

Biology

Respiration	A chemical reaction that takes place in the mitochondria of cells. Releases energy for life processes.
Aerobic Respiration	Respiration which takes place in the presence of oxygen .
Anaerobic Respiration	Respiration which takes place without oxygen.
Fermentation	Anaerobic respiration in unicellular organisms and plants

Effects of exercise

When we exercise, more energy is needed in our muscles, this means that our cells need to do more respiration. To do this we have:

- Increased heart rate
- Increased breathing rate

Breathing rate stays high after exercise to allow for enough oxygen to break down any lactic acid. The amount of oxygen needed is called an “oxygen debt”

Aerobic respiration in all organisms:
oxygen + glucose → water + carbon dioxide

Anaerobic respiration in animals:
glucose → lactic acid

Lactic acid causes cramp in muscles. Oxygen is needed to break down lactic acid.

Anaerobic respiration in plants and unicellular organisms:
glucose → ethanol + carbon dioxide
This reaction is also known as **fermentation**.

Anaerobic respiration releases **less energy** than aerobic respiration

Physics

Energy	A quantity required to do work e.g. movement or heating.
Renewable	An energy source that <u>will not</u> run out on a time scale of 1 million years e.g. solar and wind.
Non-renewable	An energy source that <u>will</u> run out on a time scale of 1 million years e.g. coal, oil or gas.
Fossil fuel	Non-renewable energy resources formed from the remains of dead organisms over millions of years.
Power	The rate of energy transfer, measured in watts (W). Power (W) = Energy (J) ÷ time (s)

Renewable energy resources:

Solar panels, wind turbines, hydroelectric power, biofuels, geothermal energy, tidal power

Non-renewable energy resources:

Coal, gas, oil.

Converting units:

1000 W = 1 kW

1000 J = 1 kJ

3,600,000 J = 1 kWh

3600 s = 1 h

Chemistry

Exothermic	A reaction which releases energy in the form of heat to the surroundings.
Endothermic	A reaction which absorbs energy in the form of heat from the surroundings.
Catalyst	A substance which increases the rate of a chemical reaction without being used up.

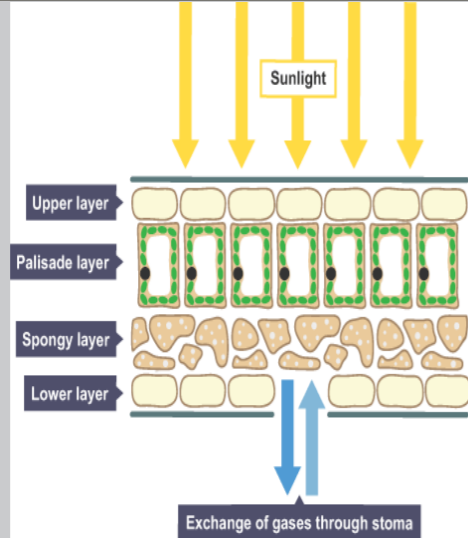
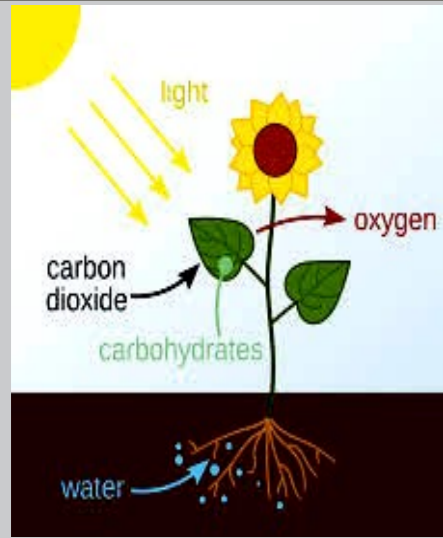


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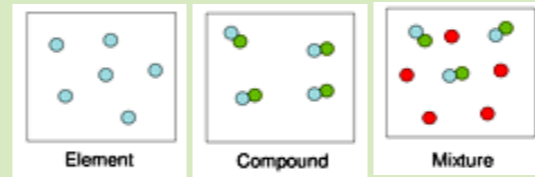
Biology



Gas exchange in plants.

Adaptation	Function
Thin	Short diffusion distance for gases to move in and out of the leaf
Chloroplast	Contains chlorophyll to absorb light
Stomata	A pore which allows gases to move in and out of the leaf
Large surface area of leaf	To maximise absorption of light
Large surface area of roots	To allow faster uptake of water and minerals
Deforestation	When natural forests are cleared through logging or burning.
Conservation	Contains chlorophyll to absorb light
Methods of conservation	Education, captive breeding, legal protection of habitats, zoos, seed banks

Chemistry



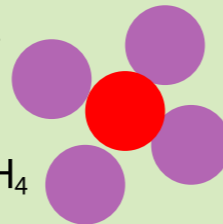
Element	A substance that contains only one type of
Compound	Two or more elements chemically bonded
Mixture	More than one element or compound not
Pure	A substance containing only one type of atom or compound
Filtration	Separates an insoluble solid from a liquid
Evaporation	Separates a soluble solid from a liquid
Distillation	Separates a solvent from a solution
Chromatography	Separates a mixture of solvents e.g.
Crystallisation	Separates a liquid from a soluble solid

Common compounds

Water: H₂O



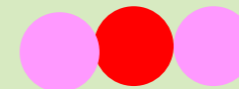
dioxide: CO₂



Methane: CH₄



Carbon



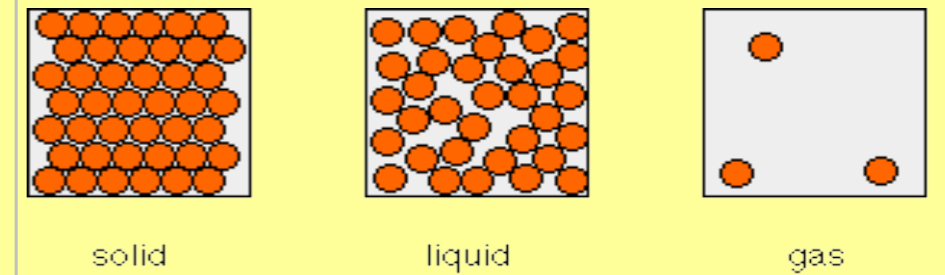
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Photosynthesis Equation

carbon dioxide + water -> glucose + oxygen



Physics



Particle	A single atom or molecule
Physical Change	A reversible change, no new products are formed
Chemical Change	An irreversible change, new products are formed
Conservation of mass	Matter cannot be created or destroyed. Mass is the same at the start and end of a chemical reaction.
Density	Mass per unit of volume.



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Biology

Monomer

A small molecule that can join to form a polymer

Polymer

A long chain of repeating units called monomers.

Enzymes are biological catalysts that break down polymers into monomers

Polymer	Enzyme	Monomer	Use of monomer
Carbohydrates	Carbohydrase	Glucose	Energy
Proteins	Protease	Amino Acids	Growth and Repair
Lipids (fats)	Lipase	Glycerol and Fatty Acid	Long term energy and insulation

The Digestive System

Stomach	Where ingested food is broken down.
Small intestine	Where food molecules are absorbed into the blood.
Large intestine	Where water molecules are absorbed into the blood.

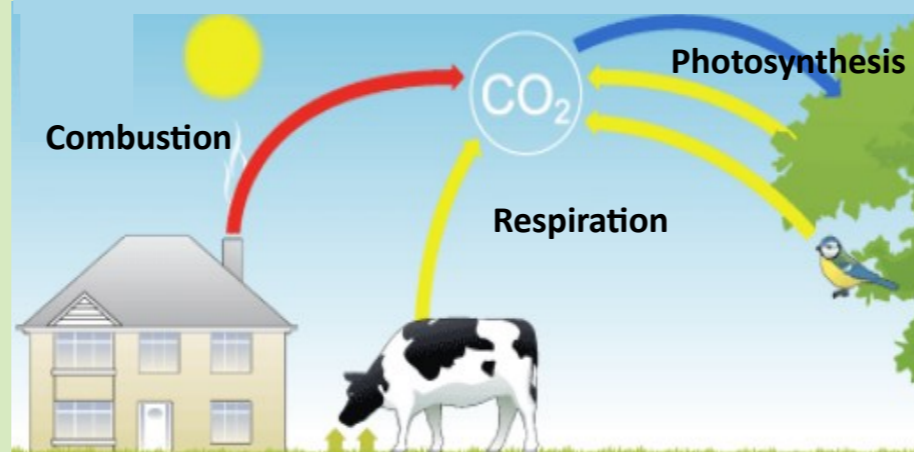
Plants synthesise their own food using energy from the sun in **photosynthesis**.

This allows them to make carbohydrates such as **sucrose**, **starch** and **cellulose**.

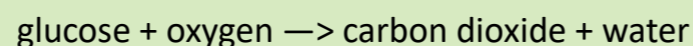
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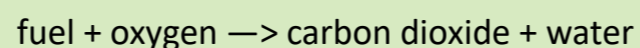
The atmosphere contains: **nitrogen 78%, oxygen 21%, carbon dioxide 0.035% and other gases < 1 %**



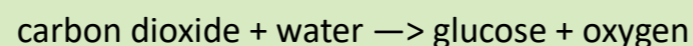
Respiration (causes an increase of CO₂)



Complete combustion (causes an increase of CO₂)



Photosynthesis (causes a decrease of CO₂)



Climate change is caused by increased CO₂ in the atmosphere. This can be caused by:

- Deforestation
- Farming
- Decomposition
- Combustion of fossil fuels
- Respiration

Physics

Energy store	Description	Example
Thermal	Hot objects	Hot coffee
Kinetic	All moving objects	Planets, buses
Electrostatic	Charged objects	Thunder clouds
Gravitational potential	An object above ground	Aeroplanes, kites, a book on a shelf.
Chemical	Energy stored in chemical bonds	Food, fuel, batteries.
Elastic	Stretched or compressed materials.	Catapults, springs, balloons.
Magnetic	Caused by the attraction or repulsion between magnets	Fridge magnets, compasses, maglev trains
Nuclear	The energy stored in an atom.	Uranium.

Key Definitions

Conduction	The transfer of energy by vibrating particles.
Radiation	Energy transferred as a wave.
Convection	The transfer of energy by movement of particles. Only occurs in fluids (liquids and gases)
Insulation	A material that does not allow thermal energy to pass through easily.
Conservation of energy	Energy cannot be created or destroyed. It can only be stored or transferred between stores.
Transfer of energy	The movement of energy from one store to another.
Dissipate	Lost to the surroundings.