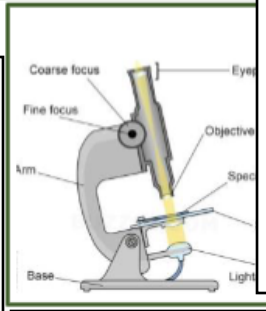
Year 7 Achievement check 1 resources

Please don't worry if you haven't covered some of this in lessons you will get to it soon.

Biology

Cells

Keyword	Definition
Cell	
Cell Membrane	
Cytoplasm	
Nucleus	
Mitochondria	
Cell Wall	
Vacuole	
Chloroplasts	
Tissue	
Organ	
Organ System	
Synovial Joint	



Light microscope:

Magnification:

Total magnification:

Draw an animal and plant cell and label them.

What is diffusion? Try and include a diagram and some examples.

Further Reading:
https://www.bbc.com/bitesize/guides/z9hyvcw/revision/2

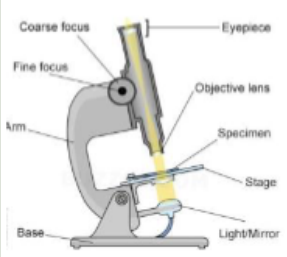
Red Blood Cell	Sperm Cell	Root Hair Cell	Palisade Cell	Nerve Cell	Egg Cell

For each of the specialised cells: draw a picture and label it, say what features it has and why they are useful for that cell's job

Cells

Keyword	Definition
Cell	Basic unit of life. Unicellular organisms only have one cell. Multicellular organisms have many cells.
Cell Membrane	Controls the movement of substances in and out of the cell.
Cytoplasm	Jelly-like substance where chemical reactions take place.
Nucleus	Carries genetic information and controls the cell.
Mitochondria	Where respirations takes place.
Cell Wall	Made of cellulose, provides support to the cell.
Vacuole	Contains cell sap.
Chloroplasts	Contains the green pigment chlorophyll, the site of photosynthesis.
Tissue	Something made from just one type of specialised cell.
Organ	Something made from different groups of specialised cells all working together.
Organ System	When a number of organs work together.
Synovial Joint	A freely moveable joint. Examples include the hip, shoulder, elbow and knee joints.

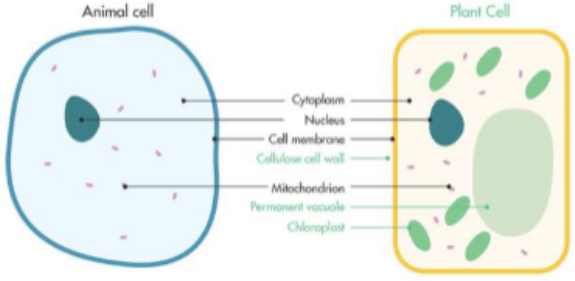
Further Reading:
https://www.bbc.com/bitesize/guides/z9hyvcw/revision/2

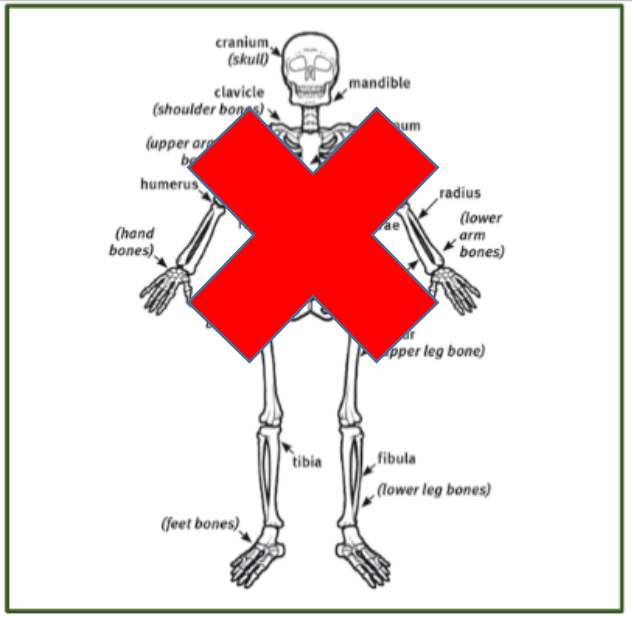


Light Microscope: A device which uses light and a series of lenses to produce a magnified image of an object.

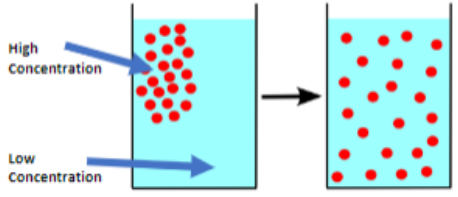
Magnification = How much bigger a sample/object appears under the microscope than it is in real life.

Total magnification = Eyepiece lens x Objective lens

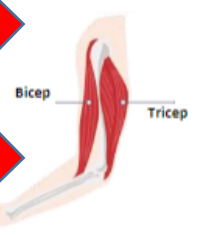




Diffusion: The movement of particles from an area of high concentration to an area of low concentration.
Substances diffuse into and out of cells.



Antagonistic Muscles:
- Muscles work by ge… ter.
- Muscles can only …
- Muscles work in pai…
- When you raise your fo…
biceps contract and the…
- When you lower yo…
biceps relax and th…



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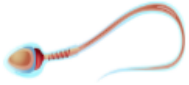
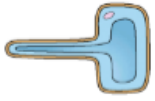
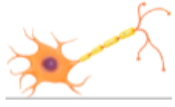
					
Carries blood around the body. **Adaptations:** No nucleus, large surface area and biconcave shape.	Carries the male genes. **Adaptations:** Tail for swimming, mitochondria for energy, acrosome to break down the egg cell.	Take in water from the soil. **Adaptations:** Long & thin; large surface area for maximum water absorption. Thin cell walls.	Production of food for the plant. **Adaptations:** Tall and thin. Lots of chloroplasts to absorb sunlight for photosynthesis.	Carry signals around the body. **Adaptations:** Long axon. Myelin sheath.	Carries the female genes. **Adaptations:** Lots of mitochondria. Outer layer hardens once fertilised.

Respiration

Keyword	Definition
Respiration	
Aerobic Respiration	
Anaerobic Respiration	
Lactic Acid	
Mitochondria	
Oxygen Debt	
Alveoli	
Bronchi	
Bronchicles	
Diaphragm	
Lung	
Trachea	

Aerobic Respiration

Anaerobic Respiration

Anaerobic Respiration In Microbes

Draw the human breathing system

Draw an alveoli and label how they are adapted

Draw an alveoli and label how they are adapted

Respiration

Keyword	Definition
Respiration	Process in living things which oxygen is used to release the energy from food. Glucose + Oxygen → Carbon Dioxide + Water (+energy)
Aerobic Respiration	Respiration that requires oxygen.
Anaerobic Respiration	Respiration without oxygen.
Lactic Acid	A chemical produced during anaerobic respiration
Mitochondria	Structures in the cytoplasm of all cells where aerobic respiration takes place.
Oxygen Debt	The amount of extra oxygen required by the body for recovery after vigorous exercise.
Alveoli	Tiny air sacs in the lungs, where gas is exchanged during breathing.
Bronchi	Branches off the trachea that distribute air to both lungs.
Bronchioles	Branches of the bronchi, that distribute the inhaled air throughout all of the lungs.
Diaphragm	Expands and moves down so lungs have room to fill with air – inhalation. Contracts and moves upwards to force air out of the lungs (exhalation).
Lung	Soft organ that inflates to draw in oxygenated air and deflates to expel air.
Trachea	Windpipe, air passes between mouth and lungs.

Aerobic Respiration

Respiration is a series of reactions that takes place in the cells of animals and plants.
Energy is released in the reaction. The mitochondria, found in the cell cytoplasm, is where respiration happens.

Glucose + Oxygen → Carbon Dioxide + Water (+energy)

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

'Energy' is in brackets because it is not a substance. This type of respiration, where oxygen is used, is known as aerobic respiration. Oxygen (from breathing) is carried from the lungs to all the cells of the body in the blood. The waste products (carbon dioxide and water) are taken away from the cells by the blood and breathed out from the lungs.

Anaerobic Respiration

Although anaerobic respiration does release some energy, it does not release as much as aerobic respiration does.

Glucose → Lactic Acid (+energy)

The lactic acid produced during anaerobic respiration builds up in muscles. This can be felt as an aching in muscles during or after exercise.

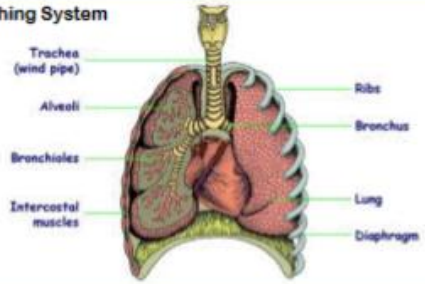
Anaerobic Respiration In Microbes

Anaerobic respiration happens in microorganisms such as bacteria because they need to release energy from glucose. Yeast (unicellular fungi), carry out a process called fermentation.

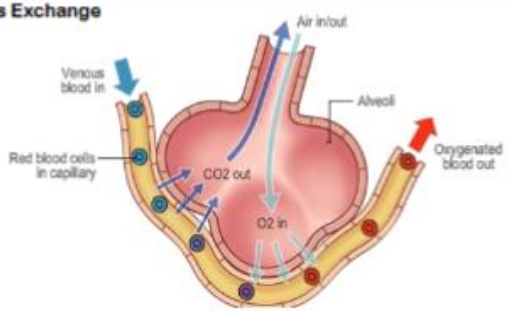
Glucose → Ethanol + Carbon Dioxide

The ethanol (alcohol) is useful for brewers, and carbon dioxide is useful to bakers because it helps their bread rise.

The Breathing System



Gas Exchange



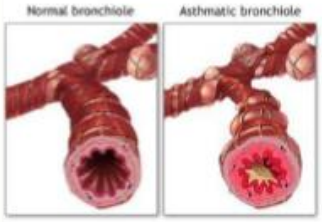
The alveoli are adapted to make gas exchange in the lungs happen easily and efficiently.

- Alveoli give the lungs a large surface area.
- Alveoli have think cells walls (just one cell thick)
- Alveoli are surrounded by lots of blood capillaries.

The gases move by diffusion from where they have a high concentration to a lower concentration.

Oxygen diffuses from the air in the alveoli into the blood.
Carbon dioxide diffuses from the blood into the air in the alveoli.

Asthma and Respiration



Air passage for people who are asthmatic become reduced.

This is why they often struggle during exercise as there is reduced volume of oxygen getting into the blood stream, so rate of respiration is reduced.

Useful links for Biology:

- https://www.bbc.co.uk/bitesize/topics/znyycdm/articles/zkm7wnb
- https://www.bbc.co.uk/bitesize/topics/znyycdm/articles/zfj3rwx
- https://www.bbc.co.uk/bitesize/topics/znyycdm/articles/z2vrr2p
- https://www.bbc.co.uk/bitesize/topics/znyycdm/articles/zbm48mn
- https://www.bbc.co.uk/bitesize/topics/znyycdm/articles/zrp3ydm
- https://www.bbc.co.uk/bitesize/topics/znyycdm/articles/zr3vsk7
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- https://www.bbc.co.uk/bitesize/topics/zvrrd2p/articles/zk9t6g8
- https://www.bbc.co.uk/bitesize/topics/zvrrd2p/articles/zbhcg7h
- https://www.bbc.co.uk/bitesize/topics/zvrrd2p/articles/zdqx2v4
- https://www.bbc.co.uk/bitesize/topics/zvrrd2p/articles/zcsbmsg
- https://www.bbc.co.uk/bitesize/topics/zvrrd2p/articles/ztdmrwx
- https://www.bbc.co.uk/bitesize/topics/zvrrd2p/articles/zkq7wnb
- https://www.bbc.co.uk/bitesize/topics/zvrrd2p/articles/z3tb3j6
- https://www.bbc.co.uk/bitesize/topics/zvrrd2p/articles/zctyqhv

Chemistry

States of Matter

Keyword	Definition
Particle	
State of Matter	
Solid	
Liquid	
Gas	
Change of State	
Melting	
Freezing	
Condensing	
Evaporation	
Density	
Density (formula)	
Dense	

Further Reading:

https://www.bbc.com/bitesize/guides/z2wmxnb/revision/1

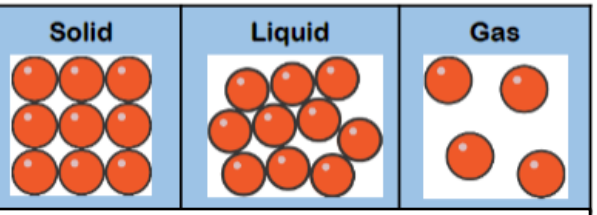
https://www.bbc.com/bitesize/articles/zqpv7p3

What are the changes of state?

Forces between particles:

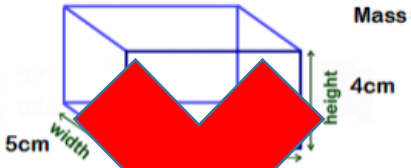
Heating Curve

What does a heating curve look like?



What characteristics does each state have?

Calculating Volume:



Volume = L x W x H
Volume = 10cm x 5cm
Volume = 200cm³.

Calculating Density:
Density = Mass ÷ Volume
Density = 20g ÷ 200cm³
Density = 0.1g/cm³

Density:
1kg of a gas has a larger v of a solid. There is empty space between pa t in a solid, they're tightly packed togethe

States of Matter

Keyword	Definition
Particle	The general term for a small piece of matter.
State of Matter	The distinct forms in which matter can exist (solid, liquid, gas)
Solid	A substance with a fixed shape and volume.
Liquid	A substance with a fixed volume but not a fixed shape.
Gas	A substance that does not have a fixed shape or volume.
Change of State	The change of a substance from one physical form to another.
Melting	The change of state when a solid changes to a liquid.
Freezing	The change of state when a liquid changes to a solid.
Condensing	The change of state when a gas changes to a liquid.
Evaporation	The change of state when a liquid changes to a gas.
Density	The amount of mass that 1cm³ of a substance has.
Density (formula)	Density = mass ÷ volume p = m ÷ v
Dense	Something which is heavy for its volume.

Further Reading:

https://www.bbc.com/bitesize/guides/z2wmxnb/revision/1

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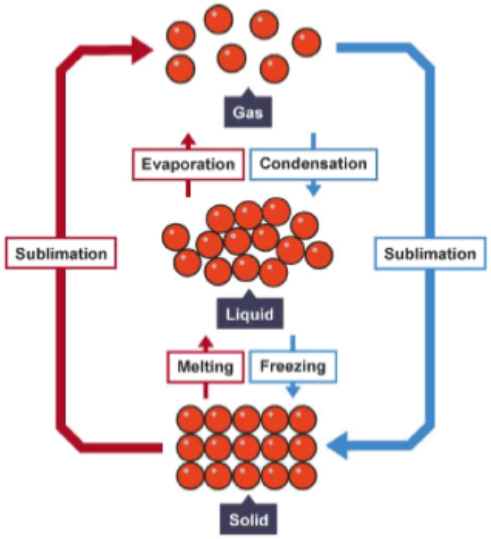


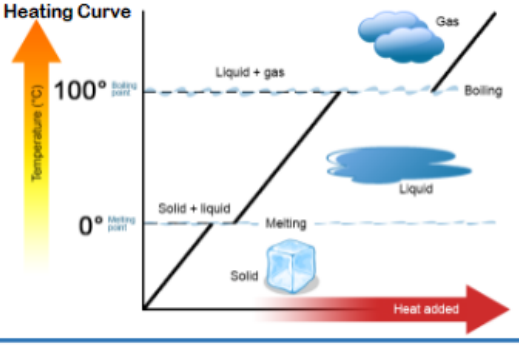
Forces between particles:

Solid: There are strong forces of attraction between the particles in a solid. Therefore, particles can only vibrate in a fixed position.

Liquid: There are weaker forces of attraction between the particles in a liquid. Therefore, the particles are close together, and are able to move around each other.

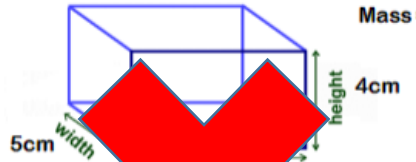
Gas: The forces of attraction between the particles are overcome. Therefore, the particles are far apart and move quickly in all directions.

Heating Curve



Solid	Liquid	Gas
		
The particles vibrate in a fixed position.	The particles are close together and move around each other.	The particles are far apart and move quickly in all directions.
The particles cannot move from place to place.	The particles are arranged in a random position.	The particles are arranged in a random way.
Particles have a fixed shape and cannot flow.	The particles flow and take the shape of the bottom of their container.	The particles flow and completely fill their container.
The particles cannot be compressed (squashed)	The particles cannot be compressed.	The particles can easily be compressed.

Calculating Volume:



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Calculating Density:
Density = Mass ÷ Volume
Density = 20g ÷ 200cm³
Density = 0.1g/cm³

Density:
1kg of a gas has a larger v of a solid. There is empty space between pa t in a solid, they're tightly packed togethe

Elements, Compounds, Mixtures

Keyword	Definition
Periodic Table	
Group	
Period	
Atom	
Element	
Compound	
Mixture	
Chemical Reaction	A process in which one or more substances are changed into o… by their at… ging rearranged… n as ir… actions.
Physical Reaction	A process in whic… perties are changed, but n… made. Also known as rev…
Reactant	A substance … s toget… nother substance to fo… products duri… chemical reaction.
Product	A substance … on.
Conservation of Mass	The total mass … emical reaction wi… ss of the reactant.

Further Reading:

https://www.bbc.co.uk/bitesize/guides/zt2hpv4/revision/1

https://www.bbc.co.uk/bitesize/guides/z84wjxs/revision/1

The Periodic Table

How is the periodic table organised?

Metals	Non-Metals

Metals vs non-metals

Atoms, Elements, Compounds & Mixtures

Draw a picture and label it for the above.

Chemical & Physical Rea… on

Chemical changes hap… occur. They involve the fo… elements or compounds.
E.g. Iron will react with oxyger… de (rust).

Physical changes do n… substances forming. In … hange, … e simply changes physical sta… g. A solid to … id.

Chemical Reactions & Equations

The changes in a chemical re… on can be mo… led using equations. In general we write:

Reactants → Prod…

The reactants are shown the l… …nd the products are shown on the right of the arrow. Th… …mical reaction has taken place.

E.g.

Iron + Oxygen → Iron …

The Iron and oxygen react together (reactants) to produce Iron Oxide (product).

Naming Compounds

Metal + Non-Metal (which c… …n two eleme…

1. The metal always …
2. The ending of th… …

E.g.

Copper + Oxygen → Copper…
Lithium + Fluorine → Lithium …

To name compounds whi… …and oxygen (three or more elements)

1. The metal always …
2. The ending of the no… …al changes t… …

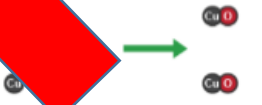
E.g.

Copper, Sulfur, Oxygen
Copper Sulfate

Conservation of Mass

No atoms are created… …n a… …ion. Instead, they just joint together in a diffe… …ore the reaction, and form products. This means … …the products in a chemical reaction will be the same as t… …he reactants.

Copper + Oxygen → C…
10g 0.5g



Balancing Equations

A balanced equation gives mo… information ab…out a chemical reaction because it gives the symbol… …formulae o… …bstances involved.

$Cu + O_2 \rightarrow CuO$

The above equation is not ba… …e is one copper atom on both sides of the arrow, but t… …n the left hand side, and only one on the right.
You need to adjust the n… …nces until you have equal numbers of atom… …s o… …u cannot change the formulae of a substance (y… …change … number).

$2Cu + O_2 \rightarrow 2CuO$

Elements, Compounds, Mixtures

©TCL

Keyword	Definition
Periodic Table	A table of all the known elements in order of their atomic number.
Group	Vertical columns on the periodic table
Period	Horizontal rows on the periodic table
Atom	The smallest piece of an element.
Element	A substance containing only one type of atom.
Compound	Two or more different elements which are chemically joined together.
Mixture	Two or more different elements or compounds which are not chemically joined together.
Chemical Reaction	A process in which one or more substances are changed into o… by their at… …ging rearranged… …n as ir… …eactions.
Physical Reaction	A process in whic… …perties are changed, but n… …made. Also known as rev…
Reactant	A substance … …s togeth… …nother substance to fo… …products duri… …chemical reaction.
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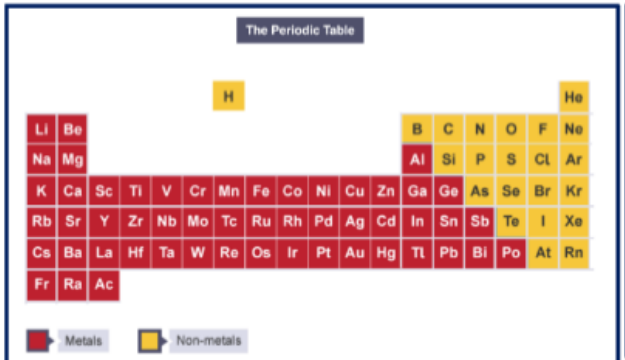
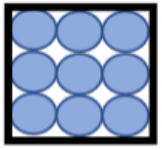


Metals	Non-Metals
Shiny in colour, solids at room temperature (except mercury), high density, strong, malleable, good conductor of heat and electricity.	Dull in colour, can be solids, liquids or gases at room temperature, low density, brittle, poor conductors of heat and electricity.

Atoms, Elements, Compounds & Mixtures



This models an element. There is only one type of atom.

This models a compound. There are two different elements chemically combined together.

This models a mixture. There are two or more different elements which are not chemically combined.

Chemical & Physical Reaction

Chemical changes happen when chemical reactions occur. They involve the formation of new chemical elements or compounds.
E.g. Iron will react with oxygen to form Iron Oxide (rust).

Physical changes do not lead to new chemical substances forming. In a physical change, a substance simply changes physical state. E.g. A solid to a liquid.

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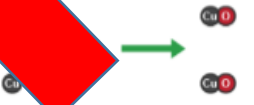

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Separation Methods

Keyword	Definition
Solution	
Solute	
Solvent	
Saturated	
Pure	
Dissolve	
Particle	
Filter	
Evaporate	
Separate	
Soluble	
Mixture	
Solubility	
Insoluble	

Further Reading:
https://www.bbc.com/bitesize/guides/zgvc4wx/revision/1

Filtration:

Write a method

Distillation:

Write a method

Evaporation:

Write a method

Chromatography:

Write a method

Separation Methods

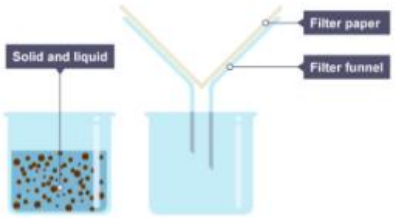
Keyword	Definition
Solution	A liquid mixture in which a solute has dissolves in the solvent
Solute	A minor component in a solution – dissolves in the solvent
Solvent	The liquid which the solute dissolves in
Saturated	The point at which no more solute can dissolve
Pure	Only one type of particle
Dissolve	Solid is mixed into a liquid to become a solution
Particle	A small piece of matter – everything is made up of these
Filter	To remove solid particles from liquid particles
Evaporate	Particles go from a liquid to a gas
Separate	To remove one type of particle from another
Soluble	A substance is capable of dissolving
Mixture	More than one type of particle
Solubility	How much of a substance will dissolve in a solution
Insoluble	A substance is not capable of dissolving

Further Reading:
https://www.bbc.com/bitesize/guides/zgvc4wx/revision/1

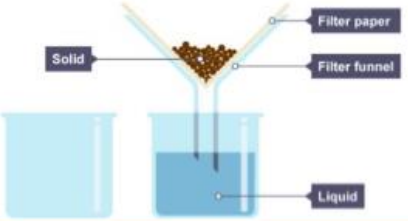
Filtration:

- A method for separating an insoluble solid from a liquid.

A beaker containing a mixture of insoluble solid and liquid. There is filter paper in a filter funnel above another beaker.



- The mixture if insoluble solid and liquid is poured into the filter funnel.
- The liquid particles are small enough to pass through the paper as a filtrate. The solid particles are too large to pass through the filter paper and stay behind as the residue.

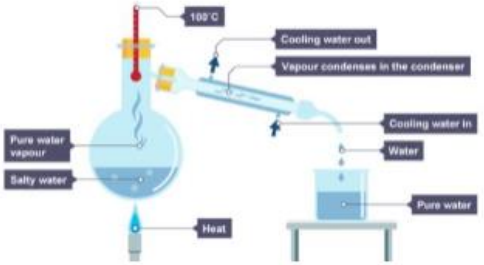


Evaporation:

- A method used to separate a soluble solid from a liquid.
- A solution is placed in an evaporating basin and heated with a Bunsen Burner.
- The water will begin to evaporate and solid particles will begin to form in the basin.
- Once the water has evaporated, it will leave solid crystals behind.

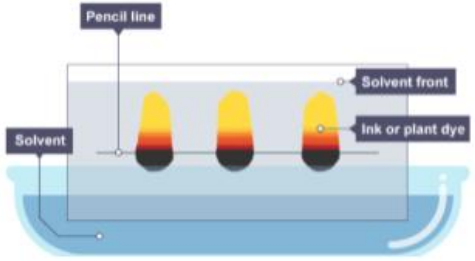
Distillation:

- A method used for separating the solvent from a solution. E.g. water can be separated from a salt solution because the water has a much lower boiling point than the salt.
- Salt water is heated. The water evaporates and it's vapours rise.
- The vapours rise and pass into the condenser, where they cool and condense.
- Liquid water drips into a beaker and the salt will be left in the round bottom flask.



Chromatography:

- Paper chromatography is a method for separating dissolved substance from one another. Often used when the dissolved substance are coloured such as inks, food colouring or plant dyes.
- A pencil line us drawn on the paper, and spots of ink are placed on the line.
- There is a solvent usually water or ethanol in a container/beaker.
- The paper is lowered into the solvent. The solvent travels up the paper, taking some of the substances with it.
- As the solvent travels up the paper, the different coloured substances are spread apart.



Useful links for Chemistry:

- https://www.bbc.co.uk/bitesize/topics/z9r4jxs
- https://www.bbc.co.uk/bitesize/topics/zstp34j/articles/zngddp3
- https://www.bbc.co.uk/bitesize/topics/zstp34j/articles/zc86m39
- https://www.bbc.co.uk/bitesize/topics/zstp34j/articles/zmsk4xs
- https://www.bbc.co.uk/bitesize/topics/zstp34j/articles/zqr4tv4
- https://www.bbc.co.uk/bitesize/topics/zych6g8
- https://www.bbc.co.uk/bitesize/topics/zv9nhcw/articles/zf4pp4j
- https://www.bbc.co.uk/bitesize/topics/zv9nhcw/articles/z8qrr2p

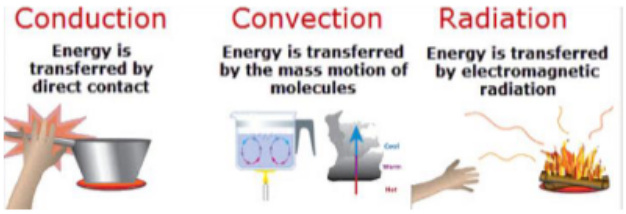
Matter

©TCL

Keyword	Definition
Particle	
Matter	
Internal Energy	The total kin… potential energy of the particles …
Specific Heat Capacity	The amount o… ed to raise the temperature … tance by 1°C.
Thermal Conductivity	
Conduction	
Convection	
Infrared Radiation	Electromagneti… emitted from a hot object.
Pressure	The force exer… of area. Pressure = forc…
Density	
Density (formula)	Density = m… p = m ÷ v

Further Reading:

https://www.bbc.co.uk/bitesize/guides/zttrd2p/revision/1
https://www.bbc.co.uk/bitesize/guides/z2gjtv4/revision/5
https://www.bbc.co.uk/bitesize/guides/zssbgk7/revision/1



Calculating Pressure

Pressure = Force ÷ Area

$$\frac{F}{A}$$ F: N, A: m^2, Pressure: N/m^2

Conduction

Convection

Forces between particles:

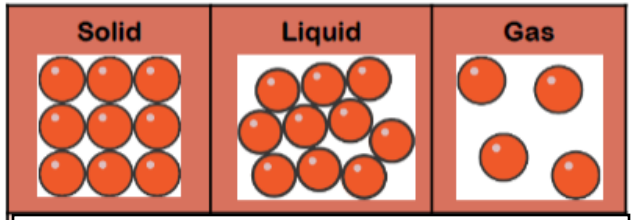
Specific heat capacity

- This is the a… f ene… ded to raise the tempera… rial by 1°C

$E = \ldots \Theta$

Energy (J) — Mass (kg) — Specific heat Capacity — Change in temperature (°C)

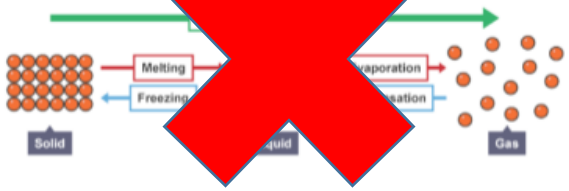
1 of 1



Density:
1kg of a gas has a larger volume than 1kg of a solid. There is empty space between particles in a gas, but in a solid, they're tightly packed together.

Calculating De… :
Density = Mass …
Density = 20g ÷ …
Density = 0.1g…

Internal Energy:
The internal energy is the total amount of kinetic energy and potential energy of all th… particles in t… system.



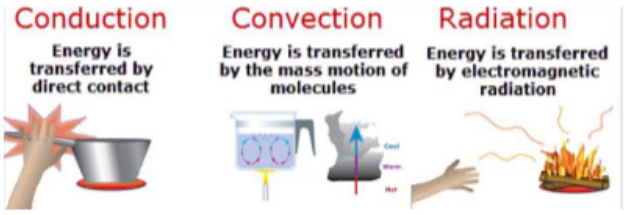
Matter

©TCL

Keyword	Definition
Particle	A term for a small piece of matter. For example atoms.
Matter	A substance which is made up by atoms or molecules.
Internal Energy	The total kin… potential energy of the particles …
Specific Heat Capacity	The amount … ed to raise the temperature … tance by 1°C.
Thermal Conductivity	A measure of how well a material conducts energy when it is heated.
Conduction	The transfer of heat through a material by transferring kinetic energy from one particle to another.
Convection	The transfer of thermal energy through a moving liquid or gas.
Infrared Radiation	Electromagneti… emitted from a hot object.
Pressure	The force exer… of area. Pressure = forc…
Density	The amount of mass that 1cm³ of a substance has.
Density (formula)	Density = m… p = m ÷ v

Further Reading:

https://www.bbc.co.uk/bitesize/guides/zttrd2p/revision/1
https://www.bbc.co.uk/bitesize/guides/z2gjtv4/revision/5
https://www.bbc.co.uk/bitesize/guides/zssbgk7/revision/1



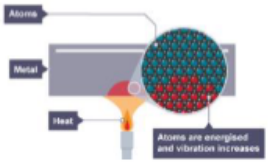
Calculating Pressure

Pressure = Force ÷ Area

$$P = \frac{F}{A}$$

F: N
A: m²
P: N/m²

Conduction
Heat energy is conducted from the hot end of an object to the cold end.
In metals, there are 'free electrons'. This is when electrons in a metal can leave their atoms and move through the structure. When the metal is heated, the particles gain kinetic energy and energy is transferred from the hot part of the metal to the cooler parts because of the movement of the free electrons.



Convection
Liquids and gases are fluids because they can be made to flow. Liquids and gases expand when they're heated. The fluids in hot areas are less dense than in cold areas, so the particles rise into the colder area. The fluids then cool, and become more dense. Therefore, the cold fluids fall into the warmer areas. In this way, convection currents that transfer heat from place to place are set up.

Forces between particles:

Solid: There are strong forces of attraction between the particles in a solid. Therefore, particles can only vibrate in a fixed position.

Liquid: There are weaker forces of attraction between the particles in a liquid. Therefore, the particles are close together, and are able to move around each other.

Gas: The forces of attraction between the particles are overcome. Therefore, the particles are far apart and move quickly in all directions.

Specific heat capacity

- This is the a… f ene… ded to raise the tempera… rial by 1°C

$E = \ldots \Theta$

Energy (J) | Mass (kg) | Specific heat Capacity | Change in temperature (°C)

1 of 1

Solid	Liquid	Gas
		
The particles vibrate in a fixed position.	The particles are close together and move around each other.	The particles are far apart and move quickly in all directions.
The particles cannot move from place to place.	The particles are arranged in a random position.	The particles are arranged in a random way.
Particles have a fixed shape and cannot flow.	The particles flow and take the shape of the bottom of their container.	The particles flow and completely fill their container.
The particles cannot be compressed (squashed)	The particles cannot be compressed.	The particles can easily be compressed.

Density:
1kg of a gas has a larger volume than 1kg of a solid. There is empty space between particles in a gas, but in a solid, they're tightly packed together.

Calculating De…
Density = Mass …
Density = 20g ÷ …
Density = 0.1g…

Internal Energy:
The internal energy is the total amount of kinetic energy and potential energy of all th… particles in t… system.

Energy

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Keyword	Definition
Energy Transfer	
Conservation of Energy	
Internal Energy	
Kinetic Energy	
Elastic Potential Energy	
Gravitational Potential Energy	
Thermal Energy Store	
Work done	
Power	
Fossil Fuel	Natural, finite fu formed from the remains of living organis oil and natural gas.
Non-Renewable	A resource that c eplaced when it is used up, such r cold.
Renewable	An energy reso that will not run out, e.g. solar energy and wind energy

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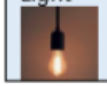
https://www.bbc.com/bitesize/guides/zggk87h/revision/1
https://www.bbc.com/bitesize/guides/zp8jtv4/revision/1

Type of energy	Description	Type of energy	Description
Kinetic 			
Chemical 			
Magnetic 			
Elastic potential 			
Light 			

Calculating Kinetic Energy

E_k = kinetic energy
m = Mass
v = velocity

Calculating GPE

GPE = mass x gravitational field strength x height

- Mass is measured in **kilograms (kg)**.
- Gravitational field strength is measured in **newtons per kilogram (N/kg)** on Earth.
- Height is measured in **metres (m)**.
- GPE is measured in **joules (j)**.

Calculating Power

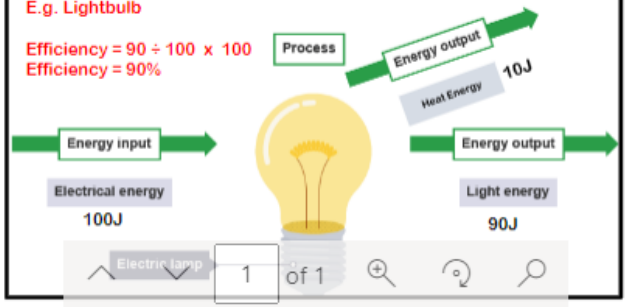
Word Equation	Power	=	Work Done	
			Time Taken	
Dimensions	P	=	W	/ t
Units	Watt	=	Joule	/ second

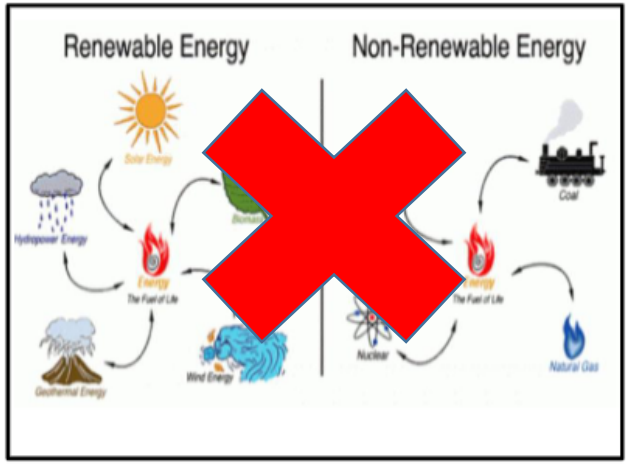
Calculating Efficiency.

Efficiency = useful energy out / total energy in X 100

E.g. Lightbulb

Efficiency = 90 ÷ 100 x 100
Efficiency = 90%





Energy

©TCL

Keyword	Definition
Energy Transfer	Changes from one form of energy to another form of energy.
Conservation of Energy	Energy cannot be created or destroyed It can be stored, dissipated or transferred from one form into another.
Internal Energy	Energy stored in all materials, including energy due to the motion of particles and the forces between them.
Kinetic Energy	Energy which an object possesses by being in motion.
Elastic Potential Energy	Energy stored in squashed, stretched or twisted materials.
Gravitational Potential Energy	The energy stored by an object lifted up against the force of gravity. Also known as GPE.
Thermal Energy Store	Energy store filled when an object is warmed up.
Work done	Work is done when a force makes an object move a distance, energy is transferred
Power	The rate of work done. Or The energy transferred per second.
Fossil Fuel	Natural, finite fu formed from the remains of living organis oil and natural gas.
Non-Renewable	A resource that c eplaced when it is used up, such r cold.
Renewable	An energy reso that will not run out, e.g. solar energy and wind energy

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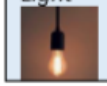
https://www.bbc.com/bitesize/guides/zggk87h/revision/1
https://www.bbc.com/bitesize/guides/zp8jtv4/revision/1

Type of energy	Description	Type of energy	Description
Kinetic 	The energy in moving objects	**Thermal (Internal)** 	The heat stored in an object
Chemical 	When a substance undergoes a chemical reaction	**Gravitational potential** 	When an object is raised to a height
Magnetic 	When 2 objects attract or repel	**Electrostatic (electrical)** 	Allows an electric current to flow
Elastic potential 	When an object is stretched or squashed	**Nuclear** 	Energy stored in an atom *(not needed till GCSE)*
Light 	*From a bright object (not stored)*	*Sound* 	*From a vibrating object (not stored)*

Calculating Kinetic Energy

E_k = kinetic energy
m = Mass
v = velocity

Calculating GPE

GPE = mass x gravitational field strength x height

- Mass is measured in **kilograms (kg)**
- Gravitational field strength is measured in **newtons per kilogram (N/kg)** on Earth.
- Height is measured in **metres (m)**.
- GPE is measured in **joules (j)**.

Calculating Power

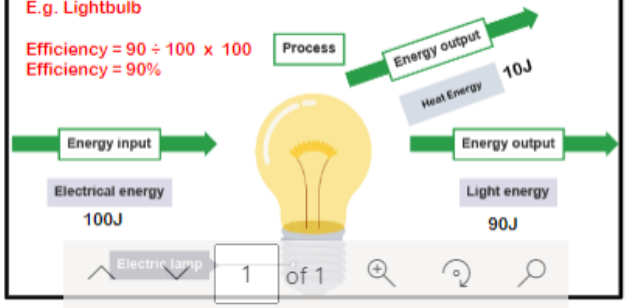
Word Equation	Power	=	Work Done	/ Time Taken
Dimensions	P	=	W	/ t
Units	Watt	=	Joule	/ second

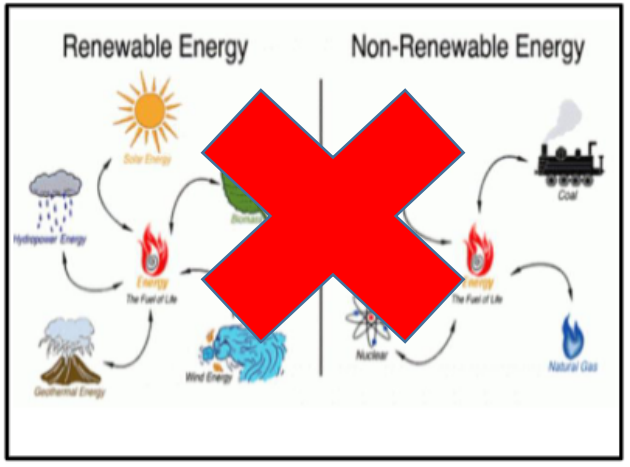
Calculating Efficiency.

$$\text{Efficiency} = \frac{\text{useful energy out}}{\text{total energy in}} \times 100$$

E.g. Lightbulb

Efficiency = 90 ÷ 100 x 100
Efficiency = 90%





Forces

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Keyword	Definition
Velocity	
Acceleration	
Terminal Velocity	
Balanced	
Resultant Force	
Friction	
Work Done (Mechanical)	
Drag	
Lift	
Upthrust	
Reaction or Normal Force	

Speed

Further Reading:

https://www.bbc.co.uk/bitesize/guides/zttfyrd/revision/9

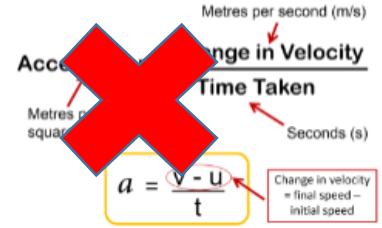
Distance Time Graphs

Unbalanced Forces

Contact & Non-Contact Forces

Acceleration:

Acceleration is the rate of change of velocity. It is the amount that velocity changes per unit time.



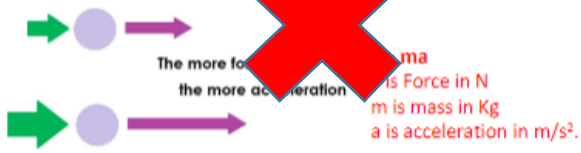
Newton's First Law

An object has a constant velocity unless acted on by a resultant force

Thrust = Drag. Zero resultant force and the plane moves at a constant velocity.

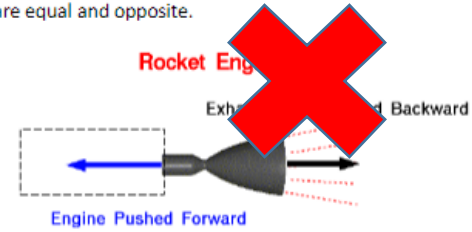
Newton's Second Law

The acceleration of an object is proportional to the resultant force acting on the object, and inversely proportional to the mass of the object.



Newton's Third Law

Wherever two objects interact, the forces they exert on each other are equal and opposite.



For every action, there is an equal and opposite re-action.

Forces

©TCL

Keyword	Definition
Velocity	Speed in a particular direction
Acceleration	Speeding up, rate of change of velocity
Terminal Velocity	Steady speed reached when weight and drag balance. Resultant force = 0N
Balanced	Two forces are equal and opposite so resultant force = 0N.
Resultant Force	The sum of all the forces acting on an object
Friction	A force that opposes the motion of a moving object.
Work Done (Mechanical)	Energy transferred when a force moves an object through a distance.
Drag	A force that resits motion through the air.
Lift	A force that uses motion to make objects rise up.
Upthrust	An upwards force pushing on an object in fluids.
Reaction or Normal Force	A force that stops you falling through the floor.

Speed

The speed of an object tells you how fast or slow it is moving. You can find the average speed of an object if you know the distance it has travelled and the time taken to travel that distance.

The equation is:

Speed(m/s) = Distance(m) ÷ Time(s)

$$V = \frac{S}{t}$$

E.g. A car travels 100m in 20s. Calculate the speed of the car.

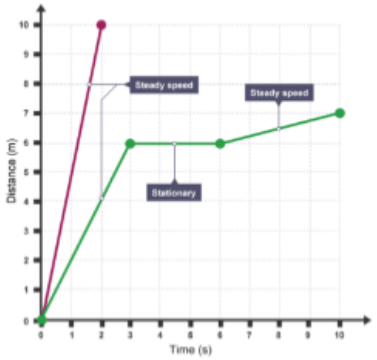
Speed = Distance ÷ Time
Speed = 100m ÷ 20s
Speed = 5m/s

Further Reading:

https://www.bbc.co.uk/bitesize/guides/zttfyrd/revision/9

Distance Time Graphs

A distance time graph is a useful way to represent the motion of an object. It shows ho the distance move from a starting point changes over time.



If the line is horizontal, the object is stationary (because the distance stays the same).
If the line is a straight diagonal, the object is moving at a constant speed.

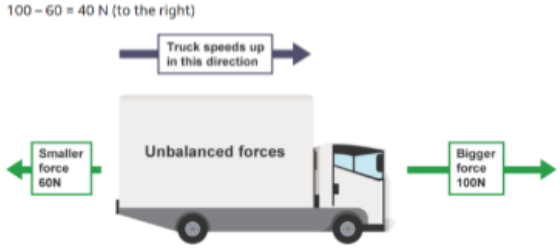
The steeper the line, the greater the gradient and the greater the speed.

E.g. Calculate the speed of the green line for the first 3s.

Speed = Distance ÷ Time
Speed = 6m ÷ 3s
Speed = 2m/s

Unbalanced Forces

If more than one force act along a straight line, the resultant force can be found by adding (acting in the same direction) or subtracting (acting in opposite direction) them.



Contact & Non-Contact Forces

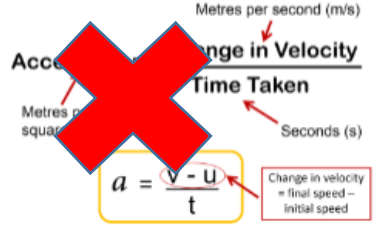
All forces between objects are either:
Contact Forces – The objects are physically touching
Non-Contact Forces – The objects are physically separated.

Contact: Friction, Air Resistance, Tension, Normal Contact

Non-Contact: Gravitational, Electrostatic, Magnetic

Acceleration:

Acceleration is the rate of change of velocity. It is the amount that velocity changes per unit time.



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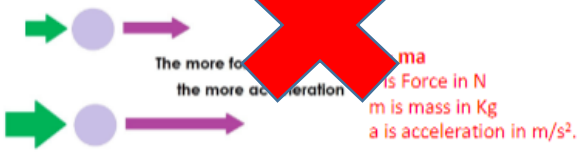

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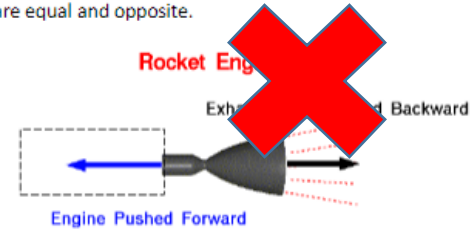

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Useful links for Physics:

- https://www.bbc.co.uk/bitesize/topics/z4brd2p/articles/zs3896f
- https://www.bbc.co.uk/bitesize/topics/z4brd2p/articles/zhnfp4j
- https://www.bbc.co.uk/bitesize/topics/z4brd2p/articles/zw9qwnb
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- https://www.bbc.co.uk/bitesize/topics/zc3g87h