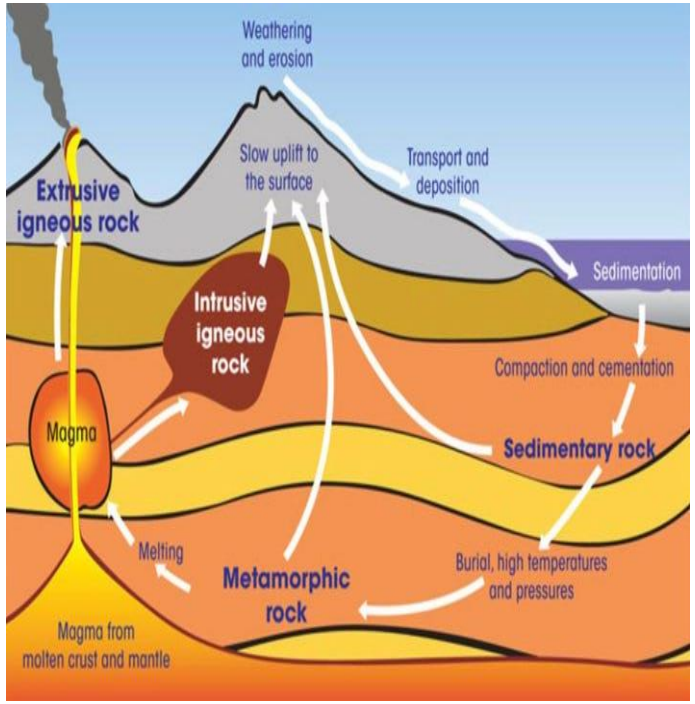
Year 8 – Knowledge Organizer – Earth Science

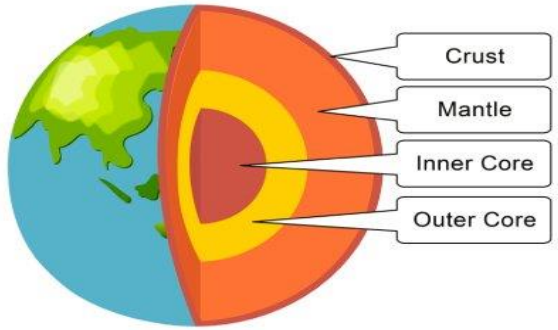
Glossary Earth Science

Term	Definition
Erosion	The weathering away of rock or other surfaces such as soil
Fossil	The remains or traces of a plant or animal preserved in a rock that lived millions of years ago.
Igneous	Type of rock formed from the solidification of magma.
Lithosphere	The outer section of the Earth comprising of the crust and the upper part of the mantle.
Magma	Molten rock inside the Earth
Metamorphic	Type of rock formed when other rocks are heated and/or placed under a lot of pressure.
Rock Cycle	The relationship between different types of rock and the processes that occur to change these over long periods of time
Sedimentary	A new rock formed by compressing and cementing small fragments together.
Weathering	The breakdown of rocks, soils and minerals by physical and or chemical processes.

The Rock Cycle - The relationship between different types of rock and the processes that occur to change these over long periods of time



Structure of the Earth



Layers	State	Thickness/km
Crust	Solid	5-8 & 8-40
Mantle	Semi liquid/solid – metal oxide	2900
Outer Core	Liquid – iron & nickel	2250
Inner Core	Solid – iron & nickel	1300

Rock Type	Formed	Features	Examples	Uses
Igneous	2 types - Intrusive – magma solidifies inside the Earth's crust – large crystals Extrusive – magma (lava) solidifies on Earth's surface – small crystals	Crystalline	Granite Basalt Pumice	Cosmetics Tooth paste Flooring
Sedimentary	By weathering, transport and erosion, deposition, cementation and compaction	Fossils Layers	Limestone Mudstone	Construction Cement production
Metamorphic	Existing rocks subjected to heat and /or pressure	Banding Various sized crystals	Marble Slate	Statues Roofing

Weathering

Physical - freezing and thawing of water causes cracking

Chemical - reaction with rain water

Biological - burrowing animals and tree root disturbance

Video Links

https://www.bbc.co.uk/bitesize/guides/zgb9kqt/revision/1

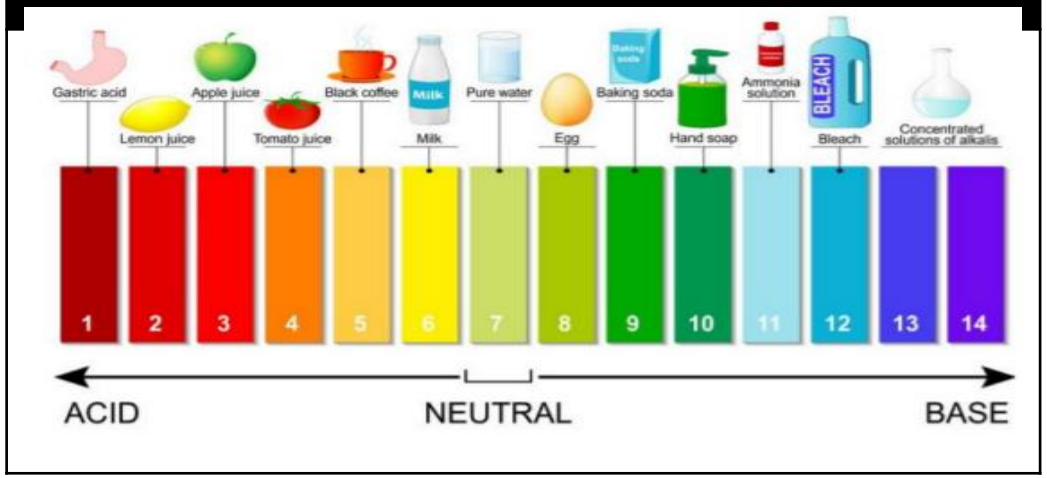
https://classroom.thenational.academy/units/materials-and-the-earth-78e8

Year 8 – Knowledge Organizer – Acids and Alkalis

Glossary Acids and Alkalis

Term	Definition
pH scale	A scale running from 1 to 14 that measures how acidic or alkaline a solution is.
Acid	A solution with a pH less than 7. Acids form H^+ ions in water.
Alkali	A solution with a pH greater than 7. Alkalis form OH^- ions in water.
Base	A substance that will neutralize an acid
Neutral	A substance with a pH equal to 7.
Indicator	A substance that changes colour depending on the pH.
Neutralisation	The chemical reaction of an acid with a base in which a salt and water are formed.
Common indicators	**Litmus:** red in acid, blue in alkali **Methyl orange:** red in acid, orange in alkali **Phenolphthalein:** colourless in acid, pink in alkali
Universal indicator	A mixture of several indicators that is red in strong acid, green when neutral and purple in strong alkali.

pH Scale - Measure of how strong or weak an acid or alkali is



Neutralisation Reaction and Uses

NEUTRALISATION

A chemical reaction happens if you mix together an acid and an alkali. The reaction is called neutralisation. A **neutral solution** is made if you add just the right amount of acid and base together. The products formed are **salt and water**.

acid + alkali → salt + water

Hydrochloric acid + sodium hydroxide → sodium chloride + water

USES:

- Soil for crops: Can add base (alkali) to the soil to neutralise some of the soil acid. This makes it suitable to grow crops, like tea.
- Acidic lakes: Acid rain falls in lakes and makes it more acidic. Some animals and plants cannot live there. Base is added to increase the pH.

Hazchem Pictograms

Irritant – may cause inflammation

Corrosive – substances which on contact with living tissue destroys them

Hazardous to the environment – do not throw down the sink

Naming Salts

When a neutralisation reaction occurs between an alkali and an acid a salt is formed

- To name the salt you need to use the alkali to form the first part of the name and the acid to form the second part of the name
- Hydrochloric acid makes chlorides
- Nitric acid make nitrates
- Sulfuric acid makes sulfates

Reactions with Acids

Reactants	Products
Acid + Metal →	**Salt + Hydrogen**
Acid + Alkali →	**Salt + Water**
Acid + Base →	**Salt + Water**
Acid + Metal Carbonate →	**Salt + Water + Carbon dioxide**

Video Links

https://www.bbc.co.uk/bitesize/guides/zyn3b9q/revision/1

https://classroom.thenational.academy/lessons/acids-and-alkalis-chk38d

https://classroom.thenational.academy/lessons/neutralisation-6xjpac

Year 8 Electricity

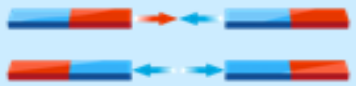
Metals and Magnets -

Examples of magnetic materials:

Metals like

I can see nick

Iron cobalt steel nickel



Alike poles repel

opposite poles attract

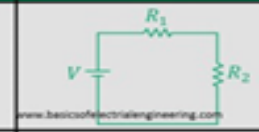
Properties of metals:

Malleable, good thermal and electrical conductors, dense, hard, high melting points, sonorous.

Why are metals good conductors?

They have free electrons which transfer charge and thermal energy throughout the metal.

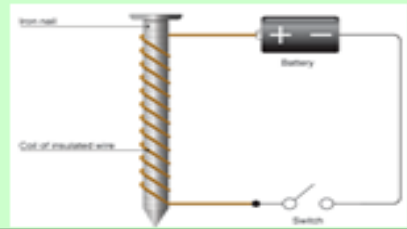
Series and Parallel circuits:

	Series	Parallel
How it looks		
Current	Always remains same in series	Divides in parallel
Voltage	Divides in parallel	Remains same in series

Ammeters measure current and go in series with components. Voltmeters measure voltage and in parallel to component tested.

Electromagnets—When a current flows around a circuit it creates a magnetic field. These electromagnets can be turned on or off and can be easily strengthened.

1) Add a soft iron core
2) Add more turns to the wire
3) Increase the voltage



Circuits—circuit symbols:

A	Ammeter		Cell		Resistor
V	Voltmeter		Battery		Variable resistor
	Diode		Potentiometer		Thermistor

Batteries covert chemical to electrical energy as a source of power.

Current = the flow of electrons round a circuit (Amps, A)

Voltage = the "push" from the battery (Volts, V)

Resistance = how easy it is for current to flow (Ohms, Ω)

V= IxR

Voltage = Current x Resistance

Factors affecting resistance:

1) Length of wire
2) Width of wire
3) Temperature

Static electricity: created by rubbing insulators together, transferring electrons creating a charge difference.

When a charged object comes close to a conductor the electricity jumps across as a spark.

e.g. you can charge your body by dragging your feet across the floor and then feel it flowing by touching a metal door handle.

Yr 8 - Knowledge Organizer - Ecosystems

Glossary

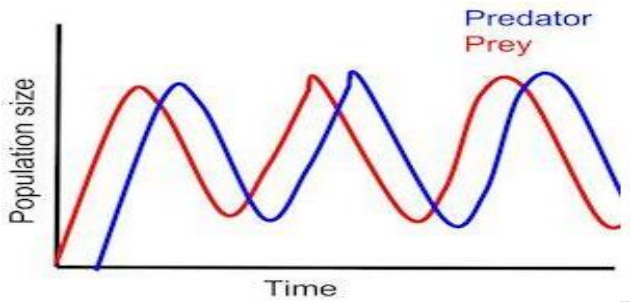
Term	Definition
Biodiversity	Range of different organisms in an area
Community	Individuals in a species all living in the same environment and interacting with each other
Competition	Struggle between different organisms for survival and resources
Consumer	An organism that eats another living organism
Food Chain	A chain showing all of the organisms that feed on each other
Niche	Is the role an organism plays within the community of an ecosystem.
Population	All the members of a species that live in the same habitat.
Predator	Animal that consumes (preys) another animal
Prey	An animal that is hunted and killed by other animals

Competition

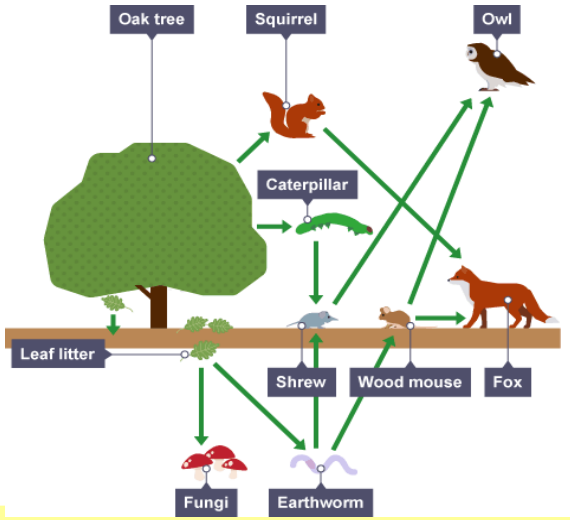
Habitats have limited supplies of the resources needed by plants and animals. Therefore, plants and animals may need to **compete** with one another for **food**, **water**, **space** and **mates** in order to survive. The best competitors are those who have adapted in order to best gain these resources.

As the number of a predator in a population increases the number of prey will decrease as more are being eaten. As the number of the predator decreases the number of prey will increase as less are being eaten.

The relationship between the predator and prey is know as a **predator – prey relationship.**



Food Webs

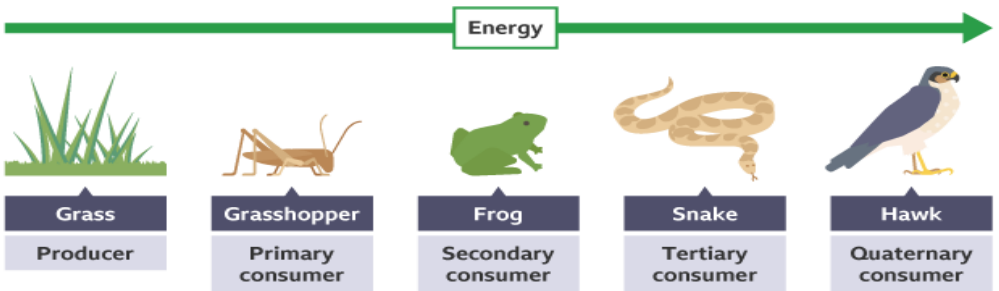


A **food web** is a network of interconnected **food chains**. It shows the energy flow through part of an **ecosystem.**

Food Chains

The Sun is the ultimate source of energy for most communities of living things. Green plants are usually the producers in a food chain. **Producers** are organisms that make their own organic nutrients (food) - usually using energy from sunlight. Green plants make their food by **photosynthesis**.

The other organisms in a food chain are **consumers**, because they all get their energy by consuming other organisms.



Effect of Toxins

This image shows bioaccumulation, the build up of a toxin (such as pesticide) in a food chain. It can be fatal to the species at the top of the food chain.

Video Links

https://www.bbc.co.uk/bitesize/topics/zxhhvcw/articles/zjh4r2p

https://docbrown.info/ks3biology/ks3biology.htm

Yr 8 - Forces/Pressure KO

Glossary

Term	Definition
Air Resistance	A force when an object moves through air, acting in the opposite direction to the one the object moves in
Equilibrium	Forces in a system/acting on an object are balanced
Friction	The amount of matter in an object. Measured in kg.
Gravitational field strength	The measurement of the gravitational force exerted per unit mass
Gravity	The force acting between any two objects, pulling them towards each other
Pressure	Pressure is the **force per unit area.**
Upthrust	A force of the particles in air/water, pushing up on an object
Weight	The force due to gravity. Measured in Newton's N.

Forces

Forces have a size and a direction. When we draw forces we use arrows.
All the forces acting on an object can be replaced with one **resultant force**.
Forces acting in the **same direction** must be **added** together
Forces acting in **opposite directions** are **subtracted**

Non Contact Forces

Non-contact forces are **forces** that act between two objects that are not physically touching each other. Examples of non-contact forces include:

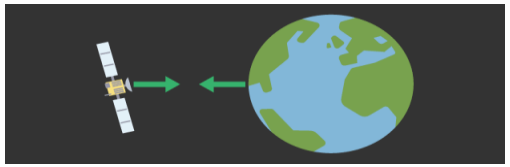
Magnetic force

A magnetic force is experienced by any **magnetic** material in a **magnetic field**.

Opposite magnetic poles (N - S or S - N) **attract** each other:

Gravitational force

A gravitational force is experienced by any **mass** in a gravitational field. Masses are attracted towards each other by gravitational force.

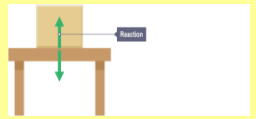


Contact Forces

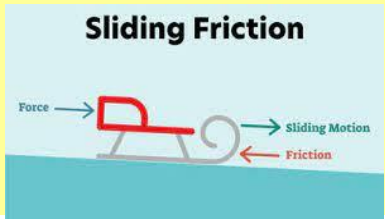
Contact forces are forces that act between two objects that are physically touching each other. Examples of contact forces include:

Reaction force

An object at rest on a surface experiences reaction force. For example, a book on a table.

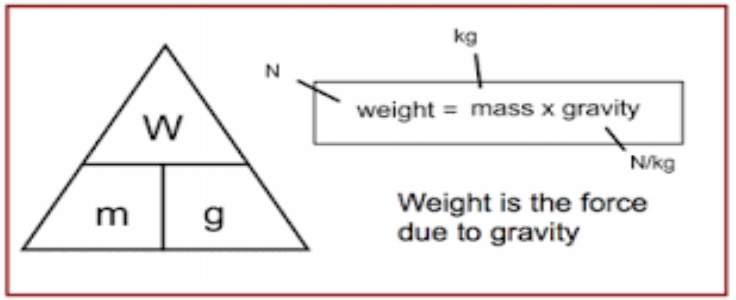


Friction Two objects sliding past each other experience **friction** forces. For example, a sleigh sliding down a slope.

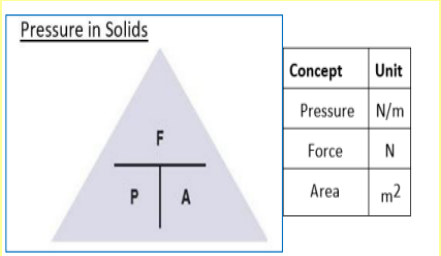


Calculating Weight

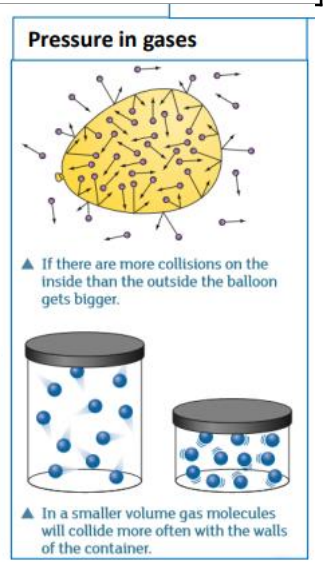
Weight = mass x gravitational field strength



Pressure



Pressure in liquids:
Pressure in liquids acts in all directions. The greater the depth the greater the pressure, as the mass (and therefore the force exerted) is greater.



Video Links

https://www.bbc.co.uk/bitesize/topics/z4brd2p/articles/zs3896f
https://www.bbc.co.uk/bitesize/search?q=pressure&page=1

Year 8 Photosynthesis

What is photosynthesis?

Photosynthesis is a chemical reaction where plants use light energy to make food (glucose).

It is an endothermic reaction as it takes in light energy for the reaction to occur.

It takes place in the chloroplasts of leaf cells.

Factors affecting photosynthesis:

Light—Required to provide energy for the reaction, as light increases the reaction increases.

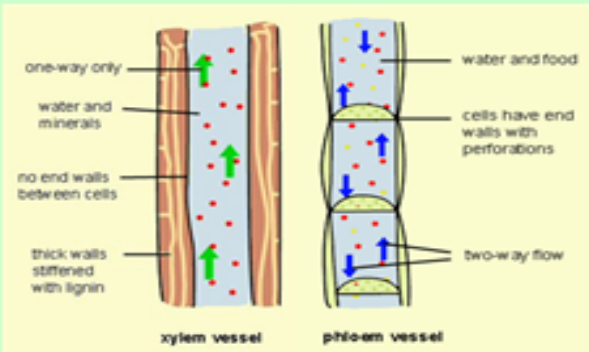
Carbon dioxide —needed to make glucose, as carbon dioxide concentration increases, so does the rate of photosynthesis.

Optimum Temperature— needed for enzymes to control the reaction.

Transport in plants:

Transpiration— the movement of water up the xylem from the roots to the leaves.

Translocation—the movement of sugars up and down the phloem from sources to sinks.



Photosynthesis Equation:

$6\ CO_2 + 6\ H_2O \longrightarrow C_6H_{12}O6 + 6\ O_2$

Reactants — Products

From the air, through stomata

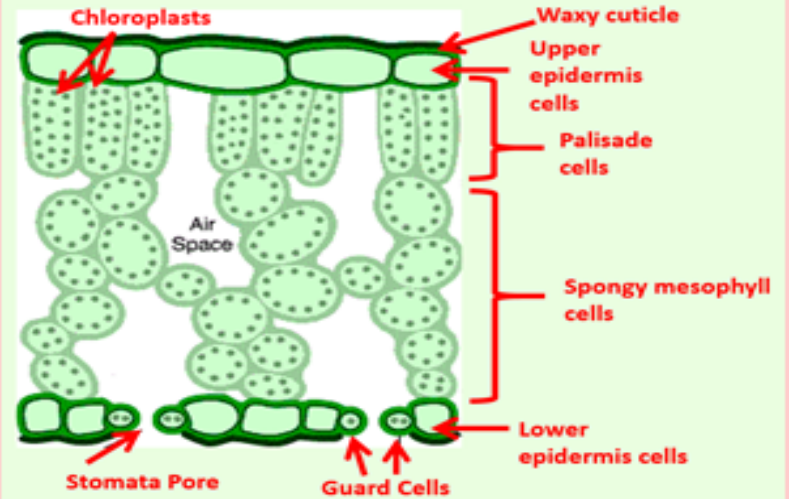
Used in respiration or to make new cells

Carbon dioxide + Water → Glucose + Oxygen

From the soil, through roots

Used in respiration or exits through stomata

Structure of the leaf:



Year 8 Respiration

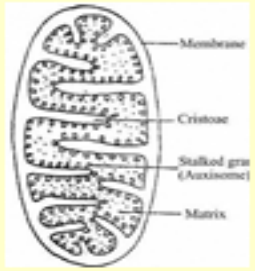
What is respiration?

Respiration is a chemical reaction essential for life in all organisms. The reaction releases energy by breaking down glucose in food.

This energy is used for movement, growth, cell division and more.

It is an exothermic reaction as it releases energy into its surroundings.

Structure of the mitochondria:



Simple outer membrane

Folded inner membrane (creates large SA for resp.)

Cristae (folds of membrane where respiration takes

Matrix (inside of mitochondria, contains DNA and special proteins for respiration)

Muscles and respiration:

Muscle fibers come in two types, fast and slow twitch. Fast fibers are used in anaerobic respiration whereas slow fibers are used in aerobic.

MUSCLE FIBERS FACE OFF	
SLOW TWITCH	FAST TWITCH
Efficient in using oxygen	Do not burn oxygen to create energy
Delayed muscle firing	Fast to fire; best for explosive body movements
Do **not** fatigue easily	Tire out quickly
Best suited for: endurance sports, including cycling, marathon running and long-distance triathlons!	**Best suited for:** short bursts of activity, including sprinting races, pole vaulting and cross fit-style events

Anaerobic respiration

Respiration without oxygen

In muscles: glucose —> lactic acid

$$C_6H_{12}O_6 \longrightarrow 2C_3H_6O_3 \text{ (+ little energy)}$$

Energy is used for movement

In plants and microorganisms (yeast):

Glucose —> carbon dioxide + ethanol (+ little energy)

Used in bread and beer making industries. Also known as fermentation.

Aerobic respiration:

Respiration with oxygen

The most common form of respiration as it releases the most amount of energy.

Glucose + oxygen —> carbon dioxide + water (+ energy)

$$C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O$$

Used by all types of organisms.

Year 8 – Knowledge Organiser – Biology B4 & B5

B4 – Health and Lifestyle

Key word	Meaning
Nutrient	A substance that that is essential for the maintenance of life and for growth.
Carbohydrates	Group of molecules including sugars and starch.
Protein	Building block of cells, made of a long chain of amino acids.
Lipids	Another name for fats.

The seven nutrients

Food tests

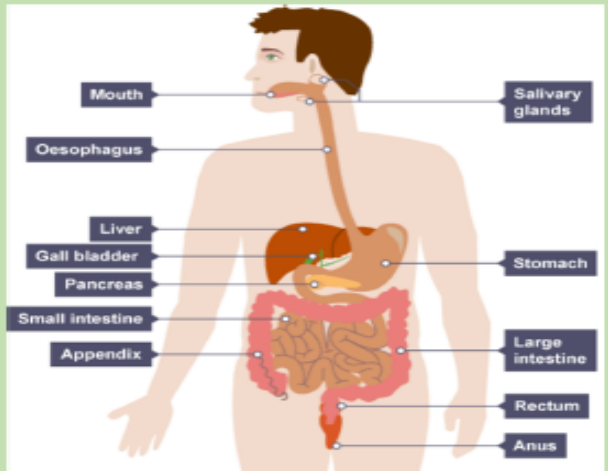
Starch: Add **iodine**, if start is present it changes from red/brown to dark **blue/black.**
Protein: Add **Biuret** reagents. If proteins are present, colour changes from blue to violet
Sugars: Add **Benedict's** reagent and **heat**. If sugars are present, colour changes from blue, through colours to brick red.

Starch Iodine →

Protein Biuret →

Sugar Benedict's →

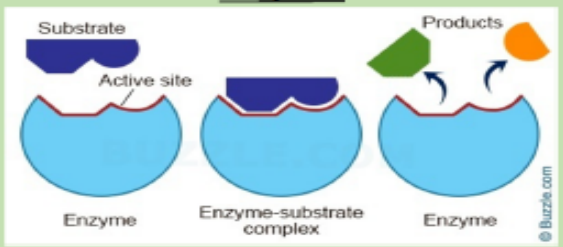
Digestive system



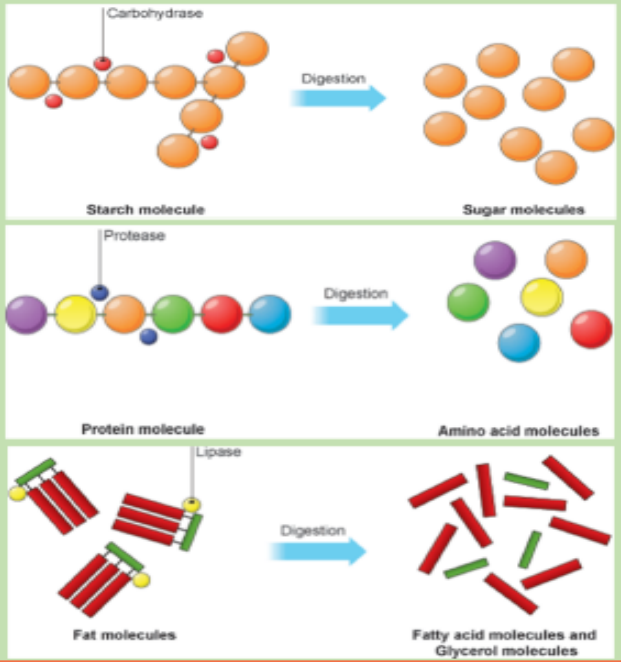
B4 – Health and Lifestyle

Organ	Meaning
Mouth	Breaks down food, where digestion begins.
Stomach	Muscular organ where digestion continues
Small intestine	Where digested food is absorbed into the blood.
Large intestine	Where water is reabsorbed
Anus	Where faeces leave the digestive system.
Pancreas	Produces digestive enzymes
Gall bladder	Stores bile before releasing it into the small intestine.

Enzymes



Digestion is the break down of **large, insoluble** molecules into **small, soluble** molecules.
Enzymes carry out the processes of digestion.



B5 – Ecosystems

Key word	Meaning
Photosynthesis	Chemical reaction that stores energy from light.
Respiration	Chemical reaction that releases stored energy for use by cells.
Interdependence	How organisms rely on each other. Examples include animals needing to eat other organisms and many plants needing insects for pollination.

Photosynthesis

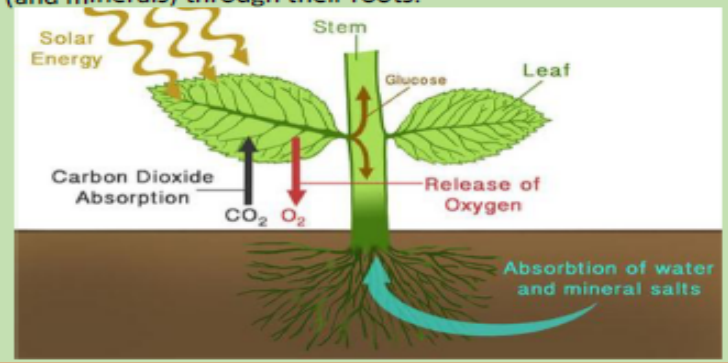
Photosynthesis is a series of chemical reactions that plants, algae and some bacteria use to store energy.
Photosynthesis **converts light energy** to stored **chemical energy** in carbohydrate molecules, like glucose.

Word equation

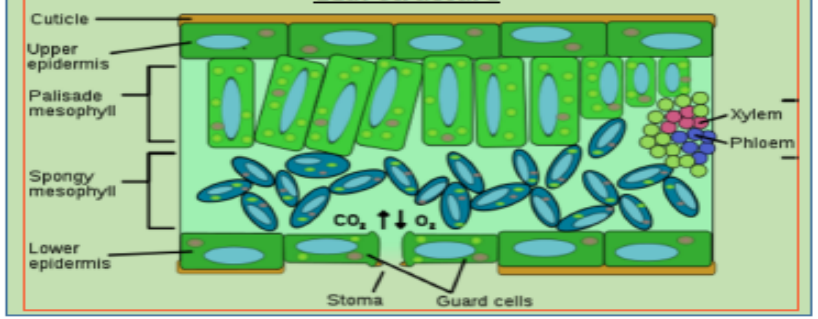
Carbon dioxide + Water —(Light, Chlorophyll)→ Glucose + Oxygen

Plant structure

Plants absorb carbon dioxide through their leaves and water (and minerals) through their roots.



Leaf structure



Year 8 – The Knowledge Organiser – Chemistry

1. Acids and Bases

Word	Definition
Acid	An acid is a substance that forms an aqueous solution with a pH of less than 7. Acids form H^+ ions in water.
Base	A base is a substance that will react with an acid to form a salt
Alkali	A base that dissolves in water to form a solution with a pH greater than 7. Alkalis form OH^- ions in water.
Neutralisation	The reaction between acids and bases
Solute	The solid being dissolved
Solvent	The liquid used for dissolving
Solution	Solute + solvent → solution
Strong acid	Ionise completely in water
Weak acid	Only partially ionise in water
Concentrated	A concentrated solution contains a large amount of dissolved solute
Dilute	A dilute solution contains a small amount of dissolved solute

The pH scale

How to measure the pH of a solution

Add universal indicator then compare colour on pH scale (above)

Or use a pH probe attached to a pH meter

2. Reactions with acids

Acid + Alkali → salt + Water

Acid + Metal → Salt + Hydrogen

Acid + Metal Oxide → Salt + Water

Acid + Metal Hydroxide → Salt + Water

Acid + Metal Carbonate → salt + Water + Carbon Dioxide

3. Naming salts

Hydrochloric acid → _____ Chloride

e.g. Magnesium + **Hydrochloric acid** → **Magnesium Chloride** + Hydrogen

Sulphuric acid → _____ Sulphate

e.g. Zinc Oxide + **Sulphuric acid** → **Zinc Sulphate** + water

Nitric acid → _____Nitrate

e.g. Calcium Hydroxide + **Nitric acid** → **Calcium Nitrate** + water

4. Neutralisation

A neutralisation reaction is a reaction between an acid and a base

In acid-alkali neutralisation reactions, hydrogen ions from the acid react with the hydroxide ions from the alkali

$H^+ + OH^- \rightarrow H_2O$

5. The Reactivity series

Metal	Reaction with cold water	Reaction with dilute acids	Reactivity
Potassium	Violent	Violent	Most reactive
Sodium			
Lithium			
Calcium	Fast	Rapid	
Magnesium	Very slow		
(Carbon)			
Zinc	Usually no reaction	Slow	
Iron	Rusts slowly		
(Hydrogen)			
Copper	No reaction	No reaction	
Gold			Least reactive

Reactivity

When **metals** react, the metal atoms lose electrons to form **positive ions**.

The more reactive the metal, the more vigorous the reaction

The more reactive the metal, the more easily the atom will lose its electrons

When a metals react with water, they produce **metal hydroxide** and **hydrogen**

e.g. Sodium + water → Sodium Hydroxide + Hydrogen

6. Displacement reactions

A more reactive metal will always displace a less reactive metal

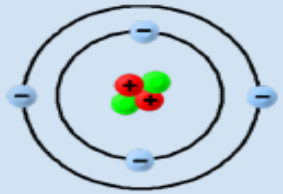
e.g. calcium + copper sulphate → calcium sulphate + copper

But

Iron + zinc sulphate → Iron + zinc sulphate

Year 8 Knowledge Organiser – Electricity

1. The Atom



Proton
Neutron
Electron

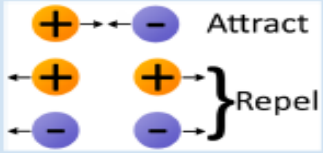
All substances are made of atoms. Atoms are made of protons, neutrons and electrons.

2. Static Electricity

Electrons are negative. If an object gains electrons it will become more negative. If an object loses electrons it will become less negative.

When one object is rubbed with another object, the friction moves electrons from one object to they other. They become charged.

Opposite charges attract. Similar charges repel.

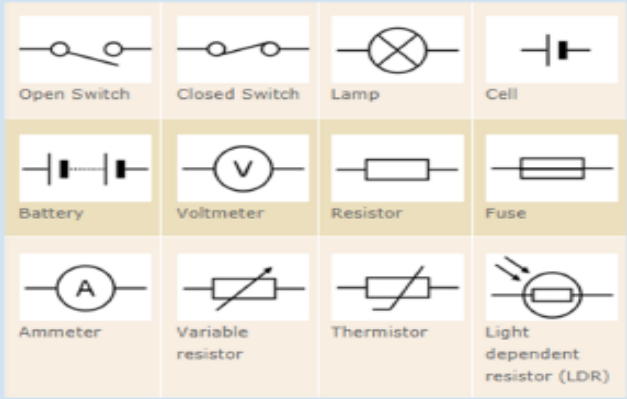


3. Definitions

Electrical conductor – Allows electrons to flow down them. E.g. metals
Electrical insulator – does not allow electricity to flow down them e.g. wood, glass, plastic
Circuit – A complete loop of conducting material. Current can only flow if there is a complete circuit.
Current – The rate of flow of electrons.
Voltage – The amount of energy the electrons have
Resistance – 'Electrical friction' that slows the current down

Quantity	Symbol	Unit	Symbol
Current	I	Amp	A
Voltage	V	Volt	V
Resistance	R	Ohm	Ω

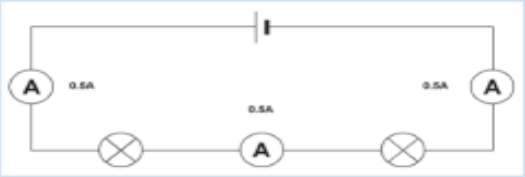
4. Circuit symbols



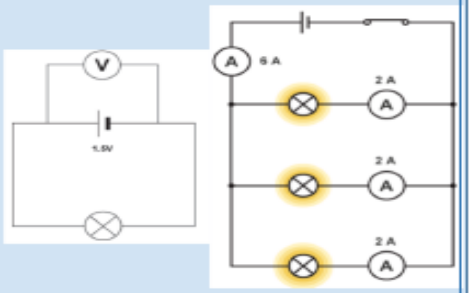
5. Series and parallel circuits

Series circuit – single loop with no branches.
- If one bulb goes out, they all go out.

-Current is the same everywhere
-Voltage of all the components added together equals the voltage of the cell
- Ammeters must be connected in series.



Parallel circuits
-Current is split up down different branches.
-If one bulb blows, there is still a complete circuit so others remain lit
- **Current is shared between all the bulbs.**
- **Voltage of each component is the same as the cell**
- Voltmeters much be connected in parallel



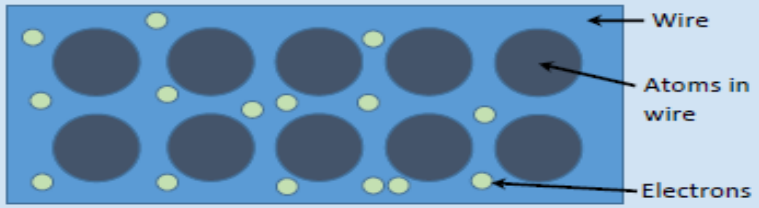
6. Ohm's Law

Voltage = Current x Resistance
(V) (A) (Ω)

V = I x R

7. Resistance

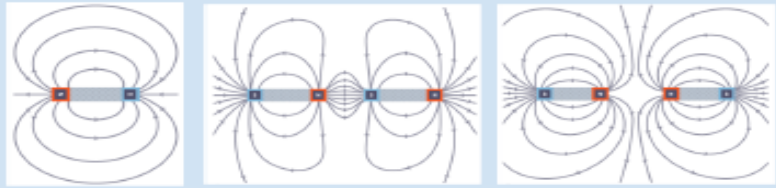
Resistance is like 'electrical friction'. It shows how hard it is for electrons to flow around a circuit.
Increasing resistance = decreases current
Increasing resistance = increasing voltage



Electrons are already in the wire. When they get energy, they can move.
When the electrons bump into the atoms in the wire, they lose energy and the wire will get hotter. This is resistance.

8. Magnets

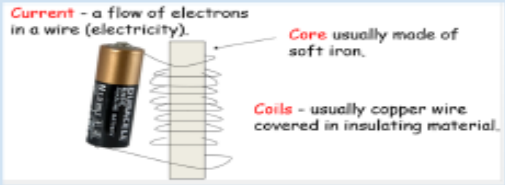
Magnetic field – Area around a magnet where another magnet will feel a force.



Single magnet | Like poles attract | Like pole repel

9. Electromagnets

When a current is passed through a wire, it creates a magnetic field
Electromagnets are made of the 3 C's: Core, Coils, Current



Advantages:
-Magnetic field can be turned on and off
-Can control the strength of the magnetic field

Uses
-Picking up scrap metal and steel in scrap yards
-Removing metal from peoples eyes