Name:______________________________________

Montgomery Academy

Science Department

Year 9 Knowledge Organiser 2023-2024

Contents

Introduction to Science Knowledge Organiser

A science laboratory is used for carrying out practical investigations. They involve using dangerous chemicals and practical equipment such as Bunsen burners.

Some practical equipment, such as test tubes, are easily breakable so care must be taken.

The pupils' and teacher's health and safety are very important so that no one gets hurt.

Hazard symbols show people how dangerous a chemical is, and what care should be taken when handling them.

Symbols can be used all over the world and are immediately recognisable, so it doesn't matter which language is used.

flammable – 

corrosive – 

harmful – 

irritant – 

can damage the environment – 

Scientific Equipment

Diagrams are used when drawing practical equipment to make it easier and quicker to draw.

evaporating basin

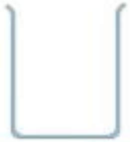
clamp and stand

thermometer

tripod and gauze

filter paper and funnel

test tube



beaker

bunsen burner

conical flask

The Safety Flame

The safety flame is used when the Bunsen burner is not in use. The flame is easier to see when it is the yellow flame. To produce this flame, the air hole is fully shut. Less oxygen will get into the Bunsen burner, hence the yellow flame.

The Roaring Flame

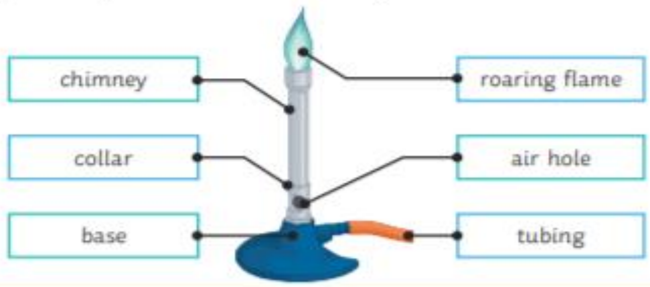
The roaring flame is used to heat things quickly. To produce this flame, the air hole must be fully open. More oxygen will get into the Bunsen burner, hence the blue flame.

Below are some safety rules that should always be followed in a lab.

- Always wear googles during a practical.
- Stand up during a practical.
- No running in the lab.
- Tie long hair back with a bobble.
- When something gets broken, tell a teacher.
- Inform a teacher of any spills and mop up immediately.
- Make sure equipment gets put away at the end of a practical.

Bunsen Burner

The Bunsen burner is an important piece of scientific equipment. It is used in many science experiments and uses methane gas.



Introduction to Science Knowledge Organiser

How to Use a Microscope

1. Plug in the microscope and turn on the light.
2. Place the specimen (the object to be observed) on the stage.
3. Turn the magnification to the smallest.
4. Make sure that the specimen is in the centre; fasten it with the clips.
5. Look down the microscope.
6. Use the fine focussing wheel to observe the specimen.
7. Increase the magnification.
8. Draw/write down any observations.

Using a Microscope

Microscopes have been used for years to observe objects that are too small to see with the naked eye.

Over time, the magnification of microscopes has significantly improved due to developments in technology. We now have microscopes that can examine specimens at an atomic level.

We have made many important scientific discoveries thanks to microscopes.

The Flame Test

This test is used to find out what metal ion is in a compound. Each metal will burn with a different colour when placed into a Bunsen burner.

1. Dip the splint in some water.
2. Dip the wet end in a test tube sample of metal chloride e.g. copper chloride.
3. Turn the Bunsen burner to the blue flame and carefully place the end of the splint with the metal into the flame.
4. Write down any observations/colours in the results table.

Chemical	Flame Test Colour
potassium (K)	purple
calcium (Ca)	yellow-red
lithium (Li)	red
sodium (Na)	orange
copper (Cu)	green-blue

Investigation Skills

Independent variable – the variable you change.

Dependent variable – the variable you measure.

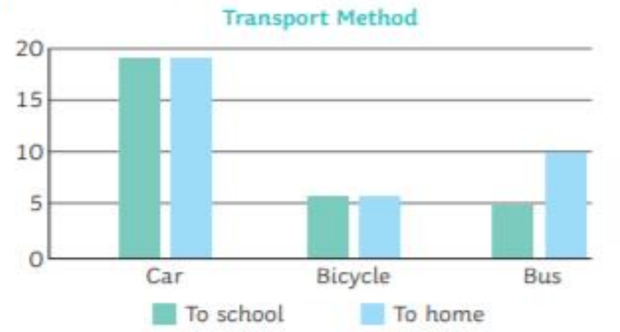
Control variables – the variables you keep the same.

Prediction – what you think will happen and why?

Method – how to carry out the practical investigation.

Results table - as the practical is carried out, write the results in a table.

Bar graph – used with categorical data.



Scatter graph – used with continuous data.

Conclusion and analysis – look at the results and discuss what you found out from the practical.

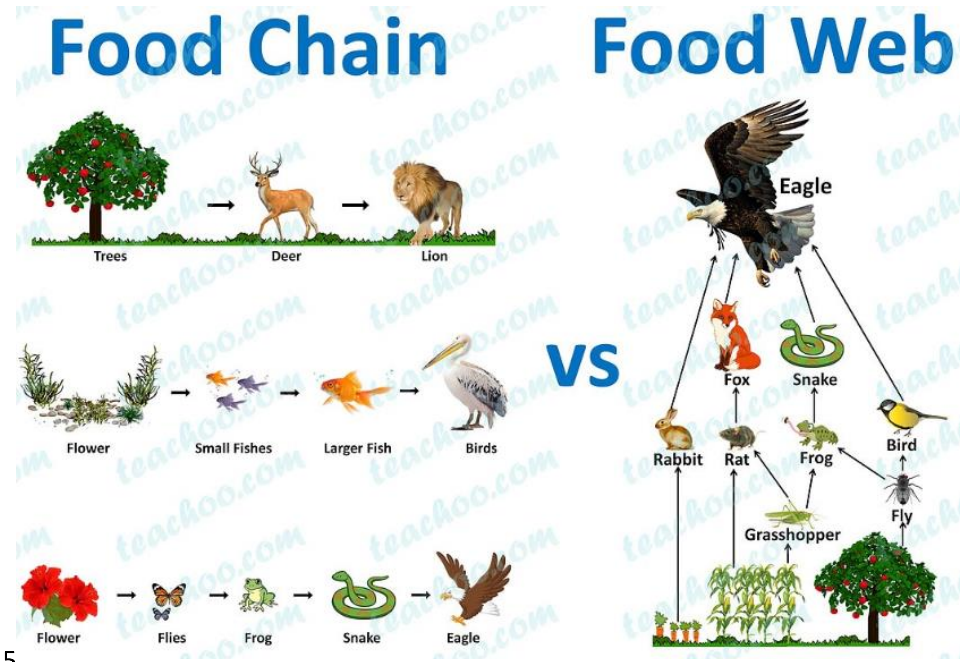
Evaluation - how can you improve the practical?

Ecology, Inheritance and Variation (Part 1)

20. Classification of organisms	
Carl Linnaeus	Invented the groups we classify organisms into 1. Kingdom 2. Phylum 3. Class 4. Order 5. Family 6. Genus 7. Species

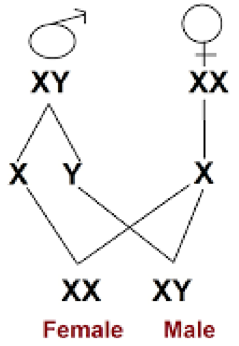
3. Levels of organisation	
Producer	An organism that makes its own food by photosynthesis. They are the starting point of all food chains
Consumer	Organism that eats something
Predator	Consumer that hunts
Prey	Consumer that is hunted

11. Trophic levels (TRIPLE ONLY)		
1	producers	Plants and algae
2	Primary consumers	Herbivores
3	Secondary consumers	Carnivores/ Predators
4	Tertiary consumers	Top carnivore/ apex predator
Energy loss between trophic levels		Only 10% of biomass makes it up each trophic level. It is wasted by • Respiration of glucose • Wasted being produced and excreted



Ecology, Inheritance and Variation (Part 2)

8. Sex determination	
No of chromosomes in a human	23 pairs (22 normal, 1 pair of sex)
Male	XY (50% chance)
Female	XX (50% chance)
Sperm	Can hold Y or X chromosome so determine gender of embryo



9. Variation	
Variation	Changes within a population. Caused by mutation
Genetic variation	Changes due to inheriting different alleles of genes
Environmental variation	Changes due to the effect the environment has

10. Evolution	
Evolution	The change in the inherited characteristics of a population due to natural selection. May result in a new species
Natural selection	The process where the organism best adapted to the environment survives and passes on their characteristics
Species	A group of organisms with similar features which can breed to make fertile offspring
Stages of evolution	
1. Population shows variation due to their genes	
2. Environment changes	
3. Some individuals are best adapted and live longer	
4. These can breed and produce more offspring	
5. Over a long period of time the offspring dominate the population	

11. Selective breeding	
Selective breeding	The ancient practice of artificially selecting animals and plants to breed together to create certain characteristics

Ecology, Inheritance and Variation (Part 3)

1. Keywords	
Ecosystem	The interaction of a community of living organisms with their environment
Biotic	Living factors
Abiotic	Non-living factors
Interdependence	Different species rely on each other for survival within an ecosystem
Adaptations	Features that help an organism survive in a particular habitat
Habitat	Natural environment of a particular organism
Competition	The process by which organisms try to gain raw materials over each other. Plants compete for space, light water and mineral ions Animals compete for shelter, food, water and mates
Biodiversity	The variety of all the living organisms within the earth or ecosystem. A good thing

Useful Websites

Food chains and webs - https://www.bbc.co.uk/bitesize/guides/zq4wjxs/revision/1

Biodiversity - https://www.bbc.co.uk/bitesize/guides/zw9jq6f/revision/1

9. Impact of pollution	
Destruction of peat bogs	Reduction in biodiversity Burning the peat releases carbon dioxide
Deforestation to make room for agriculture and biofuels	Reduction in biodiversity Reduces ability to absorb carbon dioxide
Global warming	Extreme weather Famine

10. Maintaining biodiversity

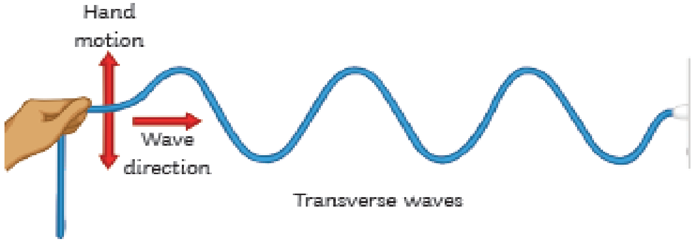
1. breeding programmes for endangered species
2. protection and regeneration of rare habitats
3. reintroduction of field margins and hedgerows in agricultural areas
4. reduction of deforestation and carbon dioxide emissions by some governments
5. recycling resources rather than dumping waste in landfill.

Waves

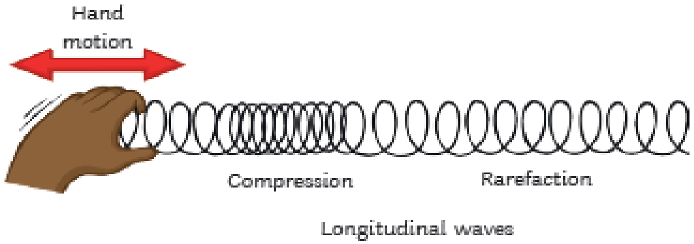
Transverse and Longitudinal Waves

Waves can be either **transverse** or **longitudinal**.

In a transverse wave, the vibrations are at a right angle (**perpendicular**) to the direction of the energy transfer. The wave has **peaks** (or crests) and **troughs**. Examples include **water waves** and **light waves**.

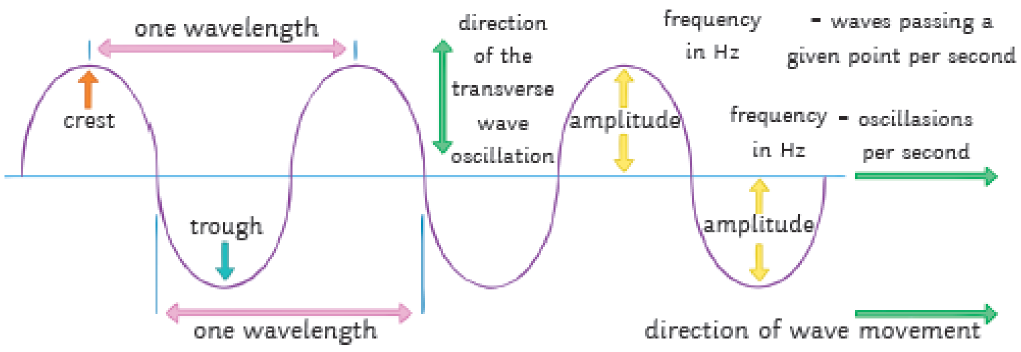


In a longitudinal wave, the vibrations are in the same direction (**parallel**) as the energy transfer. The wave has areas of **compression** and **rarefaction**. Examples of this type of wave are **sound waves**.



When a wave travels, energy is transferred but the matter itself does not move. Particles of water or air vibrate and transfer energy but do not move with the wave.

Properties of Waves



The **frequency** of a wave is the number of waves which pass a given point every second.

time period (s) = 1 ÷ frequency (Hz)

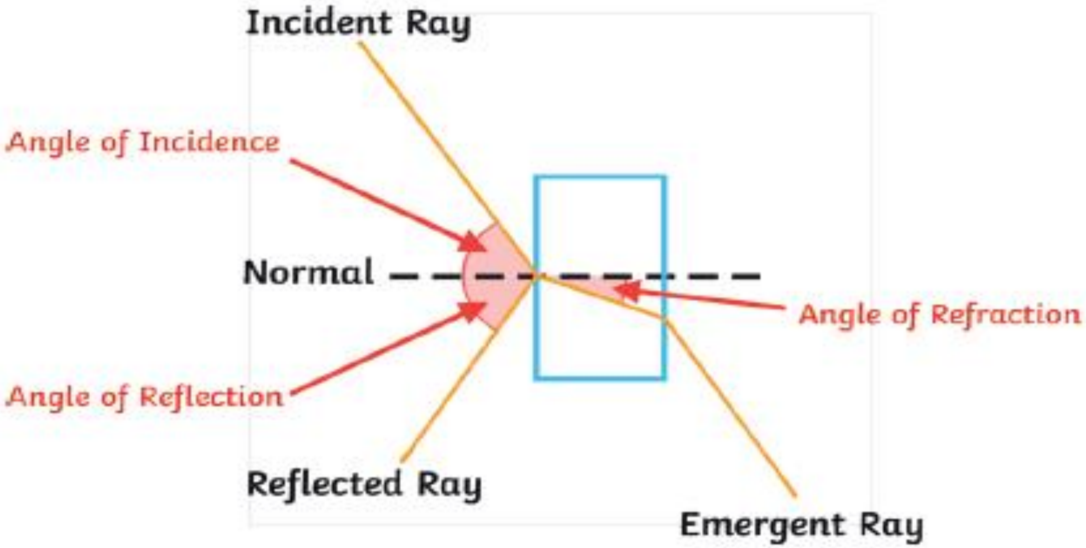
t = 1 ÷ f

The **wave speed** is how quickly the energy is transferred through a medium (how quickly the wave travels).

wave speed (m/s) = frequency (Hz) × wavelength (m)

The law of reflection states:

angle of incidence = angle of reflection

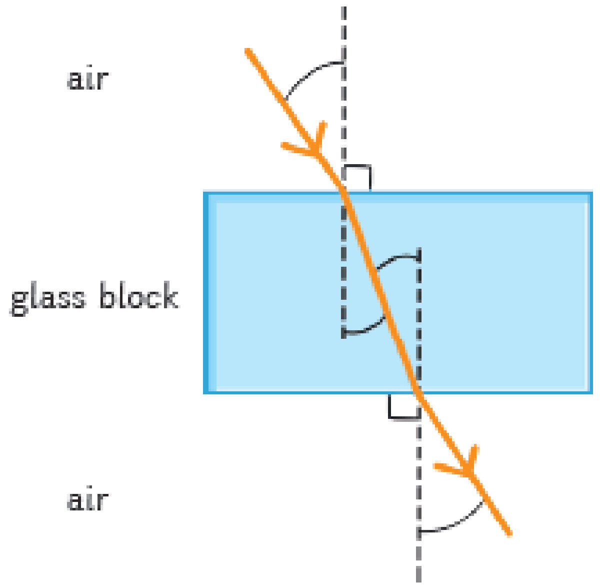


Refraction

As the wave moves **to** a more dense medium (e.g. from gas to solid), it slows down and bends so that the angle from the normal becomes smaller. The angle of incidence is larger than the angle of refraction.

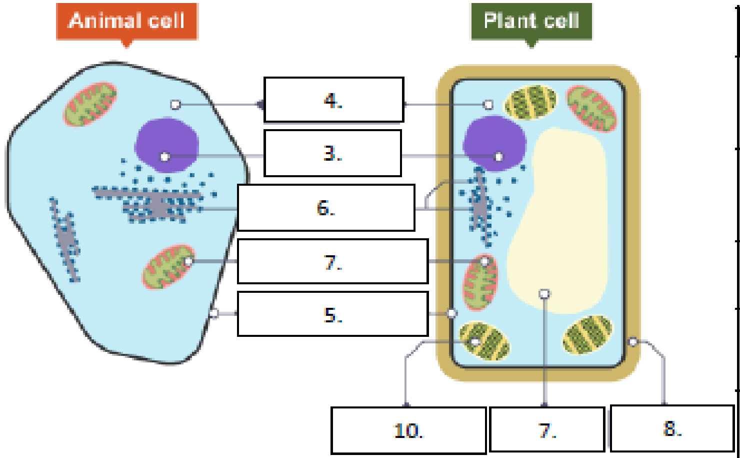
As the wave moves **from** a more dense medium (e.g. from solid to gas), it speeds up and bends so that the angle from the normal becomes larger. The angle of refraction is larger than the angle of incidence.

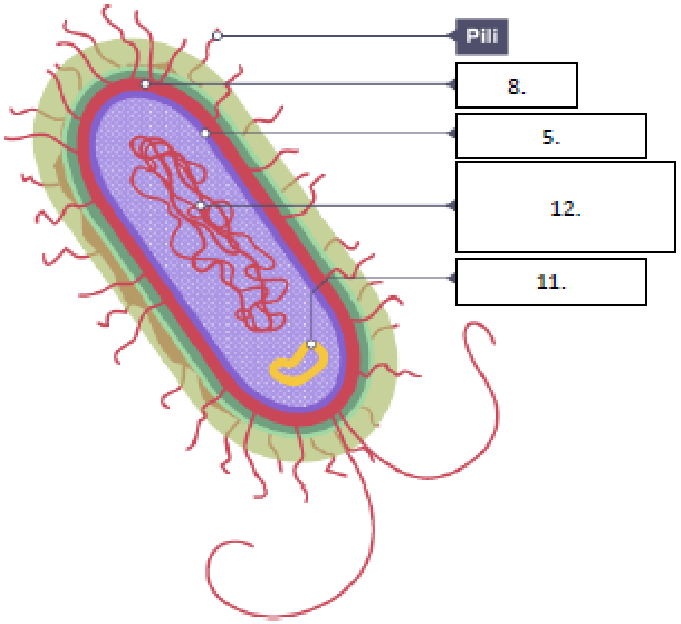
The angle at which a wave enters the glass block is equal to the angle that it leaves the glass block (when entering and leaving the same medium); however, if a wave crosses a boundary between two mediums at an angle of 90°C, then it will not change direction but instead carry on in a straight line.



Biology Topic 1: Cell Biology

1. Cell structure





Keywords	
1. Eukaryotic	A complex cell with a nucleus (e.g. animal or plant cells).
2. Prokaryotic	A smaller cell without a nucleus (e.g. bacterial cell).
3. Nucleus	Contains genetic material.
4. Cytoplasm	Where a cells chemical reactions happen.
5. Cell membrane	Controls what goes into and out of a cell.
6. Ribosome	Part of a cell where proteins are made.
7. Mitochondria	Where aerobic respiration takes place.
8. Cell wall	Only found in plant cells. Made of cellulose and supports the cell.
9. Vacuole	Only found in plant cells. Contains cell sap.
10. Chloroplasts	Only found in plant cells. Where photosynthesis takes place.
11. Plasmid	Only found in bacterial cells. A small loop of DNA.
12. Genetic material	Long strands of genes not tightly pack in a nucleus.

2. Specialised cells

Keywords	
Differentiation	A stem cell turning into a specialised cell
Stem cell	A special type of cell which can turn into other specialised cells
Adult stem cells	Can only produce certain types of cell -found in bone marrow
Embryonic stem cells	Can produce all types of cells - controversial
Meristems	Where plant stem cells are found

Sperm cells	Take male DNA to the egg • Tail to help it swim • Lots of mitochondria for energy
Nerve cells	Carry electrical signals around the body • Long to cover long distances • Branches to connect to other cells
Muscle Cells	Muscle cells contract • Long so have space to contract • Lots of mitochondria for energy
Root hair cells	Root hair cells absorb water and minerals • Long hairs • Big surface area for absorption
Phloem Cells	Phloem cells transport sugars (plants) • Long tube joined end to end
Xylem cells	Xylem cells transport water (plants) • Long tubes joined end to end • Hollow so water can flow through

3. Comparing types of microscope

Type of microscope	Advantages	Disadvantages
Light microscope	1. Cheaper 2. Can see colours 3. Can see live specimen	1. Lower magnification
Electron microscope	1. Expensive 2. Higher magnification (x1000 more)	1. Can only see dead specimen 2. No colour

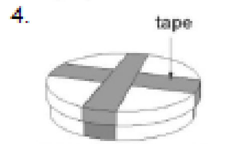
4. Calculating magnification

$$\text{magnification} = \frac{\text{size of image}}{\text{actual size of object}}$$

$$\text{actual size of object} = \frac{\text{size of image}}{\text{magnification}}$$

(mm) → × 1000 → (μm) → × 1000 → (nm); (nm) → ÷ 1000 → (μm) → ÷ 1000 → (mm)

	(mm)	(μm)	(nm)
2mm	2	2000 (2×10^{3})	2000000 (2×10^{6})
130μm	0.13	130	130000 (1.3×10^{5})
0.032m	32	32000 (3.2×10^{4})	32000000 (3.2×10^{7})
7.25μm	0.00725	7.25	7250 (7.25×10^{3})



Petri dish is placed in an incubator

Aseptic Technique (Triple only)

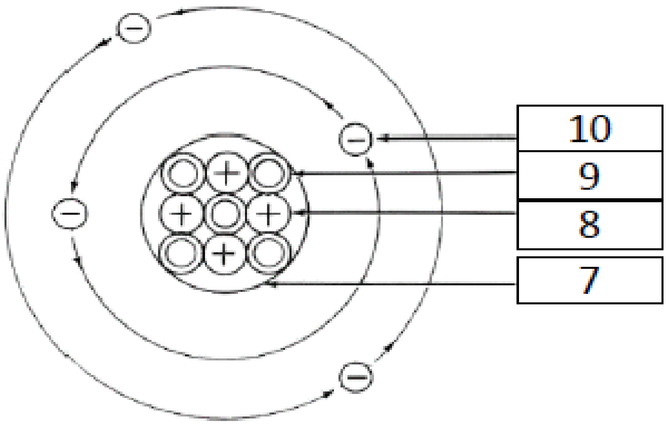
5. Culturing micro-organisms TRIPLE ONLY

Keywords	
Binary fission	"Splitting in two" how bacteria divide every 20 mins
Agar gel	A gel of nutrients bacteria can grow on
Nutrient broth	A liquid bacteria grow well in
Colony	A group of bacteria making a small circular shape
Inoculating loop	A metal loop use to transfer microorganisms
Petri dish	A small plastic dish used for growing microorganisms
Aseptic	Free from bacteria and viruses
Incubator	Device kept at constant temperature to help the microorganisms grow

Aseptic technique	
prep	All agar plates and broth must be sterilised before use
1.	The inoculating loop must be sterilised by passing through a flame
2.	Sample to be cultured is taken using the loop
3.	Sample spread on agar in petri dish
4.	Dish sealed shut with tape and incubated at 25° C

Chemistry topic 1: Atomic structure

1. Keywords	
1. Atom	The smallest possible piece of an element. Has a radius of 0.1nm (or $1x10^{-10}$m)
2. Element	A substance in which all the atoms have the same atomic number
3. Isotope	Atoms with the same number of protons but different numbers of neutrons
4. Molecule	Two or more atoms bonded together
5. Compound	Two or more <u>different</u> atoms bonded together
6. Mixture	At least two different elements or compounds together. Can be separated easily
7. Nucleus	The centre of an atom. Contains protons and neutrons
8. Proton	A positively charged particle found in the nucleus
9. Neutron	A neutral particle found in the nucleus. Has no charge
10. Electron	A negatively charged particle found in energy levels (shells) around the nucleus



2. Properties of sub-atomic particles

Particle	Relative mass	Relative charge	Location
Proton	1	+1	Nucleus
Neutron	1	0	Nucleus
Electron	0	-1	Shells

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

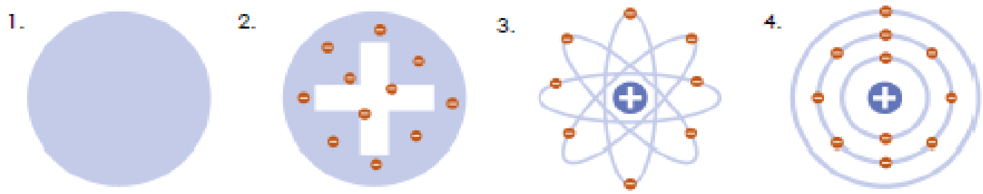
1
H
hydrogen
1

3. Using the periodic table

Number of..	Is the…	Found by..
Protons	Atomic (proton) number	Smaller number on periodic table
Electrons	Atomic (proton) number	Smaller number on periodic table
Neutrons	Difference between the atomic mass and atomic number	Big number – small number

4. History of the atom

Discovery	By	Model	Diagram
Solid particle called atom	John Dalton	Particle: solid spheres	1
The electron	JJ Thompson	Plum pudding: positive 'cake' with negative 'plums'	2
Nucleus	Rutherford	Nuclear: Positive nucleus surrounded by electrons	3
Neutron	James Chadwick	Nuclear: Now with protons and neutrons in nucleus	3
Energy levels (shells)	Niels Bohr	Planetary: Electrons now 'orbit' in different shells	4



5. Electron arrangement rules

1.	Always fill from the inside to the outside
2.	The first shell can only hold 2 electrons
3.	The second and third can hold 8

6. History of the Periodic Table

Invented by	Dmitri **Mendeleev**, a Russian scientist.
Arranged	In order of **atomic mass**, and by their **chemical properties**
What was special about it?	**Predicted** the existence of **other elements** not discovered, and **left gaps** for them in his table
Why was it used?	**New elements** were **discovered** that **matched these gaps**

7. Properties – metals and non-metals

Property	Metals	Non-metals
Density	High (they feel heavy for their size)	Low (they feel light for their size)
Strength	Strong	Weak
Malleable or brittle	Malleable (they bend without breaking)	Brittle (they break or shatter when hammered)
Conduction of heat	Good	Poor (they are insulators)
Conduction of electricity	Good	Poor (they are insulators) apart from graphite

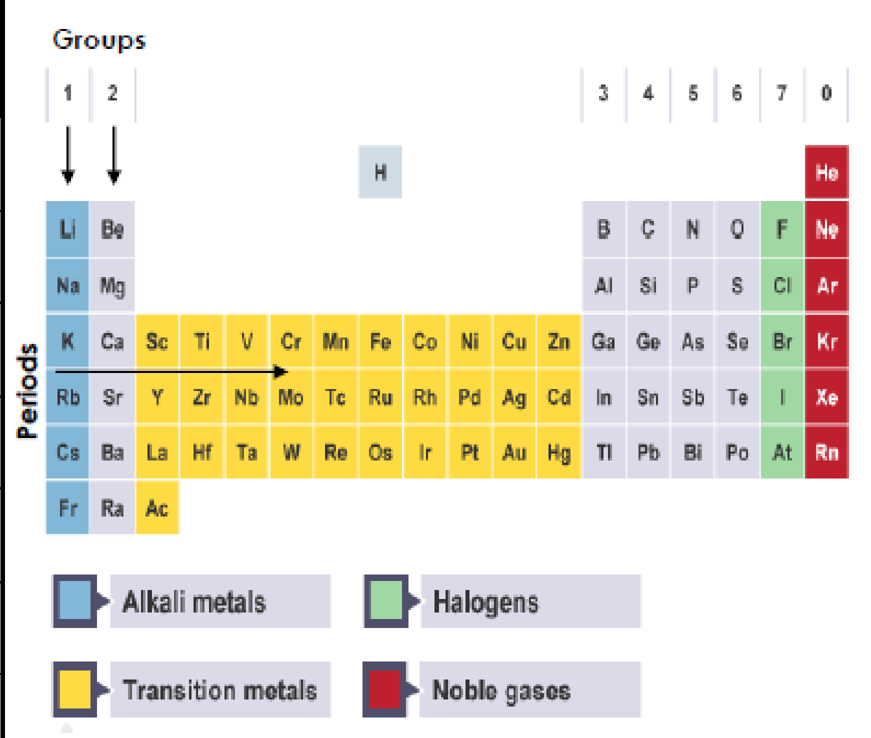
Period	No. of shells
1	1
2	2
3	3
4	4
5	5
6	6
7	7

TL/DR:

Group number
Tells you're the number of outer electrons

Period number
Tells you how many shells

8. Layout of the periodic table



Group	1	2	3	4	5	6	7	8
Electrons in outer shell	1	2	3	4	5	6	7	8
Charge of ion	+1	+2	+3	N/A	-3	-2	-1	N/A
Number of covalent bonds	N/A	N/A	N/A	4	3	2	1	N/A

N/A = not applicable (does not do it)

9. Properties – Groups 1 and 7

Group 1 (I)	Melting point	Density	Reactivity	Group 7 (VII)	Melting point	Density	Reactivity	Group 0 (VIII)	Melting point	Density	Reactivity
Lithium (Li)	**Decreases** down the group	**Increases** down the group	**Increases** down the group	Fluorine (F)	**Increases** down the group	**Increases** down the group	**Decreases** down the group	Helium (He)	**Increases** down the group	**Increases** down the group	**INERT** **(DO NOT REACT)**
Sodium (Na)				Chlorine (Cl)				Neon (Ne)			
Potassium (K)				Bromine (Br)				Argon (Ar)			
Rubidium (Rb)				Iodine (I)				Xenon (Xe)			

10. Transition metals (TRIPLE ONLY)

Properties compared to group 1 elements	Other useful properties
More dense	Ions can have different charges
Harder	Form coloured compounds
Stronger	Good catalysts
Higher melting points	
Less reactive	

11. Common separation techniques

1. Chromatography
Used to separate a mixture of dyes in ink.

2. Filtration
Used to separate insoluble solids from liquids (e.g. sand from water).

3. Evaporation
Used to separate a soluble salt from solution. The solution is heated strongly in an evaporating basin until dry crystals are left.

4. Crystallisation
Used to separate a soluble salt from solution. The solution is heated gently in an evaporating basin until crystals form; the remaining liquid is filtered out.

5. Simple distillation
Is used to separate a liquid from a solution – e.g. water from ink. A condenser is used to cool hot gas until it forms a liquid.

6. Fractional distillation
Used to separate a mixture of liquids with different boiling points.

Physics topic 1: Energy

1. Key Term	Definition
Kinetic energy (KE)	The energy an object has because it is moving
Gravitational potential energy (GPE)	The energy an object has because of its position
Elastic potential energy	The energy stored in a springy object when you stretch or squash it
Thermal energy	The energy a substance has because of its temperature
Chemical energy	The energy stored in fuels, food, and batteries
Conservation of energy	Energy cannot be created or destroyed only transferred.
Work done	The energy transferred by a force
Dissipation	The process of energy being transferred or lost to the surroundings
Friction	A force that opposes movement
System	An object or group of objects
Closed system	An isolated system where no energy transfers take place into or out of the energy stores in the system.
Useful energy	Energy in the place it is wanted in the form that it is needed in
Wasted energy	Energy that is not usefully transferred, usually as thermal.

2. Calculating efficiency

1. $\text{Efficiency} = \dfrac{\text{Useful output energy transferred by the device}}{\text{Total input energy supplied to the device}}$

2. $\text{Efficiency} = \dfrac{\text{Useful power out}}{\text{Total power in}}$

3. No device can be more than 100% efficient.
4. Machines waste energy because of friction between their moving parts, air resistance, electrical resistance, and noise.

5. Energy is transferred by:

1. Heating
2. Waves
3. Electric current
4. Force when it moves an object.

3. Equations to recall and apply

Work done, W = force applied, F x distanced moved, s
(joules, J) (newtons, N) (metres, m)

Change in objects gravitational potential energy store, ΔE_p = mass, m x Gravitational field strength, g x Change of height, Δh
(joules, J) (kilograms, kg) (newtons per kilogram, N/kg) (metres, m)

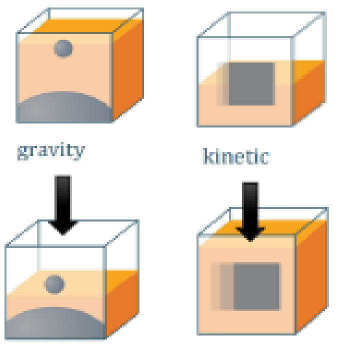
Elastic potential energy, E_e = ½ x spring constant, k x extension², e²
(joules, J) (newtons per metre, N/m) (metres, m)

Kinetic energy, E_k = ½ x mass, m x speed², v²
(joules, J) (kilograms, kg) (metres per second, m/s)

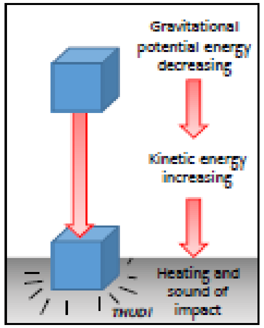
4. Power

1. The more powerful an appliance, the faster the rate at which it transfers energy
2. $\text{Power, P (watts, W)} = \dfrac{\text{Energy transferred to appliance, E (joules, J)}}{\text{Time taken for energy to be transferred, t (seconds, s)}}$
3. The power wasted by an appliance = total power input - useful power output

6. Conservation of energy in action



A falling object:
1. Decreases its GPE store
2. Increases its KE store as it falls
3. Waste energy transferred as thermal and sound



4. Energy Resources			
Energy Resource	Renewable	Advantages	Disadvantages
Fossil Fuels	No	• Low cost. • Easily transportable. • Reliable.	• Produces large amounts of Carbon Dioxide. • Produces some Sulfur Dioxide.
Nuclear	No	• Generates a lot of electricity. • Reliable.	• Expensive to construct and run. • Produces dangerous radioactive waste which will last for thousands of years.
Solar	Yes	• No fuel costs. • No pollution.	• Expensive to set up. • Doesn't work at night.
Wave	Yes	• No fuel costs. • Reliable.	• Can damage marine ecosystems. • Not everywhere is near water.
Tidal	Yes	• No fuel costs. • No pollution. • Reliable.	• Can damage marine ecosystems. • Not everywhere is near water.
Wind	Yes	• No fuel costs. • No pollution.	• Not always reliable. • Noisy. • Some think they are ugly (eyesore).
Geothermal	Yes	• No fuel costs. • No pollution.	• Very few areas where it is accessible.
Biomass	Yes	• Low cost. • Readily available. • Carbon neutral.	• Large scale land use requiring lots of water. • Destruction of habitat to grow crops.
Hydro-electric	Yes	• No fuel costs. • Reliable. • Easily controlled.	• Requires flooding land to build

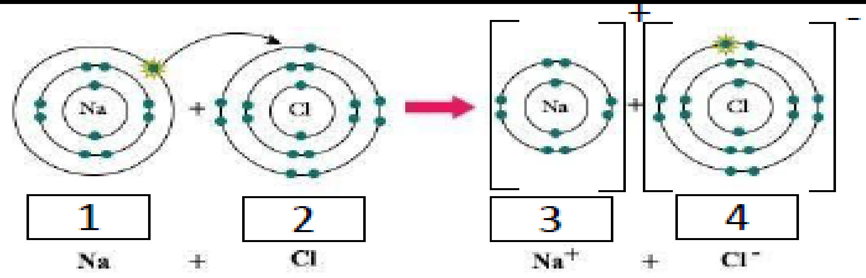
Carbon neutral: a process by which no extra carbon is released to the atmosphere.

Chemistry Topic 2: Bonding, Structure, and the properties of matter

1. Keywords

Ionic bond	When a metal donates electrons to a non-metal forming opposite charged ions that are attracted to each other
Covalent bond	A shared pair of electrons between two non-metals
Metallic bond	Positive metal ions in a 'sea' of delocalised electrons
Ions	Charged atoms which have either gained or lost electrons
Electrons	Negative particles found in the shells of atoms
Group 0	The unreactive 'noble gases' all elements aim to get to group 0 electron configuration when they react
Dot and cross diagrams	The simplest way we show the bonding in atoms
Polymer	A long chain molecule made up of repeating monomers
Monomer	The small molecules that join together to make polymers
Delocalised	Electrons which are free to move anywhere
Alloy	A mixture of a metal and another element to change its properties

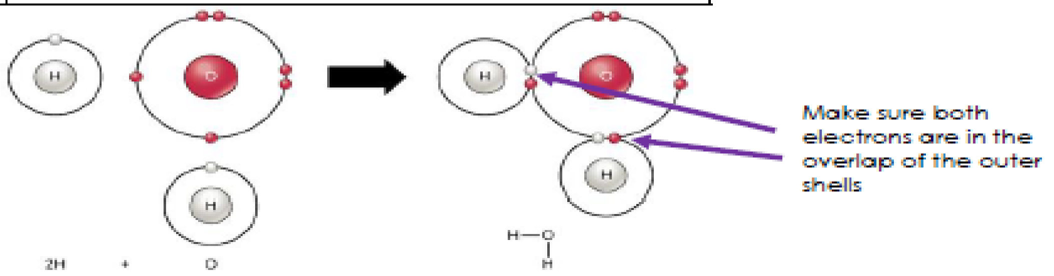
2. The process of ionic bonding



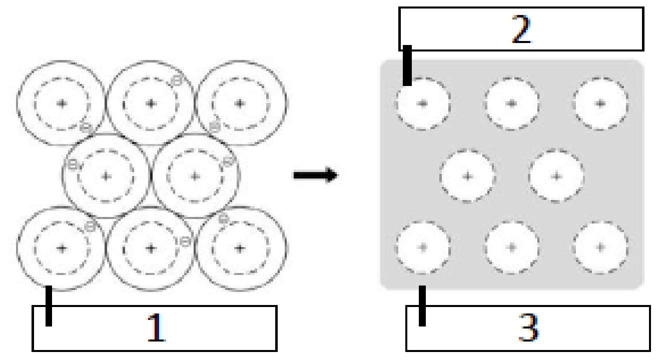
No	Name	Electron movement	Charge	Electron configuration	Does it have a full outer shell?
1	Sodium atom	0	0	2,8,1	No
2	Chlorine atom	0	0	2,8,7	No
3	Sodium ion	Lost 1	+1	2,8	Yes
4	Chloride ion	Gained 1	-1	2,8,8	Yes

3. The process of covalent bonding

1	Non metals share their outer unpaired electrons
2	Now all outer shell spaces appear full
3	There is no change in charge. They remain uncharged

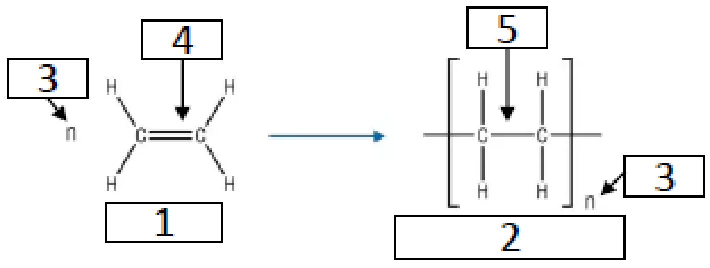


4. Metallic bonding	
1	Metal atoms
2	Positive metal ions
3	'Sea' of delocalised electrons



5. State symbols		
Symbol	Meaning	Example
(s)	Solid	Gold
(l)	Liquid	Water
(g)	Gas	Hydrogen
(aq)	Aqueous (dissolved in water)	Salt solution

6. Polymers	
1	Ethene
2	Poly(ethene) "polythene"
3	A very large number
4	A double bond
5	A single bond

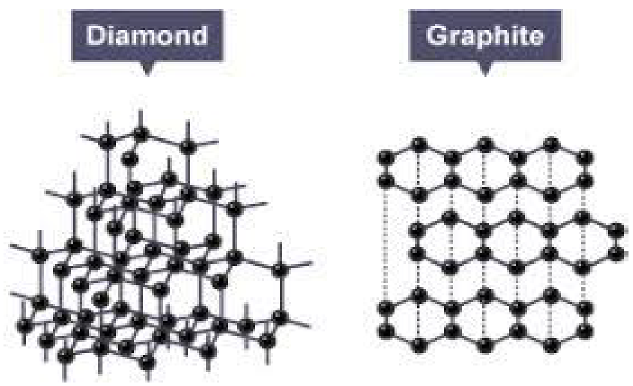


7. General properties of different substances				
Property	Ionic compounds	Small covalent molecules	Giant covalent structures	Metals and alloys
Density	High	Low	High	High
Melting and boiling point	High	Low	High	High
Conduct electricity	Only melted or dissolved in water	No	No (apart from graphite)	Yes
Conduct heat	No	No	No (apart from diamond)	Yes
Brittle or malleable	Brittle	N/A	Brittle	Malleable
Examples	• Salt (sodium chloride) • Magnesium Sulfate	• Chlorine • Oxygen	• Diamond • Graphite • Sand	• Iron • Steel

9. The structure and bonding of carbon			
Name of structure	Diamond	Graphite	Graphene + Fullerene
Number of bonds	4	3	3
Any delocalised electrons?	no	yes	Yes
Hardness	Very hard	soft	Flexible and strong
Conduct electricity	No	yes	Yes
Melting point	Very high	High	High
Uses	• Gems • Drill bits	• Electrodes • Pencils	• Electronics • Nanotubes

10. Bulk and surface properties of nanoparticles (TRIPLE ONLY)		
Name	Size in nanometres	Size in standard form
Nanoparticles	1-100 nm	1×10^{-9} m to 1×10^{-7} m
Fine particles	100-2500 nm	1×10^{-7} m to 2.5×10^{-6} m
Coarse particles ("dust")	2500nm – 10000nm	2.5×10^{-6} m to 1×10^{-5} m

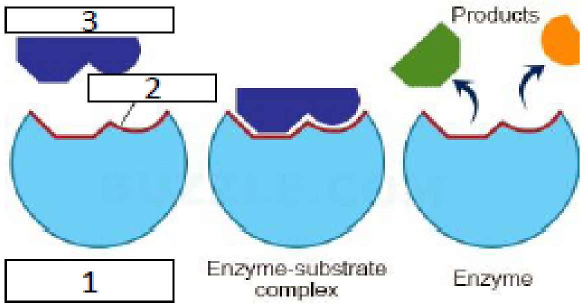
Uses of nanoparticles	Example
1. Medicine 2. Electronics 3. Cosmetics 4. Sunscreen 5. Deodorants 6. Catalysts	1. Delivering drugs directly to cells 2. Wearable electronics 3. Anti-aging creams 4. Sunscreen without white marks 5. Antibacterial action 6. Fullerne



Biology Topic 2: Organisation

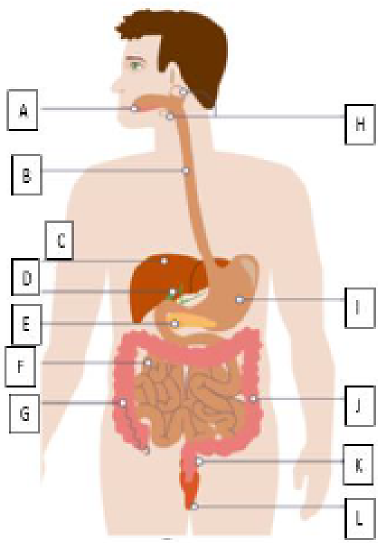
1. Principle of organisation		
Level	Definition	Examples
Cell	Basic building blocks of all living organisms	Cheek Muscle
Tissue	Group of cells with a similar structure and function	Glandular Epithelial
Organ	A group of tissues performing specific functions	Stomach Pancreas
Organ system	A group of organs which work together to form organisms	Digestive system

3. Enzymes		
1	Enzyme	A biological catalyst. One type of enzyme does one specific reaction
2	Active site	The area of the enzyme with the specific shape to make the reaction happen with the substrate(s)
3	Substrate	The chemical(s) which are involved in the enzyme catalysed reaction



Denature	When an enzyme has its shape changed so it no longer works
Caused by:	• Temperature • pH

2. Digestive System

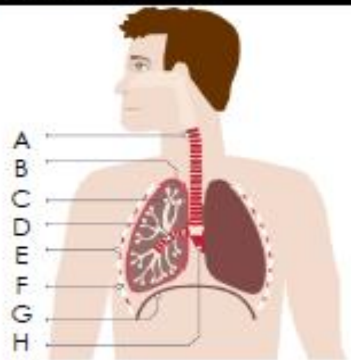


A	**Mouth:** mechanical breakdown/chew food	G	**Appendix:** useless organ which harbours bacteria (good and bad)
B	**Oesophagus** (gullet): push chewed food to stomach	H	**Salivary Glands:** produce saliva with amylase enzymes to breakdown starch
C	**Liver:** makes bile	I	**Stomach:** Partial digestion of food/mechanically churns food with HCl and protease enzymes
D	**Gall Bladder:** stores bile which breaks down fats (lipids) and neutralises the HCl(stomach acid)	J	**Large Intestine:** re-absorption of water
E	**Pancreas:** production of digestive enzymes	K	**Rectum:** muscular section of the large intestines
F	**Small Intestine:** absorption of small soluble particles	L	**Anus:** where faeces leaves the body

3. Types of enzyme

Name	Breaks down	Into	Produced in
Carbohydrase (eg amylase)	Carbohydrates (eg starch)	Simple sugars	Mouth Pancreas Small intestine
Protease	Protein	Amino acids	Stomach Pancreas Small intestine
Lipase	Fats (lipids)	Fatty acids and glycerol	Pancreas Small intestine

4. Respiratory system



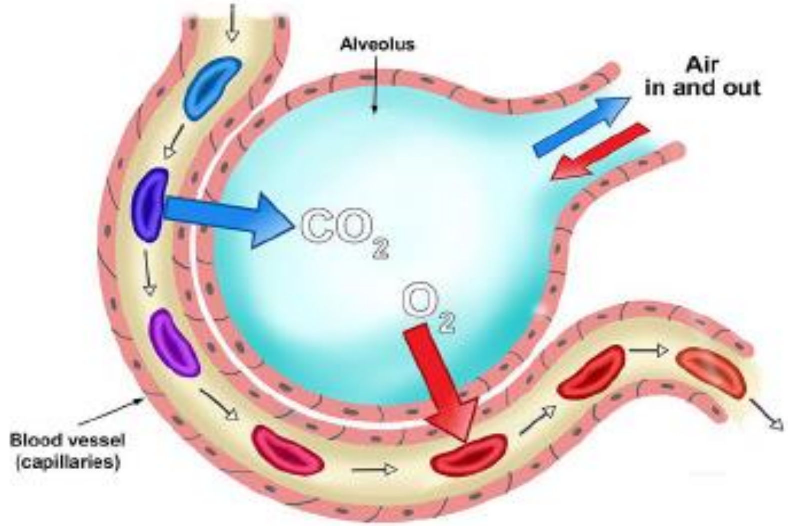
A	Trachea
B	Alveoli
C	Bronchiole
D	Right bronchus
E	Ribs
F	Intercostal muscles
G	Diaphragm
H	Heart

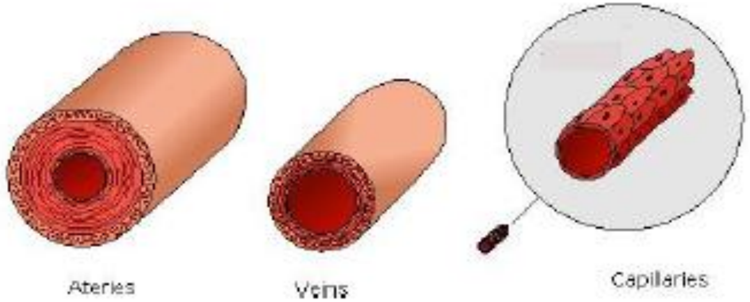
6. Blood vessels

Name	Lumen (hole) size	Walls	Muscles
Arteries	Small	Thick	Yes
Veins	Large	Thin	No
Capillaries	Very small	1 cell thin	No

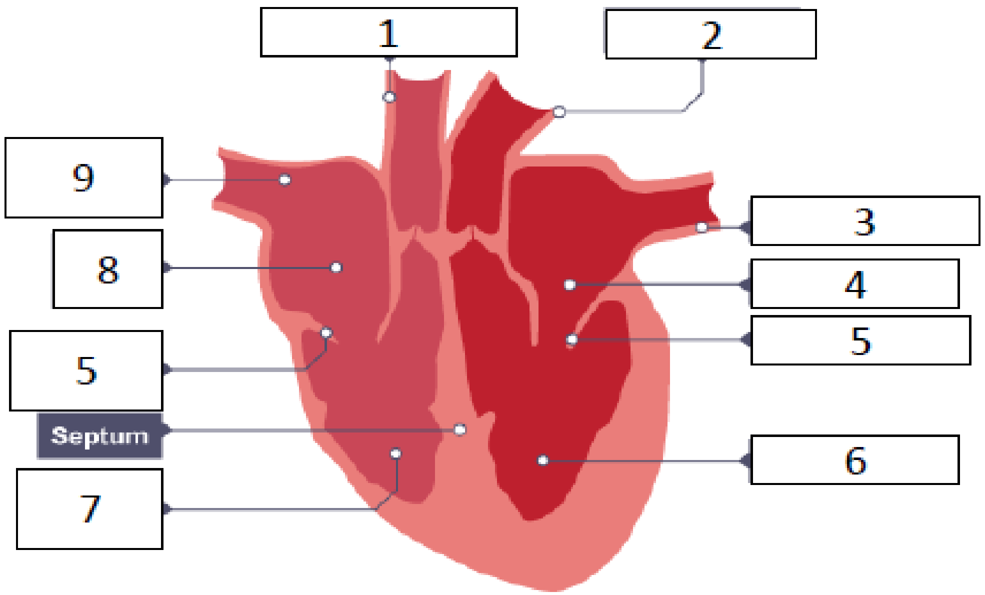
5. Adaptation to gas exchange: Alveoli

Thin walls	Capillary wall one cell thick
Moist layers	From mucus in alveoli
Large surface area	Many alveoli
High concentration gradient	Blood enters with low O_2 and high CO_2





7. The heart		
1	Pulmonary artery	Carries deoxygenated blood to the lungs
2	Aorta	Carries oxygenated blood to the body
3	Pulmonary vein	Brings oxygenated blood from the lungs
4	Left atrium	Pushes blood to left ventricle
5	Heart valve	Prevents backflow of blood
6	Left ventricle	Pumps blood to body
7	Right ventricle	Pumps blood to lungs
8	Right atrium	Pushes blood into right ventricle
9	Vena cava	Brings deoxygenated blood from body

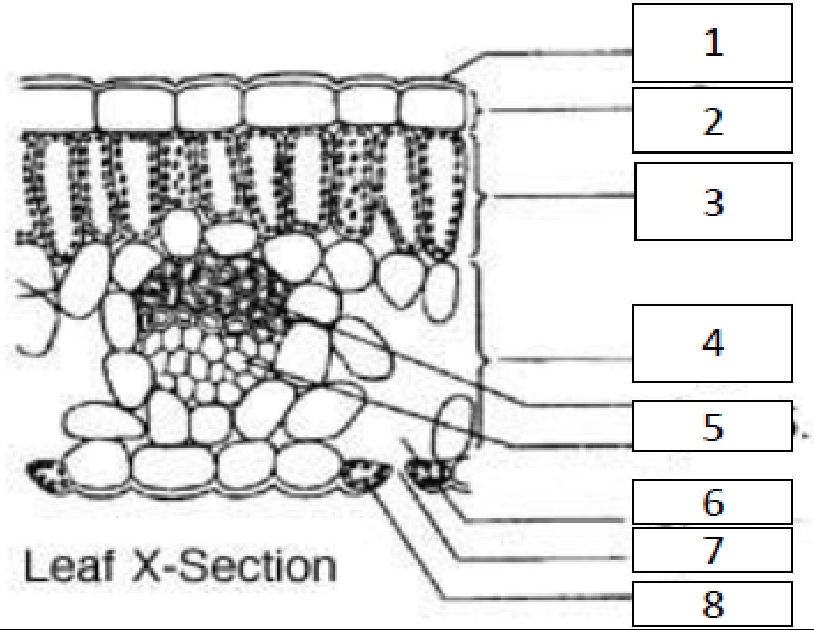


8. Blood	
Components	Function
Red blood cell	Carries oxygen
White blood cell	Fights infection
Platelets	Blood clotting
Plasma	Liquid that contain the other components and dissolved substances like urea

9. Coronary heart disease	
Coronary heart disease (CHD)	When fatty material builds up and stops the flow of blood to the heart muscle
Coronary arteries	The arteries that supply the heart muscle
Stent	A mesh tube used to keep the coronary arteries open
Statins	Drugs used to reduce blood cholesterol preventing (CHD)
Faulty valve	When the blood flows in the opposite direction through the heart. Will need replacing with biological or mechanical valve
Heart transplant	When a donor heart is used to replace a faulty heart
Artificial heart	Short term mechanical heart used while waiting for a transplant

10. Health issues	
Health	A state of physical and mental well-being
Disease	An abnormal condition that gives specific symptoms
Communicable disease	A disease which can be transferred
Non-communicable disease	A disease which can not be transferred
Lifestyle factors	Factors which can increase the chances of developing a non-communicable disease (eg smoking, diet, drugs, carcinogens)
Carcinogen	A substance which increases the risk of developing cancer
Cancer	A group of cells that divide uncontrollably
Benign tumour	A type of cancer contained within one area. It does not invade other parts of the body
Malignant tumour	A type of cancer which can invade other tissues and cause secondary tumours

11. Leaf structure and functions		
	Name	Function
1	Epidermis	Protective layer
2	Waxy cuticle	Prevents water loss
3	Palisade mesophyll	Contains a lot of chloroplasts. Site of photosynthesis
4	Spongy mesophyll	Full of air spaces to allow oxygen and carbon dioxide to diffuse
5	Vein	Contains xylem and phloem
6	Air space	Allows gases to pass through
7	Stomata	Hole for gases to move in and out of the leaf
8	Guard cells	Control the opening of stomata



12. Plant veins			
Name	Carries	Direction	Name of process
Xylem	Water and mineral ions	From roots to leaves	Transpiration
Phloem	Sugar ('food')	From leaves to roots	Translocation

13. Factors affecting transpiration		
Factor	Affect of increasing factor	Reason
Temperature	Increases transpiration	Water evaporates and diffuses faster
Humidity (amount of water in air)	Decreases transpiration	Less space in air around leaf for water to diffuse into
Air movement	Increases transpiration	Water evaporates and diffuses faster
Sunlight	Increases transpiration	Stomata are open to let in CO_2 so more water escapes