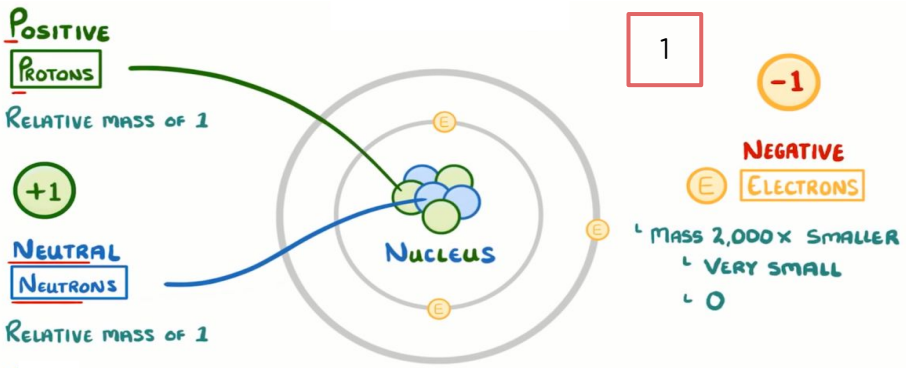
GCSE Atomic structure

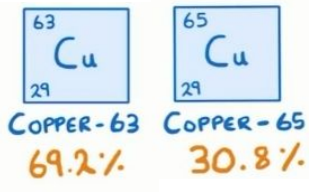
Learned	Revised	Confident

_____ % Achieved:_____



N°	Keyword	Definition
2	Atom	The smallest part of an element that can exist
3	Element	A substance made from only one type of atom
4	Compound	A substance made from two or more different types of atoms that are chemically bonded
5	Mixture	Two or more different substances that are mixed but not chemically bonded
6	Ion	A charged particle formed from losing or gaining electrons
7	Isotope	Atoms of the same elements, with the same number of protons but a different number of neutrons
8	Electronic configuration	How the electrons are arranged in the shells on an atom
9	Relative atomic mass	The number of protons and neutrons in the nucleus of an atom
10	Atomic (proton) number	The number of protons in the nucleus of an atom

11



$$\text{Sum of (Isotope Abundance} \times \text{Isotope Mass)} \div \text{Sum of Abundance of all Isotopes}$$

$$(69.2 \times 63) + (30.8 \times 65) \div (69.2 + 30.8)$$

12

Subatomic particle	Relative mass	Relative charge	Location in atom
Proton	1	+1	Nucleus
Neutron	1	0 / neutral	Nucleus
Electron	1/2000	-1	Shells

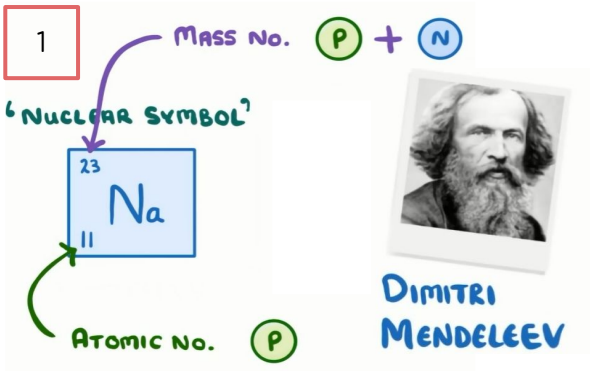
N°	Fact
13	Mixtures can be easily separated through physical processes such as filtration, distillation, chromatography and crystallisation - compounds cannot.
14	When an element loses electrons it forms a positive ion, when it gains electrons it forms a negative ion.

GCSE Periodic table

1

Learned	Revised	Confident

_____ % Achieved:_____



N°	Keyword	Definition
2	Group	The columns in the periodic table
3	Period	The rows in the periodic table
4	Trend	A pattern that can be seen e.g. reactivity or boiling point
5	Property	How a chemical behaves e.g. during a chemical reaction

6

Key: relative atomic mass, **atomic symbol**, name, atomic (proton) number

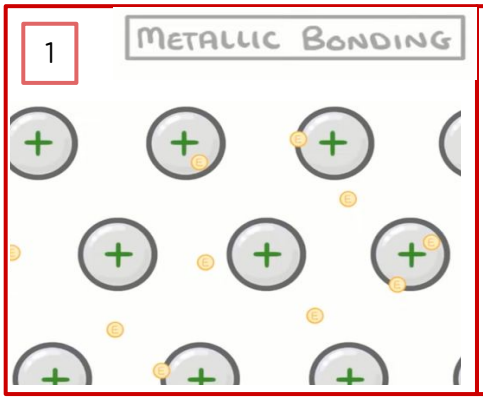
1	2											3	4	5	6	7	0
1 H hydrogen 1																	4 He helium 2
7 Li lithium 3	9 Be beryllium 4											11 B boron 5	12 C carbon 6	14 N nitrogen 7	16 O oxygen 8	19 F fluorine 9	20 Ne neon 10
23 Na sodium 11	24 Mg magnesium 12											27 Al aluminium 13	28 Si silicon 14	31 P phosphorus 15	32 S sulfur 16	35.5 Cl chlorine 17	40 Ar argon 18
39 K potassium 19	40 Ca calcium 20	45 Sc scandium 21	48 Ti titanium 22	51 V vanadium 23	52 Cr chromium 24	55 Mn manganese 25	56 Fe iron 26	59 Co cobalt 27	59 Ni nickel 28	63.5 Cu copper 29	65 Zn zinc 30	70 Ga gallium 31	73 Ge germanium 32	75 As arsenic 33	79 Se selenium 34	80 Br bromine 35	84 Kr krypton 36
85 Rb rubidium 37	88 Sr strontium 38	89 Y yttrium 39	91 Zr zirconium 40	93 Nb niobium 41	96 Mo molybdenum 42	[98] Tc technetium 43	101 Ru ruthenium 44	103 Rh rhodium 45	106 Pd palladium 46	108 Ag silver 47	112 Cd cadmium 48	115 In indium 49	119 Sn tin 50	122 Sb antimony 51	128 Te tellurium 52	127 I iodine 53	131 Xe xenon 54
133 Cs caesium 55	137 Ba barium 56	139 La* lanthanum 57	178 Hf hafnium 72	181 Ta tantalum 73	184 W tungsten 74	186 Re rhenium 75	190 Os osmium 76	192 Ir iridium 77	195 Pt platinum 78	197 Au gold 79	201 Hg mercury 80	204 Tl thallium 81	207 Pb lead 82	209 Bi bismuth 83	[209] Po polonium 84	[210] At astatine 85	[222] Rn radon 86
[223] Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	[261] Rf rutherfordium 104	[262] Db dubnium 105	[266] Sg seaborgium 106	[264] Bh bohrium 107	[277] Hs hassium 108	[268] Mt meitnerium 109	[271] Ds darmstadtium 110	[272] Rg roentgenium 111	[285] Cn copernicium 112	[286] Nh nihonium 113	[289] Fl flerovium 114	[289] Mc moscovium 115	[293] Lv livermorium 116	[294] Ts tennessine 117	[294] Og oganesson 118

N°	Fact
7	Elements in the same group all have similar properties, this is because they have the same number of electrons on their outer shell
8	Elements in the same period have the same number of electron shells
9	Down a group: Atomic radius increases; the number of electron shells increases; the outer shell/electron is further away from the nucleus; nuclear attraction decreases. These 4 factors affect the reactivity of the elements in that group
10	The boiling/melting points og group 7 and 8 increase as you go down the group. This is because the atoms/molecules get bigger and so they have more intermolecular forces to overcome.

GCSE Structure and bonding

Learned	Revised	Confident
_____ % Achieved:_____		

1



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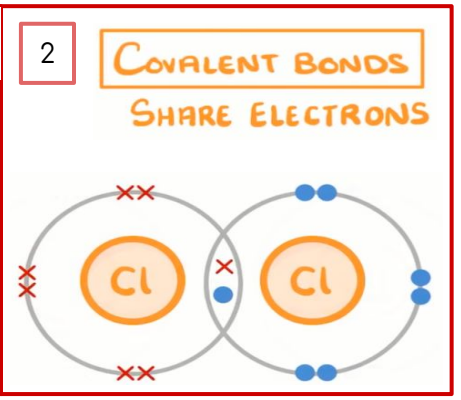

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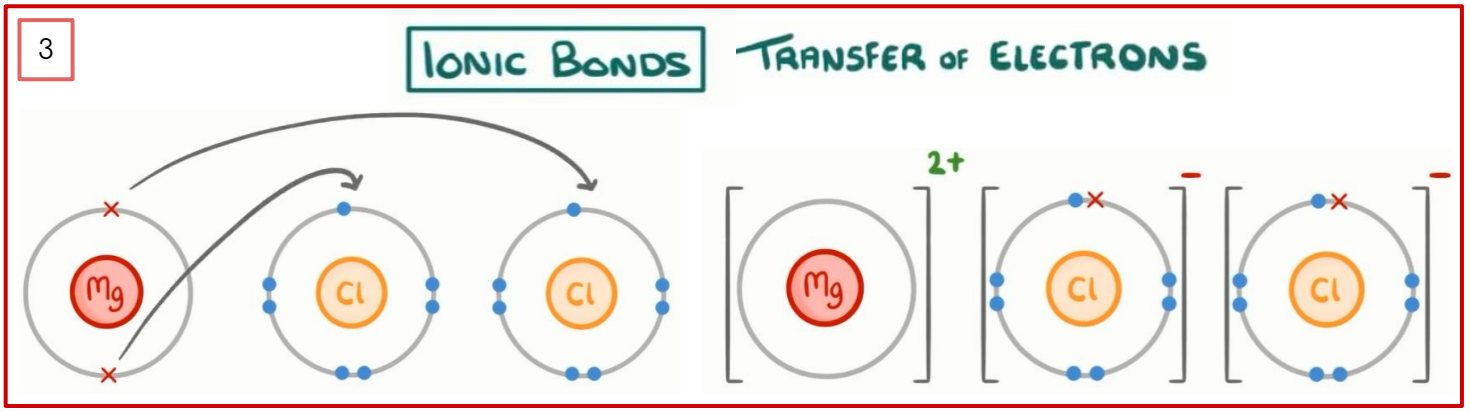


N°	Keyword	Definition
4	Delocalised electron	An electronic that isn't associated with an atom or bond, it is free to move through the structure
5	Metallic bond	Giant structure of positive metal ions in a sea of delocalised electrons- forming strong electrostatic forces of attraction
6	Ionic bond	Strong electrostatic forces of attraction between oppositely charged ions (formed from the transfer of electrons)
7	Covalent bond	Shared pair(s) of electrons between non-metal atoms
8	Electrostatic forces	Strong forces of attraction between oppositely charged particles e.g. ions and/or electrons
9	Intermolecular forces	Weak forces of attraction that occur between molecules.

N°	Fact
10	In bonding, atoms look to gain a full outer shell of electrons. They can lose electrons to drop down a shell, gain to fill their shell or share electrons between their outer shell
11	In ionic bonding, the metal atom loses electron(s) to become a positive ion, the non-metal gains the electron to become a negative ion. These ions then form a giant structure.
12	In covalent bonding, atoms share pairs of electrons to fill their outer shells. This can form a simple molecule (e.g. H_2O) or a giant structure like diamond.
13	The properties of a substance relate to its structure and bonding. For example, giant structures will generally have high melting and boiling points whereas small, simple structures will have low melting and boiling points

GCSE Quantitative chemistry

1

Relative Formula Mass (M_r)

Add together the relative atomic masses of all the atoms in that compound's molecular formula

Magnesium Chloride

$MgCl_2$

$1 \times Mg$ (24, 12)

$2 \times Cl$ (35.5, 17)

$24 + (35.5 \times 2)$

$M_r = 95$

Learned	Revised	Confident
_____ % Achieved:_____		

N°	Keyword	Definition
2	Relative formula mass	The relative mass of a compound is the total of all the atomic masses added together e.g. $H_2O = 1 + 1 + 16 = 18$
3	Percentage mass	This is the percentage of a certain atom within a compound, we can use this to find the mass of that elements in the compound
4	Mole	A unit of measurement in chemistry. One mole is equal to the relative formula mass in grams. One mole contains 6.02×10^{23} of those particles
5	Avogadro constant	6.02×10^{23} - the number of particles (atoms / molecules / ions / electrons) found in one mole of ANY substance
6	Conservation of mass	Atoms are not created or destroyed in chemical reactions, the are rearranged. The total mass of the reactants and products is the same
7	Concentration	The quantity (mass or moles) of a substance in a certain volume of solution. This can be in g/dm^3 or mol/dm^3
8	Atom economy	The percentage of the mass of the reactants that ends up as the desired product
9	Yield	The amount of product made in a reaction

10

Conservation of Mass

- No atoms are created or destroyed (only the bonds change)

$2Na + Cl_2 \xrightarrow{\text{Completely}} 2NaCl$

2.3g + 3.5g → 5.8g

11

Calculate the percentage mass of a particular element in a compound

% mass of O in Calcium Hydroxide $Ca(OH)_2$

$\frac{(16 \times 2)}{(40 + (2 \times 16) + (2 \times 1))} = 43.2\%$

12

How to calculate the concentration of a solution

'40g NaOH dissolved in $2.5\ dm^3$ of water'

$\frac{40g}{2.5\ dm^3} = 16g \text{ per } dm^3$

13

Mole

Unit we use to measure the amount of chemical we have

O_2 $M_r = (16 \times 2) = 32$

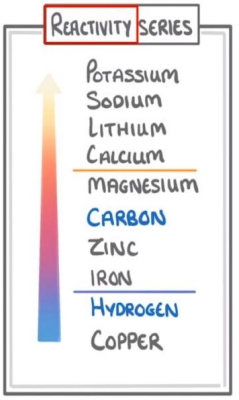
1 mole → 32g

GCSE Chemical changes

1

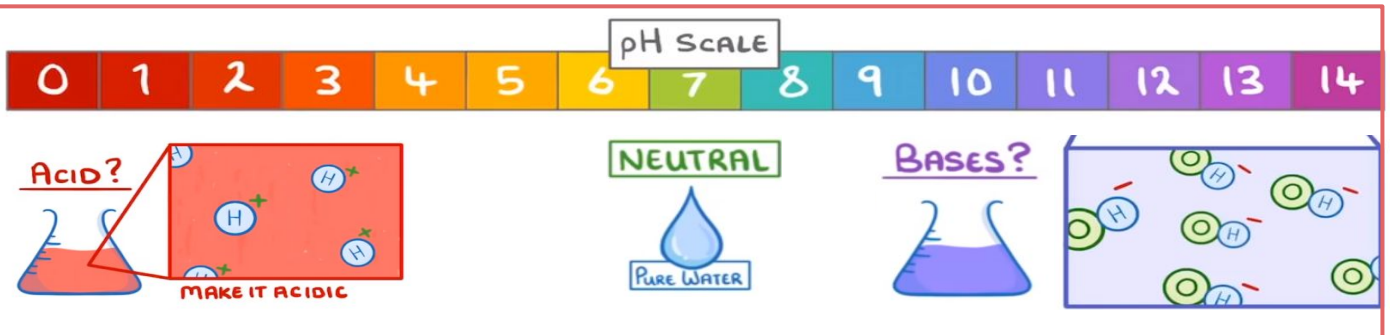
Learned	Revised	Confident
_____ % Achieved:_____		

Acid Formula	Acid Name	Salt Name
HCl	Hydrochloric	Chloride
H_2SO_4	Sulphuric	Sulphate
HNO_3	Nitric	Nitrate
H_3PO_4	Phosphoric	Phosphate

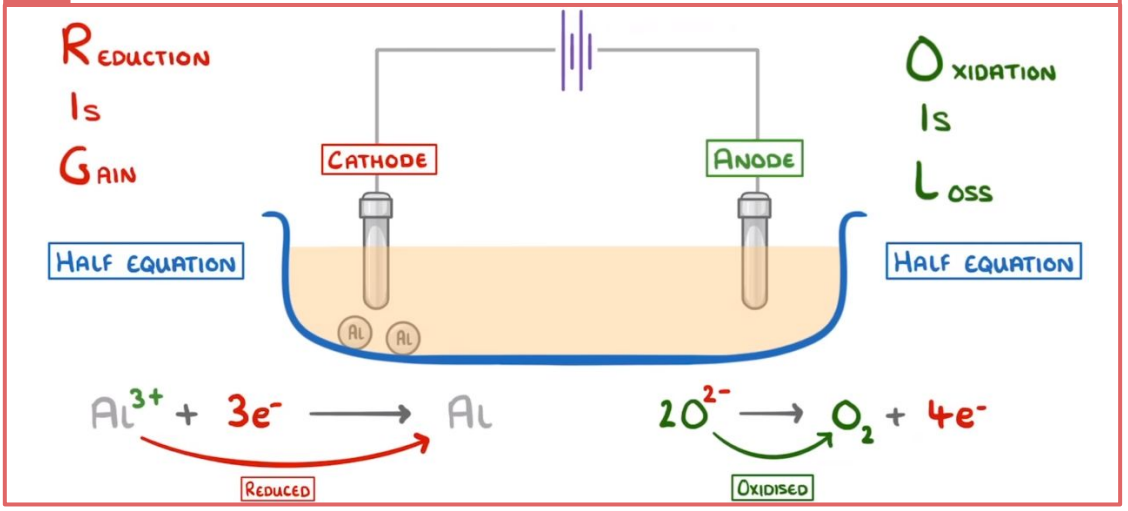


N°	Keyword	Definition
2	Acid	Substance with a pH less than 7 that forms H^+ ions in solution e.g. H_2SO_4
3	Base	A substance that reacts with an acid in a neutralisation reaction e.g. CaO
4	Alkali	Substance with a pH greater than 7 that forms ^-OH ions in solution e.g. NaOH
5	Strong acid	Strong acids will fully ionise / dissociate in solution whereas weak acids only partially ionise / dissociate in solution
6	Neutralisation	A reaction between acids and bases where a neutral product i.e. water forms
7	Displacement	A more reactive element will replace a less reactive element from a compound
8	Oxidation	Where oxygen is gained or electrons are lost by a species
9	Reduction	Where oxygen is lost or electrons are gained by a species
10	Electrolysis	Breaking down a substance, usually ionic compounds, using electricity

11



12 Electrolysis of Aluminium oxide (l)

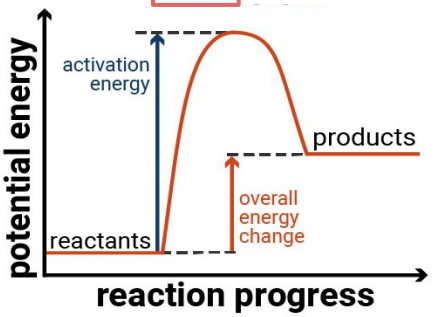


GCSE Energy changes

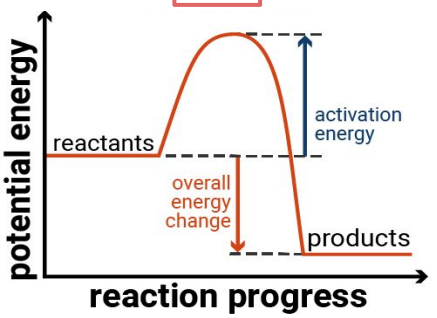
Learned	Revised	Confident

_____ % Achieved:_____

1



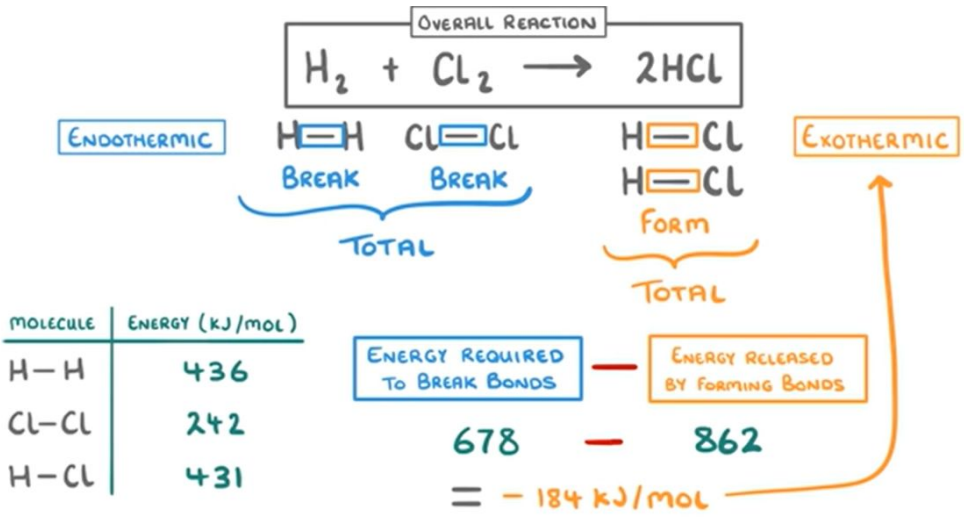
2



N°	Keyword	Definition
3	Endothermic	A reaction that takes in energy from the surroundings
4	Exothermic	A reactions that releases energy to the surroundings
5	Activation energy	Minimum amount of energy required to start a reaction
6	Overall energy change	The difference between the energy of the reactants and the products
7	Catalyst	Provides an alternate reaction pathway with a lower activation energy to speed up the reaction

N°	Facts
8	Bond breaking is an endothermic process, it requires energy
9	Bond making is an exothermic process, it releases energy
10	An endothermic reaction has a positive overall energy change - more energy was taken in than was released
11	An exothermic reaction has a negative overall energy change - less energy was taken in than was released

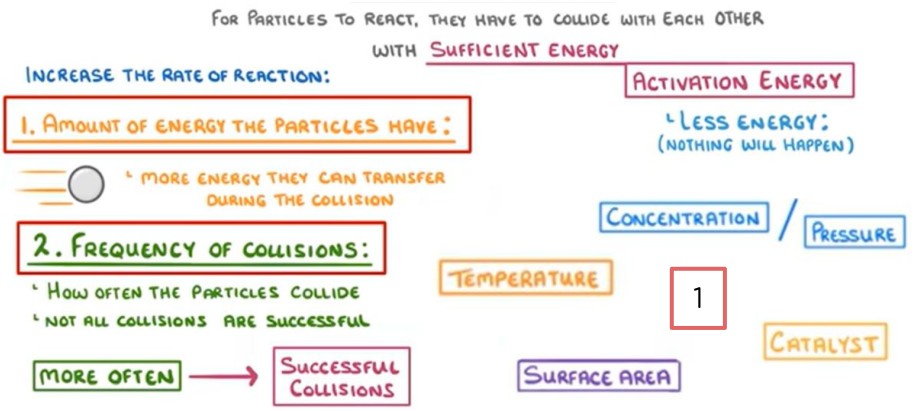
N°	Overall energy change calculations (HIGHER)
12	Complete these questions using a simple T-table with "Break" and "Make" as headings. Tick off the bonds as you count them. Total break - Total make = Overall energy change



GCSE Rates of reaction

Learned	Revised	Confident

_____ % Achieved:_____



N°	Facts
2	Increasing the temperature increases the rate of reaction. Particles have more energy and so move more and faster so the frequency of collisions increases - they also collide with more energy meaning more successful collisions
3	Increasing the concentration/pressure increases the rate of reaction. There are more particles in the same volume and so the frequency of collisions increases.
4	Increasing the Surface area increases the rate of reaction. There are more exposed particles and so the frequency of collisions increases.
5	Adding a catalyst to a reaction increases the rate of reaction. The catalyst provides an alternate reaction pathway with a lower activation energy so more particles have successful collisions (with enough energy to overcome activation energy)
6	There are generally three factors we can use to,measure rate of reaction: measure the volume of gas produced; measure loss in mass; measure the turbidity (cloudiness) if a solid is produced

Calculating rate of reaction

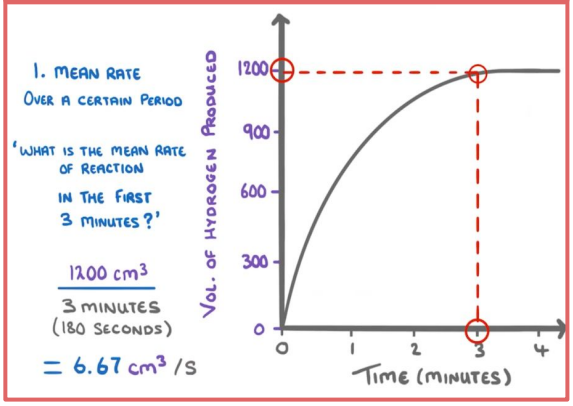
7

$$\text{Rate of Reaction} = \frac{\text{Quatity of Reactants used}}{\text{Time Taken (s)}}$$

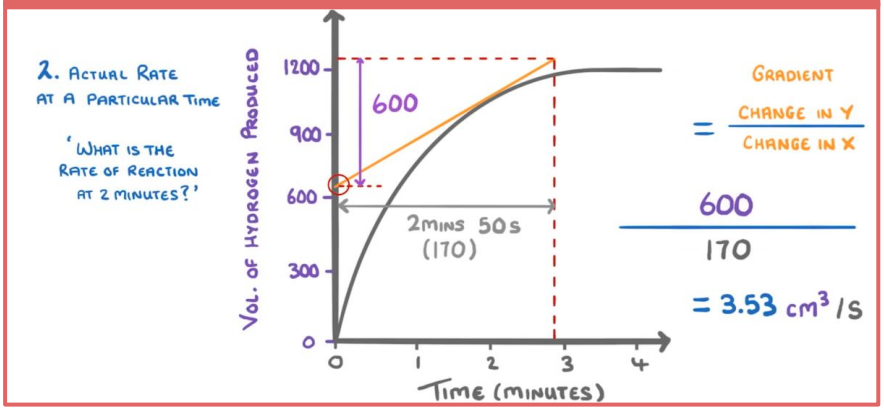
8

$$\text{Rate of Reaction} = \frac{\text{Quantity of Products Formed}}{\text{Time Taken (s)}}$$

Mean rate of reaction (H + F)



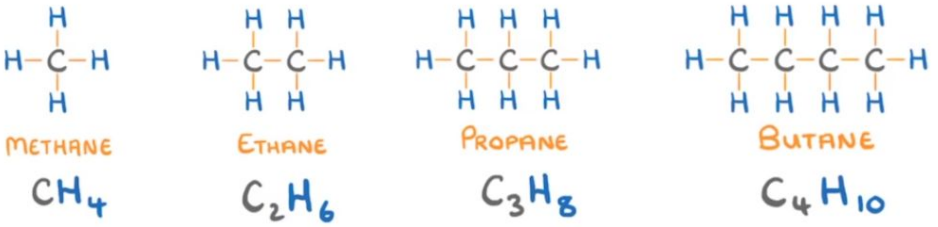
Rate of reaction at a specific time (H only)



N°	Reversible reactions (⇋) and equilibrium
9	Some chemical reactions are reversible, indicated by a ⇋ arrow. A reversible reaction reaches a state of equilibrium: *"The rate of the forward reaction is equal to the rate of the reverse reaction, in a closed system"* We can change the position of equilibrium by changing the concentrations, temperature or pressure of the system - this will change the yield of the products too.

GCSE Organic chemistry

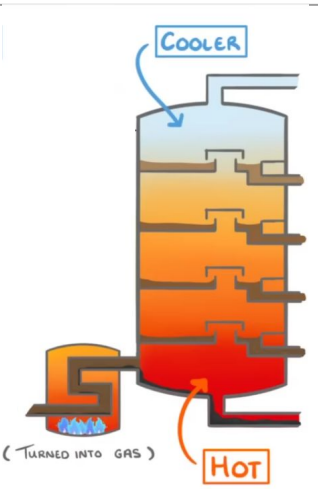
Learned	Revised	Confident
_____ % Achieved:_____		



'HOMOLOGOUS SERIES'
└ SIMILAR PROPERTIES (REACT IN A SIMILAR WAY)

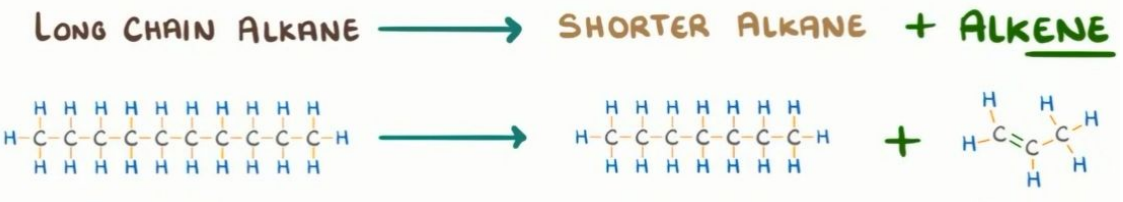
N°	Keyword	Definition
1	Hydrocarbon	A compound that contains only hydrogen and carbon
2	Alkane	The simplest hydrocarbon containing only single bonds. CnH2n+2
3	Saturated	A molecule that only contains single bonds e.g. Alkanes
4	Alkene	An unsaturated hydrocarbon. CnH2n
5	Viscosity	How runny or gloopy a substance is

N°	Fractional distillation
6	Crude oil is heated to evaporation The vapors pass into the column which has a temperature gradient Longer chains cool and condense lower in the column Shorter chains cool and condense higher in the column Longer chains have higher boiling points Longer chains have higher boiling points as they have more intermolecular forces to overcome



N°	Facts
7	We can test for alkenes using bromine water. It goes from orange to colourless
8	The longer the hydrocarbon chain, the higher the viscosity (more goopy)
9	The longer the hydrocarbon chain, the higher the boiling point
10	The longer the hydrocarbon chain, the lower the flammability

N°	Cracking hydrocarbons
11	Cracking uses steam/high temperature and a catalyst to break long chain alkanes into a shorter alkane and at least one alkene



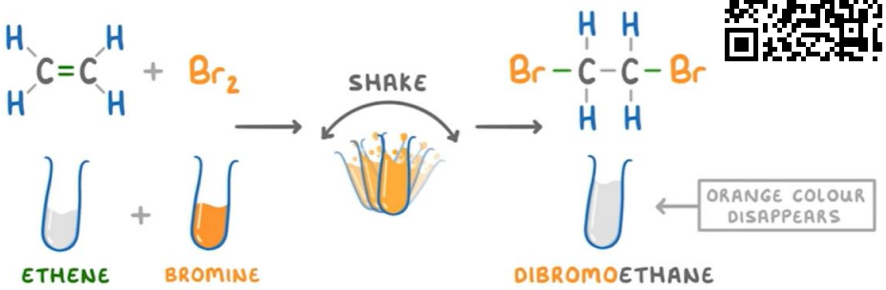
GCSE Organic Chemistry - Triple only

Learned	Revised	Confident

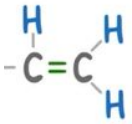
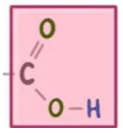
_____ % Achieved:_____

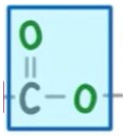
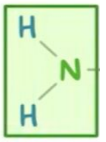
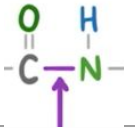
1

THE TEST WE USE TO DISTINGUISH ALKENES FROM ALKANES:



N°	Keyword	Definition
2	Monomer	Small, single molecule that can join with others to make a polymer
3	Polymer	Long chain molecule that is formed from lots of smaller monomers
4	Addition reaction	Reaction where the double bond opens and new atoms are added to each carbon, one single product forms - this can form polymers
5	Condensation reaction	Reaction where a larger molecule and a smaller molecule e.g. H_2O or HCl forms - this can form polymers
6	Functional group	A group of atoms that are responsible for the reactivity of a molecule e.g. -OH group in alcohols

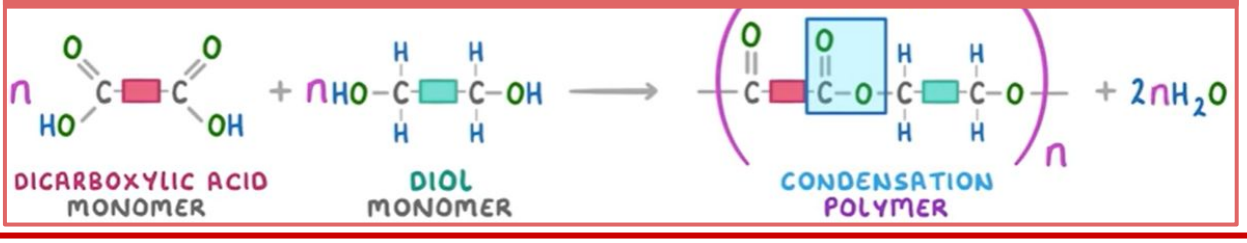
N°	Organic compound	Atoms in functional group	Functional group
7	Alkene	C=C	
8	Alcohol	-OH	
9	Carboxylic acid	-COOH	

N°	Organic compound	Atoms in functional group	Functional group
10	Ester	-COO-	
11	Amino	$-NH_2$	
12	Peptide	-NHCO-	

13 - Addition polymerisation

14 - Naturally occurring polymer (amino acids → proteins)

15 - Condensation polymerisation



GCSE Chemical analysis

Learned	Revised	Confident
_____ % Achieved:_____		

PURE SUBSTANCE

- CONTAINS ONLY ONE TYPE OF COMPOUND OR ELEMENT
- MELT AND BOIL AT SPECIFIC TEMPERATURES

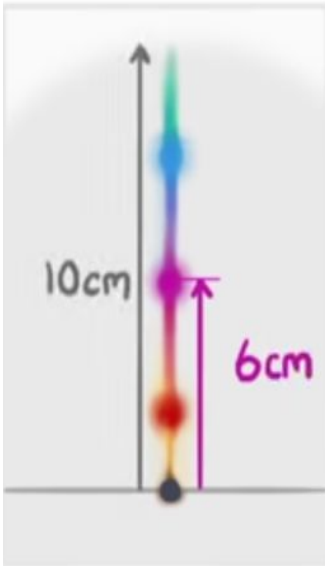
PURE SODIUM CHLORIDE

FORMULATIONS

MIXTURES THAT HAVE BEEN PREPARED USING A SPECIFIC FORMULA

N°	Keyword	Definition
1	Pure	A substance that contains only one type of compound or element
2	Formulation	A mixture that has been prepared using a specific formula for a specific purpose
3	Chromatography	A physical technique used to separate substances with different solubilities from a liquid mixture
4	Mixture	Two or more different substances that are mixed but not chemically bonded
5	Mobile phase	The phase in chromatography that moves, this is usually the solvent
6	Stationary phase	The phase in the mobile phase that does not move, fro example, the paper in paper chromatography
7	Solute	The part of a solution that dissolves in the solvent, for example, the salt in seawater
8	Solubility	A measure of how soluble a substance is in a certain liquid
9	Solvent	The liquid that the solute dissolves into to form a solution
10	Rf Value	This is a ratio of how far the solute has traveled compared to the solvent. We can use this to identify unknown substances

11 'Rf VALUE' = $\frac{\text{DISTANCE TRAVELLED BY THE SUBSTANCE}}{\text{DISTANCE TRAVELLED BY THE SOLVENT}}$ $\frac{6}{10}$ = 0.6



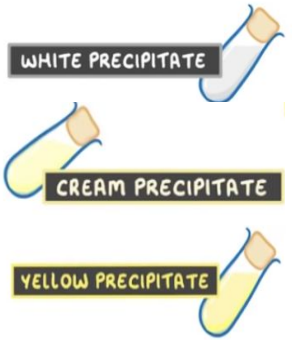
Testing for common gases			
N°	Gas	Test	Result
12	Hydrogen	Insert a lit splint	Squeaky pop noise
13	Oxygen	Insert a glowing splint	Relights the splint
14	Chlorine	Insert damp litmus paper	Bleaches the litmus paper
15	Carbon dioxide	Bubble through lime water	Lime water turns cloudy

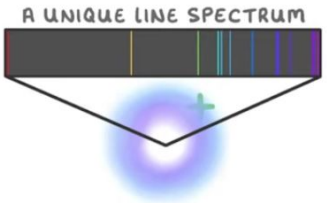
GCSE Chemical analysis - triple only

Learned	Revised	Confident
_____ % Achieved:_____		

Flame tests

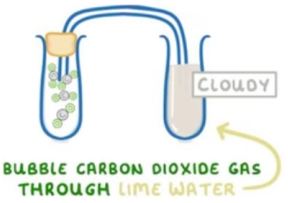
Precipitate tests





$Ba^{2+}_{(aq)} + SO_4^{2-}{}_{(aq)} \longrightarrow BaSO_{4(s)}$

$Ag^{+}_{(aq)} + Cl^{-}_{(aq)} \longrightarrow AgCl_{(s)}$

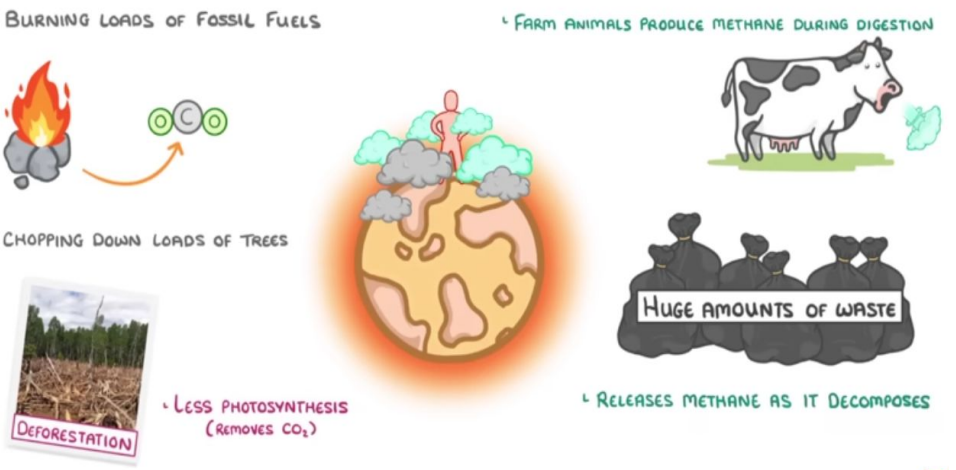


N°	Keyword	Definition
1	Anion	An atom or group of atoms that have gained electrons and become negatively charged
2	Cation	An atom or group of atoms that have lost electrons and become positively charged
3	Flame test	A qualitative identification technique where samples are heated and the metal ions present are identified by characteristic flame colours
4	Halide	A halide ion is an ion formed when a halogen atom gains one electron. Halide ions have a single negative charge.
5	Ion	Electrically charged particle, formed when an atom or molecule gains or loses electrons.
6	Precipitate	A solid particles in a liquid that form when a dissolved substance (aq) reacts to form an insoluble substance (s)

N°	Metal ion	Flame test colour	Precipitate colour with NaOH (aq)
7	Lithium	Crimson red	
8	Sodium	Yellow	
9	Potassium	Lilac	
10	Calcium	Orange-red	White
11	Copper	Green	Blue
12	Iron (II)		Green
13	Iron (III)		Brown
14	Aluminium		White - Redissolved in excess NaOH
15	Magnesium		White
16	We can distinguish between Ca, Al and Mg using excess NaOH to identify Al and then the flame test to identify the Ca with its orange-red flame		

GCSE Chemistry of the atmosphere

Learned	Revised	Confident
_____ % Achieved:_____		



N°	Keyword	Definition
1	Atmosphere	layers of gases that surround the Earth. The main gases are nitrogen, oxygen and carbon dioxide.
2	Crude oil	Mixture of hydrocarbons, mainly alkanes, formed over millions of years from the remains of ancient dead marine organisms.
3	Evidence	Information or material that shows something is true.
4	Sedimentary	Rocks that are formed through the deposition of sediments, eg limestone and sandstone
5	Global warming	The increase of the overall average global temperature
6	Carbon footprint	The total amount of greenhouse gases a person, product or event is responsible for
7	Greenhouse gases	The gases responsible for global warming - carbon dioxide, methane, nitrous oxide and water.
8	Greenhouse effect	Retention of heat in the atmosphere caused by a build-up of greenhouse gas
9	Pollutant	A toxic chemical or object that causes damage to the land, air or water.

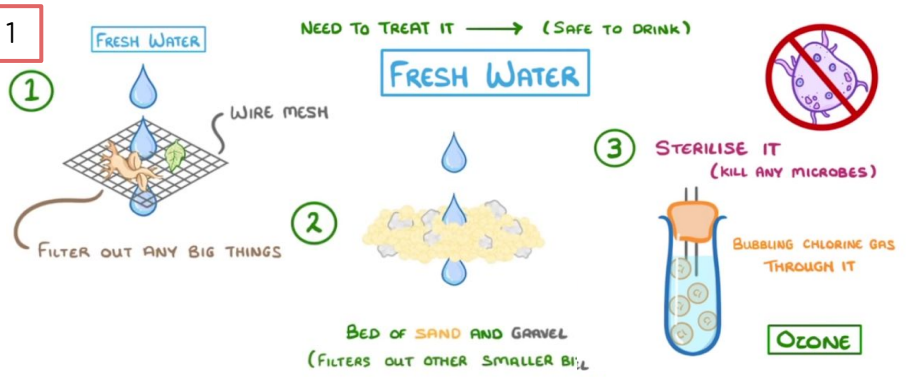
10	Atmospheric pollutants	

N°	Fact
11	The evolution of the atmosphere is only a theory. This is because there is a lack of evidence <u>NOT</u> because no-one was there
12	The main effects of global warming are: flooding from sea level rise; extreme weather such as hurricanes; changes in rainfall such as storms and droughts and extinction due to all of this
13	The Earth needs certain level of greenhouse gases to be habitable. Without greenhouse gases the Earth would be too cold to live on
14	Carbon footprints are difficult to measure due to the large number of factors that need to be considered and the complexity of the greenhouse effect in the atmosphere.

GCSE Using resources

Learned	Revised	Confident
_____ % Achieved:_____		

1



3°	Keyword	Definition
2	Finite resource	A resource that can only be used once and is in limited supply e.g. crude oil
3	Natural resource	MAterials that have been made through the formation of the world e.g. metal
4	Renewable resource	Resources which will not run out in the foreseeable future, they are being made faster than they are used
5	Synthetic resources	A material made by a chemical process, not naturally occurring.
6	Desalination	The removal of salt from water. This is an energy-intensive process.
7	Sustainable	An activity which does not consume or destroy resources or the environment for future generations
8	Potable water	Water that contains a low amount of microbes and dissolved salts and has a neutral pH.
9	Bioleaching	Using bacteria to extract metals from their ores.
10	Phytomining	Using plants to absorb metal compounds from the ground through their roots. The plants are then burned to produce an ash containing a high concentration of the metal compounds.
11	Life cycle assessment	(LCA) A 'cradle-to-grave' analysis of the impact of a manufactured product on the environment.

12	LCA steps

1. EXTRACTING AND PROCESSING THE RAW MATERIALS

2. MANUFACTURING AND PACKAGING YOUR PRODUCT

3. USING YOUR PRODUCT

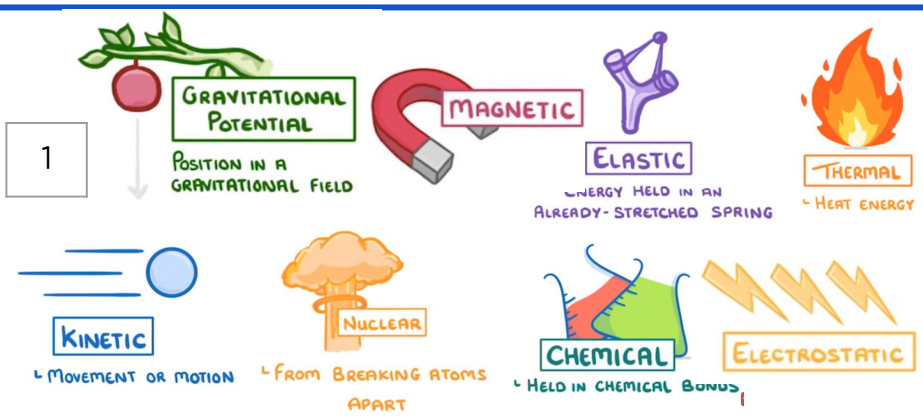
4. DISPOSING OF IT

N°	Fact
13	Potable water **isn't** pure! Potable water can contain a small amount of dissolved salts and microbes.
14	The UK sources potable water from groundwater e.g. reservoirs. Hotter countries such as Australia have to desalinate sea water using distillation or reverse osmosis.
15	There are some issues with life cycle assessments. It can be difficult to judge the impact of aspects such as pollutants and the process can be biased. The LCA may not be fully objective

GCSE Energy 1

Learned	Revised	Confident
_____ % Achieved:_____		

1



N°	Keyword	Definition
2	Conduction	The process by which vibrating particles in solids transfer energy to neighbouring particles.
3	Convection	Where more energetic particles in fluids move apart, become less dense, and rise through the fluid (from hot to cold).
4	Efficiency (energy)	The proportion of input energy transfer which is usefully transferred.
5	Efficiency (power)	The proportion of input power which is usefully output.
6	System	An object or group of objects.
7	Work done	Energy transferred.

N°	Facts
8	Energy can be transferred usefully, stored, or dissipated, but never created or destroyed
9	Specific heat capacity is the amount of energy needed to raise the temperature of a substance of a 1kg substance by 1°C
10	Efficiency can be increased by streamlining and lubricating.
11	No device is 100% efficient and the wasted energy is usually transferred to useless thermal energy stores.

N°	Equations to learn
12	Kinetic energy = 0.5 x mass x speed^2
13	Gravitational potential energy = mass x gravitational field strength x height
14	$\text{Power} = \frac{\text{energy transferred}}{\text{time}}$
15	$\text{Power} = \frac{\text{work done}}{\text{time}}$
16	$\text{Efficiency} = \frac{\text{useful power output}}{\text{total power input}}$
17	$\text{Efficiency} = \frac{\text{useful output energy transfer}}{\text{total input energy transfer}}$

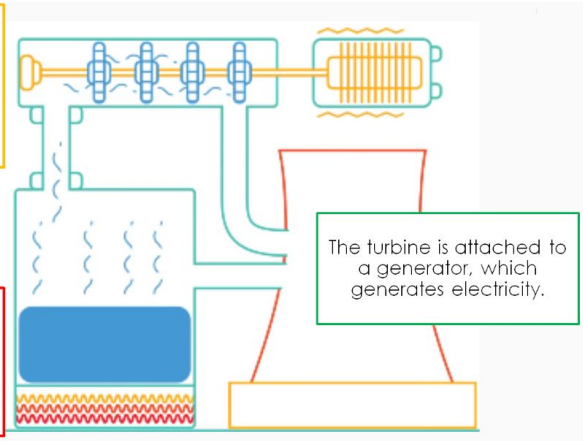
GCSE Energy 2

Learned	Revised	Confident
_____ % Achieved:_____		

1 **Power station**

Steam is used to turn a turbine **OR** the turbine is turned directly (eg. by wind)

Heat is produced (eg. by burning fossil fuels) to heat water.



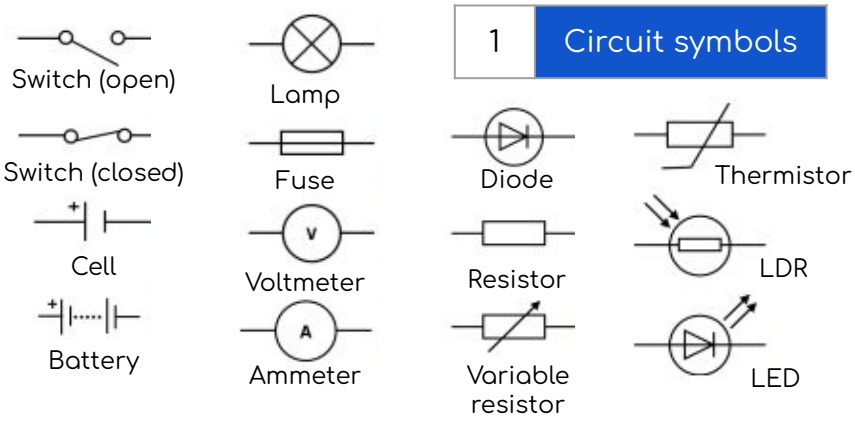
N°	Keyword	Definition
2	Biofuels	Energy released from plant products or animal dung by burning
3	Finite	A limited amount.
4	Fossil fuels	Energy released by the burning of coal, oil and natural gas.
5	Geothermal power	Uses energy in the thermal stores of hot, underground rocks to generate electricity, or to heat water directly.
6	Hydroelectricity	Electricity is generated by water moving through turbines in a dam
7	Non renewable	An energy resource that is finite (cannot be replaced as quickly as it is used) - it will run out
8	Nuclear fuels	Releases energy by the nuclear fission of uranium or plutonium.
9	Reliable	Consistent in quality - can be trusted. E.g. wind power isn't reliable - it isn't always windy.
10	Renewable	An energy resource that can be replaced as quickly as it is being used - it will not run out
11	Solar cells	Generate electric currents directly from the Sun's radiation.
12	Tidal barrages	Electricity is generated by harnessing the movement of the tides.
13	Wave power	Electricity is generated by harnessing the movement of water waves by the coast.
14	Wind power	The wind turns a turbine directly to generate electricity.

N°	Facts
15	Energy resources are used for generating electricity, heating and transport.

GCSE Electricity

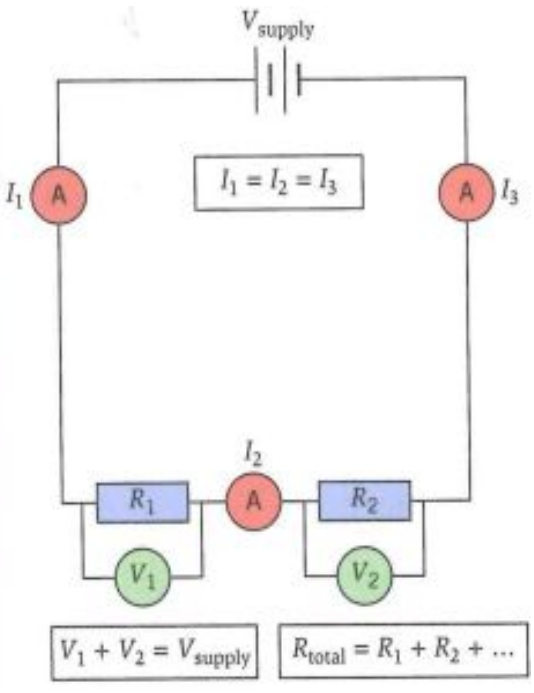
Learned	Revised	Confident
_____ % Achieved:_____		

1 Circuit symbols

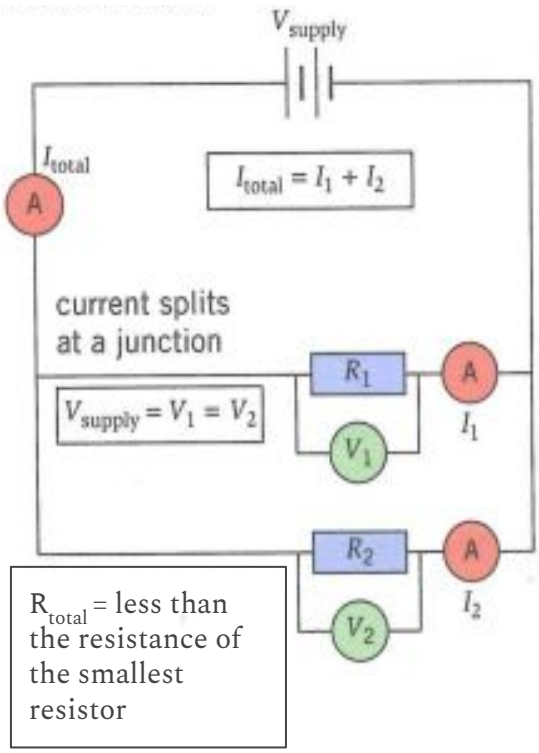


N°	Keyword	Definition
2	Current	Flow of charge, measured in amperes (A)
3	Potential difference	A measure of how much energy is transferred between two points in a circuit, measured in volts (V)
4	Resistance	Anything that opposes the flow of charge (eg, electrons colliding with ions in the wire), measured in Ohms (Ω)
5	Series circuit	Every component is connected in a line (one "loop")
6	Parallel circuit	Every component is connected to the battery separately (it has multiple "loops")

7 Series circuit rules



8 Parallel circuit rules



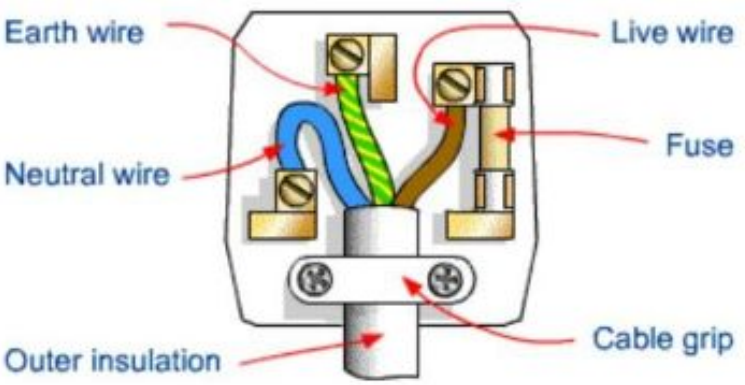
R_{total} = less than the resistance of the smallest resistor

N°	Equations to learn
9	charge flow = current × time
10	potential difference = current × resistance

GCSE Electricity (2)

Learned	Revised	Confident
_____ % Achieved:_____		

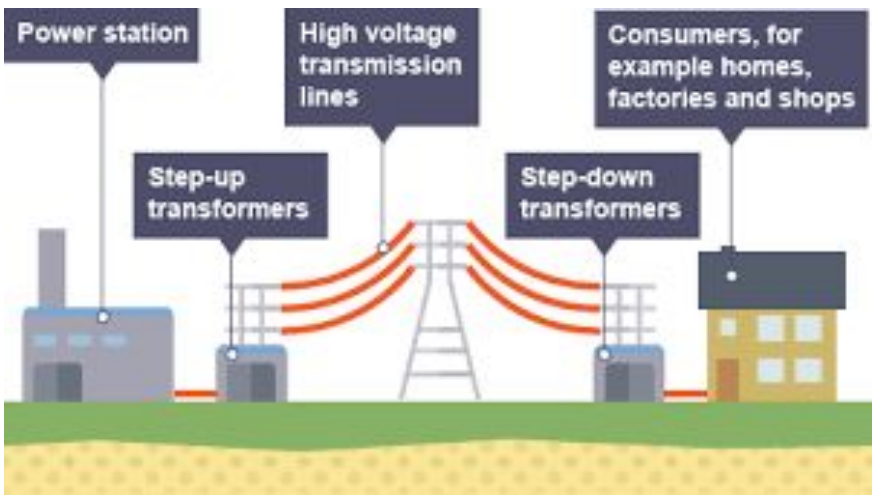
1



N°	Keyword	Definition
2	Alternating current	Current that changes direction
3	Direct current	Current that flows in one direction only
4	Step up transformer	Increases the potential difference and decreases the current (reducing resistance and heat loss, and increasing efficiency)
5	Step down transfer	Decreases the potential difference to a safe level (230V for homes).
6	The national grid	A network of cables and transformers that links electricity power stations to consumers

N°	Facts
7	UK alternating current has a potential difference of 230 V and a frequency of 50 Hz

8	The National Grid

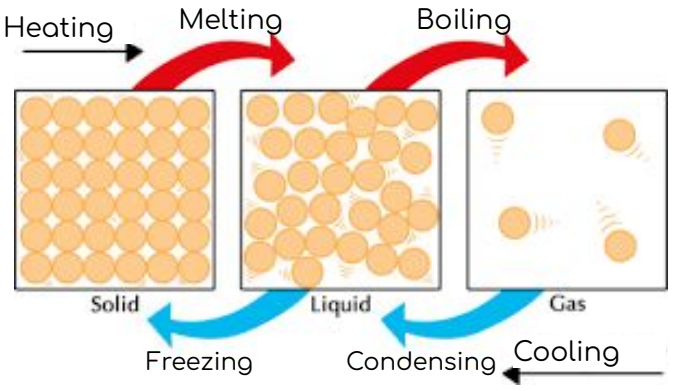


N°	Equations to learn
9	power = potential difference × current
10	power = (current)2 × resistance
11	energy transferred = power × time
12	energy transferred = charge flow × potential difference

GCSE Particle model

1

Learned	Revised	Confident
_____ % Achieved:_____		



N°	Keyword	Definition
2	Density	A measure of the "compactness" of a substance.
3	Evaporating	When particles at the surface of a liquid spontaneously gain enough energy to turn into gas particles - this happens below the boiling point.
4	Internal energy	The total energy that a system's particles have in their kinetic and potential energy stores
5	Pressure	Force per unit area
6	Specific latent heat	Energy required to change the state of 1 kg of a substance without a change in temperature (SLH fusion is for melting/freezing, SLH vaporisation is for boiling/condensing).
7	Sublimation	Change in state from a solid to a gas (without becoming a liquid)

	Solid	Liquid	Gas
8	Regular arrangement (touching)	Irregular arrangement (touching)	Irregular arrangement (not touching)
9	Vibrate in fixed positions	Free to move	Random speeds and random directions
10	Lowest energy	Medium energy	Highest energy
11	Strongest forces	Medium forces	Weakest forces

N°	Facts
12	Substances change state when they have enough energy to overcome the bonds holding the particles together.
13	The temperature of a gas is related to the average energy in the kinetic energy stores of the gas particles.

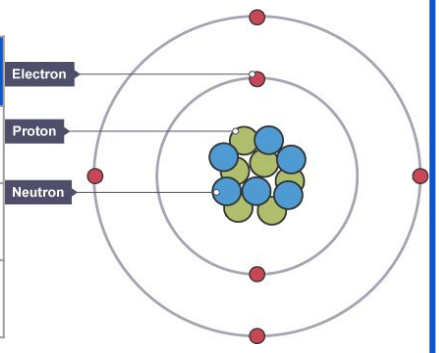
N°	Equations to learn
14	$\text{density} = \frac{\text{mass}}{\text{volume}}$

GCSE Atomic structure and radiation

Learned	Revised	Confident

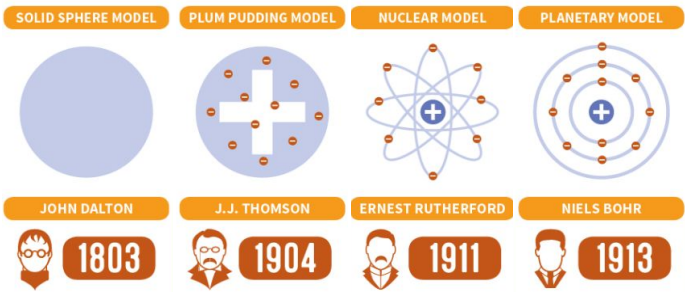
_____ % Achieved:_____

N°	Particle	Mass	Charge
1	Proton	1	+1
2	Neutron	1	0
3	Electron	1/2000	-1



N°	Keyword	Definition
4	Activity	The number of nuclei of a sample that decay per second
5	Contamination	Has unwanted radioactive atoms on or in it
6	Half life	The time it takes for the number of nuclei of a radioactive isotope in a sample to half
7	Ion	A charged particle (an atom that has gained/lost electrons)
8	Irradiation	Exposure to radiation
9	Isotope	An element with a different number of neutrons

10



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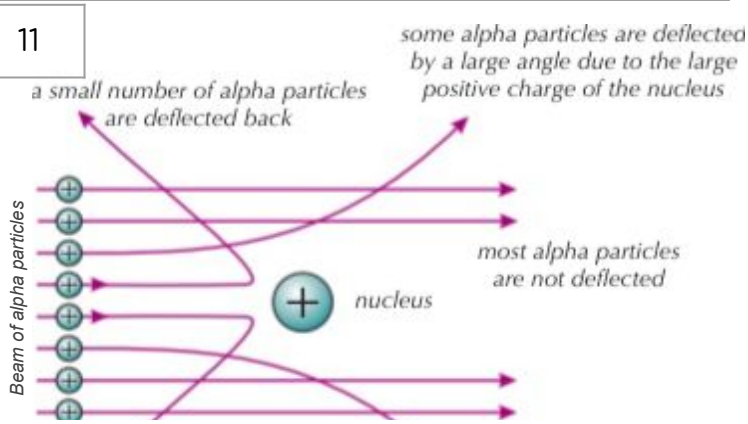
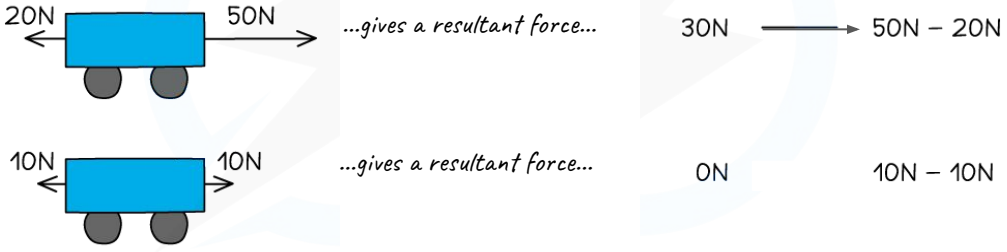


N°	Type of radiation	Change in the nucleus	Ionising power	Range in air	Stopped by
12	α **alpha** particle (two protons and two neutrons)	nucleus loses two protons and two neutrons	highest ionising power	travels a few centimetres in air	stopped by a sheet of paper
13	β **beta** particle (fast-moving electron)	a neutron changes into a proton and an electron	high ionising power	travels ≈ 1 m in air	stopped by a few millimetres of aluminium
14	γ **gamma** radiation (short-wavelength, high-frequency EM radiation)	some energy is transferred away from the nucleus	low ionising power	virtually unlimited range in air	stopped by several centimetres of thick lead or metres of concrete

GCSE Forces

Learned	Revised	Confident
_____ % Achieved:_____		

N°	Contact forces	Non contact forces
1	Air resistance Drag Friction Lift Normal contact force Tension Thrust Upthrust	Electrostatic forces Gravitational forces (weight) Magnetic forces

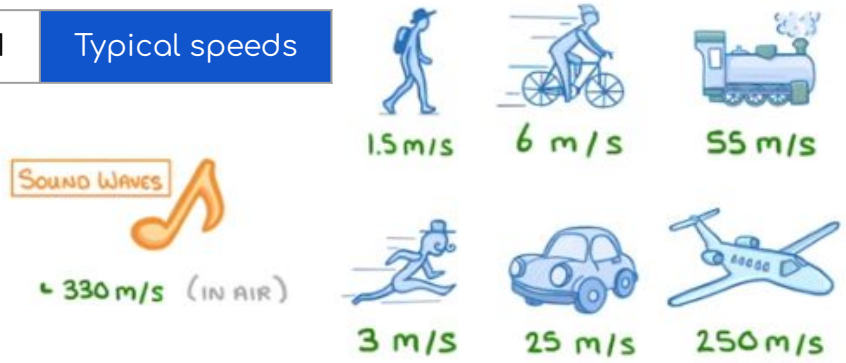
N°	Keyword	Definition
2	Contact force	Occurs when two objects must touch for a force to act
3	Centre of mass	The point at which you assume the entire mass of an object is concentrated
4	Elastic deformation	The object can go back to its original shape and saize when the forces are removed
5	Hooke's law	The extension of an elastic object is directly proportional to the force applied provided that the limit of proportionality is not exceeded
6	Inelastic deformation	The object does NOT go back to its original shape and saize when the forces are removed
7	Limit of proportionality	The point at which an elastic object stops obeying Hooke's law
8	Non contact force	Occurs when two objects do NOT need to touch for the force to act
9	Resultant force	A single force that can replace all other forces acting on an object to give the same effect as the original forces acting altogether
10	Scalar	Scalar quantities have magnitude only (eg. distance and speed)
11	Vector	Vector quantities have magnitude AND direction (eg. velocity and force)
12		

N°	Equations to learn
13	Weight = mass x gravitational field strength
14	Work done = force x distance
15	Force = spring constant x extension

GCSE Forces (2)

Learned	Revised	Confident
_____ % Achieved:_____		

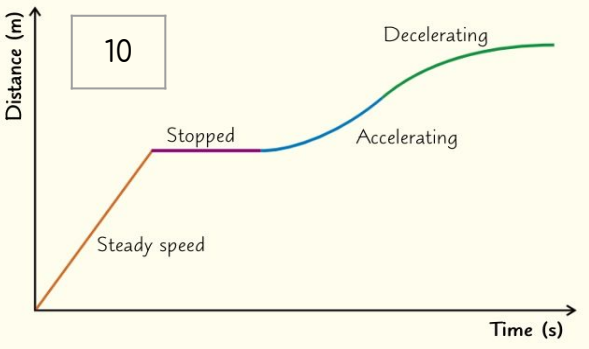
1 **Typical speeds**



N°	Keyword	Definition
2	Displacement	A measure of an object's distance and direction in a straight line from its starting point to its finishing point on a journey.
3	Velocity	Speed in a given direction.
4	Braking distance	The distance moved by a vehicle, once the brakes are applied (affected by the conditions of the road, brakes and tyres)
5	Thinking distance	The distance moved by a vehicle, during the drivers reaction time (affected by tiredness, drugs, alcohol, distractions)
6	Stopping distance	Thinking distance + braking distance

N°	Newton's laws of motion
7	(1) If the resultant force on a stationary (still) object is zero, the object will remain stationary. If the resultant force on a moving object is zero, the object will keep moving with the same velocity. If there is a non-zero resultant force acting on an object, its velocity will change (accelerate).
8	(2) Acceleration is directly proportional to force (more force, more acceleration). Acceleration is inversely proportional to mass (more mass, less acceleration)
9	(3) When two objects interact, the forces they exert on each other are equal and opposite

10



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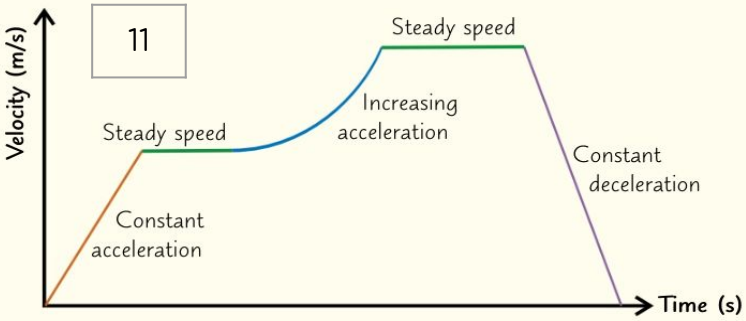


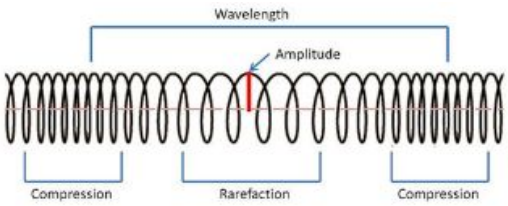
N°	Equations to learn
12	Distance travelled = speed x time
13	Acceleration = $\frac{\text{change in velocity}}{\text{time}}$
14	Resultant force = mass x acceleration
15	(HIGHER ONLY) Momentum = mass x velocity

GCSE Waves

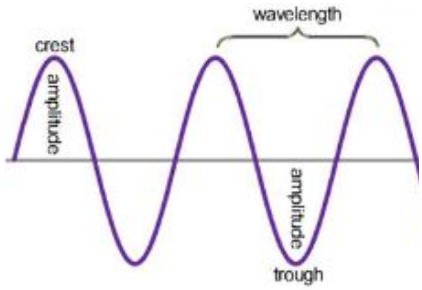
Learned	Revised	Confident

_____ % Achieved:_____

1	Longitudinal wave

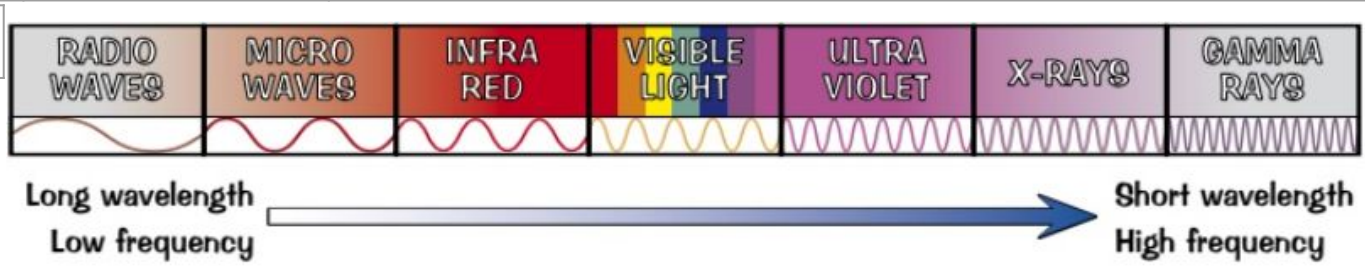


2	Transverse wave



N°	Keyword	Definition
3	Amplitude	Maximum displacement of a point on a wave from its undisturbed position (m)
4	frequency	Number of waves passing a fixed point per second (Hz)
5	Period	Time taken for one complete wave to pass a fixed point (s)
6	Wavelength	The distance from one point on a wave to the equivalent point on the next wave (m)
7	Longitudinal wave	Oscillations are **parallel** to the direction of energy transfer
8	Transverse wave	Oscillations are **perpendicular** to the direction of energy transfer
9	Normal	A line that is perpendicular (90°) to a surface.
10	Reflection	When a wave bounces back when it meets a boundary between two materials
11	Reflection	When a wave changes direction when it reaches a boundary between two materials at an angle to the normal

12



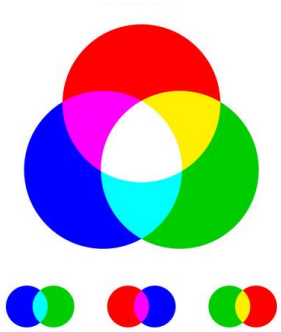
N°	Facts
13	Waves transfer energy without transferring matter
14	The law of reflection is: angle of incidence = angle of reflection

N°	Equations to learn
15	$\text{Period} = \frac{1}{\text{frequency}}$
16	Wave speed = frequency x wavelength

GCSE Waves 2 TRIPLE ONLY

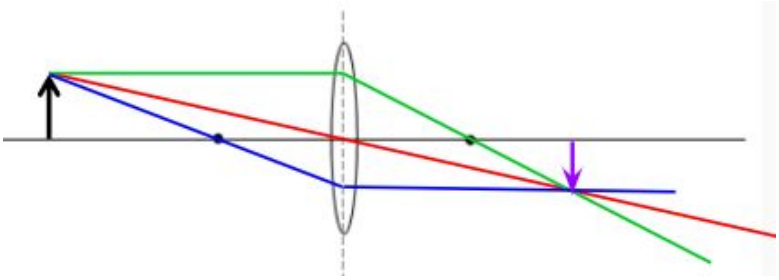
Learned	Revised	Confident
_____ % Achieved:_____		

1	Primary colours of light

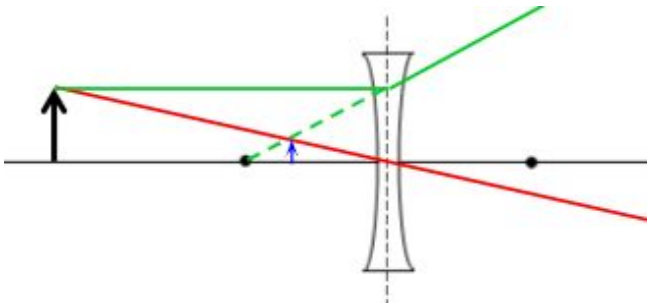


N°	Keyword	Definition
2	Black body	Maximum displacement of a point on a wave from its undisturbed position (m)
3	Concave	A lens that curves inwards and causes light to diverge.
4	Convex	A lens that bulges outwards and causes light to converge..
5	Focal point	The distance from one point on a wave to the equivalent point on the next wave (m)
6	Intensity	The power per unit area (W/m^2)
7	Lens	A line that is perpendicular (90°) to a surface.
8	Seismic waves	A wave which travels through the Earth when an earthquake occurs. P-waves and S-waves are seismic waves.
9	Sound wave	A longitudinal wave caused by vibrating particles.
10	Ultrasound	Sound with a frequency that is higher than the range of human hearing (above 20,000 Hz).

11	Convex lens ray diagram



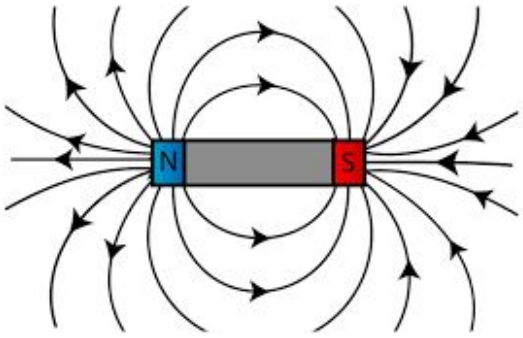
12	Convex lens ray diagram



N°	Facts
13	As the temperature of an object increases, the intensity of every wavelength increases
14	As the temperature of an object increases, the peak wavelength decreases.

GCSE Magnets and electromagnets

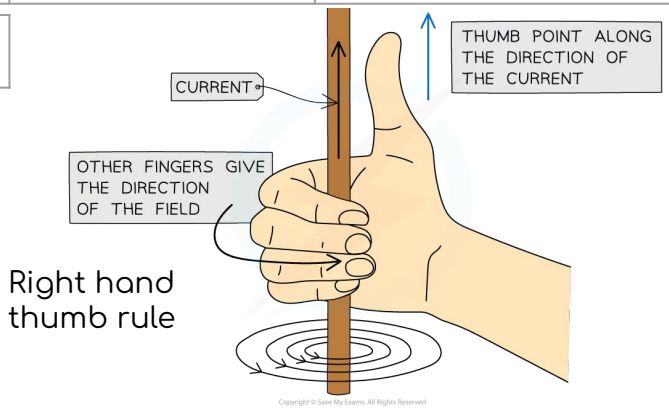
1	Bar magnet magnetic field



Learned	Revised	Confident
_____ % Achieved:_____		

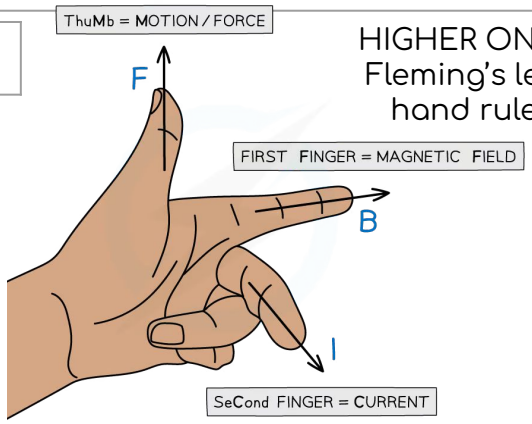
N°	Keyword	Definition
2	Magnetic field	The region around a magnet where another magnet, or magnetic material will experience a force due to the magnet.
3	Permanent magnet	Produces its own magnetic field which is always there
4	Induced magnet	An object that becomes magnetic when it is placed in a magnetic field
5	Electromagnet	A solenoid with an iron core
HIGHER ONLY		
6	Motor effect	When a current carrying wire in a magnetic field experiences a force
7	Magnetic flux density	How many field (flux) lines there are in a region

8



Right hand thumb rule

9



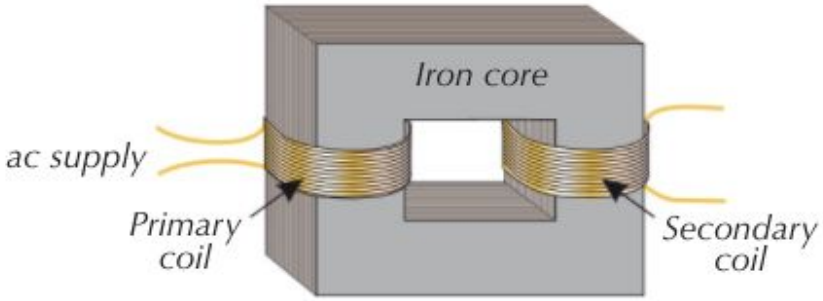
HIGHER ONLY
Fleming's left hand rule

N°	Facts
10	All magnets have a north and south pole
11	Like poles (eg. north and north, or south and south) repel each other
12	Unlike (opposite) poles (eg. north and south) attract each other
13	The magnetic metals are iron, steel, cobalt and nickel
14	The closer together magnetic field lines are, the stronger the magnet
15	Magnetic field lines always point from north to south

GCSE Magnets and electromagnets

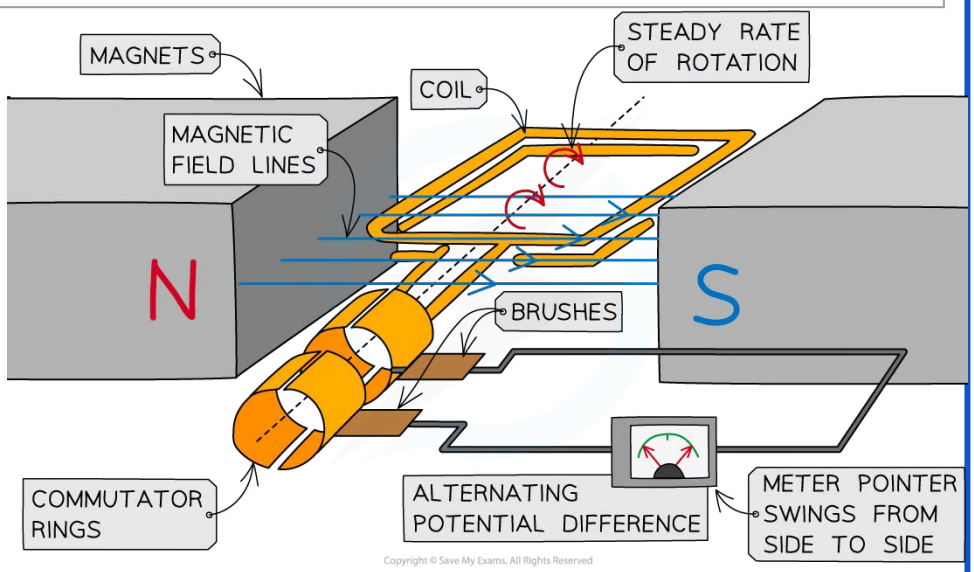
Learned	Revised	Confident
_____ % Achieved:_____		

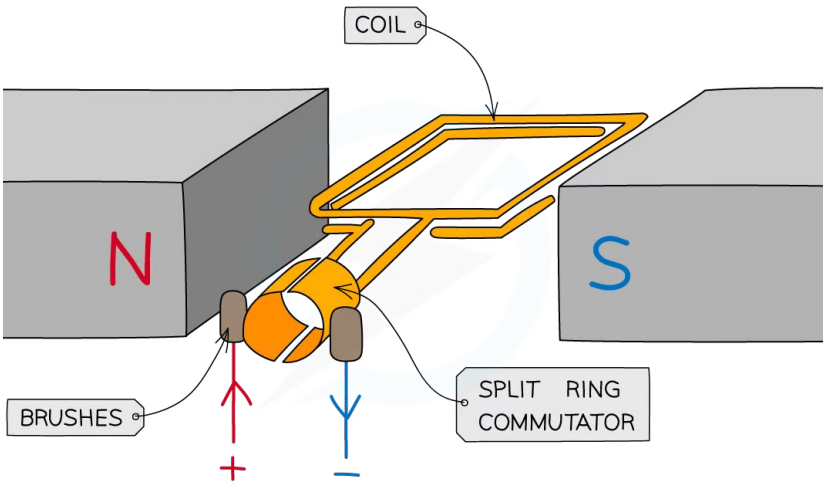
1 Transformer



N°	Keyword	Definition
2	Alternator	A type of generator that generates alternating current.
3	Dynamor	A type of generator that generates direct current.
4	Generator effect	The generator effect is the induction of a potential difference (and current if there is a complete circuit) across a conductor which is experiencing a change in an external magnetic field.
5	Transformer	A device that can change the potential difference of an ac supply.

6 Alternator



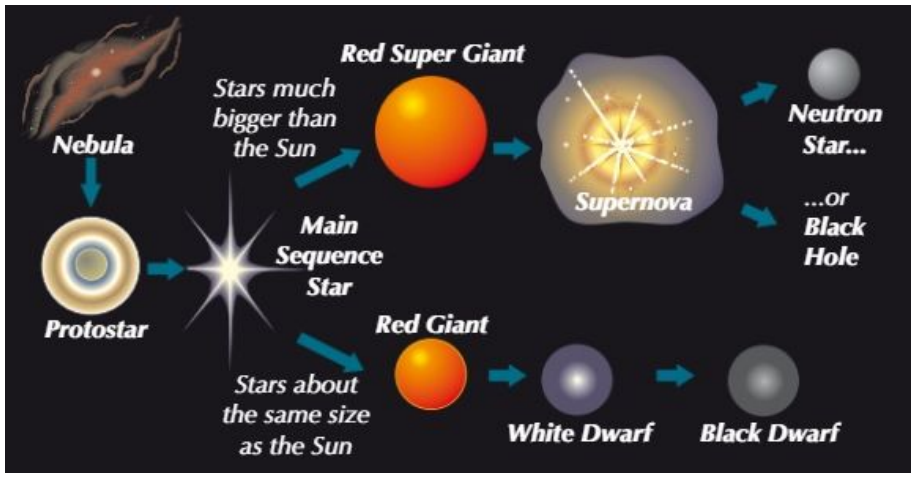


7 Dynamo

GCSE Space Physics

Learned	Revised	Confident
_____ % Achieved:_____		

1	Star life cycle



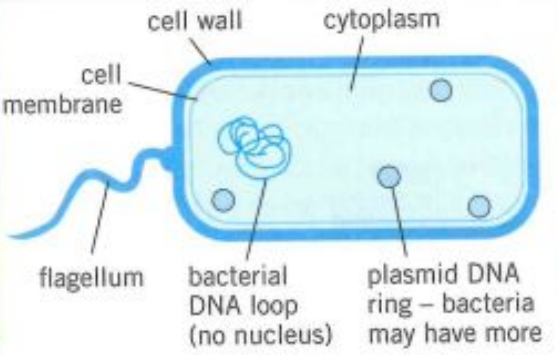
N°	Keyword	Definition
2	Dwarf planet	A planet-like object in space that orbits a star
3	Main sequence star	A star in the main sequence of its life, which is stable because the nuclear fusion provides pressure that balances the inward pull of gravity.
4	Nebula	A cloud of dust and gas in space.
5	Neutron star	The very dense core of a star that is left behind when a red super giant explodes in a supernova.
6	Nuclear fusion	When two nuclei join to form a heavier nucleus.
7	Orbit	The path on which one object moves around another
8	Planet	A natural object that orbits a star, and is large enough to have "cleared the neighbourhood".
9	Protostar	The earliest stage in the lifecycle of a star.
10	Red giant	A type of star that is formed when a star around the same size as the Sun expands as it begins to run out of hydrogen.
11	Red super giant	A type of star that is formed when a star much bigger than the Sun expands as it begins to run out of hydrogen.
12	Red shift	The shift in observed wavelength of light from a source moving away from a stationary observer (towards the red end of the EM spectrum)
13	Satellite	An object that orbits a second, more massive object. Satellites can be artificial or natural (e.g. the moon)
14	Supernova	The explosion of a red super giant
15	White dwarf	The hot, dense core left behind when a red giant becomes unstable and ejects its outer layer of dust and gas.

N°	Facts
16	The big bang theory says that initially, all matter in the universe occupied a very small space. This tiny space was very dense, and so was very hot Then it "exploded" - space started expanding, and the expansion is still going on.

GCSE Cell Biology

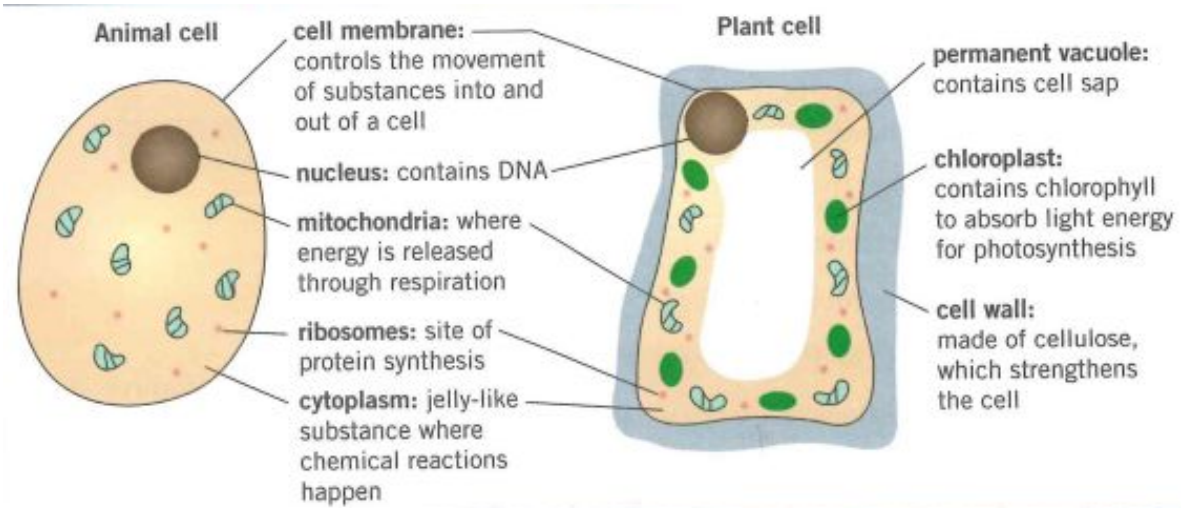
Learned	Revised	Confident
_____ % Achieved:_____		

1	Bacterium



N°	Keyword	Definition
2	Cell cycle	A process that all body cells use to grow and divide - it includes the stages "cell growth and DNA replication", "mitosis" and "cell division"
3	Chromosome	A long molecule of DNA found in the nucleus, which carries genes
4	Eukaryotic cell	A complex cell that has a nucleus, e.g. plant and animal cells
5	Meristem	Unspecialised cells in plants that are capable of cell division
6	Mitosis	When a cell reproduces itself by splitting to form two identical offspring
7	Prokaryotic cell	A simple cell with no "true nucleus", e.g. a bacterium
8	Specialised cell	A cell that is adapted to a particular function
9	Stem cells	A cell that has not yet become specialised
10	Therapeutic cloning	A type of cloning where the embryo is made to have the same genetic information as the patient

11



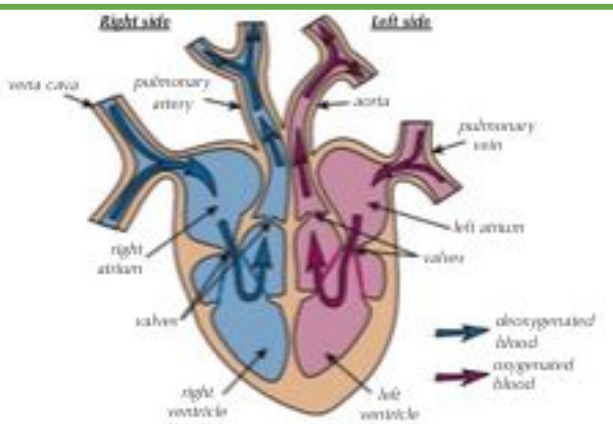
N°	Cell transport	
12	Diffusion	Movement of particles from a high concentration to a low concentration
13	Osmosis	Diffusion of water from a dilute solution to a concentrated solution through a partially permeable membrane
14	Active transport	Movement of particles from a low concentration to a high concentration - needs energy from respiration

GCSE Human Organisation

Learned	Revised	Confident

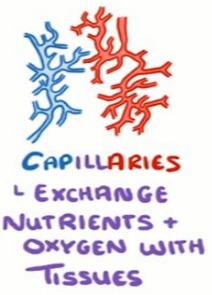
_____ % Achieved:_____

1 The heart



N°	Keyword	Definition
2	Alveoli	Tiny air sacs arranged in clusters throughout the lungs. They provide a large surface area for gas exchange.
3	Benign tumour	A growth of abnormal cells contained in one area, usually within a membrane.
4	Carbohydrase	An enzyme that breaks down carbohydrates into simple sugars. Eg: Amylase
5	Digestion	When large insoluble molecules are broken down into small soluble molecules
6	Enzyme	A biological catalyst that speeds up the rate of a reaction.
7	Lipase	An enzyme that breaks down lipids into fatty acids and glycerol
8	Malignant tumour	A growth of cells that can invade neighbouring tissues and spread to different parts of the body in the blood where they form secondary tumours.
9	Protease	An enzyme that breaks down proteins into amino acids

10 Blood vessels

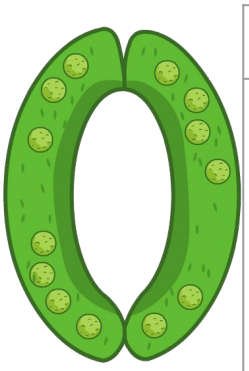


Treatment	Description	Advantage	Disadvantage
Statins	A type of drug that reduces blood cholesterol levels to slow down the rate at which fatty material is deposited in the coronary arteries.	Can reduce the risk of strokes, CHD and heart attacks.	Long term treatment and negative side effects.
Stents	A metal mesh tube placed in an artery to hold it open.	The success rate is high, they lower the risk of a heart attack and last for a long time.	Drugs needed to stop blood clotting.

GCSE Plant Organisation

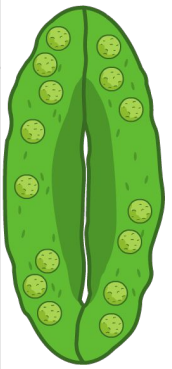
Learned	Revised	Confident

_____ % Achieved:_____



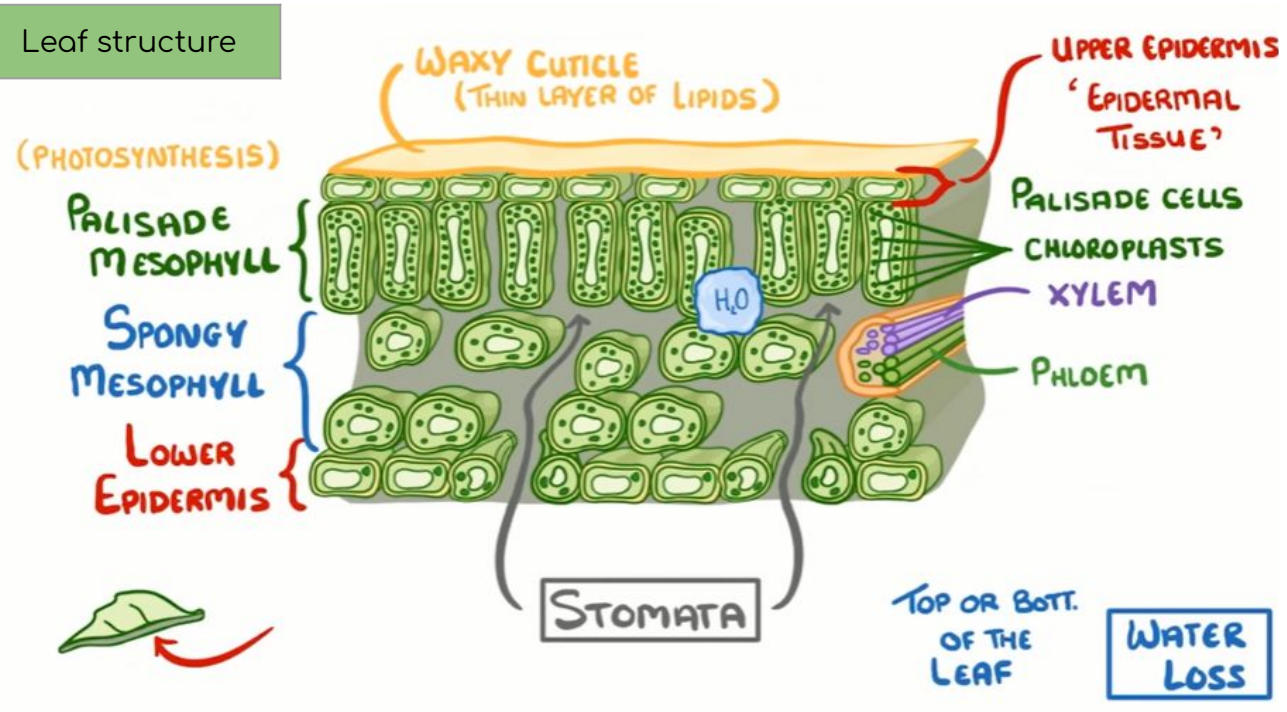
1	Guard cells

When there is plenty of water, the guard cells swell and become turgid, opening the stomata. When short of water, the guard cell loses water, becomes flaccid and the stomata close. They are also sensitive to light.



N°	Keyword	Definition
2	Guard cell	A cell which controls the opening and closing of the stomata.
3	Meristem tissue	Plant tissue found at the tips of roots and shoots made of actively dividing cells that can differentiate.
4	Palisade mesophyll	A plant tissue that contains lots of chloroplasts to carry out photosynthesis.
5	Phloem	A plant tissue that transports dissolved sugars from the leaves to other parts of the plant.
6	Spongy mesophyll	A plant tissue that contains large air spaces and has a large surface area for diffusion
7	Stomata	Small openings in the surface of a leaf that allow gases to diffuse into the leaf.
8	Translocation	The movement of dissolved sugars from the leaves to the rest of the plant, via the phloem.
9	Transpiration	The loss of water vapour through the stomata.
10	Xylem	A plant tissue that transports water and mineral ions from the roots to the stems and leaves.

11	Leaf structure

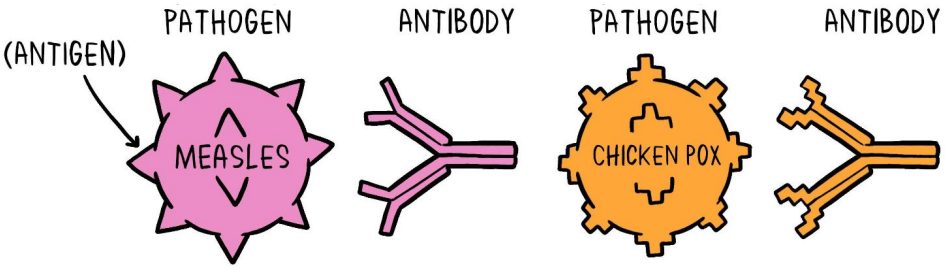


GCSE Infection and Response

Learned	Revised	Confident

_____ % Achieved:_____

1 Antibodies and antigens



N°	Keyword	Definition
2	Antibiotic	A drug used to kill or prevent the growth of bacteria (e.g. penicillin)
3	Antibody	A protein produced by white blood cells in response to the presence on an antigen
4	Antigen	A molecule on the surface of a cell, with a specific shape
5	Antitoxin	A protein produced by white blood cells which counteracts toxins (poisons) produced by bacteria
6	Clinical trials	Drug tests on human volunteers
7	Communicable disease	A disease that can be spread between individuals
8	Double-blind trial	A clinical trial where neither the doctors nor the patients know who has received the drug and who has received the placebo until after the trial
9	Efficacy	Whether something (e.g. a drug) works or not
10	Immunity	The ability of the white blood cells to respond quickly to a pathogen (so symptoms don't occur)
11	Painkiller	A drug that relieves pain. It does NOT treat the disease.
12	Pathogen	A microorganism that causes disease
13	Phagocytosis	The process by which white blood cells engulf pathogens and digest them.
14	Placebo	A dummy pill. Used in drug trials to test the effect of the real drug.
15	Preclinical trial	Drug tests on human cells and tissues, and animals
16	Vaccination	An injection of dead or inactive pathogens to provide immunity

N°	Facts
17	Bacteria, fungi, protists and viruses can all be pathogens (cause disease)
18	The skin, hair, mucus and stomach acid are general defenses that prevent pathogens from infecting the body.

GCSE Bioenergetics

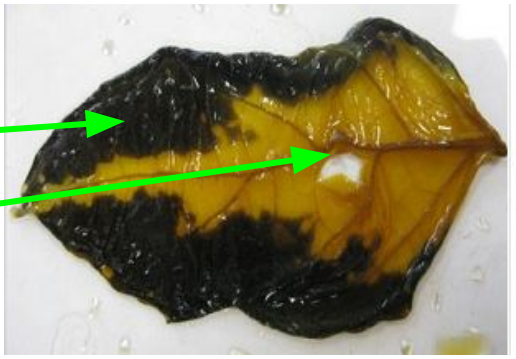
Learned	Revised	Confident

_____ % Achieved:_____

1

Starch present

No starch present



Nᵒᶜᵛ	Keyword	Definition
2	Aerobic	Respiration that involves the use of oxygen to transfer energy.
3	Anaerobic	Respiration that takes place **without** oxygen to transfer energy.
4	Fermentation	The process of breaking down sugars by anaerobic respiration in bacteria or yeast.
5	Metabolism	The sum of all the reactions in the cell or body. This is controlled by enzymes
6	Oxygen debt	The amount of extra oxygen the body needs after exercise to react with the accumulated lactic acid and remove it from the cells.
7	Photosynthesis	An endothermic reaction in which energy is transferred from the environment to chloroplasts by light.
8	Respiration	A chemical reaction that breaks down glucose to release energy.

Nᵒᶜᵛ	Facts Definition
9	**Factors affecting the rate of photosynthesis:** Carbon dioxide, Temperature, Light intensity
10	**Plants use glucose for:** Respiration, Making cellulose, Making amino acids, Converted and stored as lipids (fats), Converted and stored as starch, Stored as sucrose and other sugars in fruits.

11

Aerobic respiration

Glucose + Oxygen → Carbon dioxide + Water + Energy

12

Anaerobic respiration

Glucose → Lactic acid + Energy

13

Fermentation

Glucose → Ethanol + Carbon dioxide + Energy

14

Photosynthesis

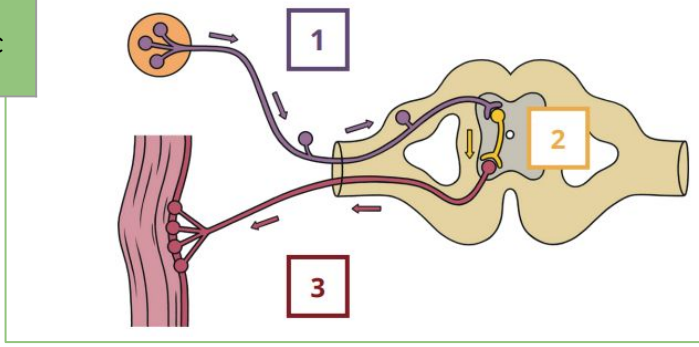
Carbon dioxide + Water → Glucose + Oxygen

GCSE Homeostasis

Learned	Revised	Confident

_____ % Achieved:_____

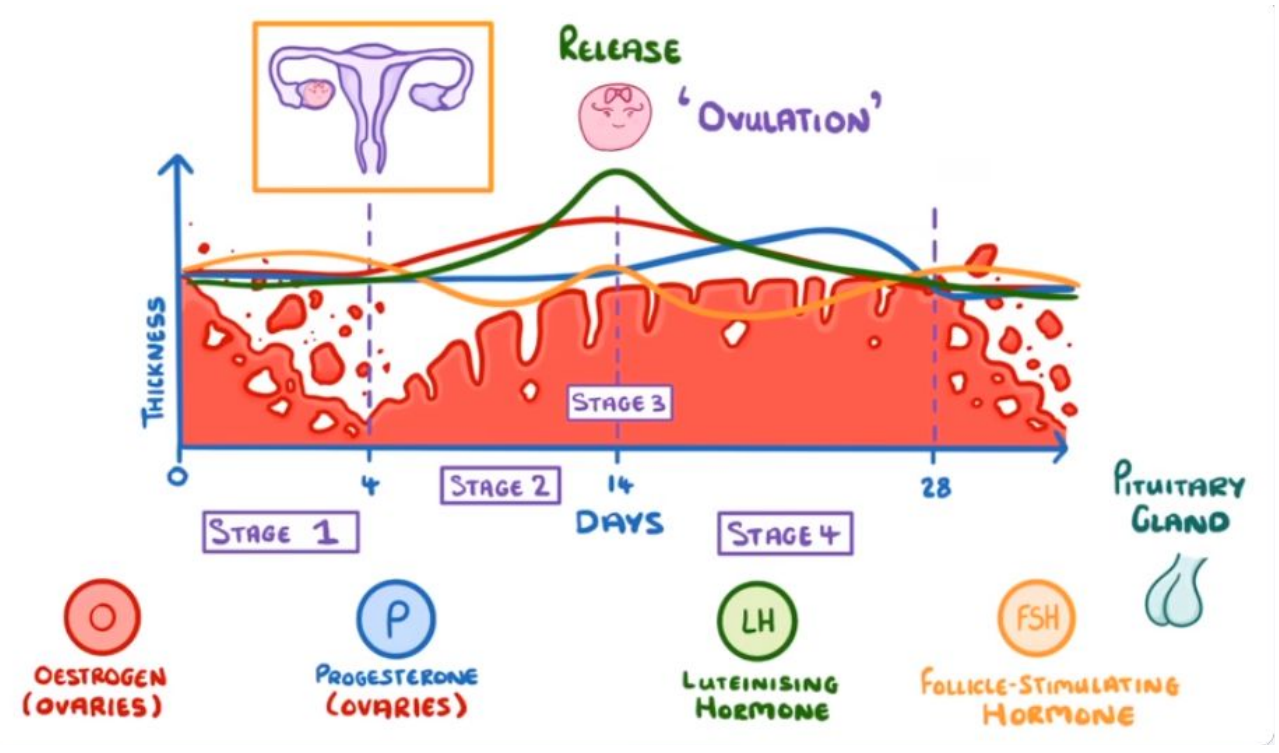
1 **Reflex arc**



1. **Sensory neurones** link the receptor to the coordination centre.
2. **Relay neurones** are found within the coordination centre and connect the sensory and motor neurones.
3. **Motor neurones** link the coordination centre to the effector.

N°	Keyword	Definition
2	Adrenal gland	The gland where the hormone adrenaline is produced.
3	Follicle stimulating hormone (FSH)	A hormone involved in the menstrual cycle that causes maturation of an egg in the ovary.
4	Glycogen	Glucose is converted into this molecule for storage in liver and muscle cells.
5	Luteinising hormone (LH)	A hormone involved in the menstrual cycle that stimulates the release of an egg
6	Oestrogen	The main female reproductive hormone. It is produced by the ovaries. It is involved in thickening and maintaining the uterus lining
7	Pituitary gland	The 'master gland' located in the brain that secretes several hormones into the blood in response to body conditions.
8	Progesterone	A female reproductive hormone that is involved in maintaining the uterus lining.
9	Synapse	A gap between two neurones. Impulses pass across it by diffusion of chemical neurotransmitters.

10

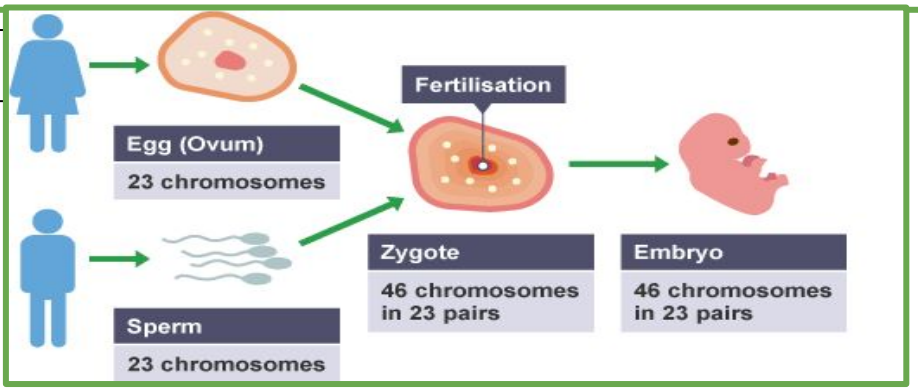


GCSE Inheritance and Evolution

Learned	Revised	Confident

_____ % Achieved:_____

1

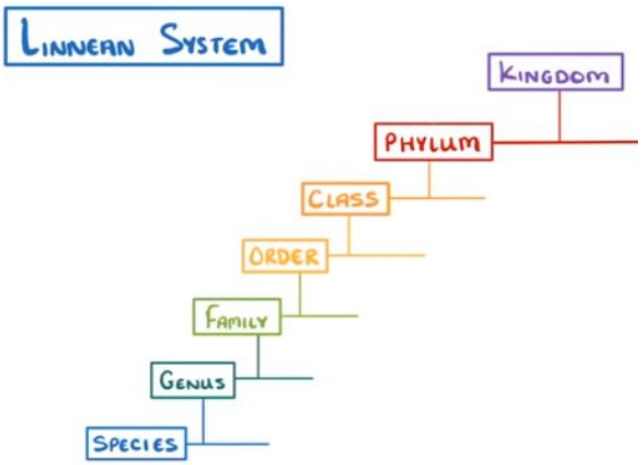


N°	Keyword	Definition
2	Alleles	Different forms of the same gene.
3	DNA	Deoxyribonucleic acid. The material inside the nucleus of cells, carrying the genetic information of a living being.
4	Dominant allele	Represented with a capital letter. It is always expressed, even if only one copy is present.
5	Gamete	Sex cell (sperm in males and ova/eggs in females).
6	Genome	Entire set of genetic material in an organism.
7	Recessive allele	Represented with a lowercase letter. It is only expressed if two copies of it are present

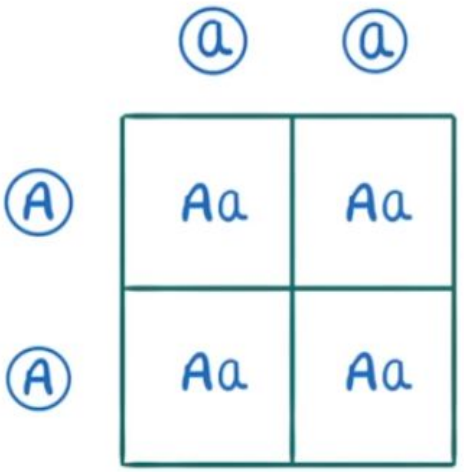
8 **Structure of DNA**

'DOUBLE HELIX'

9 **Classification of living organisms**



10 **Punnett Square**



Key facts		
11	Natural selection	All species of living things have evolved from simple life forms over a period of time.
12	Genetically modified	Describes a cell or organism that has had its genetic code altered by adding a gene from another organism.
13	Genetic engineering	Process which involves the artificial transfer of genetic information from one donor cell or organism to another.
14	Evidence for evolution	Fossils, extinction, DNA analysis and antibiotic resistance.

GCSE Ecology

Learned	Revised	Confident

_____ % Achieved:_____

Maintaining biodiversity

Breeding programmes

Protection and regeneration of rare species

Reintroduction of field margins and hedgerows.

Reduction of deforestation and carbon dioxide emissions

Recycling resources rather than dumping waste in landfill.

N°	Keyword	Definition
1	Abiotic factor	A non-living factor that can affect a community, e.g. light intensity and temperature
2	Adaptation	Special features that allow living organisms to survive and be successful in their habitat.
3	Biodiversity	The variety of all the different species of organisms on Earth, or within an ecosystem.
4	Biotic factor	A living factor that can affect a community, e.g. availability of food and new predators.
5	Community	Two or more populations of organisms occupying the same area.
6	Ecosystem	The interaction of a community of living organisms (biotic) and the non-living (abiotic) parts of their environment.
7	Interdependence	The dependence of each species on other species for food, shelter, pollination, seed dispersal etc. If one species is removed it can affect the whole community.
8	Quadrat	A square frame used to take a representative sample of plants or slow-moving animals in an area.
9	Transect	A line across a habitat or part of a habitat used to sample the number of organisms at regular intervals.

Facts

Carbon cycle - the main process involved are respiration, combustion and photosynthesis.

Water cycle - evaporation, condensation, precipitation, percolation, transpiration, respiration.

Global warming impacts living things by causing changes in the distribution of organisms, rising sea levels and habitat loss, changing weather patterns and changing migration patterns.

Land use for dumping waste, quarrying, farming and building - this reduces biodiversity.