

1. Key Words

Insulator	Material that does not allow thermal energy or a current flow through it easily.
Conductor	Material that allows thermal energy or a current flow through it easily.
Activation energy	The minimum energy needed for a collision to cause a reaction.
Dissipate	When energy spreads out into the surroundings.
Endothermic	Reaction that takes in energy from the surroundings.
Exothermic	Reaction that releases energy to the surroundings.
Internal energy	Total kinetic and potential energy of all the particles in a substance.

2. Energy Transfer

Conduction	The particles in a solid vibrate more when heated. These vibrations are passed on as the particles knock into each other.
Convection	The particles in the fluid gain energy and move further apart, reducing their density. These particles rise up through the fluid as the <u>more dense</u> particles sink. The cooler particles then heat up and continue the cycle.
Radiation	Thermal energy waves are emitted from hot objects into the surroundings.

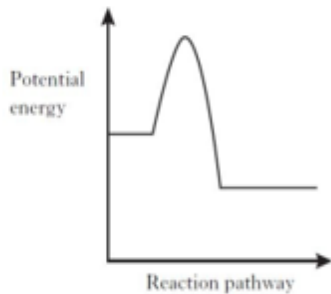
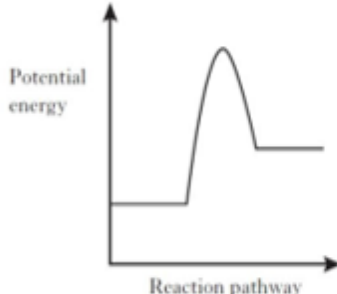
3. Energy Changes during Changes of State

Process	Energy Changes
Melting	When a solid is heated the internal energy increases as the particles move and have enough energy to start to move over each other.
Evaporation / Boiling	When a liquid is heated, thermal energy is transferred to the particles and the internal energy increases so the particles can spread out to fill the space they are in.
Condensing	When a gas is <u>cooled</u> the internal energy is transferred to thermal energy which dissipates to the surroundings and the particles move closer together.
Freezing	When a liquid is <u>cooled</u> the internal kinetic energy is transferred to thermal energy. The particles stop moving over each other and begin to vibrate around a fixed point.


4. Diets

Carbohydrates	Food group used to release energy in the body (for respiration).
Proteins	Food group used in the body for growth and repair of cells.
Iron	Mineral used in the body to make red blood cells.
Calcium	Mineral used in the body to strengthen bones and teeth.

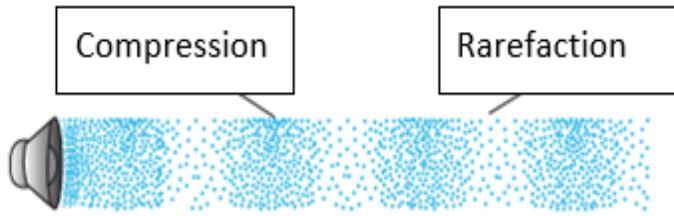
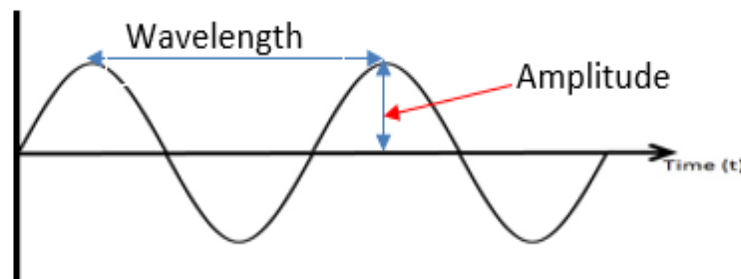
5. Exothermic and Endothermic Reactions

Exothermic reaction	Endothermic reactions
	
Energy of the products is lower than the energy of the reactants, so thermal energy is released to the surroundings.	Energy of the products is higher than the energy of the reactants, so thermal energy is taken in from the surroundings.

6. Combustion

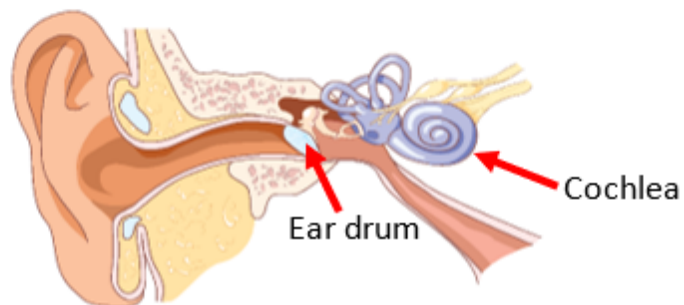
Fire triangle – if one or more of the sides of the triangle is removed the fire will be extinguished	
Combustion	The burning of fuels to release carbon dioxide and water.
$\text{Fuel} + \text{Oxygen} \rightarrow \text{Carbon dioxide} + \text{Water}$	

7. Waves

Longitudinal	Waves that transfer energy through vibrating particles, <u>e.g.</u> sound.
	
Transverse	Waves that transfer energy without particles, <u>e.g.</u> light and electromagnetic waves.
	

8. Reducing Noise

Decibels	Units for measuring noise.
Hertz	Units for measuring frequency.
Amplitude	Height of a wave.
Vacuum	Area where there are no particles.
Ear defenders	Safety wear to prevent damage to the hearing
Ear drum	Thin sheet inside the ear which vibrates to pass on longitudinal waves through to the inner ear.
Cochlea	Part of the ear containing nerve receptors to detect sound vibrations.



Types of ear defenders – contain insulating materials that are poor conductors, so vibrations are absorbed.






9. Chemical reactions

Oxidation	Reaction where an oxide compound is made.
Ion	Charged atom that has lost or gained electrons.
The presence of metal ions can be detected using a flame test. Each metal ion burns with a unique colour, allowing them to be identified in an unknown chemical.	
Metal ion	Colour in a flame test
Sodium (Na^+)	Yellow
Lithium (Li^+)	Red
Copper (Cu^{2+})	<u>Blue-green</u>
Strontium (Sr^{2+})	Dragon red
Potassium (K^+)	Lilac
Calcium (Ca^{2+})	<u>Orange-red</u>


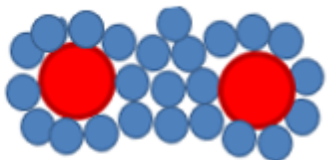
10. Careers linked to this unit

Pyrotechnics company	These provide a wide range of jobs including accounting, logistics and project managers.
Sound engineers	Work in a variety of industries from music, film, radios, computer design, <u>theatre</u> and sports.
Chemical engineer	Developing and designing chemical manufacturing processes.
Fire fighter	Industrial and domestic fire fighters working on extinguishing fires and supporting the police.










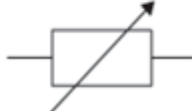
1. States of matter

Property	Solid	Liquid	Gas
Particle diagram			

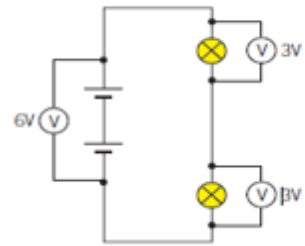
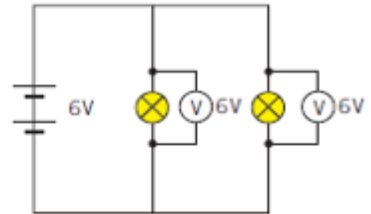
2. Properties of metals and non-metals

Metals	Non-metals
Shiny	Dull
High melting points	Low melting points
Good conductors of electricity	Poor conductors of electricity
Good conductors of heat	Poor conductors of heat
High density	Low density
Malleable and ductile	Brittle
Pure Metal	Alloy
Metal containing only one type of atom, that are arranged in layers that can easily slide over each other.	Substance containing a metal mixed with another element. The atoms of each element are different sizes, so it is harder to slide the atoms over each other and makes the metal harder than a pure metal.
	

3. Circuit symbols / components

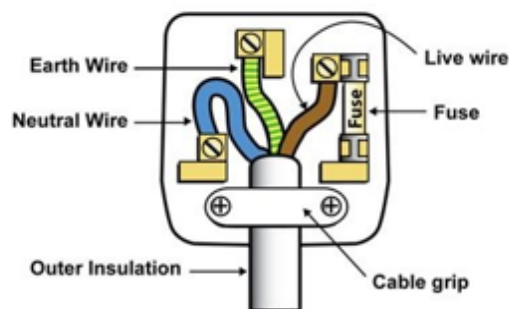
Cell		Battery	
Bulb		Motor	
Switch		Closed switch	
Ammeter		Voltmeter	
Resistor		Variable resistor	

4. Series and parallel circuits

Series circuit	Parallel circuit
Only one loop.	More than one loop.
If a component breaks, the circuit will not work.	If component breaks, the rest of the circuit will work.
	

5. Domestic electricity

1	Earth wire	Protects the circuit from causing electrocution in metal appliances.
2	Fuse	Melts if the current is too high so that the circuit is broken.
3	Neutral wire (0V)	Carries the current away from the appliance.
4	Live wire (230V)	Carries the current to the appliance.
5	Cable grip	Holds the cables in place to prevent them being pulled out.

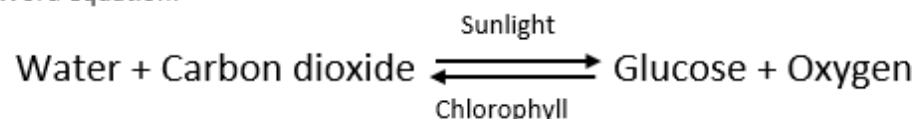


6. Generating electricity

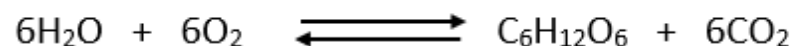
Energy source	Advantages	Disadvantages
Fossil fuels	<ul style="list-style-type: none"> Low cost. Reliable. 	<ul style="list-style-type: none"> Non-renewable. Produced CO₂.
Wind	<ul style="list-style-type: none"> Renewable. No fuel cost. Produces no pollutants. 	<ul style="list-style-type: none"> Cannot be used in high or no winds. Visual pollution.
Solar	<ul style="list-style-type: none"> Renewable. No fuel cost. Produces no pollutants. 	<ul style="list-style-type: none"> Does not work at night. Expensive to set up.
Nuclear	<ul style="list-style-type: none"> High energy output for small mass of fuel. Reliable. 	<ul style="list-style-type: none"> Non-renewable. Produces radioactive waste.

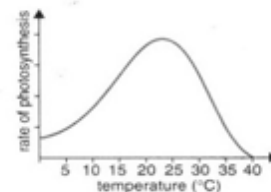
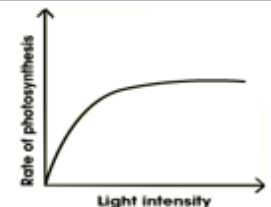
7. Factors affecting the rate of photosynthesis

Word equation:



Symbol equation (HT Only)



Factor	Effect	Pattern
Temperature	An increase in temperature increases the rate to a maximum. A further increase in temperature causes a decrease in the rate as the enzymes in the plant start to denature.	
Light intensity	An increase in light intensity, increases the rate of reaction to a maximum, then further increase in light intensity does not affect the rate of reaction.	

8. Nutrients

Nutrient	Where it is found	Role in the body
Carbohydrate	Potatoes, rice, pasta, bread.	Releases energy during respiration.
Protein	Meat, fish, dairy.	Growth and repair of body tissues.
Iron	Red meat and green vegetables.	Makes red blood cells.
Calcium	Milk, cheese and yoghurts.	Strengthens teeth and bones.

9. Effects of exercise on the body

Key Word	Definition
Aerobic respiration	A chemical reaction that releases energy from the breakdown of glucose.
Drug	Substance that affects the chemical reactions or nerve impulses in the body.
Effect	Reason
Heart beats faster	Pumps oxygenated blood around the body faster.
Breathe faster and deeper	Increases the amount of oxygen absorbed into the blood.
Red and sweaty skin	To cool the body down.

10. Balanced and unbalanced force

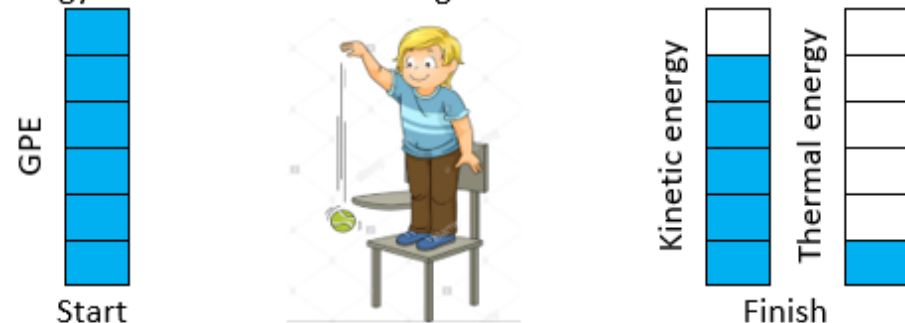
Air resistance	Contact force where air particles push against the direction of motion.
Gravity	Non-contact force that pulls objects to the centre of the Earth.
Friction	Contact force which occurs when surfaces rub against each other.
Balanced forces	Where the opposing forces are equal to give a resultant force of zero.
Unbalanced forces	Where the opposing forces are different sizes causing a change in speed, <u>direction</u> or shape of an object.
Contact force	Force that needs to have contact with an object to affect it.
Non-contact force	Force that can act at a distance from an object.

11. Conservation of energy and Energy transfers

The Law of Conservation of Energy states that energy can neither be created nor destroyed only transferred between stores.

Energy Store	Where the store can be found.
Thermal energy	Stored in hot objects (also known as light and sound).
Kinetic energy	Stored in moving objects and particles.
Gravitational potential energy	Stored in objects off the ground.
Internal energy	The total amount of kinetic and potential energy stored in an object.

Energy transfers in a ball falling



12. Careers linked to this unit

Grounds person	Work to maintain the lawns, fields, gardens, and sporting pitches.
Civil engineer	Plan, design and manage large construction projects.
Sports scientist	Study and research the factors that affect performance in sport. Often work closely with elite athletes.
Electrician	Responsible for inspecting, testing, repairing, installing, and modifying electrical components and systems.