Key Stage 3: Year 7 Curriculum- Key content Terms 3 and 4

CHEW VALLEY

Chew Valley School

Learn Grow Achieve

Design Technology Skills	Project Skills	Equipment & Materials
• Resilience	• Cooking	• Cooker
• Perseverance	• Measuring	• Hob
• Independence	• Weighing	• Grill
• Team Work	• Temperature control	• Oven
• Health & Safety	• Bridge Grip	• Vegetable knife
• Planning	• Claw Grip	• Frying pan
• Cooking	• Hygiene	• Utensils
• Preparation	• Grating	• Chopping boards
• Making	• Baking	• Scales
• Critique	• Frying	• Sieve
• Quality Control	• Grilling	• Measuring jug
• Evaluating	• Cutting	• Teaspoon
• Sensory Analysis	• Rubbing in method	• Whisk

Desk Organiser

Design Technology Skills	Project Skills	Equipment & Materials
• Resilience	• Measuring	• Tenon Saw
• Perseverance	• Marking out	• Pillar drill
• Independence	• Cutting	• Junior hacksaw
• Health & Safety	• Assembling/making	• Belt sander
• Designing	• Half lap joint	• Bench hook
• Modelling	• Drilling	• Jigs
• Making	• Shaping	• Line bender
• Critique	• Moulding	• Acrylic
• Quality Control	• Isometric design	• Softwood
• Evaluating	• Iterative design	• Glass paper

Branding

Design Technology Skills	Project Skills	Equipment & Materials
• Resilience	• CAD	• Laser cutter
• Perseverance	• CAM	• Sewing machine
• Independence	• 2D Design	• Sublimation Printer
• Team Work	• Mind mapping	• Heat press
• Health & Safety	• Threading	• Needle
• Research	• Machine Sewing	• Bobbin
• Designing	• Driving Test	• Thread
• Modelling	• Resist Dyeing (Tie-dye)	• Pins
• Making	• Heat Transfer Printing	• Fabric Shears
• Critique	• Pattern Cutting	• Cotton (Natural Fibres)
• Quality Control	• Economical Lay Plan	• Polyester (Synthetic Fibres)
• Evaluating	• Plain Seam	• Plywood
	• Hems	
	• Seam Allowance	

Designer Lantern

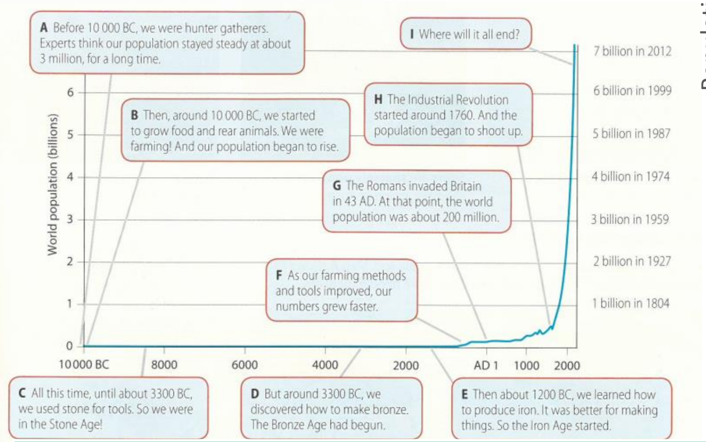
Design Technology Skills	Project Skills	Equipment & Materials
• Resilience	• Electronics	• Tenon Saw
• Perseverance	• Soldering	• Pillar drill
• Independence	• Circuits	• Mitre saw
• Team Work	• Sewable circuit	• Solder
• Health & Safety	• CAD	• Soldering iron
• Research	• Machine Sewing	• Needle
• Designing	• Sublimation Printing	• Conductive thread
• Modelling	• Measuring	• Battery cell holder
• Making	• Marking out	• LED
• Critique	• Cutting	• Sewing machine
• Quality Control	• Assembling/making	• Sublimation Printer
• Evaluating	• Half lap joint	• Heat press
• Iterative design	• Mitre joint	• Vilene (bonded fabric)
• Isometric drawing	• Dowel joint	• Softwood
• Design movements		• Hardwood

Geography

Population and Urbanisation

Key Terms

Term	Definition
Population	total number of people
Population distribution	Where the population are spread out
Population density	How many people live per square km
Sparsely populated	Not many people living per square km
Densely populated	Many people living per square km
Life expectancy	How long someone is expected to live in a specified country
Population growth rate	The amount a population has increased by in a year (expressed as a percentage)



How Physical features affect population growth

Feature	How it impacts	Expected population
Mountain	Difficult to build on and travel to/from	Low density
Rivers	Can flood Provide water Often flat ground either side good for building and farming	Often high density but high risk unless river managed
Forest	Useful building materials available Density of trees makes building difficult	Low density unless deforestation occurs
Climate	Too hot – difficult to live and water supply issues Too cold – difficult to live	Low density expected
Coastal	Great for trade, tourism and fishing	High density

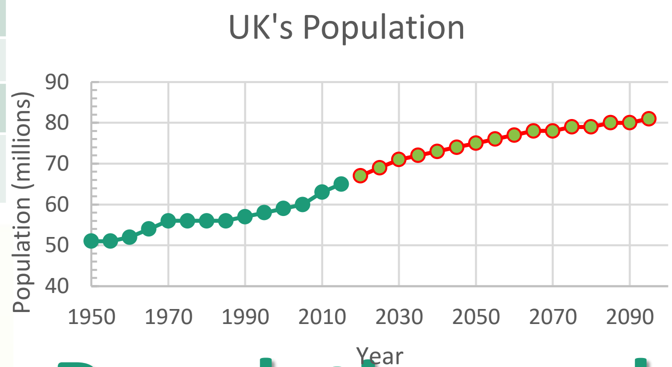
Coping with an ageing population

The UK government needs to be prepared and be ready for:

- An increased need for housing, transport, medical care, pensions, care workers and leisure activities for elderly people

Older people also provide an important contribution to

- Voluntary work
- The economy ' the grey pound'
- The democracy 'the grey vote'



What is urbanisation?

The process of cities getting bigger by people moving in to them

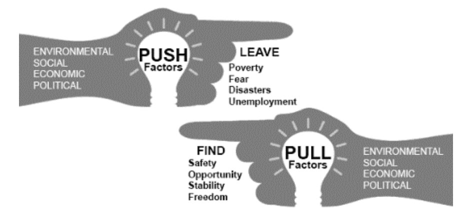
How cities grew

Small farming settlements began, people sold produce to market towns grew. The industrial revolution meant people lived near to factories that they worked in. This is now happening fast in Africa and Asia.

Urbanisation around the world c

- Africa has the lowest % urbanisation
- In Brazil 80% of people live in urban areas
- In Nepal less than 20% of the live in urban areas
- In Saudi Arabia, more than 80% live in urban areas
- Urbanisation is increasing and set to continue
- By 2050, 2/3rd s will live in urban areas globally
- Governments like to know their percentages so they can plan services accordingly

Why people migrate



Life expectancy and resource reliance

As we live longer we need more resources which puts pressure on the planet.

- The more food we need to feed us – the more land is cleared for farming, the more minerals are dug up to make fertilisers
- The more homes we need (huts, flats, houses) the more land is cleared for homes. Timber, stone, clay and sand is used up
- The more fuel we need (oil, coal, gas, petrol, electricity, firewood) the more trees are gone which means more land is cleared for oil and gas wells, coal mines and power stations

Migration to LIDC cities generates slums

These are often found: on hillsides, by main roads, by railways, under fly overs, close to the CBD, on flood plains, on rubbish tips or derelict land

Future Population issues globally

Ethiopia (LIDC) in 2050

-Life expectancy is rising in Ethiopia. Even so, the % of people aged 66 and over will still be low by 2050

-But look at the high % aged under 15. Ethiopia will have a very young population.

-With so many young people, many may find it hard to get work when they grow up.

Germany (AC) in 2050

-There will be more people aged over 65 than under 15. So this is an ageing population

-People of working age will have many elderly people to support

-The % of young people is low. When they grow up, there won't be enough of them to do all the work

-So Germany will need immigrants from other countries

Future cities should be sustainable like Masdar

They need to be able to :

- Cope with changing climate, manage transport, get resources, water, dispose of waste, provide leisure areas, have accommodation, produce food, produce energy – all without impacting at all on the air, water, land around it. Is it possible?

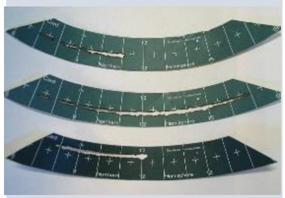
What's the difference between weather and climate?

Climate – the average weather over 30 years	Weather – the day to day condition of the atmosphere

What causes the weather?

1. The sun heats the earth – but unevenly.
2. Earth in turn warms the air, which rises.
3. Rising air leads to wind, because air from a colder place flows in to replace it.
4. The sun's heat also causes water to evaporate, giving water vapour.
5. When the air rises it cools.

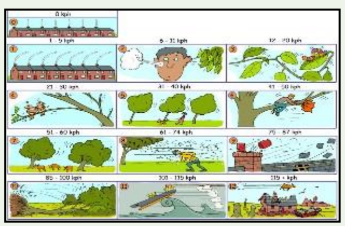
How is the weather measured?



Sunshine
Sunshine recorder

Glass ball focuses the suns rays (like a magnifying glass) to burn a hole in the cardboard recording sheet. Gaps in the burning represent times when the cloud covered the sun., preventing the burning.

Wind
Anemometer
(Beaufort Scale)



An **anemometer** is an instrument used to measure how fast the wind in blowing. The Beaufort Scale is used to measure wind speed

Temperature
Thermometer

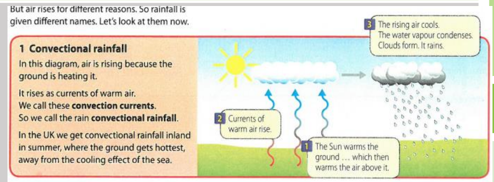
A maximum and minimum thermometer is a temperature measuring device that is designed to show the highest and lowest temperatures reached.

Rainfall

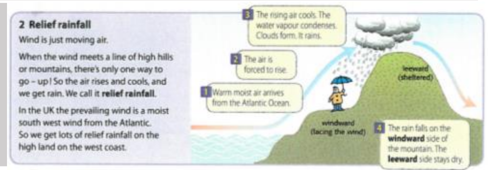
Why does it rain?

- The sun warms the water in the oceans, rivers and lakes
- Some water evaporates to form an invisible gas called Water Vapour. It goes into the air
- When the air rises, it cools. The water condenses to give clouds of water droplets
- Droplets join to form bigger drops. When these grow heavy enough, they fall as rain

Convectional Rainfall

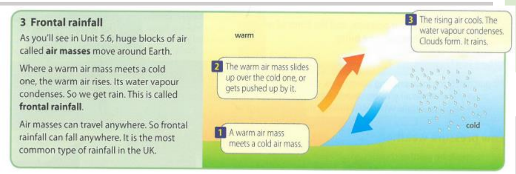


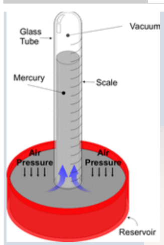
Relief Rainfall



Weather and Climate

Frontal Rainfall

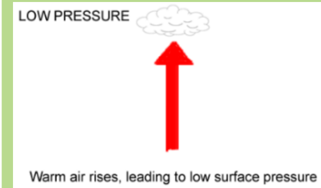




Pressure
Barometer

Air pressure is the weight (force) of the air above pressing down on the Earth. It is measured using a Barometer.
There are two main types of Barometer:
Mercury
Aneroid
The unit of measurement for air pressure is kilopascals (kPa) or inches of mercury.

Air pressure

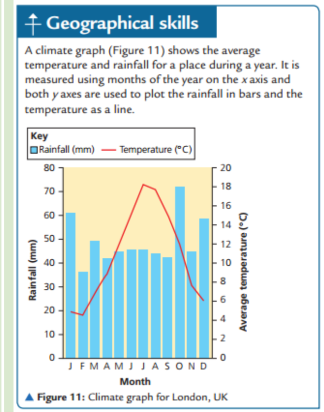


Rising air cools down and condensation occurs. This makes cloud and rain.	Falling air warms up and any moisture becomes absorbed. This leads to clear skies.

Climate Graphs

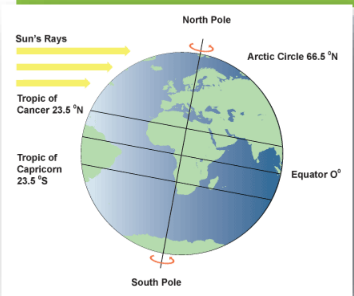
How to construct a climate graph…

- Draw and label the axes (remember you need two names for the y axis – 'temperature' and 'rainfall').
- Work out the right scale for each axis (look at your highest temperature and rainfall figures).
- Draw the graph using bars for rainfall and a line for temperature. Remember to plot the temperature points in the middle of the months on the x axis.



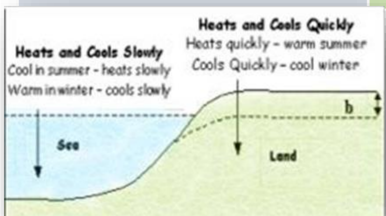
Clouds –
form when air rises, cools and condenses

What factors affect climate?



Latitude or distance from the equator

Temperatures drop the further an area is from the equator due to the curvature of the earth. In areas closer to the poles, sunlight has a larger area of atmosphere to pass through and the sun is at a lower angle in the sky. As a result, more energy is lost and temperatures are cooler.

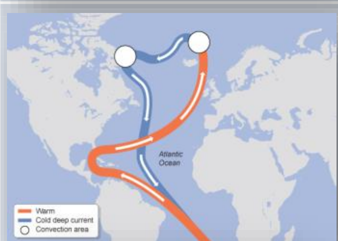


Distance from the sea

Oceans heat up and cool down much more slowly than land. This means that coastal locations tend to be cooler in summer and warmer in winter than places inland at the same latitude and altitude. Glasgow, for example, is at a similar latitude to Moscow, but is much milder in winter because it is nearer to the coast than Moscow.

Prevailing wind

The prevailing wind is the most **frequent wind direction** a location experiences. In Britain the prevailing wind is from the south west, which brings warm, moist air from the Atlantic Ocean. This contributes to the frequent rainfall. When prevailing winds blow over land areas, it can contribute to creating desert climates.



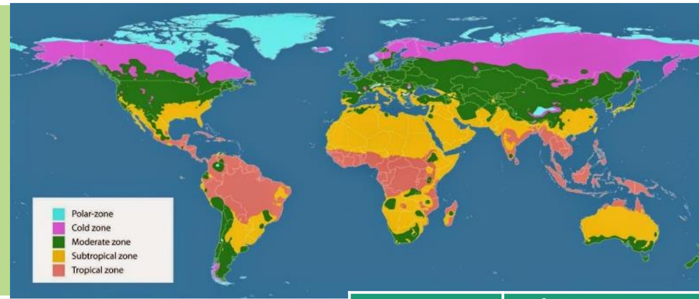
Ocean currents

Britain has a maritime climate. A warm ocean current called the North Atlantic Drift keeps Britain warmer and wetter than places in continental Europe.

Altitude or height above sea level

Locations at a higher altitude have colder temperatures. Temperature usually decreases by 1°C for every 100 metres in altitude.

Climate zones of the world



Tropical Climate (Equatorial)
City = Belem (Brazil)

Dry Desert Climate (Deserts)
City = Cairo (Egypt)

Warm Temperate Climate
City = Sydney (Australia)

Cold Temperate Climate and Weather
City = London (England)

Polar Climate and Weather
City = Moscow (Russia)

Microclimates

Microclimate is the weather of a small area

- You used the following instruments to investigate the best site for a swimming pool at Chew Valley School:
- Thermometer
- Anemometer
- Compass for direction

Key Term	Definition
Weather	The state of the atmosphere at any given time – for example how warm it is
Climate	What the weather in a place is usually like, over the year; they take measurements over long periods and calculate the average
Anemometer	Instrument used to measure wind speed
Barometer	Instrument used to measure air pressure
Thermometer	Instrument used to measure temperature
High Pressure	When air sinks
Low Pressure	When air rises
Prevailing Wind	The wind that blows most often; in the UK it is a SW wind
Altitude	Height of a place above sea level
Ocean Current	Currents of water in the ocean, that are warmer or colder than the water around them
Frontal Rainfall	Rain caused by a warm front meeting a cold one
Convectional Rainfall	The sun heats the ground, convection currents of warm air rise, the water vapour condenses and rain falls
Relief Rainfall	Rain caused with the air is forced to rise as it meets an obstruction, normally a mountain
Climate Graph	Displays yearly temperature and precipitation data for a particular location. Temperature is plotted as a line and precipitation as a blue bar graph
Cirrus	Wispy white cloud
Stratus	low-level clouds in layers
Cumulus	flat bases and are often described as "puffy", "cotton-like" or "fluffy" in appearance.

Science

Reproduction

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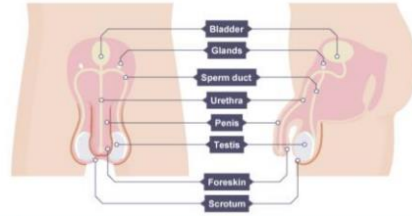
Keyword	Definition
Egg Cell	The female sex cell (gamete)
Sperm Cell	The male sex cell (gamete)
Fertilisation	The fusing of the male and female sex cells.
Ovary	The female reproductive organ that releases egg cells.
Testes	The male reproductive organs which produce sperm cells.
Embryo	Tiny new human life which grows by cell division from a fertilised egg cell.
Gestation	The period between fertilisation and birth, also known as 'pregnancy'
Placenta	The organ that allows substances (such as oxygen) to pass between the mothers blood and baby's blood.
Amniotic Fluid	A fluid which surrounds the foetus and helps to cushion it.
Foetus	The unborn baby after around 8 weeks of pregnancy.
Menstruation	Where the lining of the uterus breaks down every month if the egg is not fertilised. Also known as the period.
Sexual Reproduction	Producing new organisms by the joining of two sex cells.
Asexual Reproduction	Producing new organisms from only one parent.

Further Reading:
https://www.bbc.com/bitesize/guides/z9fgr82/revision/1

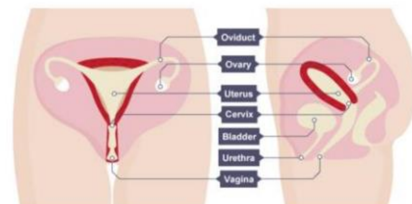
The Male Reproductive System

The testes produce millions of make gametes (sex cells) called sperm. The sperm pass through sperm ducts, and mix with fluids produce by the glands. The penis passes urine and semen out of the males body. The urethra is the tube which carries the urine or semen.



The Female Reproductive System

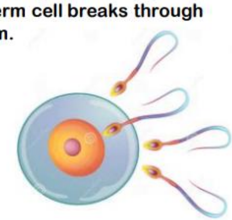
The two ovaries contain hundreds of undeveloped female gametes. These are called ova (one is called an ovum). Women have these cells in their body from birth.
Each ovary is connected to the uterus by an oviduct, sometimes known as the fallopian tube. Every month, an egg develops, becomes mature and is released from an ovary.



- The uterus is where a baby develops until its birth.
- The cervix is a ring of muscle at the lower end of the uterus. It keeps the baby in place while the woman is pregnant.
- The vagina is a muscular tube that leads from the cervix to the outside of the woman's body.

Fertilisation

Fertilisation is when a sperm cell and ovum fuse. Sperm cells are released into the female reproductive system during sexual intercourse (ejaculation). Only one sperm cell breaks through the cell membrane and enters the ovum.



The Menstrual Cycle

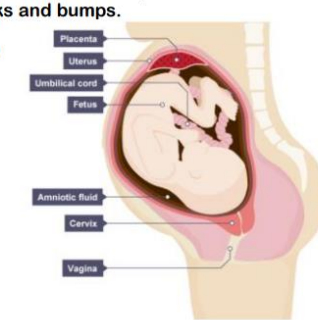
The menstrual cycle prepares the female body for pregnancy by causing eggs (ova) to mature and be released. The process lasts for 28 days.

- **Days 1-5**
  - 'period' happens (menstruation), where uterus lining breaks down.
- **Days 6-13**
  - Uterus lining builds up (thickens) to prepare for pregnancy. The egg (ovum) matures in the ovary
- **Day 14**
  - Egg (ovum) released from the ovary and travels down the oviduct
- **Days 15-28**
  - Uterus lining stays thick, in case the egg is fertilised

Foetus Development & Placenta

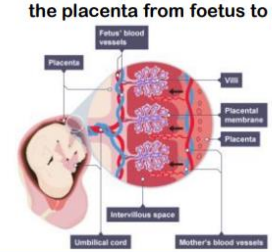
The foetus relies upon its mother as it develops.

- Protection against knocks and bumps.
- Oxygen
- Nutrients (food & Water)



The placenta is an organ responsible for providing oxygen and nutrients, and removing waste substances. It grows into the wall of the uterus and is joined by the foetus by the umbilical cord.

- Oxygen and nutrients diffuse from mother to foetus.
- Carbon dioxide and other waste substances diffuse across the placenta from foetus to mother.



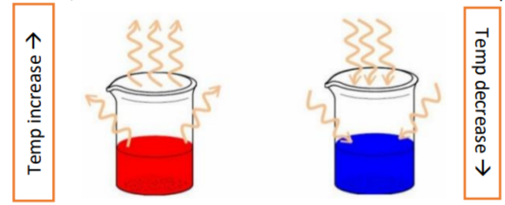
Chemical Reactions

Keyword	Definition
Endothermic	Reactions that take in heat
Exothermic	Reactions that give out heat
Oxidation	Reaction of other elements with oxygen
Combustion	Burning fuel in oxygen
Thermal Decomposition	When a substance is broken down into 2 or more products by heat
Reactivity series	List of metals in order of reactivity
Displacement	A more reactive metal will displace a less reactive metal from its compound
Catalyst	A substance that increases the rate of a reaction but is not itself used up.
Polymer	Long chain molecules made up of many monomers.
Fuel	Contain hydrocarbons – compounds containing hydrogen and carbon atoms only.
Activation Energy	The minimum amount of energy that colliding particles must have for them to react

Further Reading:
https://www.bbc.com/bitesize/guides/zqd2mp3/revision/3
https://www.bbc.com/bitesize/articles/zcwxcj6
https://www.bbc.com/bitesize/guides/zqd2mp3/revision/5
https://www.bbc.com/bitesize/guides/zqd2mp3/revision/6

Endothermic Reactions
In an endothermic reaction, thermal energy is taken in from the surroundings, therefore there is a temperature decrease. Thermal decomposition is an example.

Exothermic Reactions
In an exothermic reaction, thermal energy is given out to the surroundings, therefore there is a temperature increase. Combustion, oxidation and neutralisation reactions are all examples.



Combustion
Combustion is another name for burning. It is an example of an exothermic reaction. There are two types of combustion – complete combustion and incomplete combustion.

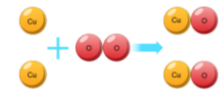
<u>Complete Combustion</u>
Coal, oil and gas are furls. They contain hydrocarbons (compounds of hydrogen and carbon atoms only). When these fuels burn, it reacts with oxygen in the air to produce carbon dioxide and water vapour.
Fuel + Oxygen → Carbon Dioxide + Water

<u>Incomplete Combustion</u>
If there is not enough oxygen in the air for complete combustion, incomplete combustion will happen instead.
This time either carbon monoxide is produced (a toxic gas which can lead to death) or carbon is produced (appears as soot and smoke which can cause breathing problems).
Fuel + Oxygen → Carbon Monoxide + Water
Fuel + Oxygen → Carbon + Water

Oxidation Reactions
In an oxidation reaction, a substance gains oxygen. Metals and non-metals can take part in oxidation reactions.

Metals react with oxygen in the air to produce metal oxides. For example, copper reacts with oxygen to produce copper oxide when it is heated in the air.

Copper + Oxygen → Copper Oxide
$2Cu + O_2 \rightarrow 2CuO$



Thermal Decomposition
Some compounds break down when heated, forming two or more products from one reactants.
Many metal carbonates can break down easily when it is heated:
Copper Carbonate → Copper Oxide + Carbon Dioxide

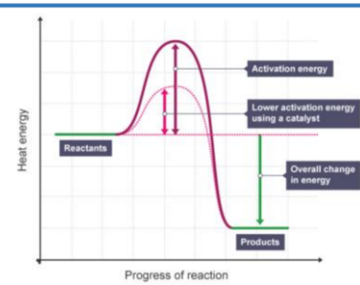
Copper carbonate is green, copper oxide is black. We can test for carbon dioxide using limewater. Limewater is colourless, but turns cloudy when carbon dioxide is bubbled through it.

Reactivity Series
Some metals are very unreactive. This means they don't take part in chemical reactions. For example platinum. Some metals are very reactive and they take part in chemical reactions easily to form new substances.

Catalysts

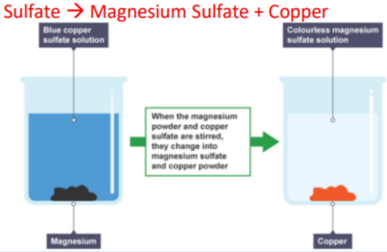
A catalyst is a substance that:
- Speeds up the rate of a chemical reaction
- Does not alter the products of the reaction
- Is unchanged chemically and in mass at the end of the reaction.

Catalysts provide an alternative reaction pathway that has a lower activation energy than the uncatalysed reaction.



Displacement Reactions
Displacement reactions involve a metal and a compound of a different metal. In displacement reactions, a more reactive metal will displace a less reactive metal from its compound.
Magnesium + Copper Sulfate → Magnesium Sulfate + Copper

Magnesium is more reactive than copper, so it displaces (pushes out) the copper within the compound.



Science

Energy

Keyword	Definition
Energy Transfer	Changes from one form of energy to another form of energy.
Conservation of Energy	Energy cannot be created or destroyed It can be stored, dissipated or transferred from one form into another.
Internal Energy	Energy stored in all materials, including energy due to the motion of particles and the forces between them.
Kinetic Energy	Energy which an object possesses by being in motion.
Elastic Potential Energy	Energy stored in squashed, stretched or twisted materials.
Gravitational Potential Energy	The energy stored by an object lifted up against the force of gravity. Also known as GPE.
Thermal Energy Store	Energy store filled when an object is warmed up.
Work done	Work is done when a force makes an object move a distance, energy is transferred
Power	The rate of work done. Or The energy transferred per second.
Fossil Fuel	Natural, finite fuel formed from the remains of living organisms, e.g. oil, coal and natural gas.
Non-Renewable	A resource that cannot be replaced when it is used up, such as natural gas or cold.
Renewable	An energy resource that will not run out, e.g. solar energy and wind energy

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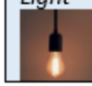
Type of energy	Description	Type of energy	Description
Kinetic 	The energy in moving objects	Thermal (Internal) 	The heat stored in an object
Chemical 	When a substance undergoes a chemical reaction	Gravitational potential 	When an object is raised to a height
Magnetic 	When 2 objects attract or repel	Electrostatic (electrical) 	Allows an electric current to flow
Elastic potential 	When an object is stretched or squashed	Nuclear 	Energy stored in an atom*(not needed till GCSE)*
Light 	*From a bright object (not stored)*	*Sound* 	*From a vibrating object (not stored)*

Calculating Kinetic Energy

$$E_K = \frac{1}{2} m v^2$$

E_K = Kinetic Energy
m = Mass
v = velocity

Calculating GPE

GPE = mass x gravitational field strength x height

- Mass is measured in **kilograms** (kg).
- Gravitational field strength is measured in **newtons per kilogram (N/kg)**, usually taken as 10 N/kg on Earth.
- Height is measured in **metres** (m).
- GPE is measured in **joules** (J).

Calculating Power

Word Equation	Power	=	Work Done / Time Taken	
Dimensions	P	=	W	/ t
Units	Watt	=	Joule	/ second

Calculating Efficiency.

$$\text{Efficiency} = \frac{\text{useful energy out}}{\text{total energy in}} \times 100$$

E.g. Lightbulb

Efficiency = 90 ÷ 100 x 100
Efficiency = 90%