



Key Knowledge Year 8

8B1 Plants



Function of cell parts

- Nucleus – controls the cell, contains DNA
- Cell membrane – allows substances in and out
- Cell wall – shape, structure, support
- Mitochondria – respiration
- Ribosomes – make protein
- Vacuole – stores water and sap
- Chloroplast – absorbs sunlight energy for photosynthesis
- Cytoplasm – liquid that fills the cell, chemical reactions occur here

Tissues

- A tissue is a group of cells working together
- Plant tissues – root hair tissue, xylem tissue
- Root hair cells/tissue absorb water by osmosis
- Xylem tissue transports water around a plant

Adaptations of a leaf

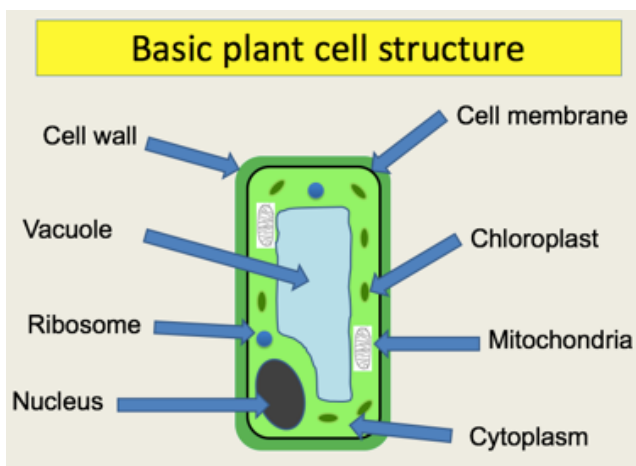
- Large surface area to absorb lots of sunlight
- Lots of chloroplasts
- Stomata to allow gas exchange

Photosynthesis

- Carbon dioxide + water → glucose + oxygen

Limiting factors of photosynthesis

- Limiting factors are the thing in short supply – this prevents photosynthesis
- Light intensity
- Carbon dioxide levels
- Temperature





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8B2 Breathing & Respiration



Aerobic respiration

- Aerobic respiration uses oxygen
- Glucose + oxygen → carbon dioxide + water

Anaerobic respiration

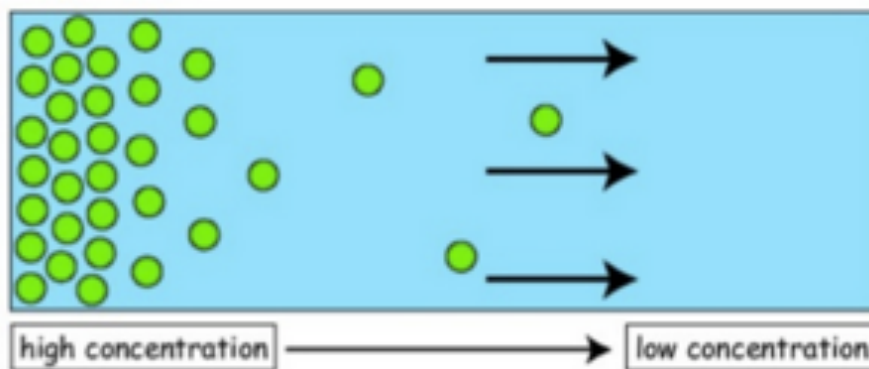
- Anaerobic respiration does not use oxygen
- Glucose → lactic acid

Gas exchange

- The air we breathe is 21% oxygen
- Lungs have alveoli (tiny air sacs)
- Alveoli have a large surface area
- Gas is exchanged in the lungs by diffusion

Diffusion

- Movement of particles from a high concentration to a low concentration





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8B3 Unicellular Organisms



Unicellular organisms

- Are made up of one cell only
- Two groups – protists and prokaryotes

Prokaryotes

- Have NO nucleus
- Bacteria are in this group

Pathogens and disease

- A pathogen is a microorganism that causes a disease

How diseases are spread

- Through the air
- Through dirty water
- Uncooked food
- Touching
- Animal vectors eg. mosquitos carry the pathogen that causes malaria

Physical defences in the body

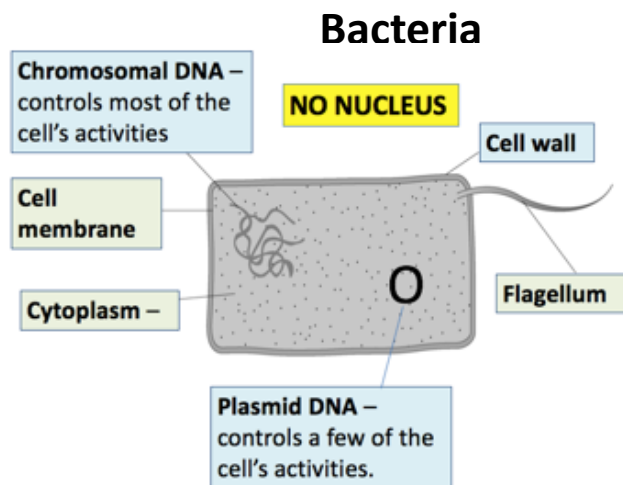
- Physical defences stop pathogens getting into the body
- Skin
- Mucus
- Cilia

Chemical defences in the body

- Chemical defences kill pathogens
- Hydrochloric acid in the stomach
- Enzymes in tears

The immune system

- White blood cells destroy pathogens





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8B4 Genetics & Evolution



Human gametes

- Gametes are sex cells
- Male gamete = sperm, contains 23 chromosomes
- Female gamete = egg, contains 23 chromosomes

DNA

- Chromosomes are made up of DNA
- Chromosomes and DNA is found in the nucleus
- A short section of DNA is a gene
- An allele is a different form of the same gene

Structure of DNA

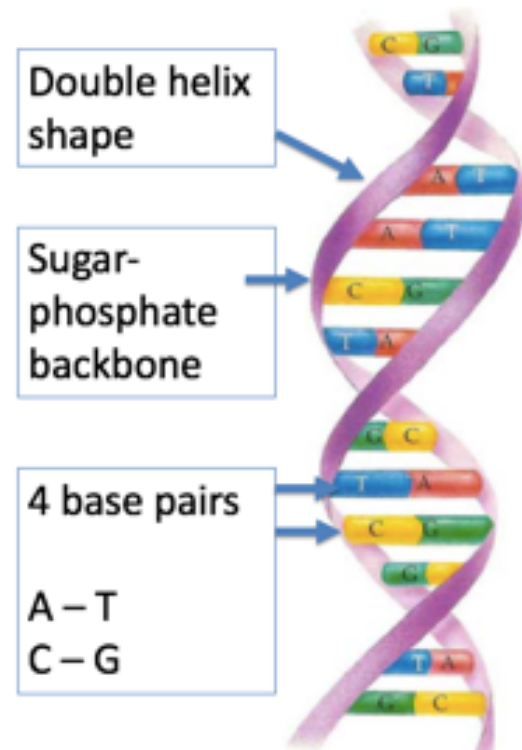
- Double helix shape
- Sugar-phosphate backbone
- 4 base pairs
- Base pairs always match up the same way: A – T C – G

Variation

- Genetic variation is from parents
- Environmental variation is from your surroundings

Evolution

- Genetic variation
- Environmental change causes competition
- Best adapted survive
- They reproduce and pass on their genes
- Over time a new species is formed





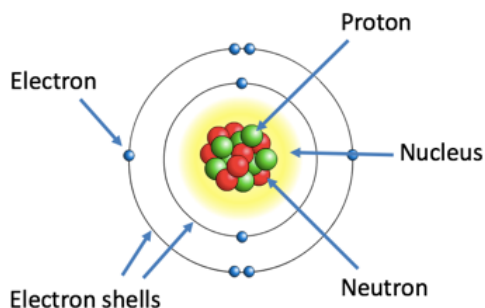
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8C1 Atomic Structure & The Periodic Table



Structure of the atom

- Protons and neutrons in the nucleus
- Electrons in the shells



Mass and charge

Particle	Mass	Charge
Proton	1	+1
Neutron	1	0
Electron	Very small	-1

Ions

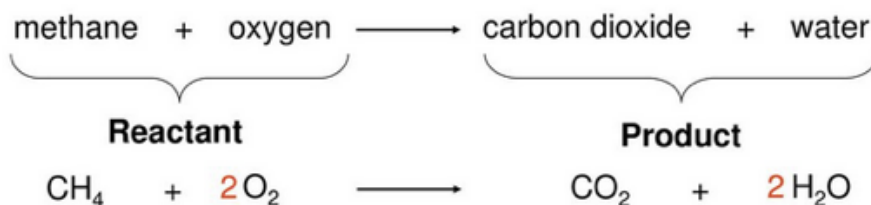
- An ion is an atom that has lost or gained one or more electrons
- Ionic bonds form between metal ions and non-metal ions

The Periodic Table

- Metals on the left and in the middle
- Non-metals on the right
- Group 1 = alkali metals
- Group 7 = halogens
- Group 0 = noble gases

Equations

- Reactants are the substances on the left, that are reacting
- Products are the substance on the right, that are made in the reaction
- The number of atoms must be the same on both sides of the equation





Key Knowledge Year 8

8C2 Combustion



Fuels

- A fuel is a substance that is burned to release energy
- Energy is measured in joules (J)
- A fire needs fuel, heat and oxygen to burn

Hydrocarbons

- Hydrocarbons are molecules made of hydrogen and carbon only
- Hydrocarbons are found in crude oil
- Hydrocarbons burn in oxygen to produce carbon dioxide and water

- Hydrocarbon + oxygen \rightarrow carbon dioxide + water

Complete combustion

- There is enough oxygen to fully burn the fuel

Incomplete combustion

- There is not enough oxygen to fully burn the fuel
- Produces carbon monoxide, a toxic gas

Global warming and the greenhouse effect

- Carbon dioxide is a greenhouse gas
- Greenhouse gases trap heat in the atmosphere
- This causes the Earth to warm up
- Carbon dioxide is released when fossil fuels are burned

Alkanes

- The alkanes are a group of hydrocarbons
- The first four alkanes are:
- Methane
- Ethane
- Propane
- Butane

Name	Structural formula	Chemical formula
Methane	<pre> H H-C-H H</pre>	CH ₄
Ethane	<pre> H H H-C-C-H H H</pre>	C ₂ H ₆
Propane	<pre> H H H H-C-C-C-H H H H</pre>	C ₃ H ₈
Butane	<pre> H H H H H-C-C-C-C-H H H H H</pre>	C ₄ H ₁₀



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8C3 Metals and Reactivity



Properties of metals

- Conduct heat and electricity
- Ductile (can be pulled into a wire)
- Malleable (can be bent into different shapes)
- Strong
- Lustrous (shiny when polished)

Reactions with metals

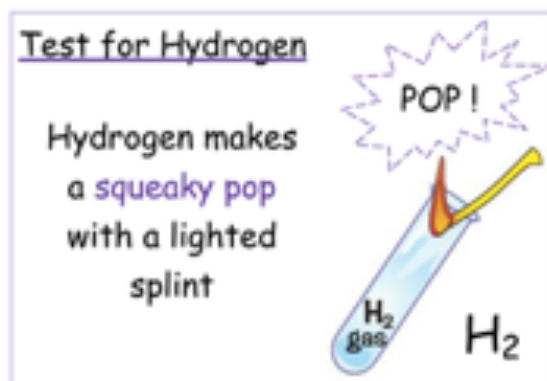
- Metal + acid \rightarrow salt + hydrogen
- Alkali metal + water \rightarrow metal hydroxide + hydrogen

Test for hydrogen gas

- A lit splint makes a squeaky pop

State symbols

- (s) = solid
- (l) = liquid
- (g) = gas
- (aq) = aqueous (dissolved in water)



Displacement

- In a reaction, more reactive elements displace less reactive ones

Electrolysis

- Splitting a compound using electricity

Exothermic reactions

- Exothermic reactions give out heat

Endothermic reactions

- Endothermic reactions take heat in



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8C4 Rocks



Types of rock

- Sedimentary – sandstone, limestone
- Metamorphic – marble, slate
- Igneous – granite, basalt

Formation of rocks

- Sedimentary rocks are formed under water in layers
- Metamorphic rocks are formed underground by heat and pressure
- Igneous rocks are formed when lava cools down and solidifies
- Slower cooling of lava forms larger crystals
- Faster cooling of lava forms smaller crystals

Fossils

- A fossil is the remains of an organism preserved in a rock
- Older fossils are found deeper underground
- The fossil record has gaps in it

Reasons for gaps in the fossil record

- Conditions where an organism died not suitable for fossil formation
- Only organisms with bones leave fossils (usually)
- Dead organism might get eaten before they can form a fossil
- Fossils could be destroyed by earthquakes or volcanic eruptions
- Not all fossils found yet



An ichthyosaur fossil



Key Knowledge Year 8

8P1 Fluids



Fluids




- Fluids are liquids and gases

Particle diagrams and properties



Changes of state

- Solid → liquid = melting
- Liquid → gas = evaporation
- Liquid → solid = freezing
- Gas → liquid = condensation
- Solid → gas = sublimation

Solid	Liquid	Gas
		
Cannot be compressed	Cannot be compressed	Can be compressed
Fixed shape	Takes shape of container	Takes shape of container
Doesn't flow	Flows	Flows
High density	Quite high density	Low density

Density

- Density = $\frac{\text{mass}}{\text{volume}}$

Gas pressure

- Particles move and collide
- When particles collide with the walls of a box they cause pressure
- Higher temperature = faster movement of particles = more collisions = higher pressure

Pressure in fluids

- Pressure gets higher if a fluid is deeper



Key Knowledge Year 8

8P2 Energy Transfers



Law of conservation of energy

- Energy cannot be created or destroyed, only transferred from one type to another

Heat and temperature

- Heat is how much thermal energy an object has
- Heat is measured in joules (J)
- Temperature is how hot or cold an object is
- Temperature is measured in degrees Celsius ($^{\circ}\text{C}$)

Conduction

- Solids conduct heat
- Particles vibrate and collide with other particles
- This transfers the energy

Convection

- Convection happens in liquids and gases
- Hotter liquids or gases become less dense
- Less dense liquids or gases rise
- Cooler, more dense liquids or gases sink
- This sets up a convection current

Radiation

- Infra-red radiation does not require particles to travel through
- Infra-red radiation can travel through a vacuum

Insulators

- An insulator reduces energy transfer

Efficiency

- More efficient machines waste less energy
- Energy is usually wasted as heat

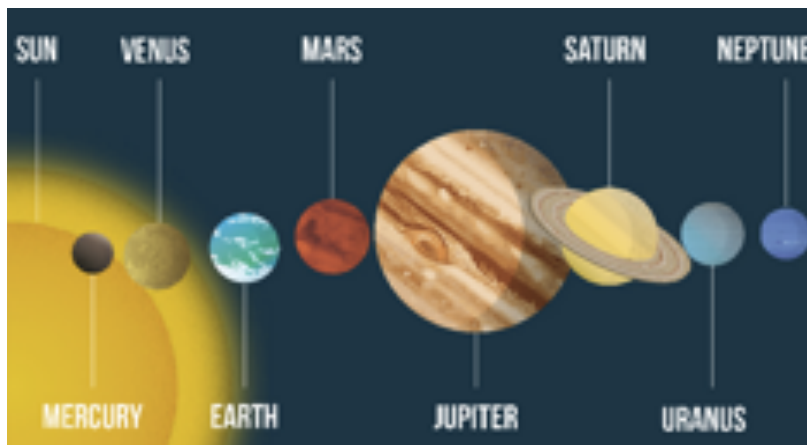
Power

- Power is measured in watts (W)



The Solar System

- The order of the planets in the Solar System



Life cycle of a star

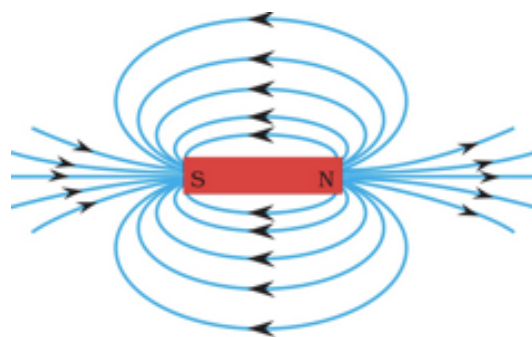
- A star like our Sun will go through these stages:
- Nebula
- Protostar
- Main sequence star (this is what the Sun is today)
- Red giant
- White dwarf

Evidence for The Big Bang Theory

- Red-shift
- Cosmic Microwave Background Radiation

Magnetic Earth

- The Earth has a magnetic field
- The shape of it is the same shape as the magnetic field around a bar magnet
- Magnets have a north-seeking pole and a south-seeking pole
- Magnet field lines point from North to South
- The shape of the magnetic field





Key Knowledge Year 8

8P4 Forces & Motion



Force and motion

- Force is measured in newtons (N)
- If forces are unbalanced, an object will accelerate
- If forces are balanced, an object will remain at rest **or** will continue to move at a constant speed

Scalars and vectors

- Scalars have a number only. Eg. speed, distance, time
- Vectors have a number and a direction. Eg. velocity, acceleration, force

Speed

- Speed = distance ÷ time
- Unit of speed = metres per second (m/s)
- Unit of distance – metres (m)
- Unit of time = seconds (s)
- Velocity is speed in a stated direction

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

Acceleration

- Acceleration is the change in velocity
- The unit of acceleration is metres per second squared (m/s²)

Work done

- Work done is the same as energy transferred
- Work done is measured in joules (J)
- Work done = force x distance moved



Key Knowledge Year 8

8P5 Force Fields & Magnetism



Force fields

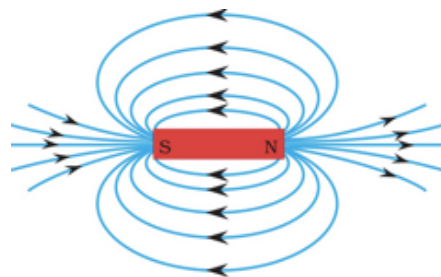
- A force field creates a non-contact force
- Electric field
- Magnetic field
- Gravitational field

Static electricity

- Static electricity is the build up of charge on an insulator
- Current is the flow of electrons

Magnetism

- Magnets have a north-seeking pole and a south-seeking pole
- Magnet field lines point from North to South
- The shape of the magnetic field →



Electromagnets

- A moving current creates a magnetic field
- A coil of wire is called a solenoid
- An electromagnet is a magnet that can be switched on and off

How to increase the strength of an electromagnet

- Increase the number of coils
- Increase the current
- Use an iron core

