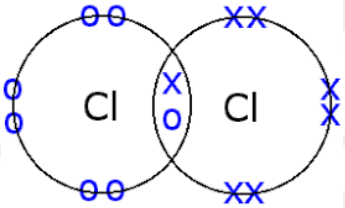
SUBJECT: GCSE Science

UNIT: Bonding and the properties of matter

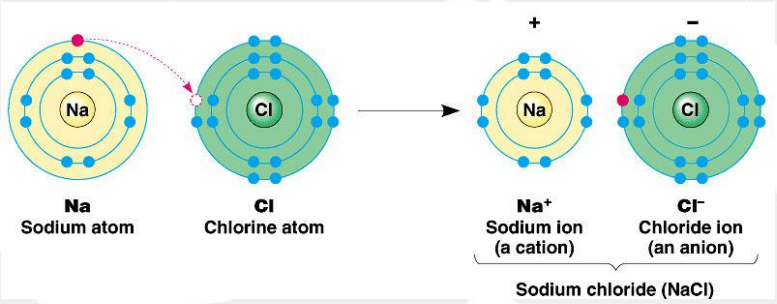
Covalent Bonding

This is between two non-metals. Electrons are shared. They have weak intermolecular forces.



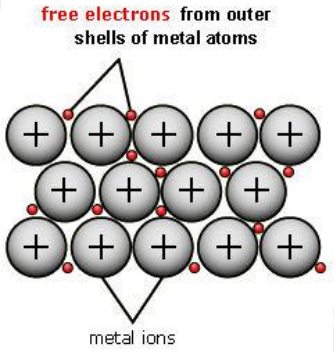
Ionic bonding

Ionic bonds form between metals and non-metals. They gain or lose electrons, becoming ions. Ionic substances are made up of a giant lattice of positive and negative ions in a regular structure.



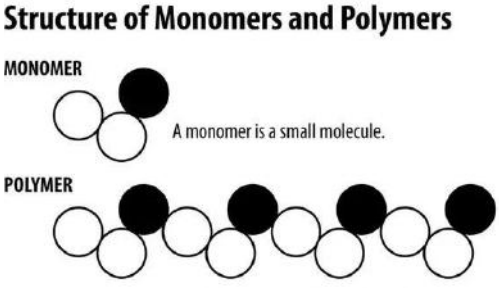
Metallic bonding

Metals have certain properties: They conduct electricity, have high melting points, are malleable, ductile and can form alloys.



Monomers and Polymers

Mono=one, poly=many. So a polymer is lots of monomers joined together.



SUBJECT: GCSE Science

UNIT: Ecology

SANDHILL VIEW
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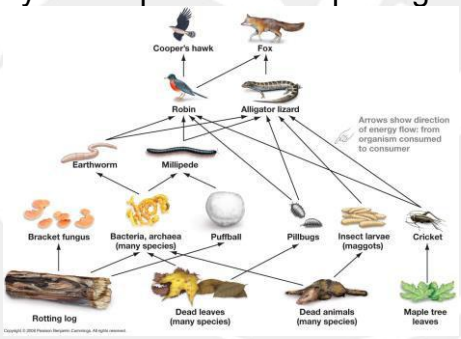
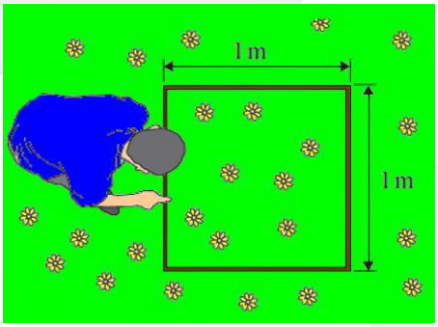
Food chains and food webs
These show the direction of energy transfer from one thing to another. They start with a producer, usually a green plant that has created food from photosynthesis. These are eaten by consumers, who are then eaten by predators. These food chains can be interrupted if one species is affected by a new predator or a pathogen arriving.



Biotic and abiotic factors
Biotic factors are living things that can affect species. These are things like: a new predator arriving or a new pathogen. Abiotic factors are non-living things: sunlight, water, temperature, soil pH or availability of Oxygen and Carbon dioxide.

Sampling
Quadrats are used to sample a small area and then the results are used to estimate how many of a species there are in the whole area. This should be randomised. The number of species found in one quadrat is then counted. The area of the quadrat is then multiplied by how many quadrats would fit in the whole area to find out the total estimated number in the whole area.



Key terms
An **individual** is a single member of a species.
A **population** is all of the members of a species that live in the same area.
A **community** is the different species interacting in the same area.
An **ecosystem** is the interaction between the living (biotic) and non-living (abiotic) parts of the area.
Interdependence is when one part of the community depends on another, for example predator and prey. In this the population often changes. As more predators arrive, they will kill prey and the prey number will fall. This will then lead to less food, so less predators. When there is less predators, more prey can survive and a cycle forms.

SUBJECT: GCSE Science

UNIT: Energy

Non- renewable
These energy sources are not being replenished as they are used: coal, oil, natural gas and nuclear are examples. They are usually reliable, easy to source but can release pollution.

Renewable
These energy sources are replenished as they are used: Wind, solar, hydroelectric, geothermal and tidal. They are less reliable but do not release pollution.

Energy first principle
Energy can not be created or destroyed but transferred from one kind to another.
The energy forms are: Magnetic, Kinetic, Heat, Light, Gravitational, Chemical, Sound, Electric, Elastic, Nuclear.

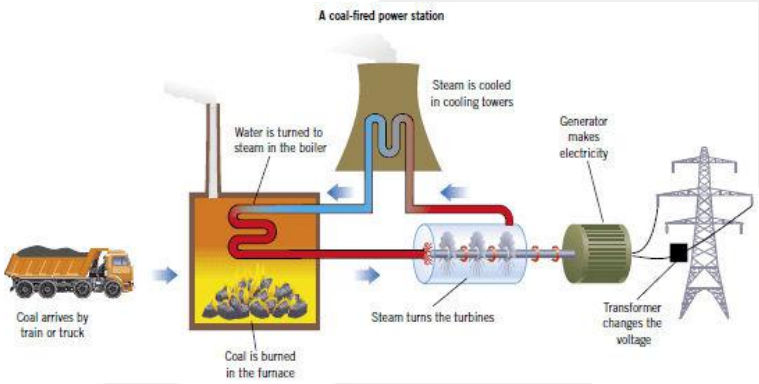
Energy Equations

Efficiency (%) = (useful energy out ÷ total energy in) x 100.

GPE = mgh	Gravitational Potential Energy = mass x gravity x height.
$E_e = \frac{1}{2}ke^2$	Elastic potential energy = 0.5 x spring constant x extension^2
$KE = \frac{1}{2}mv^2$	Kinetic Energy = 0·5 x mass x velocity^2.
W = F x d	work done = force x distance.
W = E	work done = energy transferred.
P = E ÷ t	power = energy ÷ time.
E = c x m x θ	energy = specific heat capacity x mass x change in temperature.

Specific heat capacity
This is the energy required to raise the temperature of 1kg of a substance by 1 degree Celsius. A high number means a lot of energy is required to heat it, but it will also store more energy.

Electricity generation
All power stations work on similar principles. They need to turn a generator. In a coal, oil, gas or nuclear station they use to heat to generate steam, which turns a turbine and then turns the generator. In renewables they use different methods, such as wind or water to turn a turbine.



SUBJECT: GCSE Science

UNIT: Inheritance and variation

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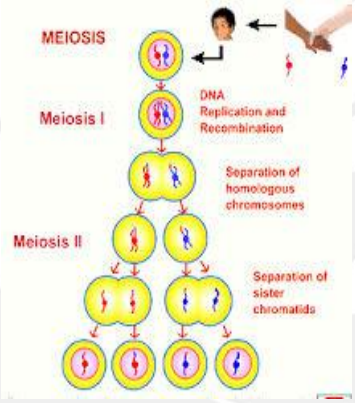
Sexual reproduction

Variation comes from sexual reproduction. This is because meiosis produces four (haploid), none identical cells (gametes – sperm or egg) which can then combine with another gamete to form a new diploid cell.



Evolution and adaptation

Evolution occurs when a random mutation occurs which provides a survival advantage. This survival advantage allows further reproduction and the ability to pass on the mutated, advantageous genes. For example, peppered moths were white but during the industrial revolution tree bark darkened due to pollution and a mutated peppered moth became black, which gave it a survival advantage whilst sitting on dark tree bark. Over time, peppered moths became black. This can be remembered by MSR POG

Mutate
Survive
Reproduce
Pass
On
Genes

Selective breeding

This process relies on choosing an animal or plant with the best characteristics and then breeding it with another that shows a desirable characteristic. An example of this is cows that produce a lot of milk.

Punnett Squares

These are a way of finding out the percentage chance of each phenotype, from the genotyopes of the parent.

For example, a blue eyed (Phenotype) parent would have the recessive bb, homozygous genotype.

A brown eyed parent could have Bb, which is heterozygous, where the genotype is not both the same. A punnett square for this is below/. In this example 50% of offspring have blue eyes and 50% have brown eyes.

	b	**b**
B	**Bb**	**Bb**
b	**bb**	**bb**

SUBJECT: GCSE Science

UNIT: Rate and Extent of chemical change

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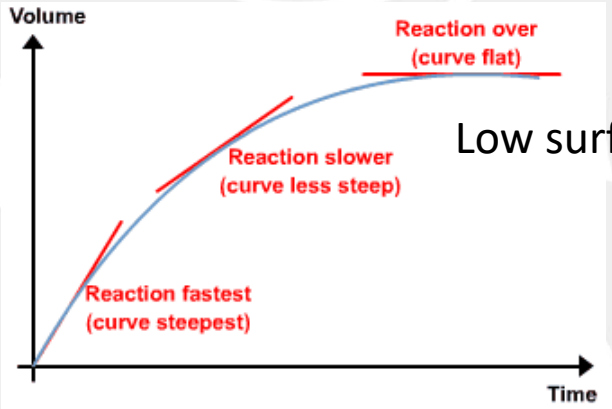
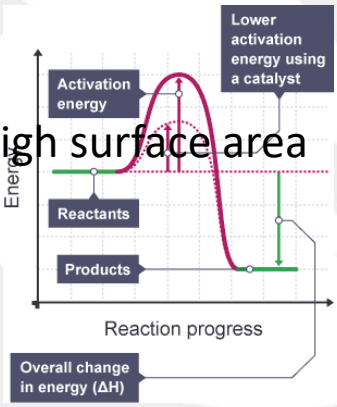
Rate of reaction	**The speed at which a reaction takes place. This can be worked out in two ways: Mean rate of reaction = quantity of reactant used ÷ time Mean rate of reaction = quantity of product formed ÷ time**
Activation energy	**The minimum energy particles must have to react**
Catalyst	**A substance that speeds up a chemical reaction by lowering the activation energy**
Enzymes	**Molecules that act as catalysts in biological systems**
Closed system	**A system where no substances can get in or out**
Dynamic equilibrium	**System where both the forward and reverse reactions are taking place simultaneously and at the same rate**

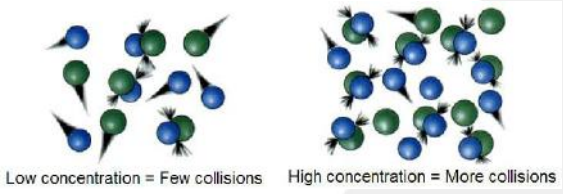
Reaction Profiles

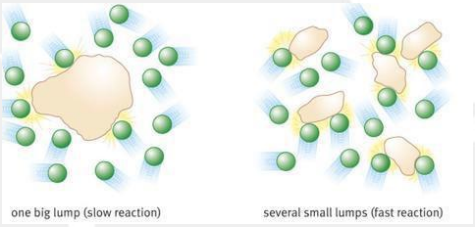


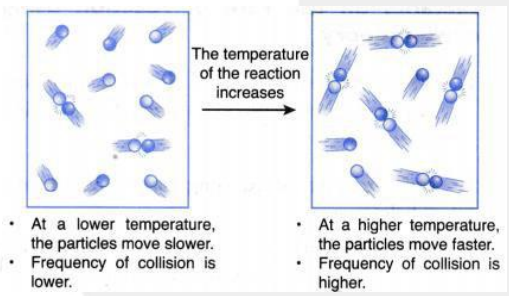
Low surface area High surface area



Factors affecting rates of reaction







SUBJECT: GCSE Science

UNIT: Waves

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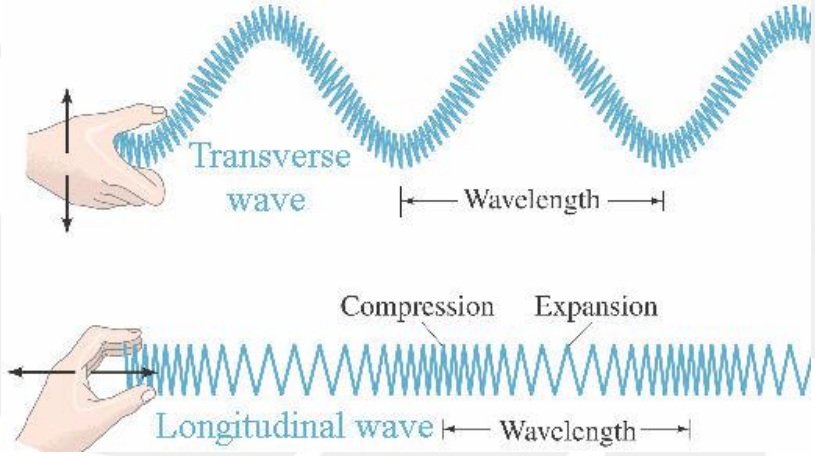
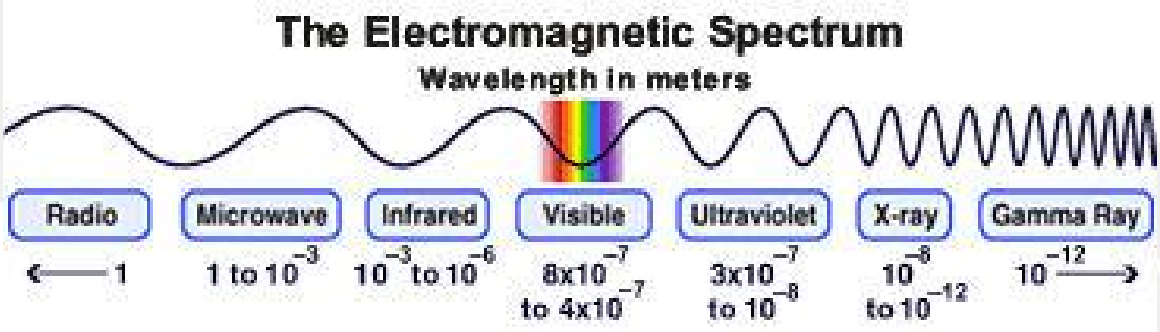
Waves

Waves are a means of transferring energy from one place to another. They come in two main types, Transverse and longitudinal. Transverse waves do not need a medium to pass through – examples include light and x-rays. Longitudinal waves do need a medium to pass through, for example sound waves.



EM waves

Electromagnetic waves are a spectrum of waves that all travel at 300000000 m/s. They can pass through a vacuum as they are all transverse waves.



Refraction of waves

Waves can be refracted when they change from one medium to another. This is because they change speed in different media. An example is light passing into a Perspex block. The light will bend toward the normal and then bend away from the normal again when it leaves the block.