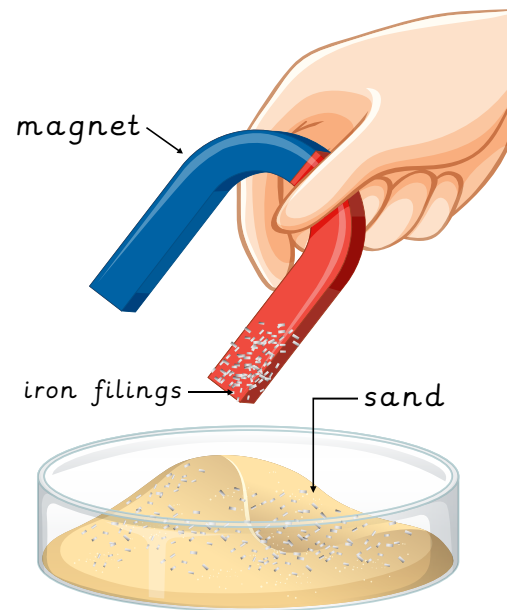
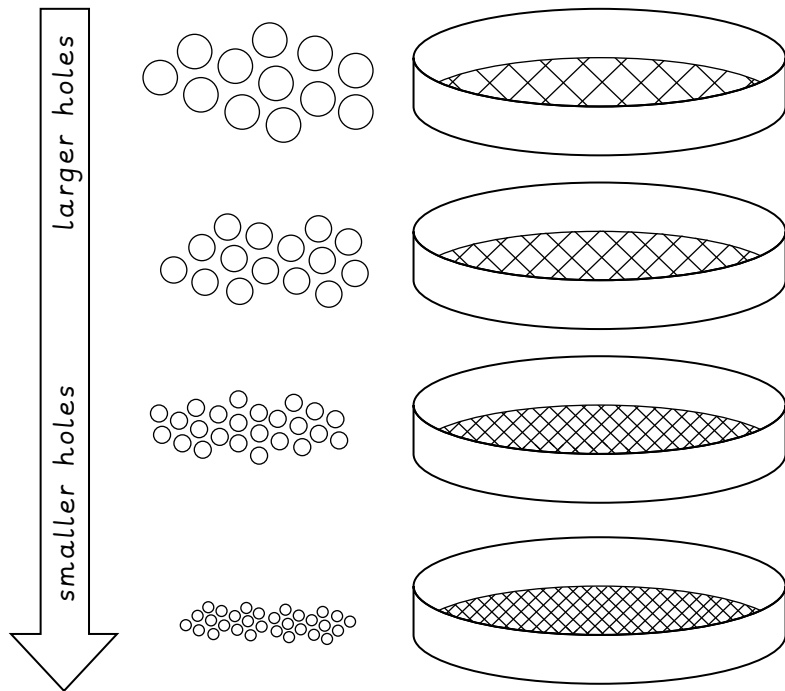


## Mixtures and separation

**Mixtures:** a **mixture** forms when two or more substances are mixed and remain present. The different parts of a mixture can be separated. Some examples are air, sand, gunpowder, fizzy drinks, soil and seawater.

**Sieving:** used to separate mixtures of solids which are different sizes, such as soil. A series of **sieves** with increasingly small holes separate out the particles from largest to smallest.



**Magnets:** used to separate mixtures of solids where the particles are similar sizes (so sieving is not practical) and one of the substances is **magnetic**, such as iron.

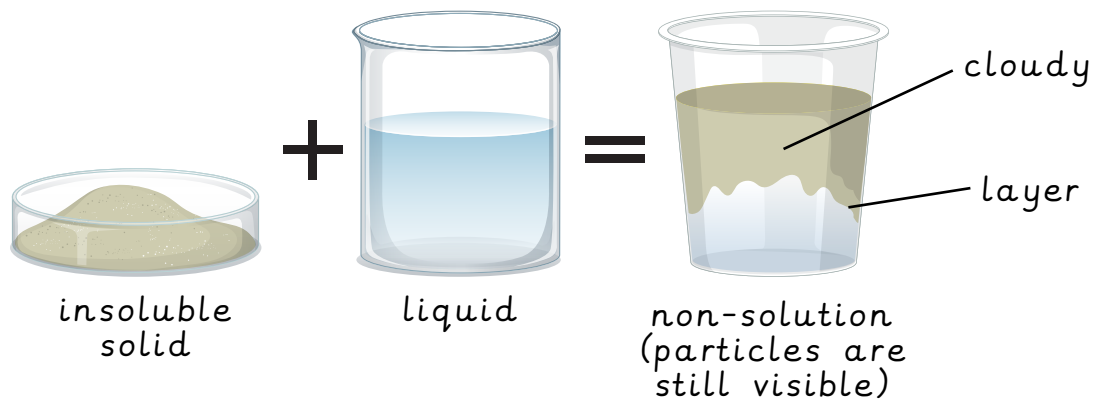
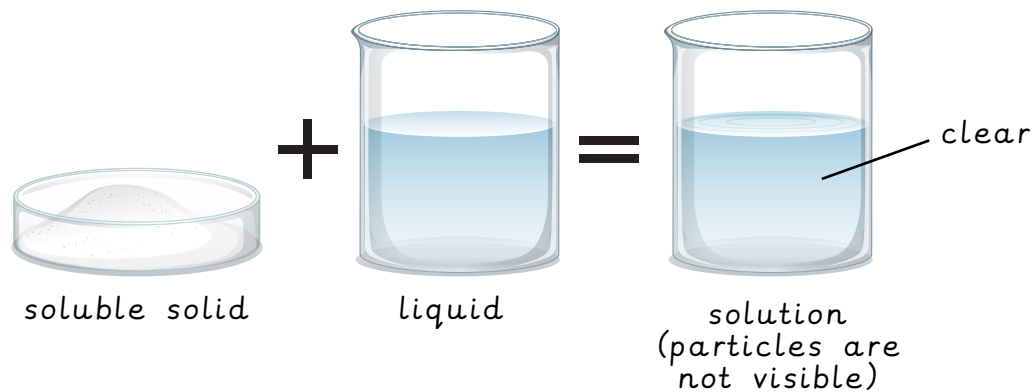


sand under a microscope

**Filtering:** used to separate mixtures containing a liquid and undissolved solids, such as sand and water. The mixture passes through a **filter** or **filter paper**. The gaps in the filter are small enough to let the liquid through but not the solid.



**Solutions:** some substances can **dissolve** in a liquid to make a **solution**. Dissolving is when a substance spreads evenly throughout a liquid. Some examples of substances that are **soluble** (will dissolve) in water are: salt, sugar and tea. Some examples of substances that are **insoluble** (will not dissolve) in water are: sand and flour.



### Factors affecting dissolving:

- Stirring decreases the time taken to dissolve.
- Smaller pieces of the soluble solid (e.g. loose sugar granules) will dissolve faster than larger pieces (e.g. a sugar cube).
- If the liquid is warmer, the solid will dissolve faster.
- Some solids are more soluble than others. For example, sugar is more soluble in water than salt and will dissolve faster.
- If a solid will not dissolve in water, it may dissolve in another liquid, such as alcohol.



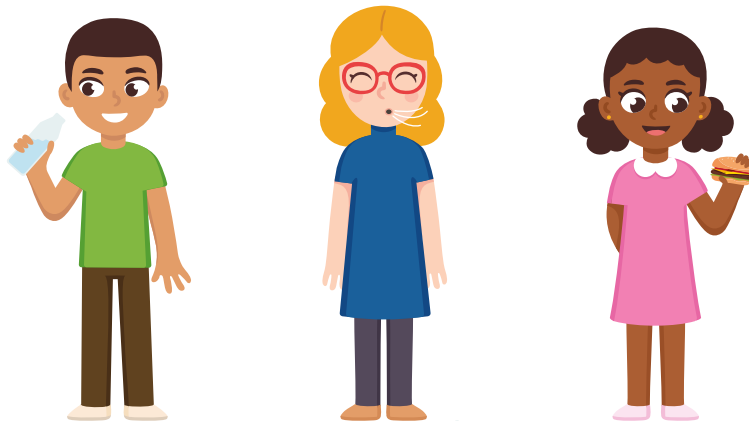
**Evaporation:** separates solutions. The solution is heated until the liquid evaporates. The dissolved substance will **crystallise** as the liquid **evaporates**. Salt flats form because of evaporation.

Human life cycle



baby    toddler    child    teenager    adult

Basic needs for survival



water    air    food

Personal hygiene



health

How the body feels.

hygiene

Keeping things clean.

life cycle

The stages an animal goes through to become an adult.

offspring

Young animals or plants produced by parents.

survive

To continue to live.

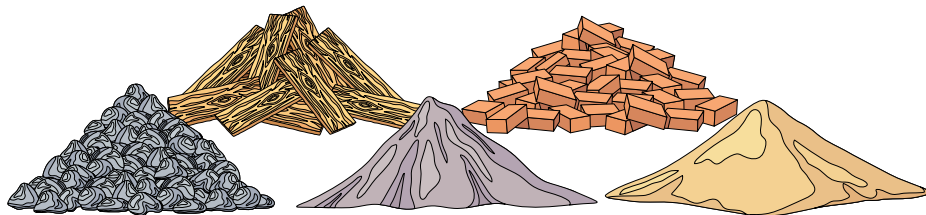
**Conductivity** is a measure of how quickly and easily a material will let heat or electrical charge pass through.

- Good **conductors**, like metal, will let heat and electricity pass through quickly.
- Good **insulators**, like plastic and rubber, will not let heat and electricity pass through easily.

**Hardness** is a measure of how easily a material can be scratched or dented.

- **Hard** materials, like most metals, cannot be scratched or dented easily.
- **Soft** materials, like clay or wax, can be scratched and dented easily.

Materials are chosen for specific uses according to their **properties**. For example, buildings are made from strong, durable materials like wood, stone, brick, concrete and metal.

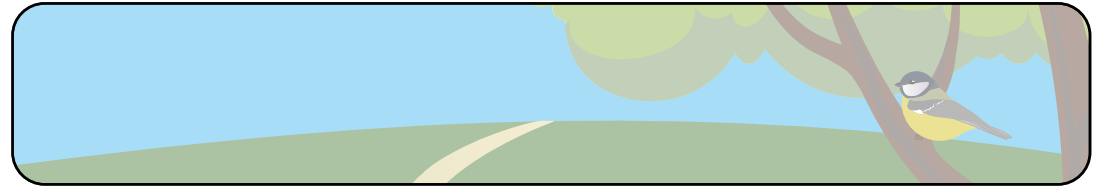


**Transparency** is a measure of how much light a material lets pass through.

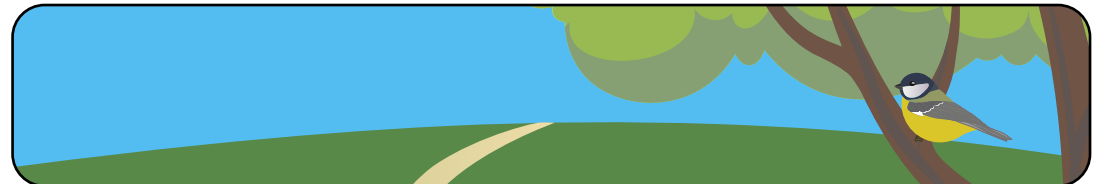
- **Opaque** materials, like metal and wood, do not let any light pass through so objects on the other side cannot be seen.



- **Translucent** materials, like some plastics, let some light pass through. The light is scattered as it passes through so objects on the other side (if visible) appear fuzzy, coloured or distorted.



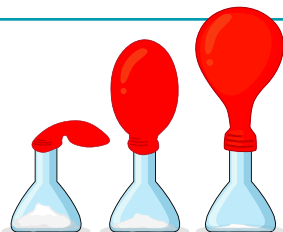
- **Transparent** materials, like glass, let most light pass through with minimal scattering so objects on the other side are clearly visible.



A **reversible change** is when a material is changed but can be easily reverted to its original state.

**Dissolving** is a reversible change because the dissolved substance can be reclaimed by evaporating the liquid.

**Mixing** vinegar and bicarbonate of soda is an irreversible change. A new product (a gas) is formed which causes fizzing.

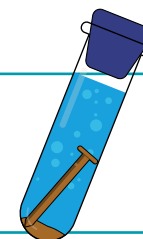


An **irreversible change** occurs when a material is changed but cannot be easily reverted to its original state. New materials are produced in the process.

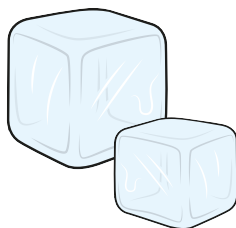


**Burning** is an irreversible change in which a material is burned and makes new products.

**Rusting** is an irreversible change in which **iron** makes **rust** when exposed to **water** and **air** (oxygen).



**Changes of state** are all examples of reversible changes because heating or cooling the substance will change it back to its original state.

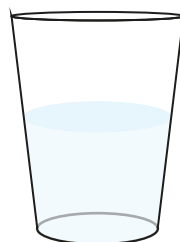


solid

melting



freezing



liquid

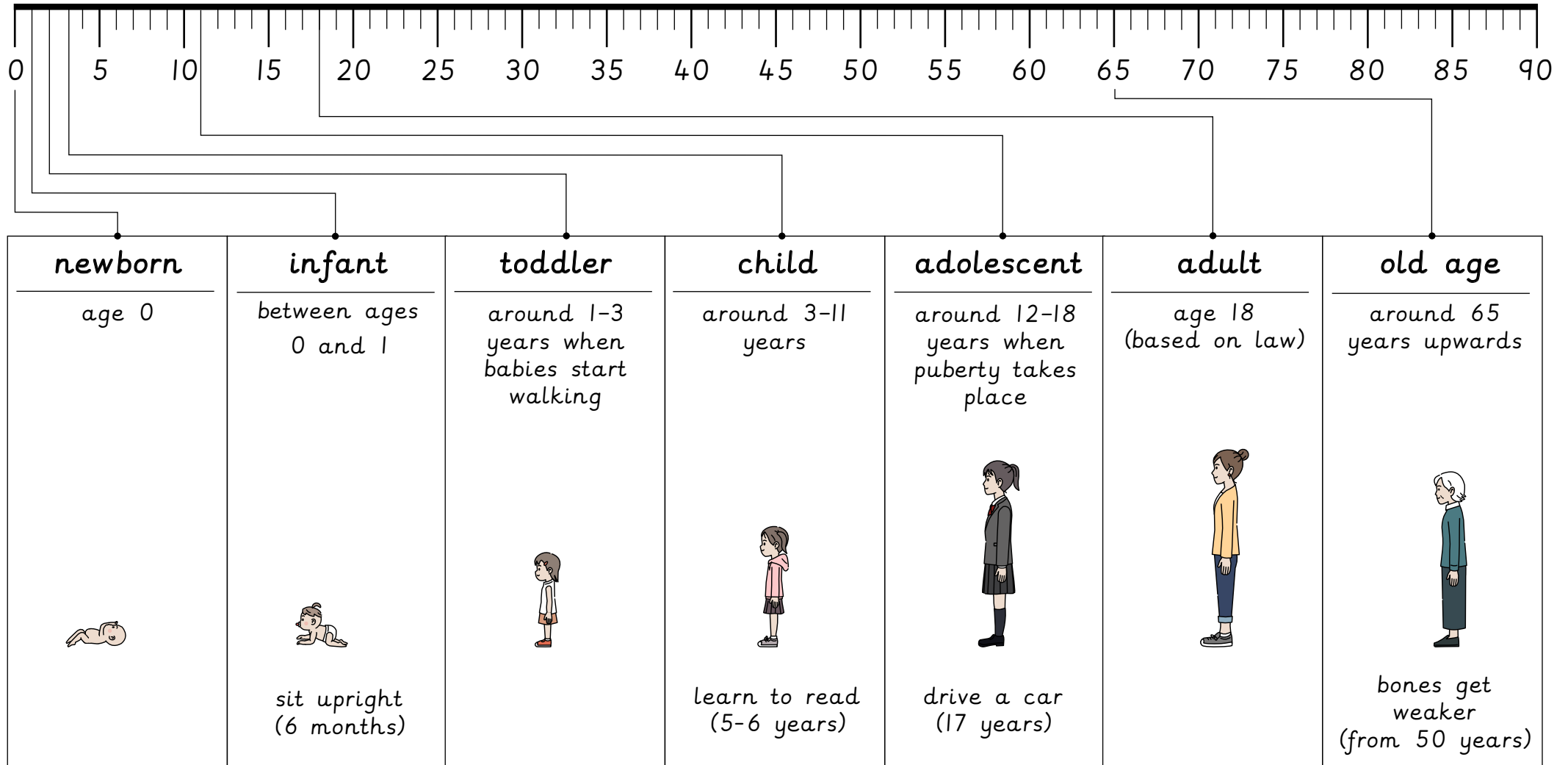
evaporating



condensing

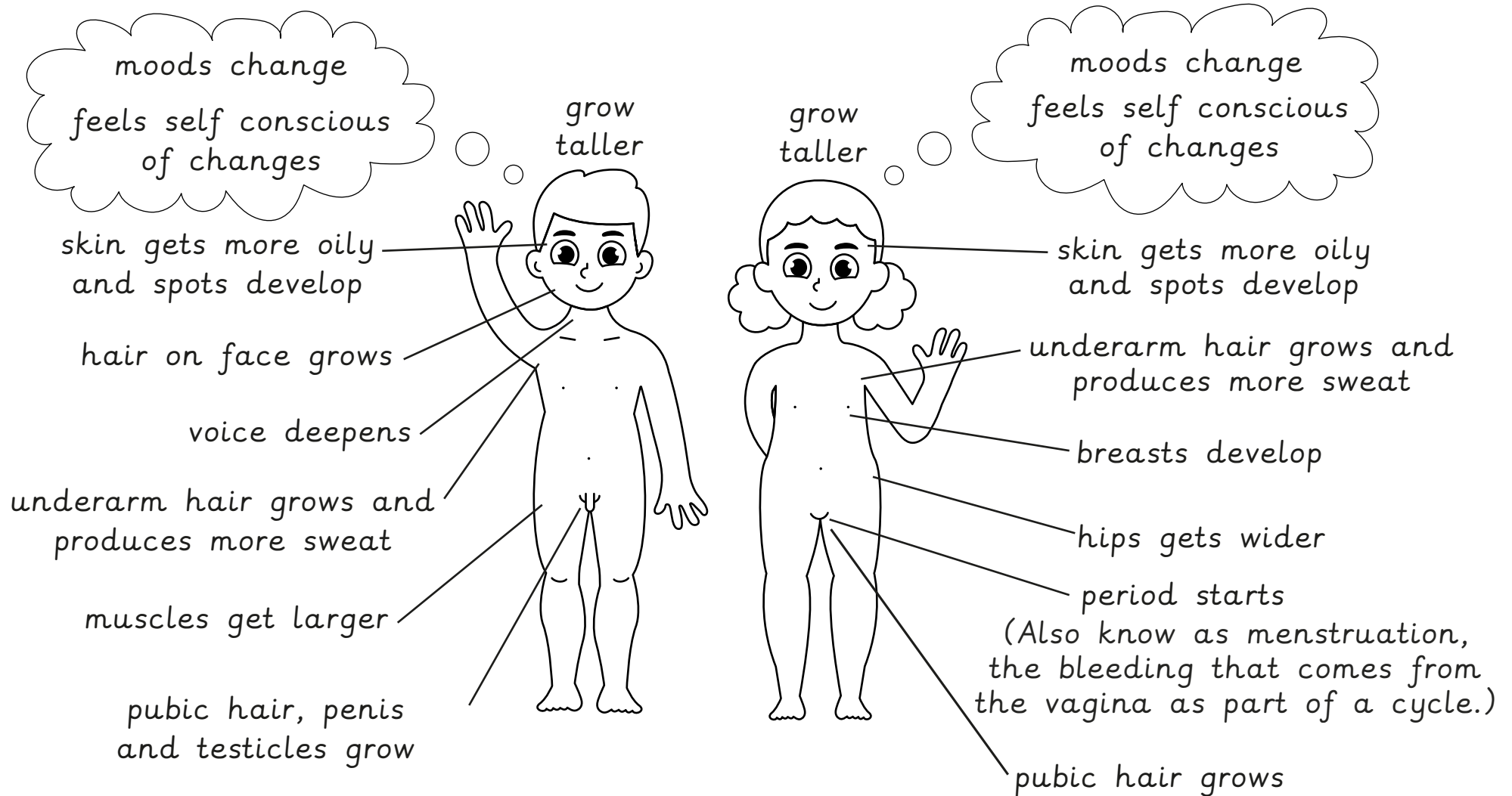


gas

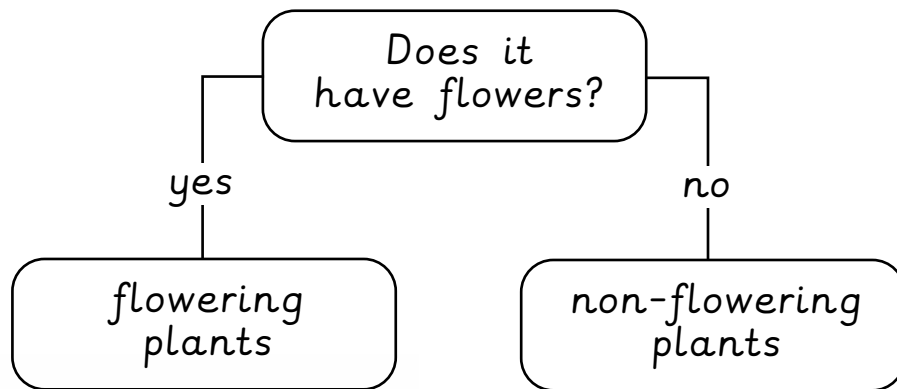


Not everyone experiences these changes at the same time. Some changes depend on our choices, such as when we decide to ride a bike or learn to drive. Some changes take place over a longer period of time, like learning to read or puberty.

Puberty is when a child's body changes to become an adult that can reproduce. It is controlled by hormones, which are chemical messages within the body.



Living things can be sorted and identified with a tool called a **classification key**, which uses a series of yes/no questions:



**Taxonomists** are scientists who sort, group, identify and name living things.

### Habitats can change because of negative human impacts:





- Plastic pollution is building up in our seas, hurting animals that get trapped in or ingest it.
- Climate change, caused by human activities, is heating up the Earth, disrupting habitats and affecting species survival.
- Coral bleaching, resulting from increased sea temperatures, makes it difficult for coral and the animals that live there to survive.
- Deforestation involves cutting down large areas of forest, destroying the habitats of many plants and animals.

### Habitats can change due to natural disasters:

- Earthquakes can make mountains change shape. They can also cause volcanoes to erupt, destroy animals' shelters and uproot plants.
- Wildfires can destroy large areas, burning all the plants. This can cause animals to die or lose their homes.
- Floods can make plants waterlogged or uproot them. They can wash away soil, destroy animals' shelters and cause animals to drown. Floods can also spread disease.

Living things can be classified into different groups according to their shared characteristics:






Animals without backbones are classified as **invertebrates**. They include the following groups:

worms	snails and slugs	insects	spiders
			



**Conservationists** are scientists who protect and restore habitats. They are working to reverse negative human impacts.

Animals with backbones are classified as **vertebrates**. They include the following groups:

fish	amphibians	reptiles	birds	mammals
				

Conservationists help by:

- Studying nature.
- Protecting and restoring habitats.
- Cleaning up pollution.
- Fighting climate change.
- Helping endangered species.
- Making laws and rules to protect the environment.
- Educating others about the environment.

The Solar System is a group of celestial bodies, including the Sun, planets, asteroids and moons, held together by gravity.

The Sun, Earth, moons and other planets are spherical in shape.

Ptolemy



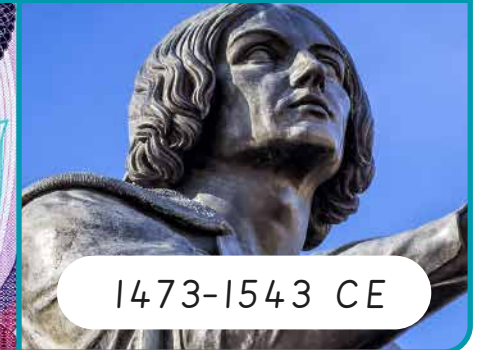
100-170 CE

Alhazen



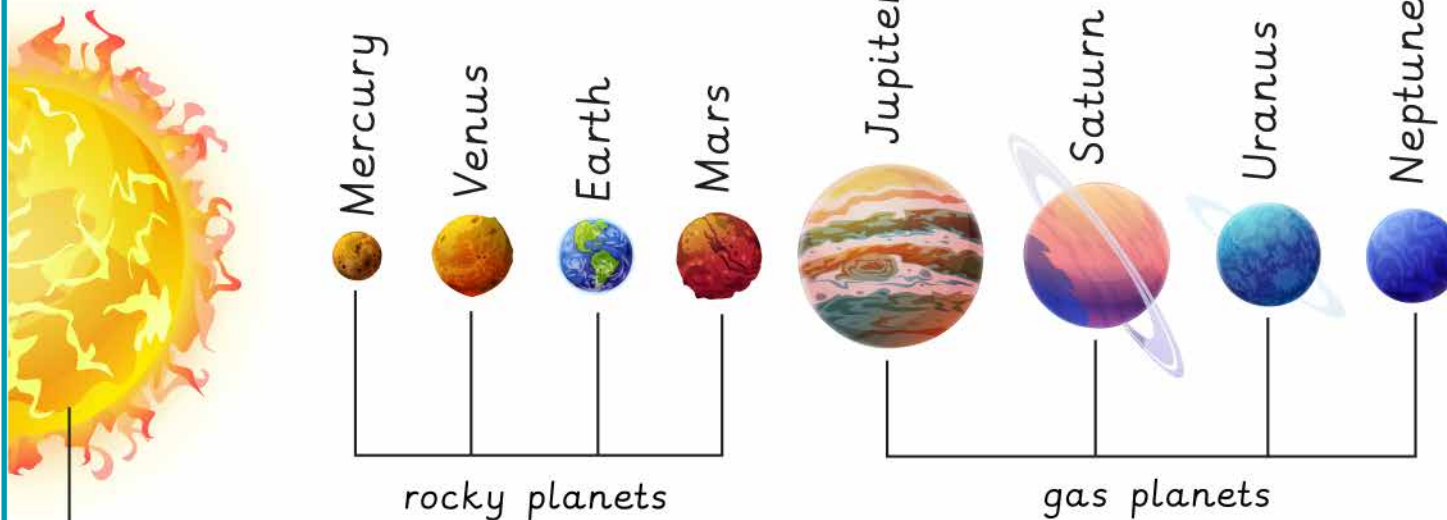
965-1040 CE

Copernicus



1473-1543 CE

## Our Solar System



Sun - a star at the centre of our Solar System

The heliocentric model was developed by Copernicus (1473-1543 CE) and theorised that the Sun was at the centre of the Solar System with the Earth and other planets orbiting around it.

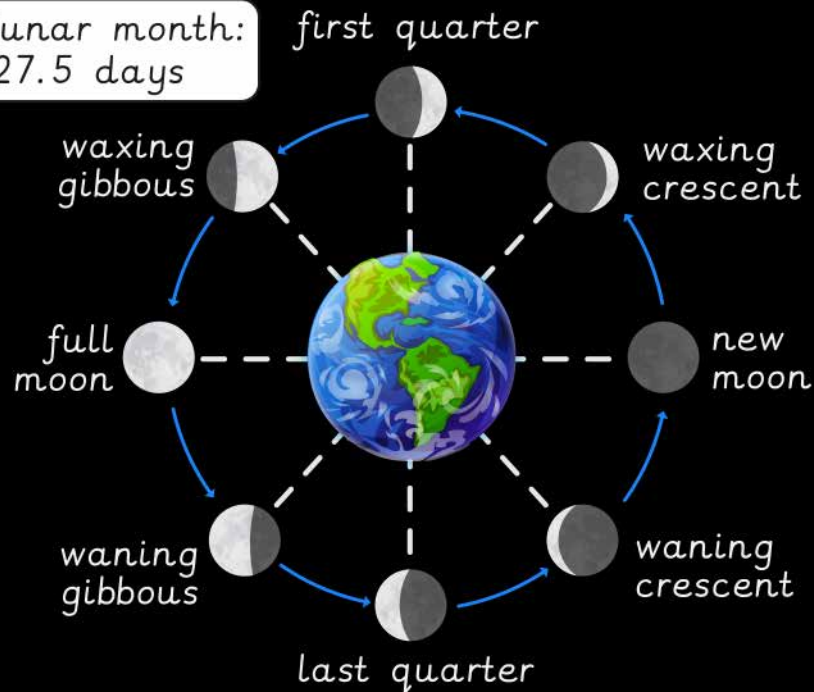
The geocentric model was developed by Ptolemy (100-170 CE) and theorised that the Earth was at the centre of the Solar System with the Sun and other planets orbiting around it.



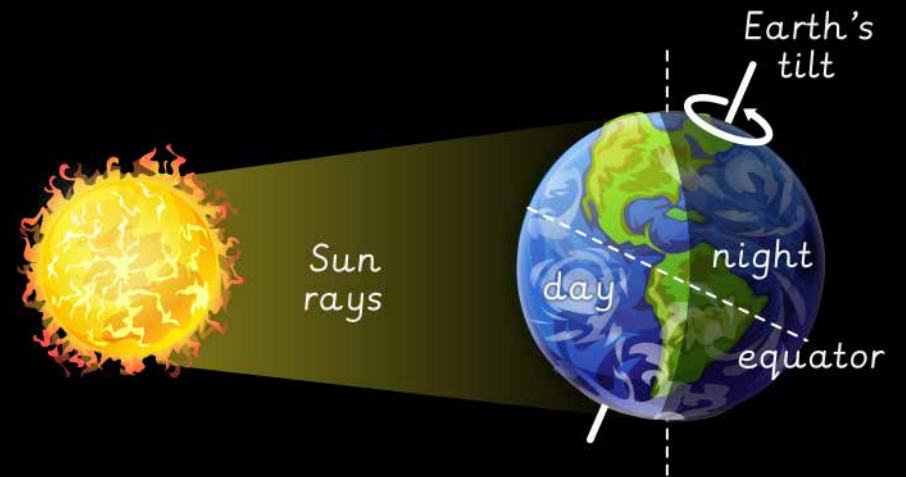
Artificial satellites are human-made objects that orbit planets. They have many uses, including gathering data, communications and taking images.

Phases of the Moon: the Moon appears to change shape as it orbits the Earth because we see different amounts of its lit-up side (the side reflecting light from the Sun).

lunar month:  
27.5 days

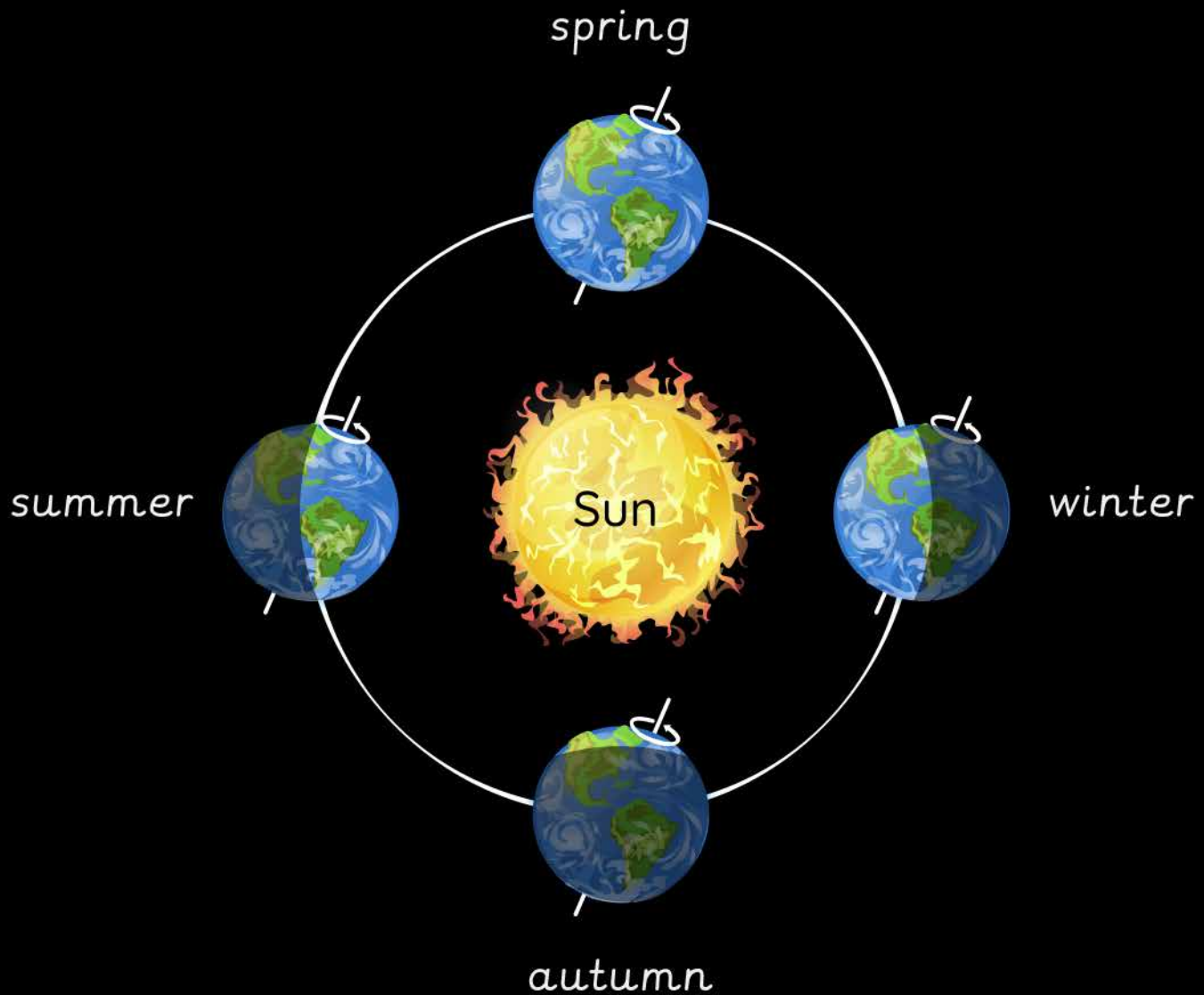


Day and night: the Earth rotates on its axis every 24 hours, creating periods of daylight and nighttime.



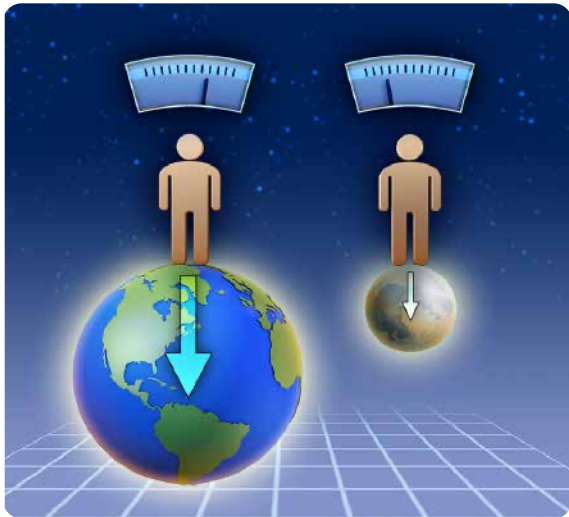
Moons, also called natural satellites, are celestial bodies that orbit planets. The Earth has one moon. Some planets, like Mercury, have no moons and other planets, like Saturn, have many moons (the current count is 146).

## The Earth's seasons



The Earth orbits the Sun once every 365.25 days (one year). When the Northern Hemisphere is tilted towards the Sun, it receives more light for longer so it is summer. When it is tilted away from the Sun, it is winter in the Northern Hemisphere.

**Gravity** is a pulling force that acts between any two objects with mass. The greater the mass of the objects and the closer they are to each other, the stronger the gravitational pull between them.

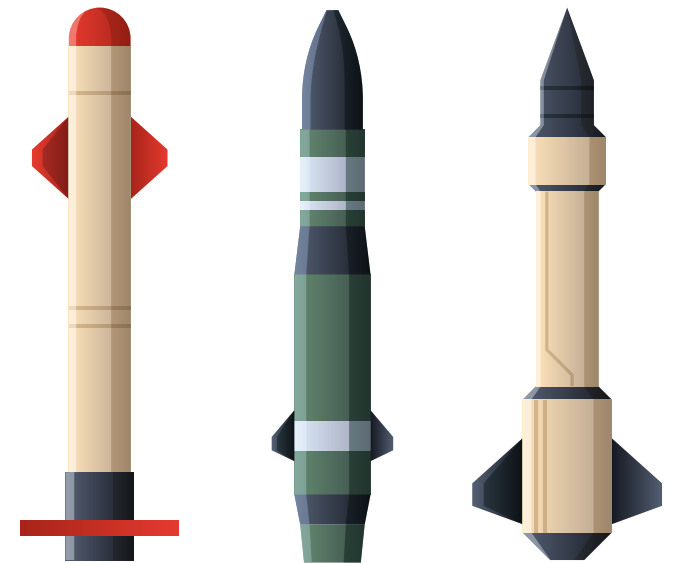


**Friction** is a contact force between two surfaces that opposes motion and causes a slowing effect. Rougher surfaces and more weight increase friction.

**Air resistance**, a type of friction, is the force that opposes an object moving through the air. The greater the object's surface area and the faster it moves, the greater the air resistance.



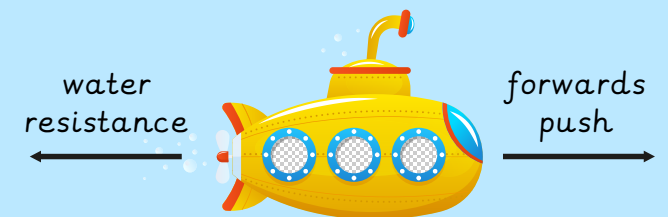
**Streamlining** involves designing objects to move through air or water more easily by making their shape smooth and sleek to reduce resistance from air or water.



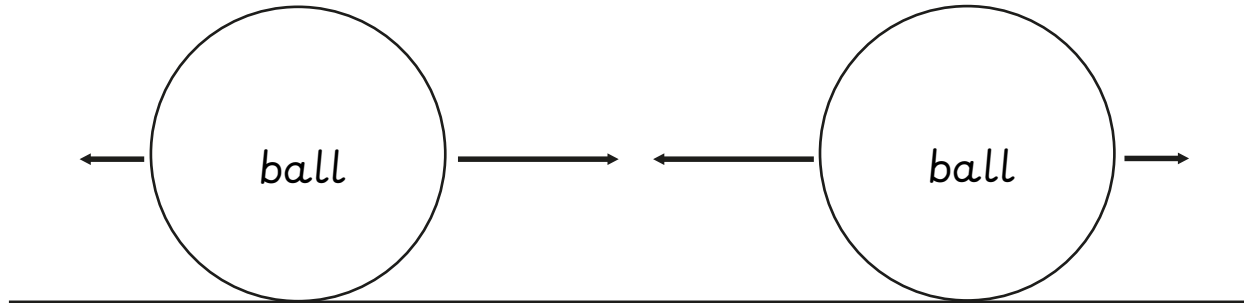
Sir Isaac Newton (1643-1727) was an English scientist who discovered the laws of gravity.



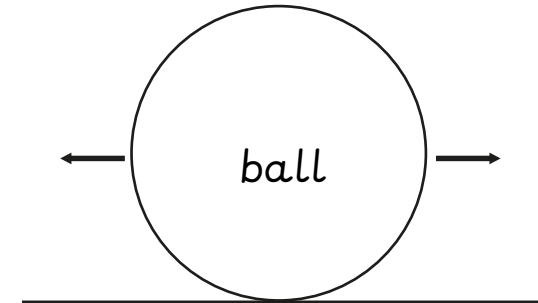
**Water resistance**, a type of friction, is the force that opposes an object moving through water. The greater the object's surface area and the faster it moves, the greater the water resistance.



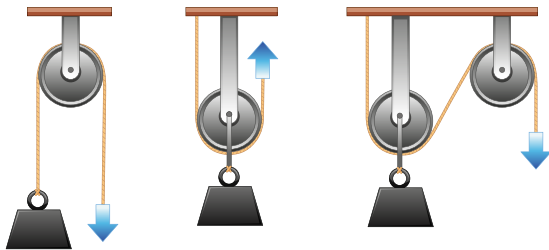
When forces are **unbalanced** (unequal), change will happen: changing speed, shape, direction, starting or stopping moving.



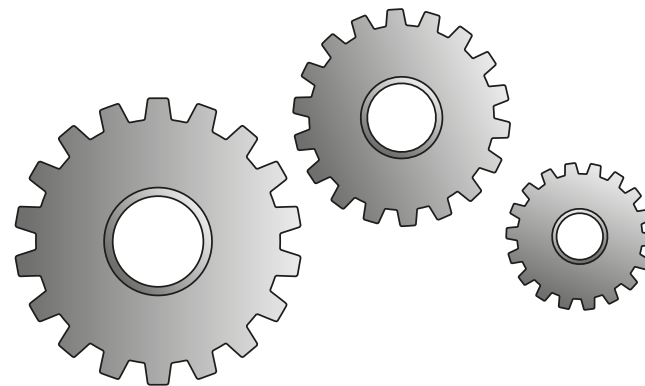
When forces are **balanced** (equal), an object will either be stationary or moving at a steady speed.



A **pulley** is a wheel with a groove around it for a rope, making it easier to lift heavy things by pulling down on the rope.



A **gear** is a wheel with teeth that fits into another gear to change the speed or direction of movement.



A **lever** is a stiff bar that moves around a pivot to lift a load more easily.

