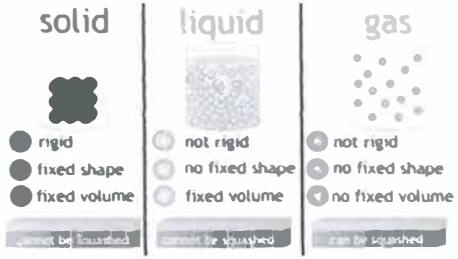
# Yr7 Knowledge Organiser Chemistry Matter 1 – particle model

| Key word | Definition |
|---|---|
| boil (boiling) | The change of state from liquid to gas that occurs when bubbles of the substance in its gas state form throughout the liquid. Boiling occurs at the boiling point of a substance. |
| boiling point | The temperature at which a substance boils. |
| change of state | The process by which a substance changes from one state to another. |
| condense (condensation) | The change of state from gas to liquid. It can happen at any temperature below the boiling point. |
| Density | The mass of a material in a certain volume. |
| Diffusion | The process by which particles in liquids or gases spread out through random movement from a region where there are many particles to one where there are fewer. |
| Dissolve | The complete mixing of a solute with a solvent to make a solution. |
| evaporate (evaporation) | The change of state from liquid to gas that occurs when particles leave the surface of the liquid only. It can happen at any temperature. Evaporation can be used to separate a solid dissolved in a liquid. |
| freeze (freezing) | The change of state from liquid to solid at the melting point of a substance. |
| Gas | In the gas state, a substance can flow and can also be compressed. |
| gas pressure | The force exerted per unit area on the walls of a container. It is caused by collisions of particles with the walls. |
| Liquid | In the liquid state, a substance can flow but cannot be compressed. |
| melt (melting) | The change of state from solid to liquid at the melting point of a substance. |
| melting point | The temperature at which a substance melts. |
| Particle | A very tiny object, such as an atom or molecule, that materials are made from. They are too small to be seen with a microscope. |
| particle model | A way to think about how substances behave in terms of small, moving particles. |
| Solid | In the solid state, a substance cannot be compressed and it cannot flow. |

## Particle Theory

All matter is made up of particles. Particles are found in all three states of matter. Particles in the three states have different movement and arrangement.

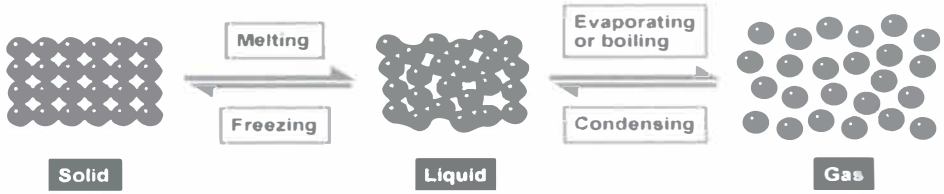
- In solids, particles are arranged in a regular pattern and they can only vibrate in a fixed position. Particles are held together by strong bonds.
- In liquids, particles are arranged randomly but are still touching each other. Particles can slide past each other and move around.
- In gases, particles are far apart and are arranged randomly. Particles carry a lot of energy and they move in all directions in a high speed.




## Changes of State

Changes of state take place when the particles gain or lose energy.

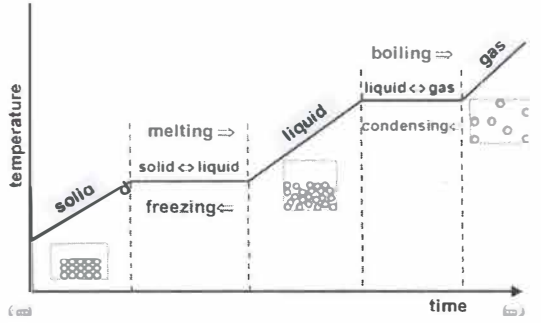
- When energy is applied, particles gain energy, move faster and move further apart.
- When energy is lost, particles become closer to each other, move slower and arrange themselves more regularly




## Energy transfer graph

The graph shows how the temperature of a substance changes as heat is applied.

- When the line is sloped, the temperature of the substance is increasing.
- When the line is flat, the temperature stays the same even though heat is being applied.



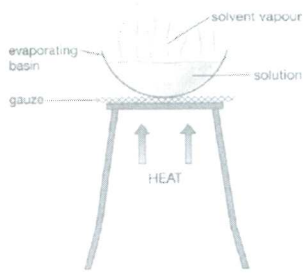

This is because the heat is going into making the particles change state.
During the change of state, the temperature will stay the same until the change of state is complete e.g. all liquid has turned into gas.

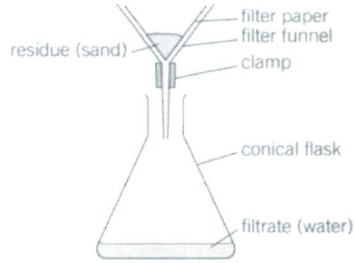
# Yr7 Knowledge Organiser Chemistry Matter 1 – separating mixtures

| Key word | Definition |
|---|---|
| Chromatogram | An image obtained from chromatography. |
| Chromatography | A technique to separate mixtures of liquids (often coloured) that are soluble in the same solvent. |
| Dissolve | The complete mixing of a solute with a solvent to make a solution. |
| Distillation | A technique that uses evaporation and condensation to obtain a solvent from a solution. |
| Diffusion | The process by which particles in liquids or gases spread out through random movement from a region where there are many particles to one where there are fewer. |
| Filtrate | The liquid or solution that collects in the container after the mixture has passed through the filter paper. |
| Filtration | A way of separating pieces of solid that are mixed with a liquid or solution by pouring through filter paper. |
| Mixture | A mixture is made up of two or more pure substances that are mixed (not chemically joined) together. A mixture's properties are different from the properties of the individual substances that make it up. |
| Pure substance | A single material with no other substances mixed with it. |
| Residue | The solid that collects in the filter paper during filtration. |
| Saturated solution | A solution in which no more solute can dissolve. |
| Solubility | The maximum mass of solute that dissolves in a certain volume or mass of solvent. |
| solubility curve | A graph showing the change in solubility of a substance with temperature. |
| Soluble (insoluble) | A soluble substance can dissolve in a given solvent. An insoluble substance cannot dissolve in a given solvent. |
| Solute | The solid or gas that is dissolved in a liquid. |
| Solution | A mixture of a solute dissolved in a solvent. All parts of the mixture are the same. |
| Solvent | A substance, normally a liquid, that dissolves another substance. |

## Evaporation and Filtration

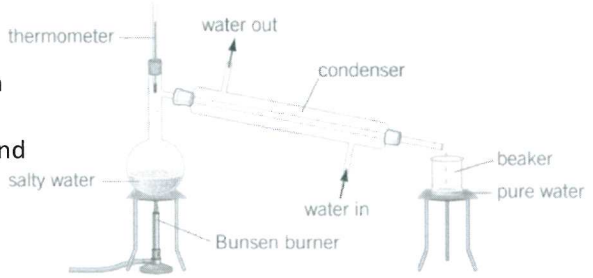
- If you have a solution, for example salt water, you can evaporate the water leaving pure salt.
- If you have two substances where one is magnetic and one is not, for example iron and sulphur, then a magnet can be used to separate the two substances.
- If you have a mixture of an insoluble solid and a liquid then the mixture can be filtered.



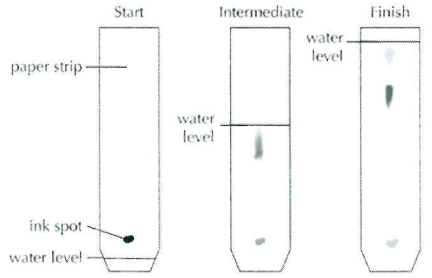

## Distillation

- Good for separating a liquid from a solution. E.g. water can be separated from salty water by simple distillation.
- This method works because the water evaporates from the solution, but is then cooled and condensed into a separate container. The salt does not evaporate and so it stays behind.
- Distillation can also be used to separate two liquids that have different boiling points because the one with the lower boiling point will evaporate and condense first.




## Chromatography

- Simple chromatography is carried out on paper.
- A spot of the mixture is placed near the bottom of a piece of chromatography paper and the paper is then placed upright in a suitable solvent, e.g. water. As the solvent soaks up the paper, it carries the mixtures with it.
- Different components of the mixture will move at different rates, which separates the mixture out



# *Introduction to Science and Working Scientifically*

## Working Safely and Lab Apparatus

| Key Word | Definition |
|---|---|
| Hazard | A situation that presents a threat to people. |
| Risk | How likely something is to be harmful. |
| Control Measure | An action taken to remove the hazard or to reduce the exposure to it. |
| Risk Assessment | A description of how you will make it less likely that people will be injured, or equipment damaged, and what to do if this happens. |

Flammable

Corrosive

Health hazard: harmful or irritant

Harmful to environment

Toxic

Explosive

Tripod and gauze

clamp stand

Test tube

Evaporating dish

Filter paper, funnel

Beaker

Bunsen burner

Thermometer

Conical flask

## Units and Symbols

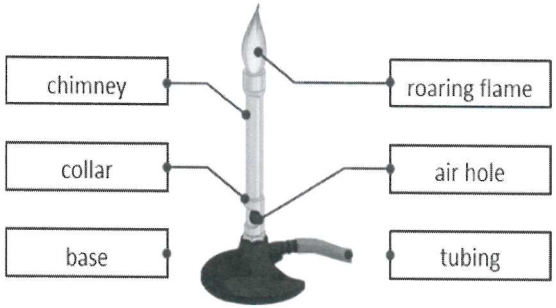
| Quantity Name | Unit Name | Unit Symbol |
|---|---|---|
| Length | Metre | m |
| Mass | Kilogram | Kg |
| Time | Second | s |
| Temperature | Degrees Celsius | °C |
| Energy | Joule | J |
| Force or weight | Newton | N |
| Pressure | Pascal | Pa |
| Power | Watt | W |
| Voltage | Volt | V |
| Current | Ampere | A |
| Resistance | Ohm | Ω |
| Charge | Coulomb | C |
| Frequency | Hertz | Hz |

## Exam Command Words

| Word | Meaning |
|---|---|
| **Calculate** | Use numbers given in the question to work out the answer |
| **Define** | Specify the meaning of something |
| **Describe** | Recall some facts, events or process in an accurate way |
| **Design** | Set out how something will be done |
| **Evaluate** | To consider evidence for and against when making a judgement |
| **Explain** | Make something clear, or state the reasons for something happening. |
| **Plan** | Write a method |
| **Predict** | Say what you think will happen |
| **Use** | The answer must be based on the information given in the question. Unless the information given in the question is used, no marks can be given. In some cases you might be asked to use your own knowledge and understanding. |

## Bunsen burner

The Bunsen burner uses methane gas.




### The Safety Flame

The safety flame is used when the Bunsen burner is not in use.

The flame is easier to see when the flame is yellow.

To produce this flame, the air hole is fully shut.

Less oxygen will get into the Bunsen burner.

### The Roaring Flame

The roaring flame is used to heat things quickly.

The flame is more difficult to see when the flame is blue.

To produce this flame, the air hole is fully open.

More oxygen will get into the Bunsen burner.

# *Introduction to Science and Working Scientifically*

## Planning an Investigation

| Scientific Method |
|---|
| Ask scientific questions / Aim |
| Make a prediction |
| Plan and Carry out a valid experiment |
| Results and conclusions |
| Evaluate the results and method |

### What to think about when planning?

- What data or observations need to be collected?
- What are the variables?
- How many measurements need to be taken to see a pattern?
- What range of measurements is needed?
- How many repeats is enough?
- What apparatus and techniques should be used?
- How is the apparatus used to record accurate measurements?
- What are the possible risks? How can the risks be reduced?
- How can the data be presented?

## Variables

Investigations are often performed to identify if there are patterns or relationships between two variables.
One variable is changed to see how it affects another variable.

| Variable | Meaning |
|---|---|
| Independent variable (IV) | Variable the is **changed** |
| Dependent variable (DV) | Variable that is **measured** |
| Control variable (CV) | All the other variables in an investigation that should be **kept the same** |

## Presenting Data: Tables

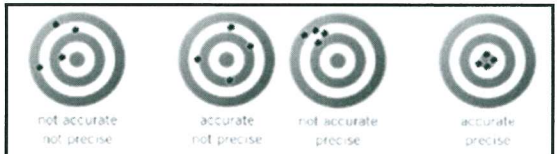
*Independent Variable* | *Dependent Variable*

*Column header (units)* →

| Temperature (°C) | Time taken (s) |
|---|---|
| 40 | 18.6 |
| 50 | 35.4 |
| 60 | 49.0 |

*Never put units in the body of the table* →

← *Keep number of decimal places the same*



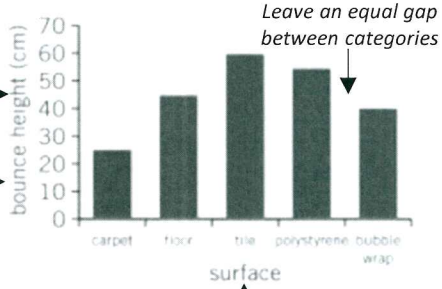

| | |
|---|---|
| Accuracy | Data is close to the true value |
| Precision | Data is similar each time it is repeated |
| Repeatability | Similar results when **same** investigator repeats |
| Reproducibility | Similar results when **different** investigator repeats |

## Presenting Data: Bar Charts (Categoric data)

*Leave an equal gap between categories*

*DV Axis label (units)* →

*Linear scale Equal values between each division* →

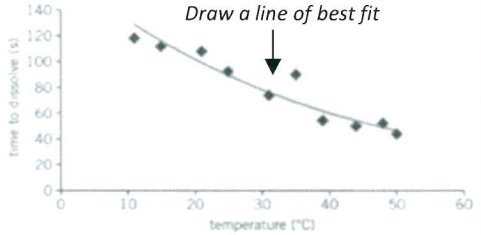



*IV Axis label (units)* ↑

## Presenting Data: Line Graph (Continuous data)

*DV Axis label (units)* →

*Linear scale Equal values between each division* →




*IV Axis label (units)* ↑

## Evaluating Data: Calculations

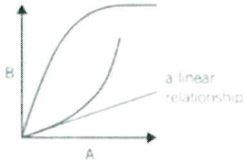
Mean = sum of values divided by the number of values

eg: $\frac{18.6 + 35.4 + 49.0}{3}$ = 34.3 (s)

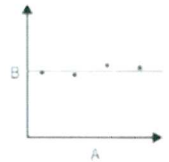
Range = difference between lowest and highest measurement

eg: 49.0 – 18.6 = 30.4 (s)

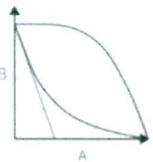
## Evaluating Data: Relationships and Conclusions




As A increases then B increases
(Positive correlation)




As A increases B remains constant
(No correlation)




As A increases then B decreases
(Negative correlation)

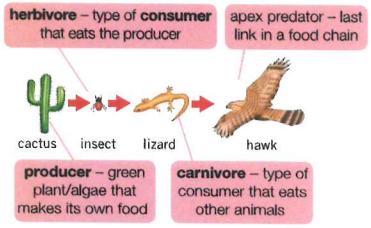
# B1 Chapter 9: Ecosystems
## Knowledge organiser

Activate
Question • Progress • Succeed

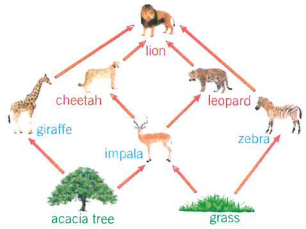
## Food chains and webs

- **Food chains** show the direction in which energy flows when one organism eats another
- The direction of the arrows represent the direction in which the energy flows
- **Food webs** show how a number of different food chains are connected

**Food chain**




**Food web**




- **Producers** are the organisms which start the food chain, they convert energy from the Sun, making their own food, these are often plants
- **Prey** are organisms which are eaten by other organisms
- **Predators** are the organisms which eat the prey

## Disruption to food chains

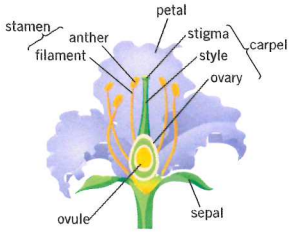
- **Interdependence** is the way in which living organisms rely on each other to survive
- A food chain will be disrupted if one of the organisms die out
- If the producer dies out the rest of the food chain will also die out unless they have a different food source
- If the **consumer** population die out the number of organisms which they eat will increase unless they are eaten by another organism
- **Bioaccumulation** is the process by which chemicals such as pesticides and insecticides build up along a food chain

## Parts of a flower

### Stamen

Male part of the flower

- The **anther** produces **pollen**
- The **filament** holds up the anther




### Carpel

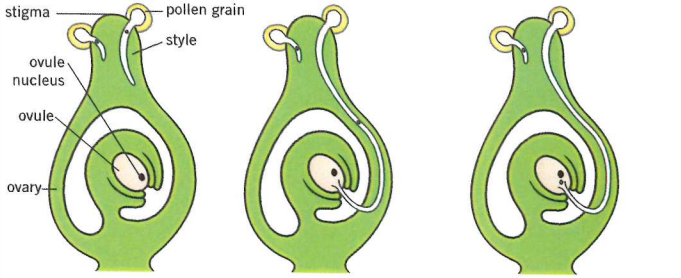
Female part of the flower

- The **stigma** is sticky to catch grains of pollen
- The **style** holds up the stigma
- The **ovary** contains **ovules**

## Pollination and fertilisation

**Pollination** is the **fertilisation** of the ovule, the point at which the pollen is transferred to the ovule from the anther to the stigma, there are two types of pollination

- Cross pollination is between two different types of plant
- Self pollination happens within the same plant




The tube grows out of the pollen grain and down through the style.

The pollen nucleus moves down the tube.

The pollen nucleus joins with the ovule nucleus. Fertilisation takes place and a seed will form.

**Germination** is the process in which the **seed** begins to grow, for this to occur the seed needs:

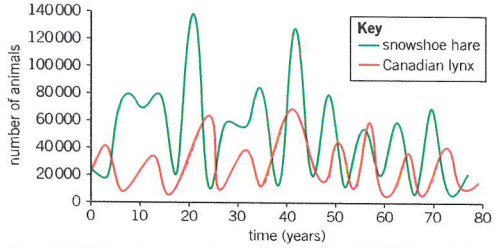
- Water to allow the seed to swell and grow and for the embryo tostart growing
- Oxygen for that the cell can start respiring to release energy forgermination
- Warmth to allow the chemical reactions to start to occur within the seed

## Ecosystems

- All of the organisms which live in one area are known as a **population**
- An **ecosystem** is all of the organisms which are found in a particular location and the area in which they live in, both the living and non-living features
- A **community** are all of the areas in an ecosystem, the area in which the organisms live in is known as the **habitat**
- A **niche** is the specific role in which an organism has within an ecosystem, for example a panda's diet consists of 99 % bamboo

## Competition

- **Competition** is the process in which organisms compete with one another for resources
- Animals compete for food, water, space and mates
- Plants compete for light, water, space and minerals
- The best competitors are those who have adapted in order to best gain these resources
- As the number of a predator in a population increases the number of the prey will decrease as more are being eaten
- As the number of the predator decreases the number of the prey will increase as less are being eaten
- The relationship between the predator and the prey is known as a **predator-prey relationship**




**Key terms** Make sure you can write definitions for these key terms.

anther bioaccumulation carpel community competition consumer ecosystem fertilisation food chain food web germination habitat interdependence niche ovary ovule petal predator prey producer pollen pollination population seed sepal stamen stigma style

# P1 Chapter 3: Energy
## Knowledge organiser

Activate
Question • Progress • Succeed

### Energy

- **Energy** is needed to make things happen
- It is measured in **joules** or **kilojoules**

- The **law of conservation of energy** says that energy cannot be created or destroyed, only transferred
- This means that the total energy before a change if always equal to the total energy after a change

Energy can be in different energy **stores**, including:

- **Chemical** – to do with food, fuels and batteries
- **Thermal** – to do with hot objects
- **Kinetic** – to do with moving objects
- **Gravitational potential** – to do with the position in a gravitational field
- **Elastic potential** – to do with changing shape, squashing and stretching

### Food and energy

- Food has energy in a chemical energy store
- Different foods contain different amounts of energy
- Different activities require different amounts of energy
- Different people need different amounts of energy depending on what they do each day

### Power and energy

- **Power** is a measure of how much energy is transferred per second
- Power is measured in **watts** (W)
- Each appliance has it's own power rating to tell us how quickly it uses energy
- We can calculate power with the equation:

$$\text{power (W)} = \frac{\text{energy (J)}}{\text{time (s)}}$$

### Non-renewable energy

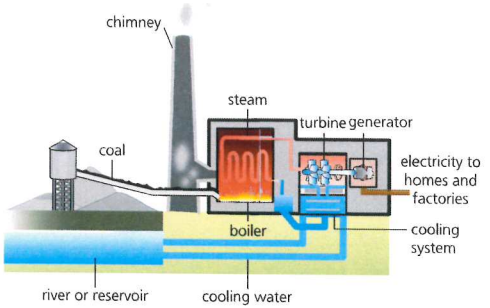
- **Non-renewable** energy cannot be replaced within your lifetime
- Non-renewable **energy resources** include coal, oil, natural gas and nuclear resources
- Coal, oil and natural gas are also known as **fossil fuels**, they release carbon dioxide when burned which contributes to global warming

### Renewable energy

- **Renewable** energy can be replaced within your lifetime
- Renewable energy resources include wind, tidal, wave, biomass, solar, hydroelectric and geothermal
- Renewable energy resources do not produce much carbon dioxide, meaning that they have a smaller effect on global warming

### Power stations

Thermal power stations burn coal, oil and natural gas, which are all non-renewable energy resources




Fuel is burned underneath water → Water is heated and turns into steam → The steam turns a turbine which turns a generator → Electricity is generated

### Dissipation of energy

- We say that energy is **dissipated** when it is transferred to a nonuseful store, it cannot be used for what it was intended for
- Energy can be wasted through friction, heating up components or heating the surroundings
- **Efficiency** is a measure of how much of the energy has been used in a useful way, we can calculate this with the equation:

$$\text{efficiency (\%)} = \frac{\text{useful energy output}}{\text{energy input}} \times 100$$

**Key terms** Make sure you can write definitions for these key terms.

chemical · dissipated · efficiency · elastic potential · energy · energy resources · fossil fuels · graviational potential · joules · kinetic · kilojoules · law of conservation of energy · non-renewable · power · renewable · thermal · watts

# B1 Chapter 9: Ecosystems
## Knowledge organiser

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Question • Progress • Succeed

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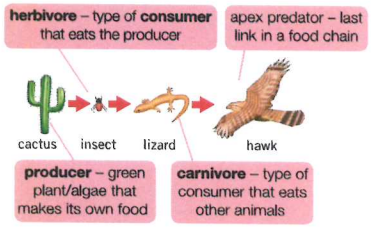
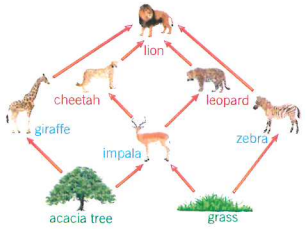



**Food web**

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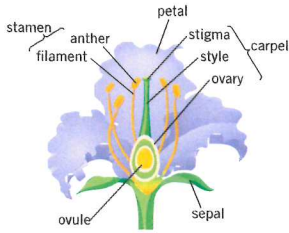


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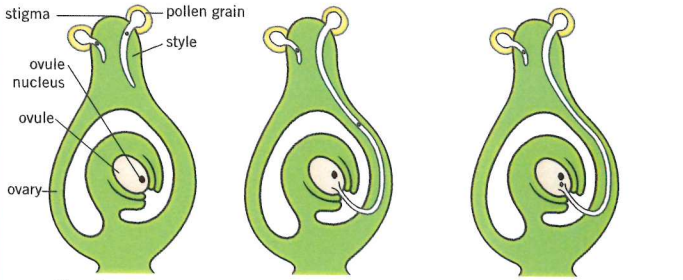



The tube grows out of the pollen grain and down through the style.

The pollen nucleus moves down the tube.

The pollen nucleus joins with the ovule nucleus. Fertilisation takes place and a seed will form.

**Germination** is the process in which the **seed** begins to grow, for this to occur the seed needs:

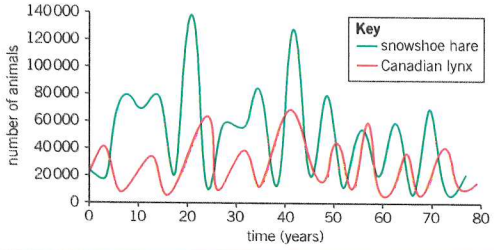
- Water to allow the seed to swell and grow and for the embryo tostart growing
- Oxygen for that the cell can start respiring to release energy forgermination
- Warmth to allow the chemical reactions to start to occur within the seed

## Ecosystems

- All of the organisms which live in one area are known as a **population**
- An **ecosystem** is all of the organisms which are found in a particular location and the area in which they live in, both the living and non-living features
- A **community** are all of the areas in an ecosystem, the area in which the organisms live in is known as the **habitat**
- A **niche** is the specific role in which an organism has within an ecosystem, for example a panda's diet consists of 99 % bamboo

## Competition

- **Competition** is the process in which organisms compete with one another for resources
- Animals compete for food, water, space and mates
- Plants compete for light, water, space and minerals
- The best competitors are those who have adapted in order to best gain these resources
- As the number of a predator in a population increases the number of the prey will decrease as more are being eaten
- As the number of the predator decreases the number of the prey will increase as less are being eaten
- The relationship between the predator and the prey is known as a **predator-prey relationship**




**Key terms** Make sure you can write definitions for these key terms.

anther bioaccumulation carpel community competition consumer ecosystem fertilisation food chain food web germination habitat interdependence niche ovary ovule petal predator prey producer pollen pollination population seed sepal stamen stigma style

# P1 Chapter 1: Forces
## Knowledge organiser

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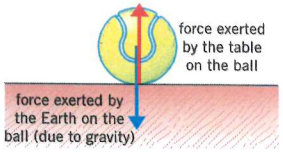
### What is a force?

- A **force** can be a **push** or a **pull**
- A force is measured in **Newtons** (N)
- We measure forces with a **newton meter**
- Forces explain why objects will move, change direction and change speed

- Forces always act in pairs, we call these **interaction pairs**

e.g. the tennis ball exerts a downward force of **weight** onto the table, the table exerts an equal and opposite reaction force onto the ball




### Types of forces

- **Contact forces** act when two objects are physically touching
- **Air resistance** and **friction** are examples of contact forces

- **Non-contact forces** act when two objects are physically separated (not touching)
- Examples of non-contact forces include **gravitational force** and magnetic forces
- We call the region where an object experiences a non-contact force a **field**, examples of these include gravitational fields and magnetic fields

### Gravity

- **Gravity** is a non-contact force that acts between two objects
- **Gravitational force** pulls you back to Earth when you jump
- The size of the gravitational force depends on the mass of the two objects and how far apart they are

- **Weight** is the downward force caused by gravity acting upon the mass of an object, it is measured in Newtons (N)
- **Mass** is the amount of matter within an object, whereas weight is the downward force of the object, we measure mass in **kilograms**
- We calculate weight with the equation:

$$\text{weight (N)} = \text{mass (kg)} \times \frac{\text{gravitational}}{\text{field strength}} \text{ (N/kg)}$$

- The value of the gravitational field strength can vary, so although a person's mass would be the same on different planets, their weight would not be

### Balanced and unbalanced forces

- When forces acting on an object are the same size, but acting in different directions, we say that they are **balanced**
- When forces are balanced, the object is either not moving (stationary) or moving at a constant **speed**

- When the two forces acting on an object are not the same size, we say that the forces are **unbalanced**
- When forces are **unbalanced**, the object will either be in **acceleration** or **deceleration**
- The **resultant force** is the difference between the two unbalanced forces


### Speed

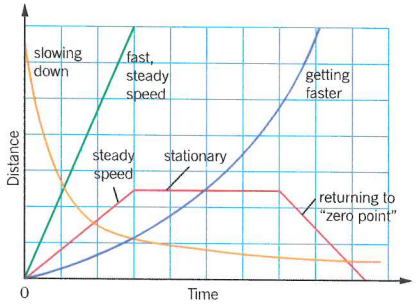
- **Speed** is a measure of how quickly or slowly that something is moving
- We measure speed in meters per second (m/s), this means that distance must be in meters and time must be in seconds
- We calculate speed with the following formula:

$$\text{speed (m/s)} = \frac{\text{distance travelled (m)}}{\text{time taken (s)}}$$

- **Relative motion** compares how quickly one object is moving compared to another
- If both objects are moving at the same speed, they are not changing position in comparison to one another, meaning that their relative speed is zero

### Distance-time graphs

- **Distance-time graphs** tell the story of a journey, they show how much distance has been covered in a certain period of time




- To find the average speed, the total distance must be divided by the total time

**Key terms** Make sure you can write definitions for these key terms.

acceleration, air resistance, balanced, contact force, deceleration, distance-time graph, field, force, friction, gravity, gravitational force, interaction pair, kilograms, mass, Newton, newton, non-contact, pull, push, relative motion, resultant force, speed, unbalanced, weight

# C1 Chapter 5: Matter
## Knowledge organiser

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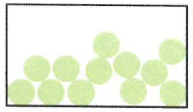
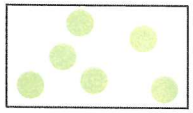
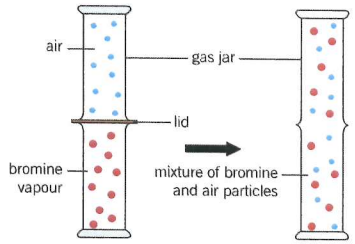
## Changes of state

| | solid | liquid | gas |
|---|---|---|---|
| changes of state | melting | boiling/evaporation | |
| state of matter | solid | liquid | gas |
| how do the particles move? | Particles donot move around | Particles touching but can slide over each other | particles are spread out far away from each other |
| arrangement of particles |  |  |  |
| can it be compressed? | No, becausethere is no space between the particles | No, because the particles are touching their neighbours | Yes, because there is space between the particles |
| can it flow? | No, because the particles can't move around | No, because the particles can't move around | Yes, because the particles can move around |
| changes of state | freezing | condensation | |

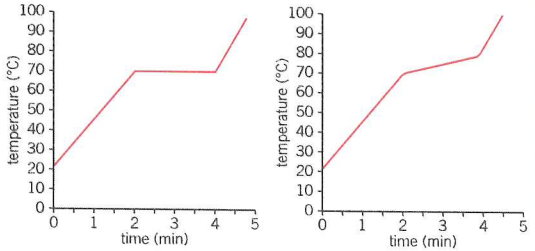
## Diffusion

- **Diffusion** is the movement of particles from an area of high concentration (lots of the same particle) to an area of low concentration (not a lot of the same particle)
- It is a random process which does not need energy
- The speed of diffusion can be increased by:
  - A higher temperature
  - Smaller particles diffusing
  - A gas rather than a liquid
- Diffusion does not happen in a solid as the particles can't flow




## Melting and boiling points

- The **melting point** of a substance is the temperature at which it turns from a solid to a liquid, or a liquid to a solid
- The **boiling point** of a substance is the temperature at which it turns from a liquid to a gas or a gas to a liquid
- **Pure substances** have a fixed (sharp) boiling or melting point, whereas **impure substances** have a range which appears as a diagonal line on a graph




## Mixtures

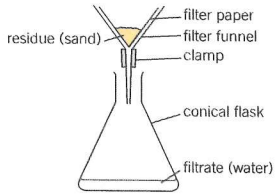
- **Mixtures** are different **substances** which are together, they are not chemically bonded and so are easy to separate
- The substances which make up a mixture keep their own **properties** unlike those in a compound
- A mixture is an **impure** substance as it does not have a fixed melting point, instead it has a range

- A **solution** is a type of mixture which is made up of two parts
- A **solute** is the part which has dissolved in the solution
- A **solvent** is the liquid part which the solute has dissolved into

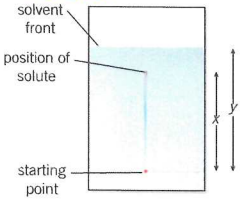
- The **solubility** of a substance is a measure of how much of it will **dissolve**
- Not all solutes will dissolve in all solvents
- Solutes which do not dissolve are known as **insoluble**
- Substances which do dissolve are known as **soluble**
- The **solubility** of a substance can be increased by increasing the temperature of the solution or by stirring the solution
- A **saturated solution** is one where the maximum amount of solute has dissolved in it, no more solute will be able to dissolve

## Separating Mixtures

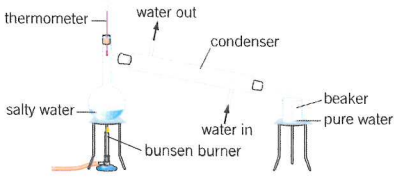
### Filtration




### Chromatography




### Distillation




### Evaporation


**Key terms** Make sure you can write definitions for these key terms.

boiling point · chromatography · condensation · diffusion · dissolve · distillation · evaporation · filtration · freezing · impure substance · melting point · mixture · property · properties · pure substance · saturated solution · substance · soluble · solubility · solute · solution · solvent

# B1 Chapter 8: Organisms
## Knowledge organiser

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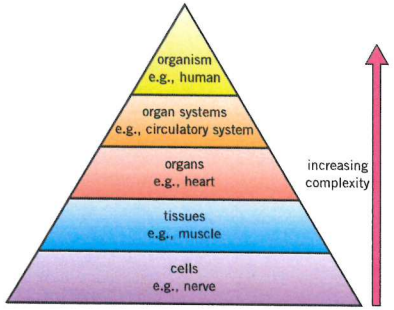
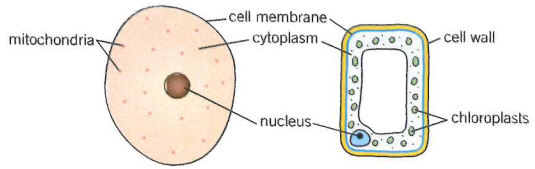
## Levels of organisation




## Plant and animal cells

- To be able to **observe** a **cell** we need to use a **microscope**, this magnifies the cell to a point to which we can see it
- Plant and animal cells have small structures inside known as **organelles**, each of these performs a certain role which allows the cell to survive

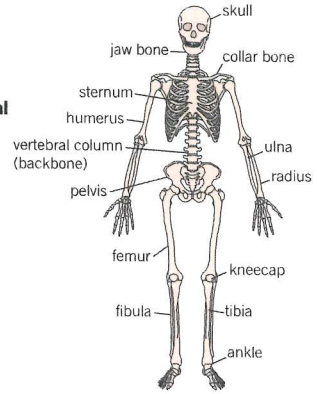



## Specialised cells

- **Specialised cells** are designed to carry out a particular function, because of this they have specific features and adaptations to allow them to carry this out
- Both plant and animal cells can be specialised, with these specialised cells working together to help the organism to survive

## The skeleton

- The **skeleton** is made up of 206 **bones** which are a type of **tissue**
- Bones have a blood supply and are a living tissue
- The skeleton is part of the **muscular-skeletal system**
- The four main functions of the skeleton are:
  - To support the body – to keep you upright and hold **organs** in place
  - Protect organs – such as the skull protecting the brain
  - Movement – by working with muscles to allow you to move
  - Making blood cells – the **bone marrow** produces red and white blood cells




## Muscles

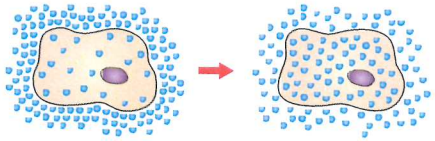
- **Muscles** are a type of tissue which allows movement
- They pull on tendons which in turn pull on bones to allow movement
- Muscles like the triceps and biceps are known as **antagonistic muscle pairs**, they work together –as one contracts, the other will relax

## Organs

- An organ is a group of tissues that have the same function
- They can work with other organs in an **organ system**, such as the respiratory system which uses organs like the heart and lungs to transfer oxygen around the body
- Vital organs are the organs that need to keep functioning for an **organism** to stay alive, e.g. the heart

## Movement into and out of cells

- The process in which substances move into and out of cells is known as **diffusion**
- This occurs across the **cell membrane**
- During diffusion particles move from an area of high **concentration**, to an area of low concentration




- Oxygen and nutrients enter the cell by diffusion, carbon dioxide and waste products leave

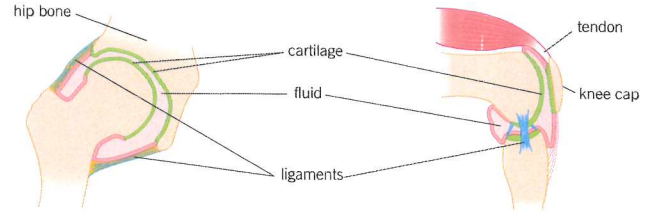
## Movement

**Joints** occur between bones and allow movement, there are three main types of joints

| Hinge | Ball and socket | Fixed |
|---|---|---|
| *For back and forward movement, e.g. knees* | *For movement in all directionse.g. hips* | *Do not allow movement, e.g. skull* |

Joints have three main types of tissue:

| Ligaments | Cartilage | Tendons |
|---|---|---|
| *Connect bone to bone* | *Coats the end of bones as a protection* | *Connects bone to muscle* |




**Key terms** Make sure you can write definitions for these key terms.

antagonistic muscle pair · bone · bone marrow · cartilage · cell · concentration · diffusion · joints · ligaments · microscope · muscular skeletal system · nucleus · organ · organism · organ system · skeleton · specialised cells · tendons · tissue

# C1 Chapter 6: Reaction
## Knowledge organiser

Activate
Question • Progress • Succeed

### Chemical reactions

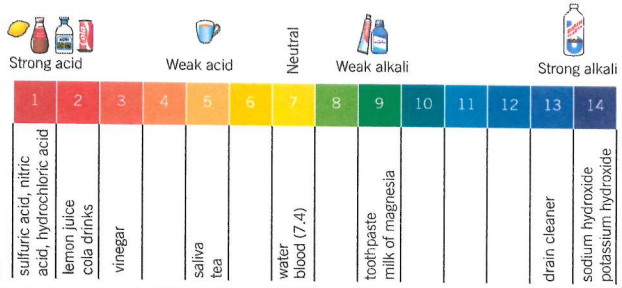
- A **chemical** reaction is a change in which atoms are rearranged to make new substances
- A **reversible** reaction is one where the products can react to get back the substances which you started with, most chemical reactions are not reversible
- You can look for signs that a chemical reaction has taken place such as flames, smells, heat change, a loud bang or gentle fizz

### Acids and alkalis

- **Acids** and **alkalis** are the chemical opposites of one another
- Both acids and alkalis can be **corrosive** and **irritants**

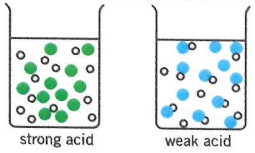
To see whether a substance is an acid or an alkali, we can use an **indicator**. Indicators show how acidic or how alkaline a solution is by showing its position on the **pH scale**, one example of this is **universal indicator**

- If the solution has a pH value of 1–6 it is **acidic**
- If the solution has a pH value of 8–14 it is **alkaline**
- If the solution has a pH value of 7 it is known as **neutral**




### Acid strength

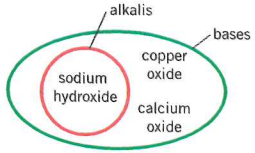
- The strength of an acid depends on how much of the acid has broken apart when it has dissolved in water
- Hydrogen chloride dissolves in water to form hydrochloric acid, this is a **strong acid** as all of the particles split up
- A **weak acid** will have particles that do not all split up




- The **concentration** of the acid is the amount of acid which has dissolved in 1 litre of water
- The more concentrated the acid, the lower the pH

### Neutralisation

- **Neutralisation** reactions are any reaction in which acids react with a **base** to cancel out the effect of the acid
- These reactions form a neutral solution with a pH of seven
- A **base** is any substance which neutralises an acid
- An alkali is a base which has been dissolved in water




### Salts

**Salts** are substances which are formed when an acid reacts with a metal or metal compound

Different acids form different types of salts:

- Hydrochloric acids form chloride
- Sulphuric acids form sulphates
- Nitric acids form nitrates

### Metal reactions

When a metal reacts with an acid it will produce a salt and hydrogen gas, the fizzing that you see is the hydrogen gas being given off

metal + acid → salt + hydrogen
magnesium + hydrochloric acid → magnesium chloride + hydrogen

When a metal reacts with oxygen a metal **oxide** is formed, this process is known as **oxidation**

metal + oxygen → metal oxide
aluminum + oxygen → aluminum oxide

- When a metal reacts with water it forms a metal **hydroxide** and hydrogen gas.
- The alkali (group 1) metals react most vigorously, giving off a brightly coloured flame

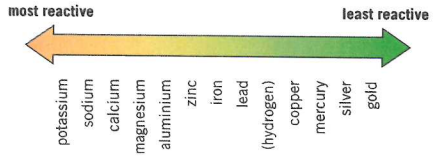
metal + water → metal hydroxide + hydrogen
sodium + water → sodium hydroxide + hydrogen

When a more reactive metal reacts with a compound containing a less reactive metal, it can take it's place, this is known as a **displacement** reaction


- If the metal on it's own is higher in the **reactivity series** than the metal in the compound a reaction will take place
- If the metal on it's own is lower in the reactivity series than the metal in the compound, a reaction will not take place

### The reactivity series

- The **reactivity series** describes how reactive different metals are compared to one another
- The higher the metal is in the reactivity series the more reactive it will be this means that it will react much more vigorously




### Key terms

**Make sure you can write definitions for these key terms.**

acid, acidic, alkali, alkaline, base, chemical, chemical reaction, concentration, concentrated, corrosive, displacement, hydroxide, indicator, irritant, neutral, neutralisation, oxide, oxidation, pH scale, reversible, reactivity, reactivity series, salt, strong acid, universal indicator, weak acid