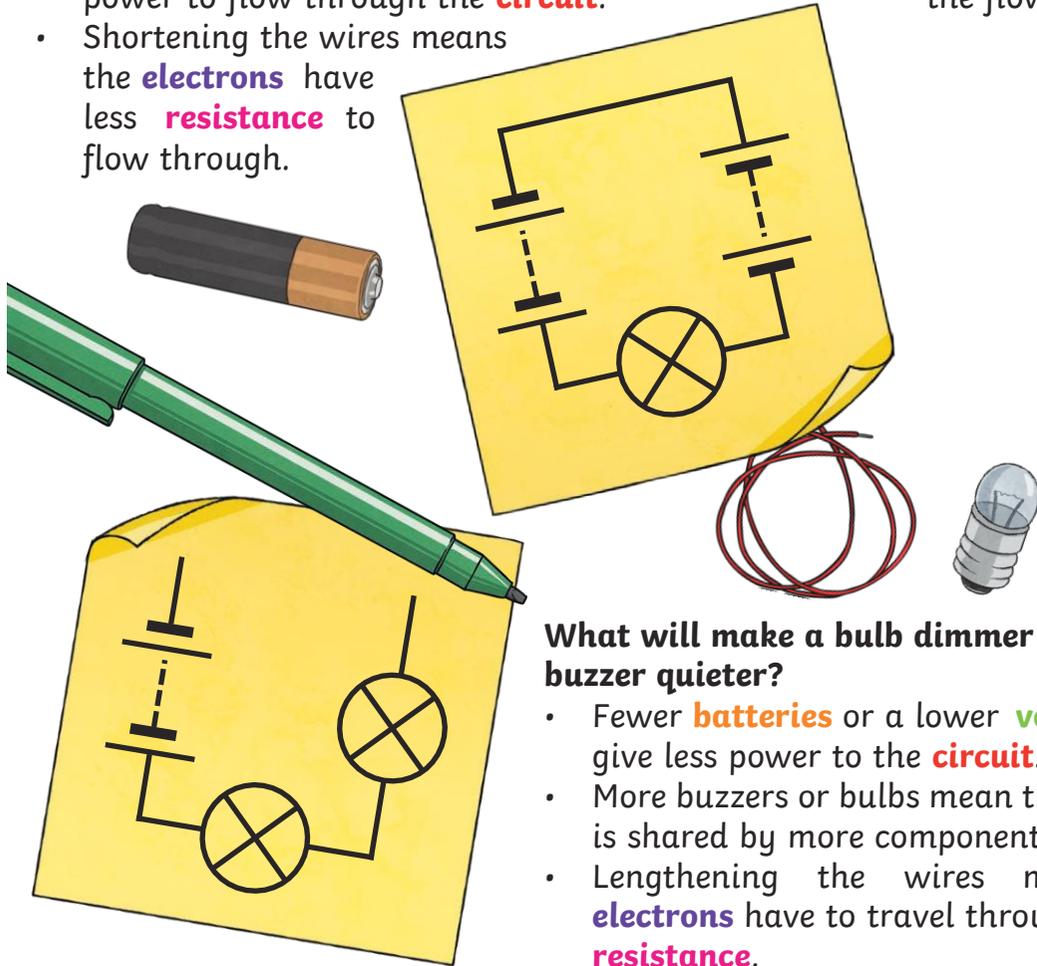
<b>circuit</b>	A path that an electrical <b>current</b> can flow around.
<b>symbol</b>	A visual picture that stands for something else.
<b>cell/battery</b>	A device that stores energy as a chemical until it is needed. A <b>cell</b> is a single unit. A <b>battery</b> is a collection of <b>cells</b> .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

## Key Knowledge

Components of a **Circuit** and Their **Symbols**

## 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.

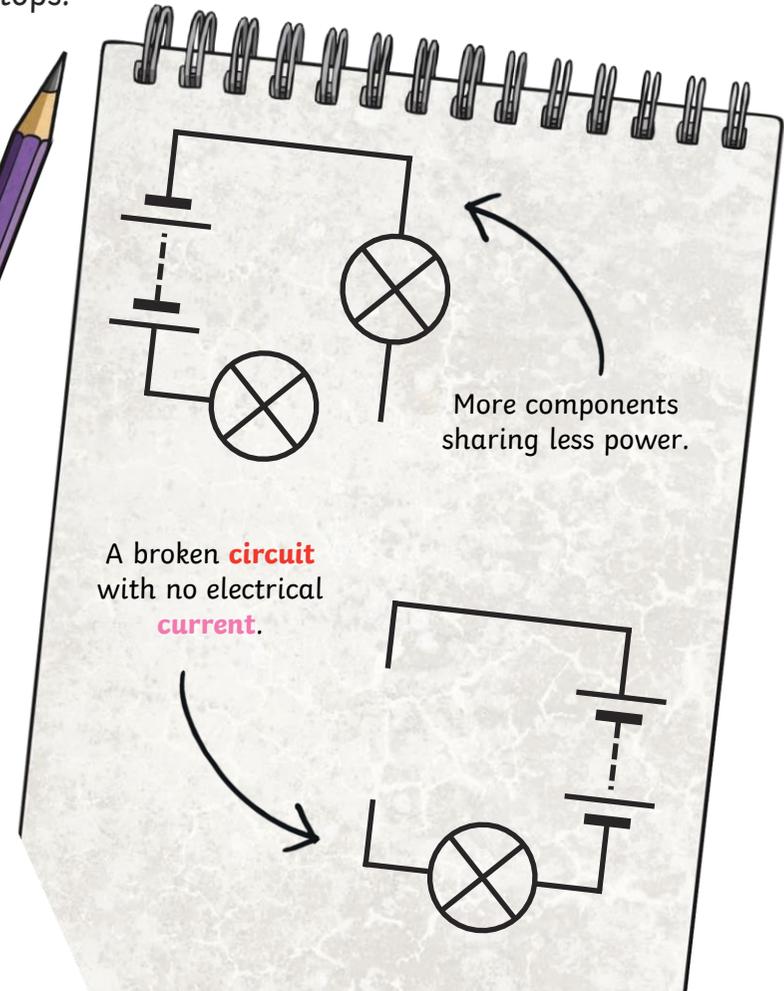


## What will make a bulb dimmer or a buzzer quieter?

- 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.



Key Vocabulary	
<b>offspring</b>	The young animal or plant that is produced by the reproduction of that species.
<b>inheritance</b>	This is when <b>characteristics</b> are passed on to <b>offspring</b> from their parents.
<b>variations</b>	The differences between individuals within a species.
<b>characteristics</b>	The distinguishing features or qualities that are specific to a species.
<b>adaptation</b>	An <b>adaptation</b> is a trait (or <b>characteristic</b> ) changing to increase a living thing's chances of surviving and reproducing.
<b>habitat</b>	Refers to a specific area or place in which particular animals and plants can live.
<b>environment</b>	An <b>environment</b> contains many <b>habitats</b> and includes areas where there are both living and non-living things.

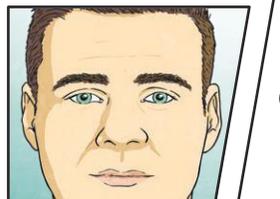
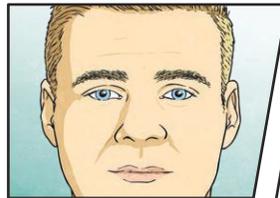
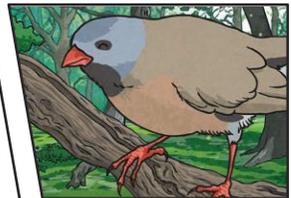


**Offspring**  
Animals and plants produce **offspring** that are similar but not identical to them. **Offspring** often look like their parents because features are passed on.

**Variation**  
In the same way that there is **variation** between parents and their **offspring**, you can see **variation** within any species, even plants.



**Adaptive Traits**  
**Characteristics** that are influenced by the **environment** the living things live in. These **adaptations** can develop as a result of many things, such as food and climate.



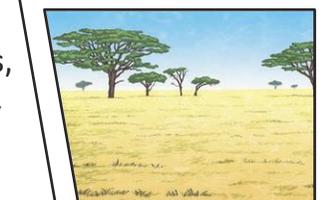
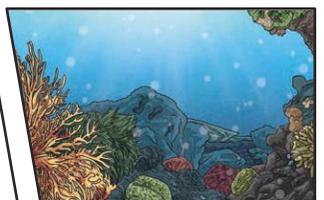
**Inherited Traits**  
Eye colour is an example of an **inherited trait**, but so are things like hair colour, the shape of your earlobes and whether or not you can smell certain flowers.



**Habitats**  
A good **habitat** should provide shelter, water, enough space and plenty of food.

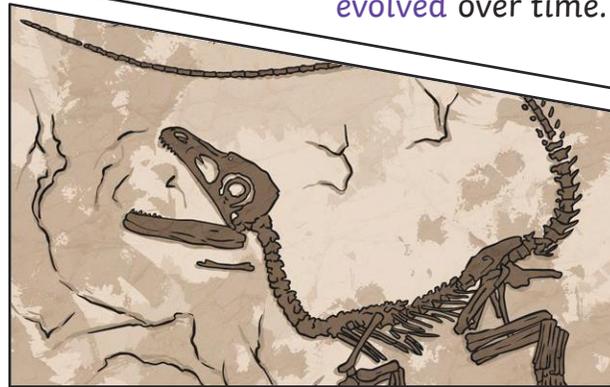


**Environments**  
There are many types of **environment** around the world. Polar regions, deserts, rainforests, oceans, rivers, and grasslands are all **environments**.

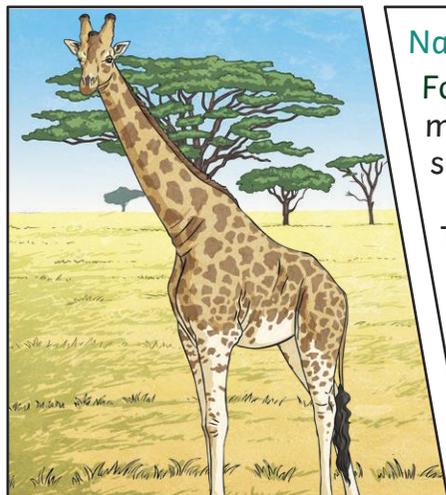
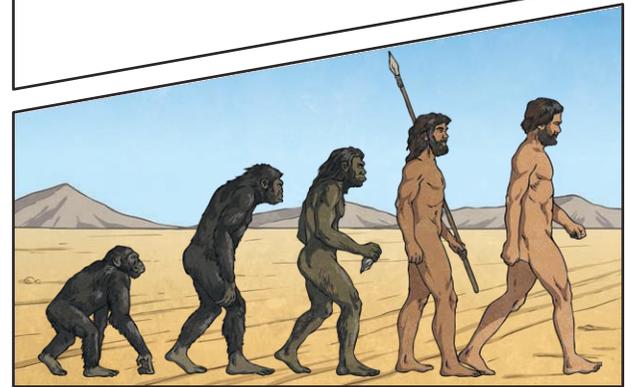


Key Vocabulary	
<b>evolution</b>	<b>Adaptation</b> over a very long time.
<b>natural selection</b>	The process where organisms that are better adapted to their <b>environment</b> tend to survive and produce more <b>offspring</b> .
<b>fossil</b>	The remains or imprint of a prehistoric plant or animal, embedded in rock and preserved.
<b>adaptive traits</b>	Genetic features that help a living thing to survive.
<b>inherited traits</b>	These are traits you get from your parents. Within a family, you will often see similar traits, e.g. curly hair.

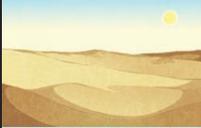
Fossils are the preserved remains, or partial remains, of ancient animals and plants. Fossils let scientists know how plants and animals used to look millions of years ago. This is proof that living things have **evolved** over time.



**Evolution** is the gradual process by which different kinds of living organism have developed from earlier forms over millions of years. Scientists have proof that living things are continuously **evolving** - even today!



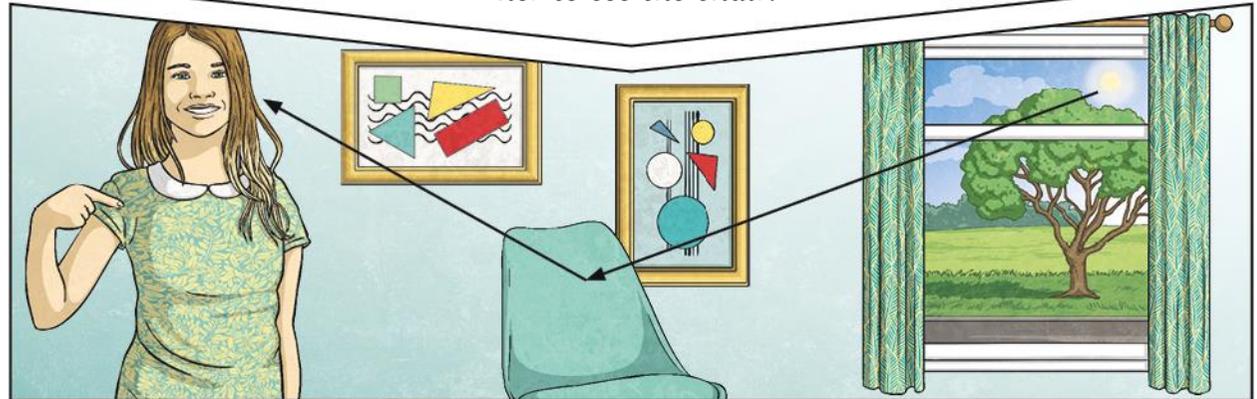
**Natural Selection**  
Fossils of giraffes from millions of years ago show that they used to have shorter necks. They have gradually **evolved** through **natural selection** to have longer necks so that they can reach the top leaves on taller trees.

Living Things	Habitat	Adaptive Traits
polar bear	 arctic	 Its white fur enables it to camouflage in the snow.
camel	 desert	 It has wide feet to make it easier to walk in the sand.
cactus	 desert	 It stores water in its stem.
toucan	 rainforest	 Its narrow tongue allows it to eat small fruit and insects.

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

**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**.

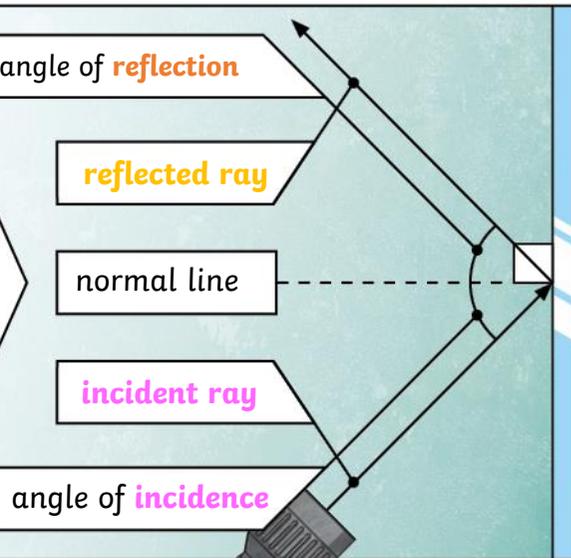
**Light** from the sun travels in a straight line and hits the chair. The **light** ray is then **reflected** off the chair and travels in a straight line to the girl's eye, enabling her to see the chair.



**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**.



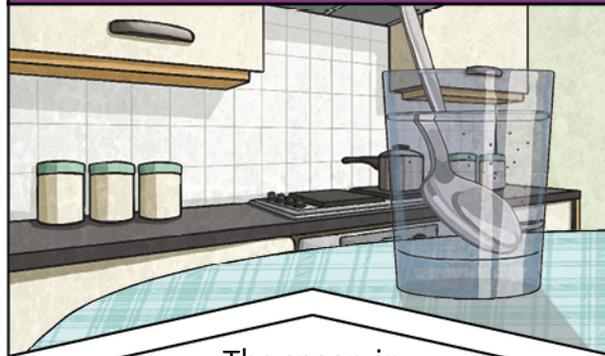
**Light** travels as a wave. But unlike waves of water or sound waves, it does not need a medium to travel through. This means **light** can travel through a vacuum - a completely airless space.



**Key Vocabulary**

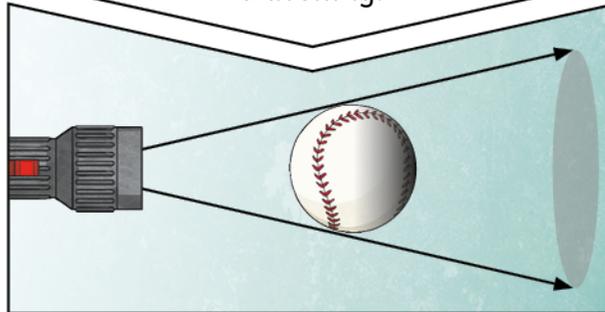
<b>refraction</b>	This is when light bends as it passes from one medium to another. E.g <b>Light</b> bends when it moves from air into water.
<b>visible spectrum</b>	<b>Light</b> that is visible to the human eye. It is made up of a colour
<b>prism</b>	A <b>prism</b> is a solid 3D shape with flat sides.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

**Key Knowledge**

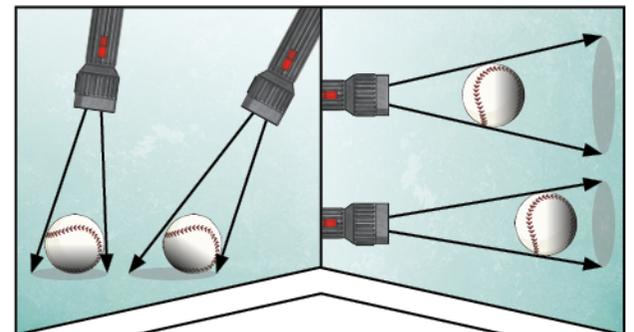
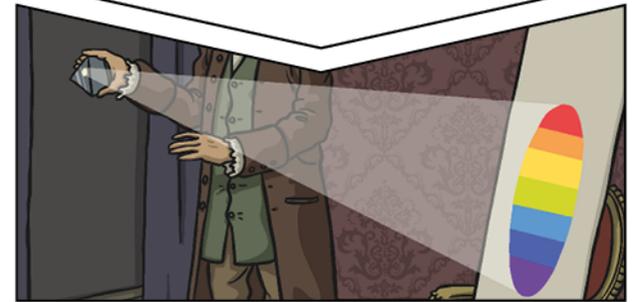


The spoon in this water looks as if it is bent. This is because **light** bends when it moves from air to water. When **light** bends in this way, it is called **refraction**.

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**.

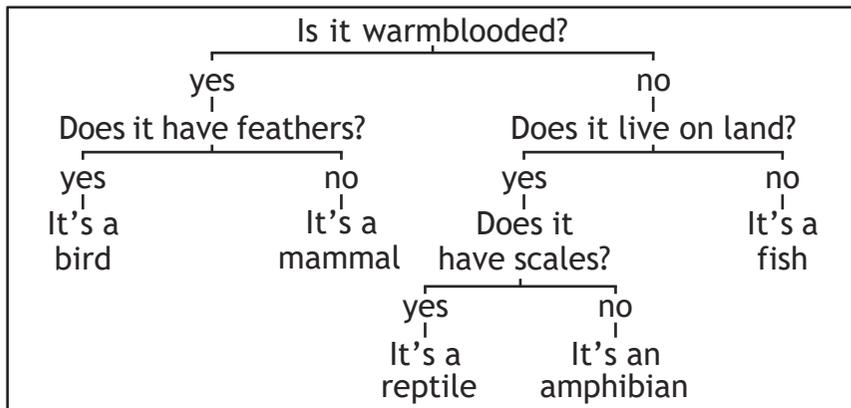


**Shadows** can also be elongated or shortened depending on the angle of the **light source**. A **shadow** is also larger when the object is closer to the **light source**. This is because it blocks more of the **light**.

**Key Vocabulary**

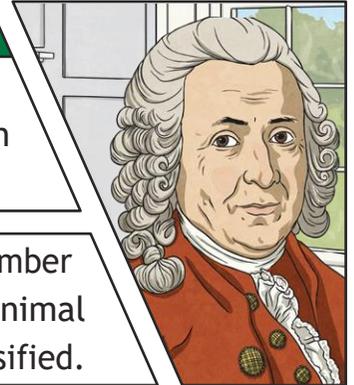
<b>characteristics</b>	Special qualities or appearances that make an individual or group of things different to others.
<b>classify</b>	To sort things into different groups.
<b>taxonomist</b>	A scientist who classifies different living things into categories.
<b>key</b>	A <b>key</b> is a series of questions about the <b>characteristics</b> of living things. A <b>key</b> is used to identify a living thing or decide which group it belongs to by answering 'yes' or 'no' questions.

Scientists, called Taxonomists, sort and group living things according to their similarities and differences.



**Classification**

In 1735, Swedish Scientist Carl Linnaeus first published a system for **classifying** all living things. An adapted version of this system is still used today: The Linnaeus System.



Living things can be **classified** by these eight levels. The number of living things in each level gets smaller until the one animal is left in its species level. This is how a dog would be classified.

**Domain: Eukarya**

jackal, clownfish, cat, dog, ladybird, daisy, rabbit, fox

**Kingdom: Animals**

jackal, clownfish, cat, dog, ladybird, rabbit, fox

**Phylum: Chordata**

jackal, clownfish, cat, dog, rabbit, fox

**Class: Mammals**

jackal, cat, dog, rabbit, fox

**Order: Carnivore**

jackal, cat, dog, fox

**Family: Canidae**

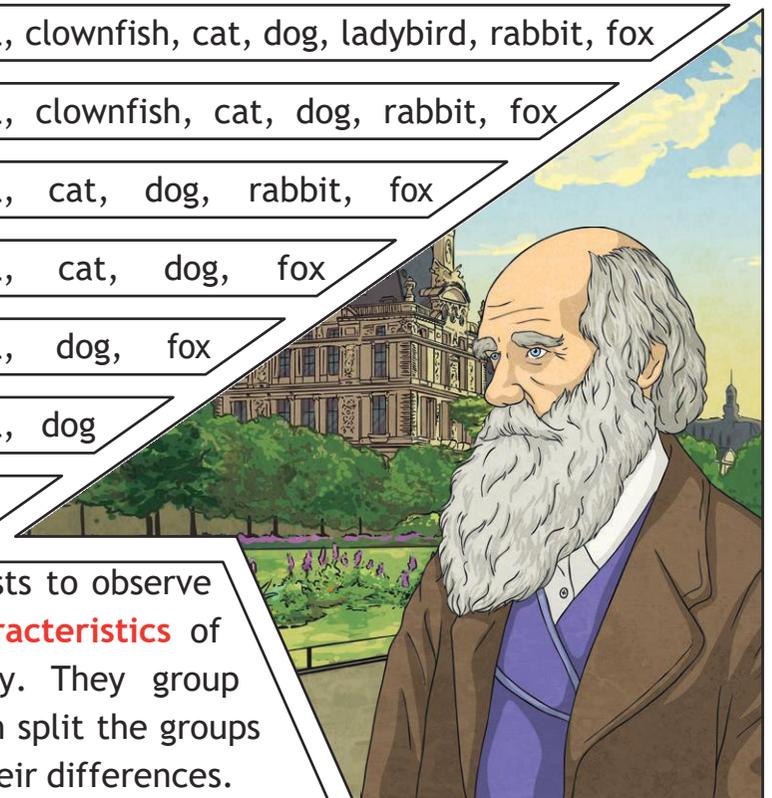
jackal, dog, fox

**Genus: Canis**

jackal, dog

**Species: Lupus**

dog



Each group allows scientists to observe and understand the **characteristics** of living things more clearly. They group similar things together then split the groups again and again based on their differences.



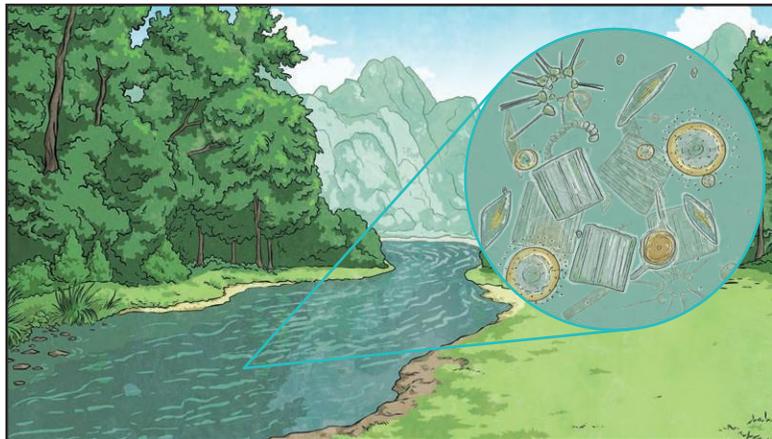
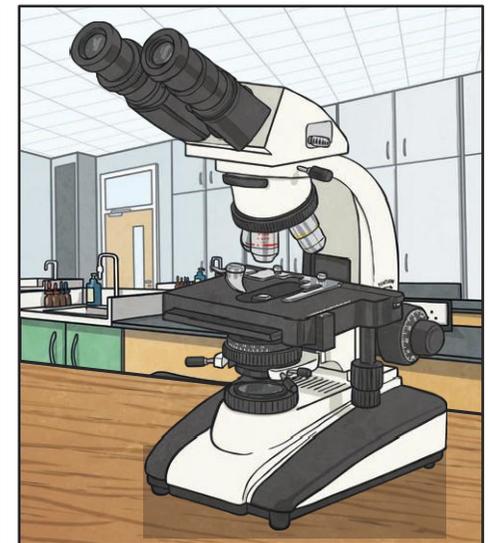
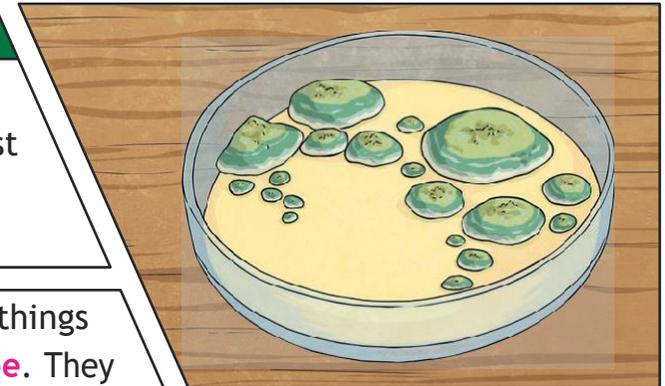
**Key Vocabulary**

<b>bacteria</b>	A single-celled <b>microorganism</b> .
<b>microorganism</b>	An organism that can only be seen using a <b>microscope</b> , e.g. <b>bacteria</b> , mould and yeast.
<b>microscope</b>	A piece of equipment that is used to view very tiny ( <b>microscopic</b> ) things by magnifying their appearance.
<b>species</b>	A group of animals that can reproduce to produce fertile offspring.

**Microorganisms**

**Microorganisms** are viruses, **bacteria**, moulds and yeast. Some animals (dust mites) and plants (phytoplankton) are also **microorganisms**.

**Microorganisms** are very tiny living things that can only be seen using a **microscope**. They can be found in and on our bodies, in the air, in water and on objects around us.



<b>Helpful Microbes</b>	<b>Harmful Microbes</b>
<b>Bacteria</b> - cheese	<b>Bacteria</b> - salmonella is a bacterium that can lead to food poisoning
Yeast - wine	Virus - chicken pox and flu are examples of viral diseases
<b>Bacteria</b> - yoghurt	Fungi - athlete's foot
Yeast - bread dough	<b>Bacteria</b> - plaque
Penicillium fungi - antibiotics	Fungi - mould

