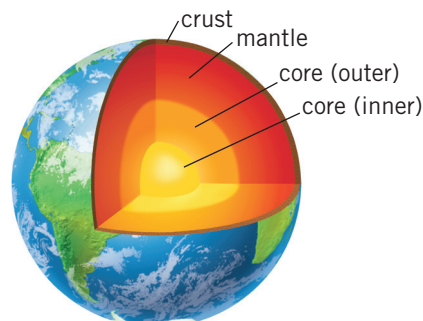


# P1 Chapter 7: Earth Knowledge organiser

## The Earth

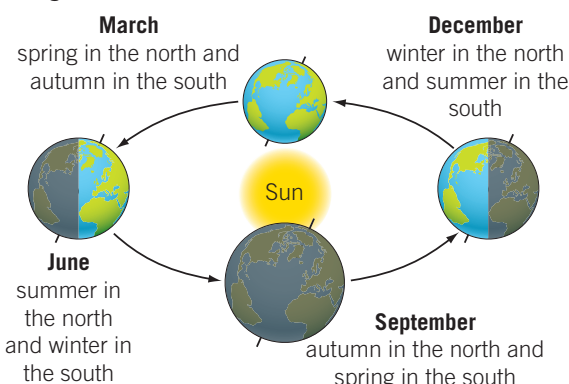


The Earth has three main layers:

- The **crust** is rocky and solid
- The **mantle** is made from mainly solid rock but this can flow
- The **outer core** is liquid metal and the **inner core** is solid

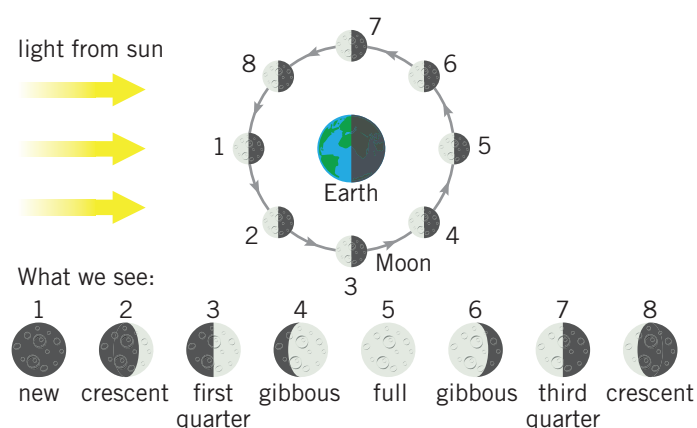
## The spinning Earth

- The Earth takes 365 days to **orbit** the Sun, this is one Earth **year**
- The Earth takes 24 hours to spin on its axis, that is why we have day and night
- The Earth's **axis** has a tilt of 23.4° which gives rise to our **seasons**



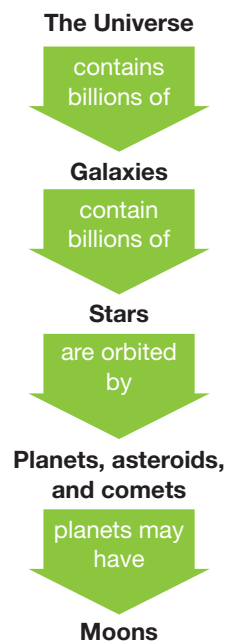
## The Moon

- The Moon is a **natural satellite** which orbits the Earth
- One orbit of the Earth takes 27 days and 7 hours, this causes us to see the **phases of the moon**
- The different phases of the moon are caused by different parts of the Moon being lit by the Sun



## The night sky

- A **galaxy** is a collection of **stars**, our galaxy is known as the **Milky Way**
- Stars** produce their own light
- Planets** are large objects which do not produce their own light but orbit stars
- Natural satellites** include moons which can orbit planets
- Artificial satellites**, such as the International Space Station, are man made structures which can orbit planets



## Types of rock

Type of rock	How it is formed	Properties	Uses
<b>sedimentary rock</b>	<ul style="list-style-type: none"> <li>sediment piles up in one place and, over many years, sticks together by compaction or cementation</li> <li><b>compaction</b>: weight of sediments above squeeze them into rocks</li> <li><b>cementation</b>: another substance sticks the sediments together</li> </ul>	<ul style="list-style-type: none"> <li><b>porous</b>: made of small grains stuck together so there are holes that water can pass through</li> <li>soft: easy to break apart the sediments</li> </ul>	building materials (e.g. sandstone and limestone)
<b>igneous rock</b>	<ul style="list-style-type: none"> <li>when liquid rock cools it turns into igneous rocks these are made of crystals locked tightly together</li> <li><b>magma</b>: liquid rock underground-cools slowly and forms large crystal</li> <li><b>lava</b>: liquid rock above the ground-cools quickly and forms small crystals</li> </ul>	<ul style="list-style-type: none"> <li><b>durable</b> and hard (difficult to damage): the crystals are locked tightly together</li> <li>not porous: there is no space between crystals</li> </ul>	pavement rail tracks
<b>metamorphic rock</b>	<ul style="list-style-type: none"> <li>other rocks under that Earth are heated and put under pressure</li> <li>over time, these rocks become metamorphic</li> </ul>	<ul style="list-style-type: none"> <li>not porous: there is no space between crystals</li> </ul>	marble used for kitchens slate used for roofing tiles

## The Solar system

Our **solar system** consists of eight planets which orbit the Sun, four inner and four outer planets

Inner planets  
*Small and rocky planets (dwarf planets)*

Mercury, Venus, Earth, Mars

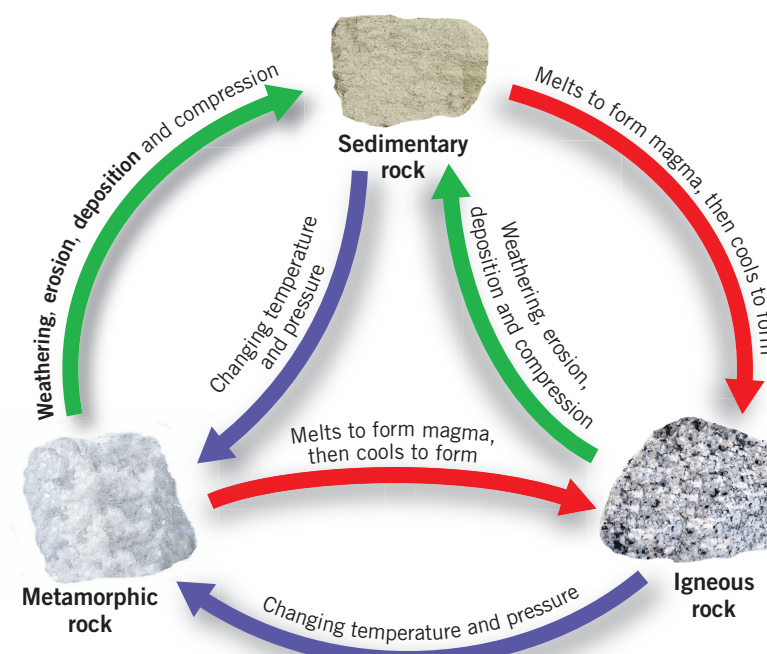
Outer planets  
*Gas giants*

Jupiter, Saturn, Uranus, Neptune

- Between the inner and outer planets, between Mars and Jupiter, there is the **asteroid belt**
- The planets all orbit the Sun, but the path of their orbits are all slightly different, giving them the look of 'wandering' in the sky

## The rock cycle

The **rock cycle** shows how rocks change and how their materials are recycled over millions of years



## Key terms

Make sure you can write definitions for these key terms.

asteroid belt artificial satellite axis crust deposition durable dwarf planet galaxy gas giants igneous rock lava inner core  
magma mantle metamorphic rock milky way natural satellite outer core orbit phases of the moon planet porous rock cycle season  
sediment sedimentary rock solar system star sun universe year

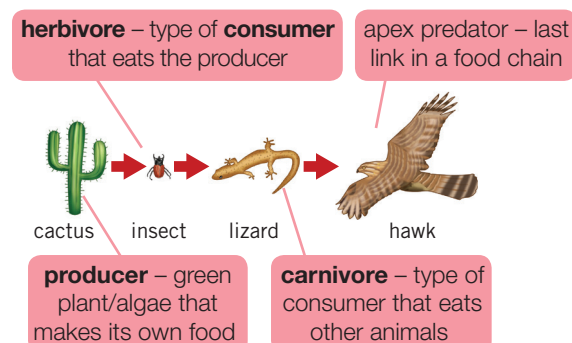
# B1 Chapter 9: Ecosystems

## Knowledge organiser

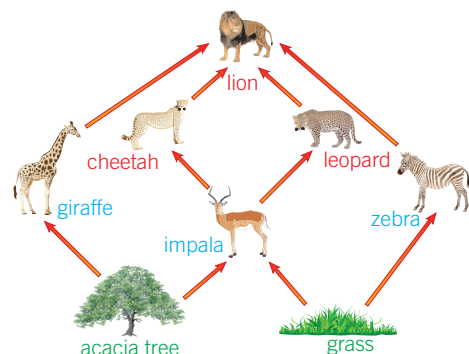
### Food chains and webs

- 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

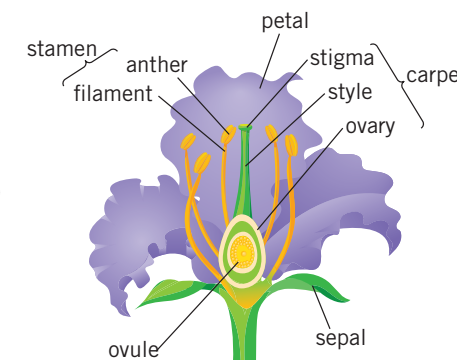
- Interdependence** is the way in which living organisms rely on each other to survive
- A food chain will be disrupted if one of the organisms die out
- If the producer dies out the rest of the food chain will also die out unless they have a different food source
- If the **consumer** population die 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

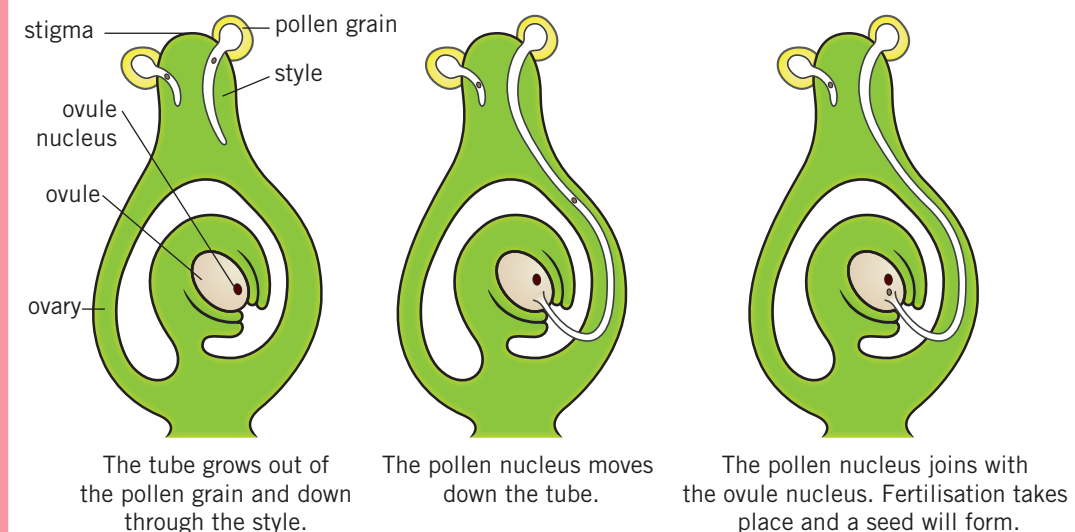
Female part of the flower

- 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



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

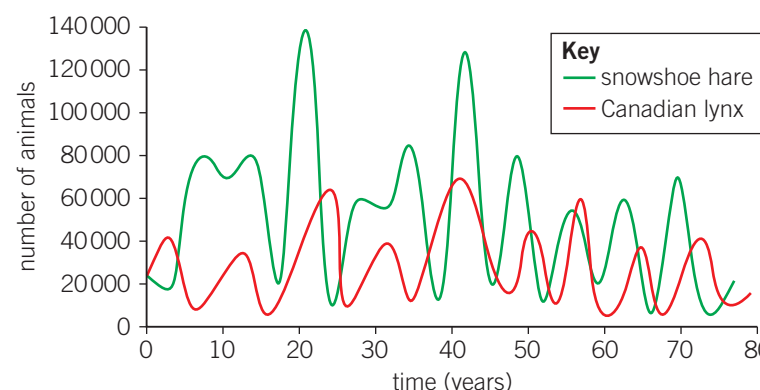
- Water to allow the seed to swell and grow and for the embryo to start growing
- Oxygen for that the cell can start respiring to release energy for germination
- Warmth to allow the chemical reactions to start to occur within the seed

### 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**



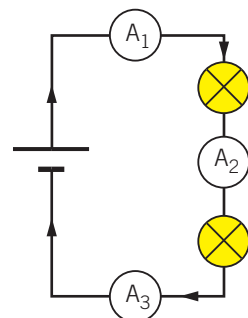
#### Key terms

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

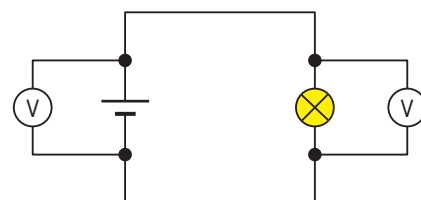
### Current

- Current** is the amount of **charge** flowing per second
- The charges that flow in a circuit are **electrons**, they are negatively charged
- Electrons** leave the negative end of the **cell** and travel around the circuit to the positive end of the cell
- Current has the unit of Amps (A) and is measured with an **ammeter** (which is placed in series or in the main circuit)



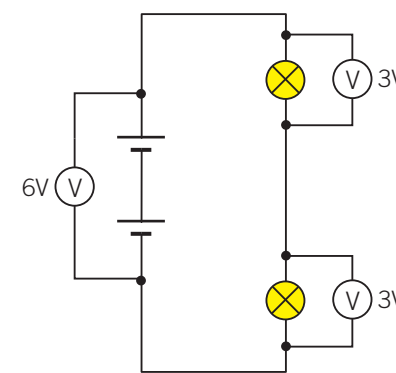
### Potential difference

- Potential difference** is the amount of energy transferred by the cell or **battery** to the charges
- The value of potential difference tells us about the force applied to each charge and then the energy transferred by each charge to the component which it passes through
- Potential difference has the unit of volts (V) and is measured with a **voltmeter** (which is placed in parallel to the circuit)



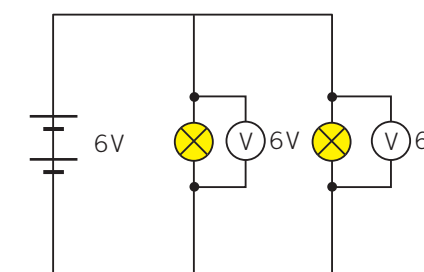
### Series circuits

- Series** circuits only have one loop
- If one component breaks, the whole circuit stops working
- Current is the same everywhere in a series circuit
- The total potential difference from the battery is shared between the components in a series circuit
- Adding more bulbs decreases the brightness of the bulbs



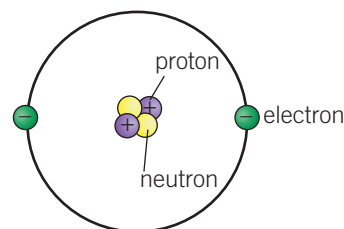
### Parallel circuits

- Parallel** circuits have more than one loop
- If one component breaks, the rest of the circuit will still work
- Current is shared between the different loops in the circuit
- The potential difference is the same everywhere in the circuit
- Adding more bulbs does not affect the brightness of the bulbs



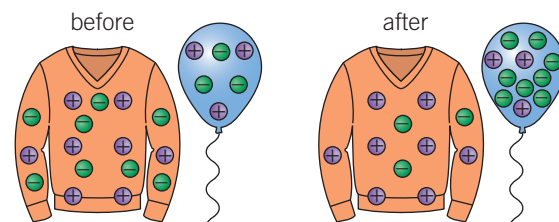
### The atom

- The **atom** consists of a central nucleus with electrons orbiting around the outside in shells
- Electrons** have a negative charge
- Protons** are inside the nucleus and have a positive charge
- Neutrons** are inside the nucleus and have a neutral charge



### Static electricity

- Static electricity is caused by the rubbing together of two **insulators**
- This causes electrons to be transferred, leaving one object with a positive charge, and one object with a negative charge



- Like charges will **repel**, opposite charges will **attract**



### Resistance

- Resistance** is a measure of how easy or how hard it is for charges to pass through a component in a circuit
- Resistance has the unit of ohms ( $\Omega$ )
- Resistance is calculated by measuring potential difference and current and using the following equation:

$$\text{resistance } (\Omega) = \frac{\text{potential difference (V)}}{\text{current (A)}}$$

- Materials with a high resistance are said to be **insulators**
- Materials with a low resistance are said to be **conductors**



#### Key terms

Make sure you can write definitions for these key terms.

ammeter atom attract battery cell conductors current electrons electric charge insulator neutral neutrons parallel  
potential difference protons repel resistance series voltmeter



# P1 Chapter 3: Energy

## Knowledge organiser

### 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 is 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 its 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

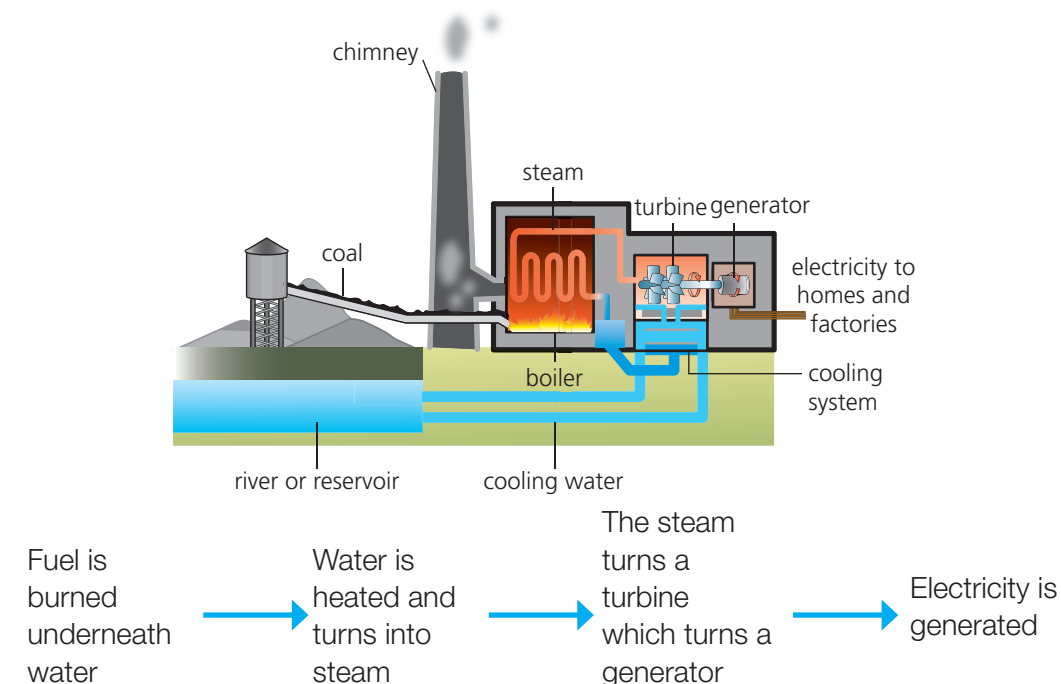
- **Non-renewable** energy cannot be replaced within your lifetime
- Non-renewable **energy resources** include coal, oil, natural gas and nuclear resources
- Coal, oil and natural gas are also known as **fossil fuels**, they release carbon dioxide when burned which contributes to global warming

### 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



### 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    gravitational potential    joules    kinetic    kilojoules  
law of conservation of energy    non-renewable    power    renewable    thermal    watts

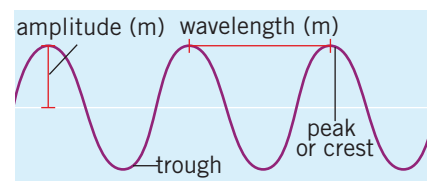


# P1 Chapter 4: Waves

## Knowledge organiser

### Properties of waves

- A **wave** is an **oscillation** or **vibration** which transfers energy from one place to another
- Amplitude** – the distance from the middle to the top or bottom of the wave
- Wavelength** – the distance between a point on the wave to the same point on the next wave
- Trough** – The bottom of the wave
- Peak** – The top of the wave
- Frequency** – How many waves pass a fixed point per second, measured in Hertz (Hz)



There are two main types of waves:

**Transverse** waves, e.g. light

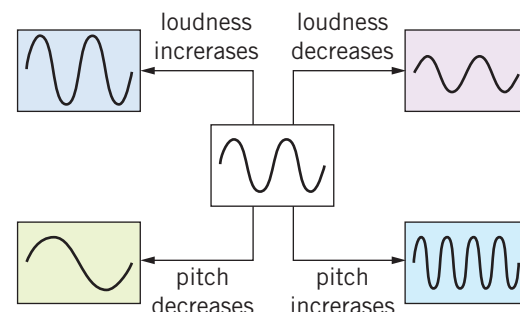
- Travel at 90° direction of energy transfer
- Do not need a medium to travel through

**Longitudinal** waves, e.g. sound

- Travel in the direction of energy transfer
- Need a medium to travel through

### Sound waves

- Sound waves are caused by the vibration of particles, sound travels quicker in a solid than a gas as the particles are closer together
- Oscilloscopes** display sound waves on a screen
- Humans can hear between 20–20 000 **hertz** (Hz), but other animals have different ranges of hearing
- Sound waves above 20 000 Hz are known as **ultrasound**, these sound waves are too high pitched for humans to hear

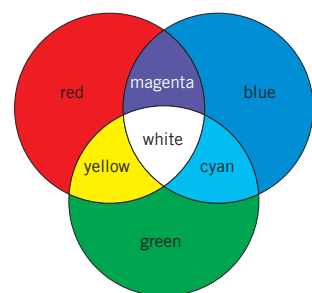


### Hearing

- The **pinna** directs sound along the **auditory canal** to the **eardrum** which will vibrate
- The vibration from the ear drum moves onto the ossicles which amplifies the sound
- This passes the sound to the cochlea where tiny hairs detect the vibrations and passes this along to the **auditory nerve** as electrical signals for our brain

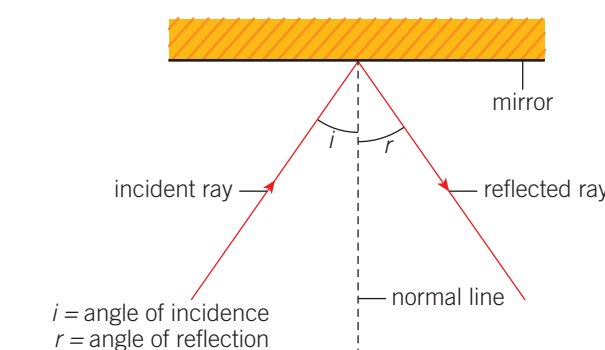
### Colour

- Light can be split using a prism and is made up from different colours of light
- Primary colours** can be mixed in order to form **secondary colours**
- Objects appear a certain colour as they absorb all other colours of light, but reflect the colour of light which they appear.

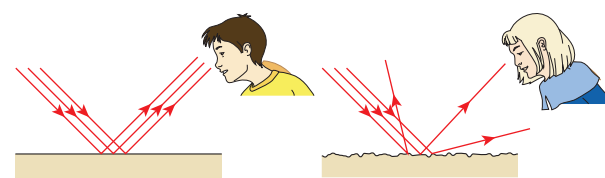


### Reflection

- The **law of reflection** states that the **angle of incidence** will be equal to the **angle of reflection**

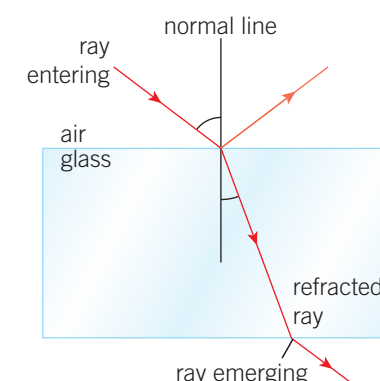


- For light reflecting off a smooth surface will form an image is called **specular reflection**
- Reflection off of a rough surface will not form an image and is known as **diffuse scattering**



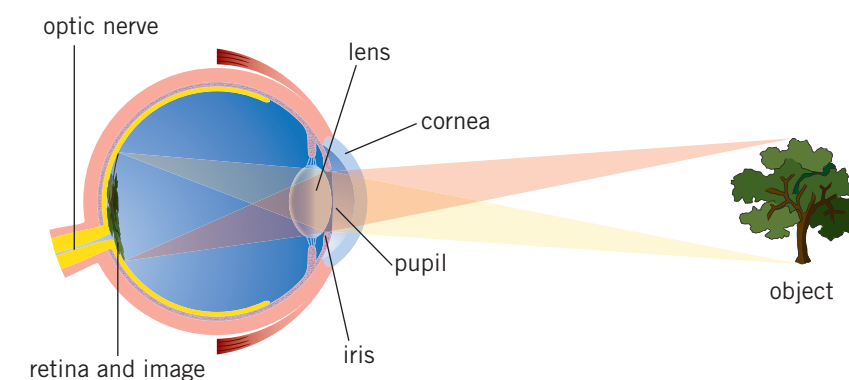
### Refraction

- Refraction** occurs when a wave passes between two different substances
- This happens as the wave will travel at different speeds in the different materials
- When the wave passes into a more dense material from a less dense material it will bend towards the **normal**, e.g. air into glass
- When the wave passes into a less dense material from a more dense material it bends away from the normal e.g. glass to air



### Light and the eye

- Light entering your eye is refracted by the **lens**, focusing it on the retina and creating an inverted image
- Photoreceptors** detect the light hitting your retina and send an electrical impulse to your brain
- If the light is not focussed on the retina or the eye, people cannot see properly
- Long sighted people have the light focus behind the eye, short sighted people have the light focus in front of the retina.
- Lenses can be used to refract the light in a way in which it will focus on the retina.



#### Key terms

Make sure you can write definitions for these key terms.

amplitude angle of incidence angle of reflection auditory canal auditory nerve diffuse scattering eardrum frequency hertz law of reflection lens longitudinal normal oscillation oscilloscope peak photoreceptors primary colour refraction secondary colour specular reflection transverse trough ultrasound wave wavelength

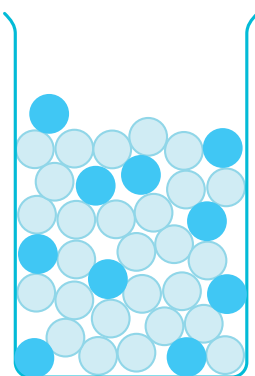
### Acids and alkalis

**Acids** and **alkalis** are special solutions which are chemical opposites to each other.

If a solution is between acid and alkaline it is **neutral**.

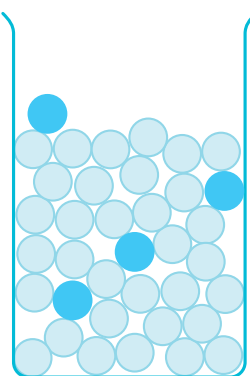
Acids and alkalis can be:

**concentrated**



Lots of acid/alkali particles for the amount of water.

**dilute**



A small number of acid/alkali particles in the same amount of water.

Acids and alkalis are **corrosive**

This means that they can cause burns if they get on your skin.



Acids and alkalis can be extremely dangerous, depending on the type of acid/alkali and its concentration.

As a general rule the more concentrated the solution, the more dangerous it can be.

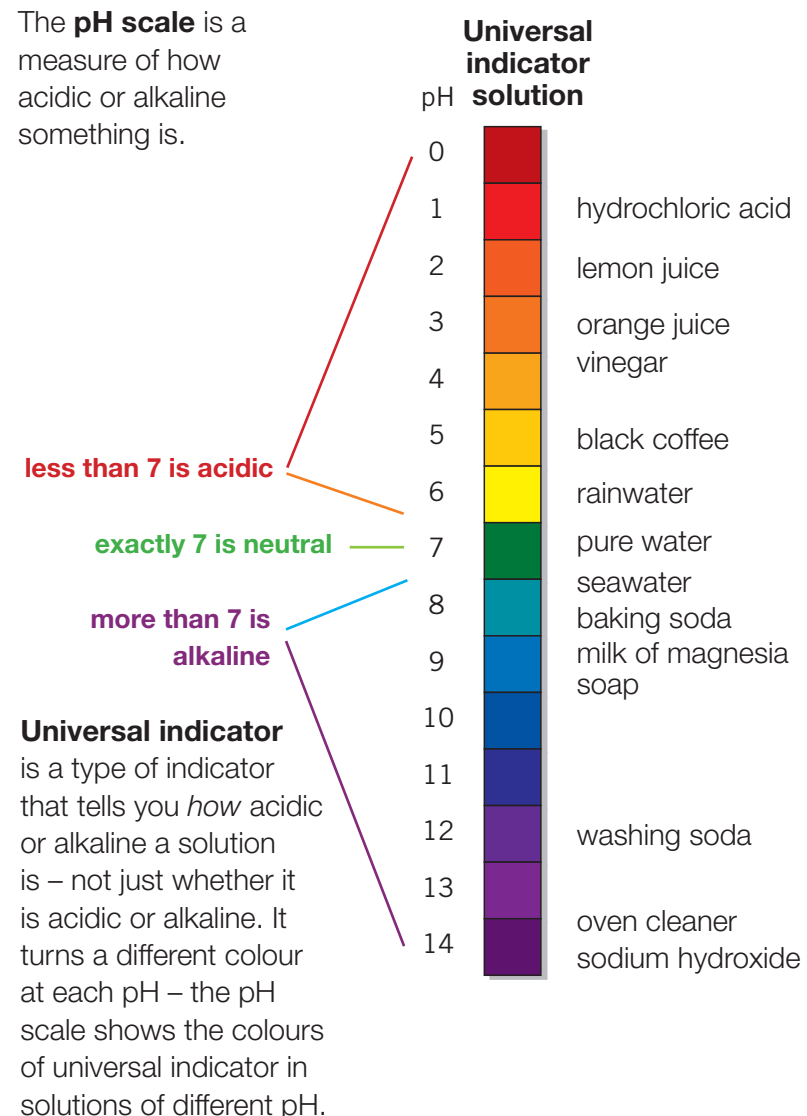
### Indicators

If you want to know if something is acidic or alkaline, you need to use an **indicator**. Indicators contain a dye that turns different colours in acidic and alkaline solutions.

**Litmus** paper is a type of indicator. It can be either **pink** paper or **blue** paper.

- in acid – **blue** paper turns **pink**
- in alkali – **pink** paper turns **blue**

The **pH scale** is a measure of how acidic or alkaline something is.



### Reactions with acids

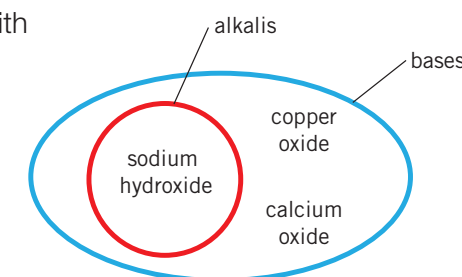
When an acid reacts with a metal element or compound a **salt** is formed. The hydrogen atoms of the acid are replaced with atoms of the metal element.



A **base** is a compound that can react with an acid to make a neutral solution.

This is called **neutralisation**.

Bases that are soluble in water are **alkalis**.



Neutralisation reactions produce water and a salt.

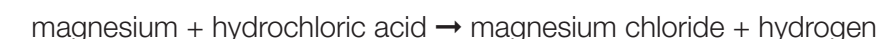


for example,



Metals can also react with acids, but they produce a salt and hydrogen gas.

for example,



### Naming salts

The name of the metal comes first, for example, **magnesium** chloride.

Different acids produce different types of salt:

- hydrochloric acid produces metal **chlorides**
- sulfuric acid produces metal **sulfates**
- nitric acid produces metal **nitrates**



### Key terms

Make sure you can write definitions for these key terms.

acid

alkali

base

concentrated

corrosive

dilute

indicator

litmus

neutral

neutralisation

pH scale

salt

universal indicator