Year 8 Science BiE2

Exam content and knowledge organisers

Paper 1 will assess the following content:

Knowledge Organiser Topics:

- 8.01 The Periodic Table
- 8.02 Digestion
- 8.04 Nutrition
- 8.05 Light
- 8.09 Space

Oak National Academy Topics:

- https://classroom.thenational.academy/units/light-and-space-fa61
- https://classroom.thenational.academy/units/atoms-and-the-periodic-table-68d3
- https://classroom.thenational.academy/units/digestion-and-nutrition-9fd9

Content from year 7 can also be assessed.

Paper 2 will assess the following content:

Knowledge Organiser Topics:

- 8.03 Electricity & Magnetism
- 8.07 Geology
- 8.08 Ecological Relationships
- 8.10 Atmosphere
- 8.11 Conservation

Oak National Academy Topics:

- https://classroom.thenational.academy/units/ecological-relationships-and-classification-b523
- https://classroom.thenational.academy/units/electricity-and-magnetism-ab64
- https://classroom.thenational.academy/units/materials-and-the-earth-78e8

Content from year 7 can also be assessed.

Year 8 Chemistry Knowledge Organiser – Pg 1
Topic 1: Periodic Table

Key Terms	Definitions
element	A substance made from only one type of atom
mixture	A substance made from two or more substances that are not chemically bonded together
compound	A substance that contains two or more elements that are chemically bonded together

Elements

- All 118 currently known elements are listed in the periodic table.
- All elements are given a symbol. These must be written with a capital letter first and a lower case letter second. For example Au is the symbol for gold.
- Symbols to learn:

Symbol	Element
Mg	magnesium
Cl	chlorine
Ar	argon
Au	gold
Ag	silver
Cu	copper
Pb	lead

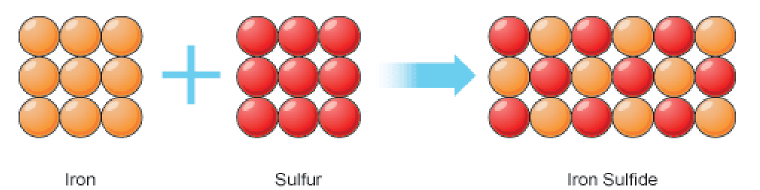
Symbol	Element
H	hydrogen
O	oxygen
N	nitrogen
C	carbon
He	helium
Fe	iron
S	sulphur
Na	sodium

Mixtures

- Examples of mixtures are air, salt water and petrol.
- These can be easily separated using different techniques, for example distillation, chromatography and evaporation.

Compounds

- A compound has at least two elements in it.
- Compounds form in chemical reactions.
- For example if iron and sulphur are heated up, they form a compound called iron sulphide, as the diagram shows.
- Compounds have a chemical formula. For example: H_2O means a ratio of 2 hydrogen atoms to 1 oxygen atom bonded together.
- Other examples of compounds include sodium chloride, carbon dioxide and methane.
- Compounds are hard to separate into elements because chemical bonds between atoms are strong.
- Compounds have different properties to the elements that started, for example iron is magnetic , iron sulphide is not.



Chemical Reactions

- In a chemical reaction we start with reactants and we make products. We represent chemical reactions using a word equation.

Sodium + Chlorine → Sodium Chloride

Reactants   Products

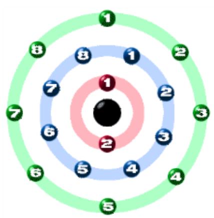
- We can also represent this reaction using a symbol equation

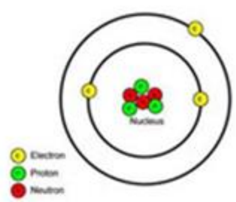
$2Na + Cl_2 \rightarrow 2NaCl$

Year 8 Chemistry Knowledge Organiser – Pg 2
Topic 1: Periodic Table

Structure of the atom

- An atom is a particle made up of three smaller subatomic particles: protons, electrons and neutrons. Atoms of every element have equal numbers of protons and electrons.
- Protons and neutrons are found in the nucleus of the atom (in the centre).
- Electrons are found orbiting the nucleus in shells (also known as *energy levels*).
- Electrons occupy the shells, following some very strict rules:
- A maximum of 2 electrons can go in the first shell
- The first shell MUST be full before the second shell is filled up
- The second shell can take a maximum of 8 electrons. This too must be full before the third shell can be filled.
- The third shall can take a maximum of 8 electrons.

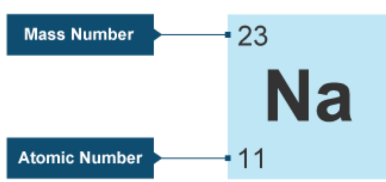




Atomic Number and Mass Number

This is the total of protons + neutrons

This is the number of protons



Therefore sodium has 11 protons, 11 electrons and 23-11=12 neutrons.

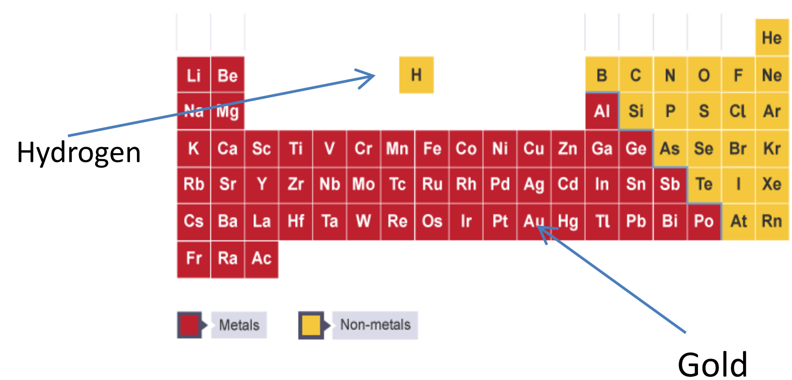
Key Terms	Definitions
atom	The particles from which elements are made; formed of three kinds of subatomic particles.
proton	A subatomic particle with a positive charge
electron	A subatomic particle with a negative charge
neutron	A subatomic particle with a neutral charge
atomic number	The number of protons in an atom

Structure of the atom and the periodic table

All 118 chemical elements are arranged in the periodic table. The elements are arranged in order of increasing atomic number.

On the periodic table, we can see the metal elements on the left and non metal elements on the right. The middle block of the periodic table contains the transition metals.

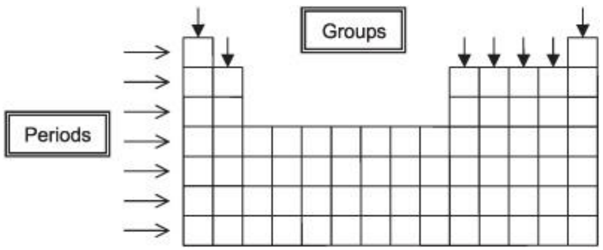
Hydrogen has an atomic number of 1 as it has only one proton, it is therefore the first element in the periodic table. Gold has an atomic number of 79 and is therefore a much larger atom and is found much further down the periodic table.



Year 8 Chemistry Knowledge Organiser – Pg 3
Topic 1: Periodic Table

Groups and Periods

Elements are arranged on the periodic table in groups and periods. Horizontal rows are called periods and vertical columns are called groups.



Groups are labelled 1-7 from left to right, with last group being called either group 8 or 0. (There are more than 8 columns because these group numbers don't apply to the transition metals in the middle block.) Elements in the same group have similar properties, because of this we can make predictions about the elements' reactivity (see the chemical reactions topic).

The History of the Periodic Table

- Throughout history scientists have tried to classify substances and many scientists attempted to construct a periodic table.
- One of the first attempts was by a scientist called John Dalton, which looks very different from today's Periodic Table.
- In 1864 a scientist call John Newlands arranged the elements by atomic mass and he noticed a pattern in the properties every 8 elements.
- Although he made some mistakes it was an important step in making the modern periodic table.

H	Li	Be	B	C	N	O
F	Na	Mg	Al	Si	P	S
Cl	K	Ca	Cr	Ti	Mn	Fe

Part of Newlands' table

Key Terms	Definitions
group	The vertical groups of elements in the periodic table
period	The horizontal rows of elements in the periodic table

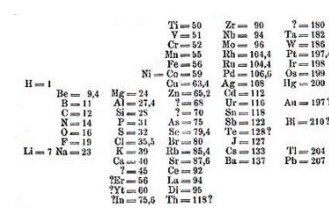
Metals and Non-Metals

Metals are found on the left hand side of the periodic table. The majority of elements are metals. Some elements are known as metalloids meaning they have the properties of metals and non-metals.

- Properties of metals are: high density, high melting point (except mercury) and good conductors of heat and electricity.
- Only three metals are magnetic (iron, cobalt and nickel).

Mendeleev

- Following Newland's work, in 1869, Dimitri Mendeleev (a Russian scientist) published his periodic table. It was different to those that had come before.
- He still arranged elements by atomic weight but he also left gaps for where he predicted undiscovered elements would fit in.
- He very accurately predicted the properties of elements that were not discovered until many years later e.g. gallium.
- The modern periodic table looks different to the one Mendeleev made. We now have very advanced instruments that can give us lots of information about elements.
- We have now discovered the elements that were left blank by Mendeleev, as well as other elements that were not discovered at the time of Mendeleev.
- In 2015 4 new elements were added to the periodic table, making 118 in total.



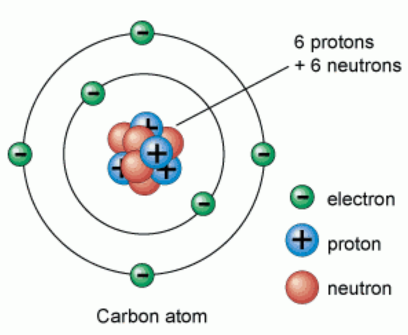
Mendeleev's table

Modern Periodic table

Year 8 Chemistry Knowledge Organiser – Pg 4
Topic 1: Periodic Table

Structure of the Atom

- Atoms of different elements are made from different numbers of protons, electrons and neutrons.
- All atoms have a neutral charge (overall zero charge) as the number of negative charges (electrons) is the same as the number of positive charges (protons). The opposite charges cancel out each other.



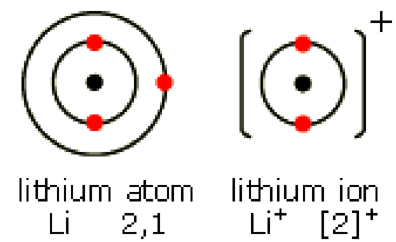
There are 6 electrons, i.e. 6 negative charges in carbon. At the same time, there are 6 protons, i.e. 6 positive charges.
The overall charge will be -6+6 = 0.

Structure of the ion

- An ion is formed when electrons are gained or lost by an atom, in order to gain a full outer shell.
- In a full outer shell, there would be 2 or 8 electrons. Atoms will tend to react with other atoms to fill their outer shell.
- Metal atoms lose electrons and form positive ions.
- Non-metal atoms gain electrons and form negative ions.

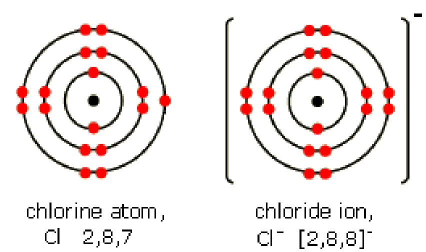
Example of positive ion – Lithium ion

Lithium has an atomic number of 3. This means it has 3 protons and 3 electrons. There are 2 electrons on the first shell and 1 electron on the second shell.
To achieve a full outer shell, it is easier for lithium to lose 1 electron than to gain 7 electrons onto the second shell.
After losing 1 electron, a lithium ion is formed.
It still has 3 protons (positive charges) while it only has 2 electrons (negative charges). Therefore, the overall charge is +3 -2 = +1.



Example of a negative ion – Chloride ion

Chlorine has an atomic number of 17. This means it has 17 protons and 17 electrons. There are 2 electrons on the first shell, 8 on the second and 7 on the outer shell. To achieve a full outer shell, chlorine tends to gain one 1 electron onto the outer shell.
After gaining an electron, a chlori<u>de</u> ion is formed. (Notice the change in spelling for a negative ion.)
The chloride ion still has 17 protons (positive charges) but now it has 18 electrons (negative charges). Therefore, the overall charge is +17-18 = -1.



Year 8 Biology Knowledge Organiser – Pg 5
Topic 2: Digestion

Key Terms	Definitions
symbiotic	Describes a relationship between two organisms, where both organisms benefit from each other
digestive system	The organ system that breaks down large food molecules into small molecules for absorption
absorption	Movement of chemicals from the digestive system into the blood
mechanical digestion	When large pieces of food are broken down into smaller ones (e.g. by chewing)
chemical digestion	When food molecules are broken down into small soluble chemicals, using enzymes
enzymes	Protein molecules that speed up chemical reactions, including digestion reactions

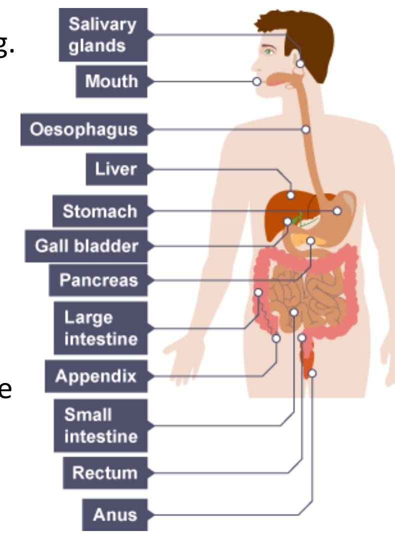
Bacteria in the digestive system

The human digestive system contains many symbiotic bacteria that play important roles. For example:

1. They can digest certain carbohydrates that our own enzymes cannot digest
2. They can reduce the chances of harmful bacteria multiplying and making us ill
3. They can produce some vitamins that we need, which we are unable to produce ourselves, such as vitamins K and B

The digestive system

Food is digested and absorbed in the **digestive system**, which is an organ system. You should be able to name all parts of the diagram below:



- The mouth has teeth that mechanically digest the food by chewing. It also has salivary glands that release enzymes to break the food down.
- The oesophagus is a muscular tube that pushes the food into the stomach
- The stomach churns the food up, while also adding acid and enzymes to break the food molecules down.
- In the small intestine, chemical digestion continues and the products are absorbed thorough the walls of the intestine into the bloodstream.
- The large intestine absorbs any remaining water from the food
- Finally the undigested food passes through the anus as faeces

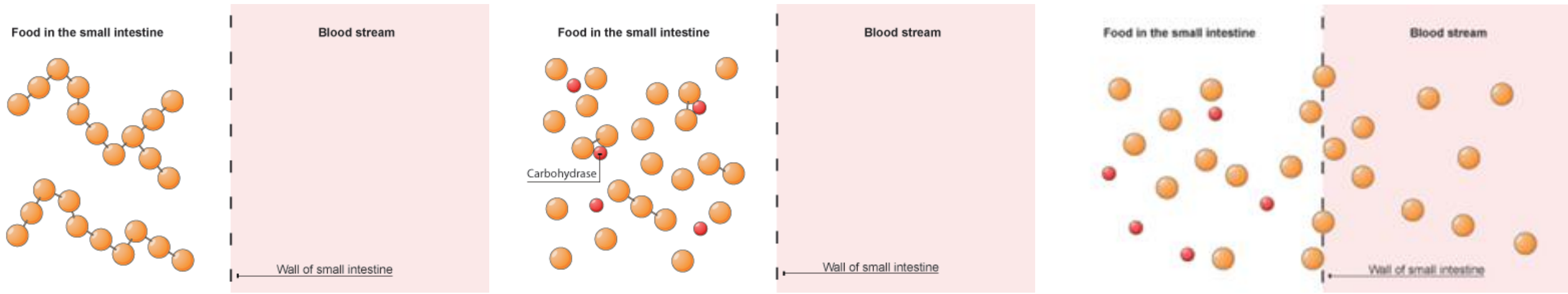
The liver

The liver produces bile which is then stored in the gall bladder. It is added to the food after it leaves the stomach to neutralise the stomach acid. It is important to neutralise the acid so it doesn't damage the small intestine, and so enzymes in the small intestine work properly.

Year 8 Biology Knowledge Organiser – Pg 6
Topic 2: Digestion

Enzymes

Enzymes break down larger food molecules into smaller ones, so that they can be absorbed through the walls of our small intestines into our blood stream. The small molecules are then transported around the body in the blood to be used by all the cells of the body.



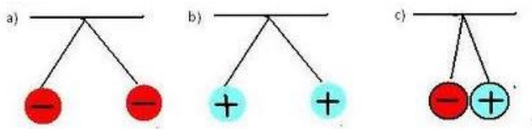
Proteins, carbohydrates and fats each have their own enzyme that breaks them down in smaller products, that can be absorbed.

Enzyme	Enzyme made in…..	Where it breaks food down….	What it breaks down…..
carbohydrase	Salivary glands, pancreas, small intestine	Mouth and small intestine	Starch into sugars
protease	Stomach, pancreas, small intestine	Stomach and small intestine	Protein into amino acids
lipase	Pancreas and small intestine	Small intestine	Lipids into fatty acids and glycerol

Year 8 Physics Knowledge Organiser – Pg 7
Topic 3: Electricity and Magnetism

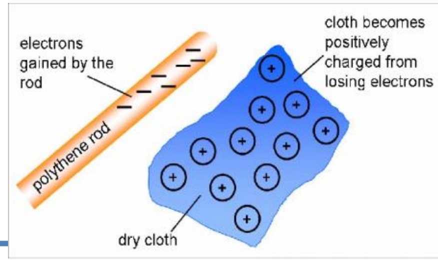
Electric charge and static electricity

- Electric charges are positive or negative. For example, electrons have a negative charge. Opposite charges attract each other (+ and -), whereas charges that are alike repel each other (+ and +, OR - and -). This is because there is a force of attraction between opposite charges, but a force of repulsion between like charges.



repulsion　　repulsion　　attraction

- If a material/object has a charge, but the charge is not moving anywhere, we call this static electricity. This will only happen if the material is an insulator. To get a positive or negative charge on an insulator, all you have to do is rub it with a different material (use the force of friction).
- For example: rubbing a balloon on your hair will produce a charge on the balloon and the opposite charge on your hair. This causes them to attract each other.
- When a static charge is produced like this, it is because electrons from one material are transferred to the other material (see diagram below).
- The material that <u>gains</u> electrons becomes more negative.
- The material that <u>loses</u> electrons becomes more positive.
- Any time there is a difference in electric charge between two points, there is a difference in electrical potential energy. We call this a potential difference.



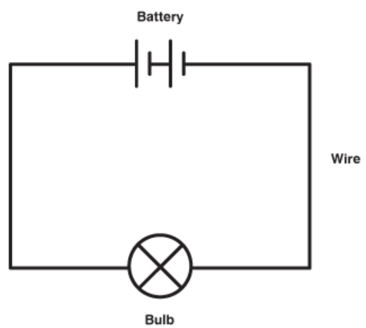
Key Terms	Definitions
charge	A positive or negative property of an object that causes the object to feel a force when there are other charges nearby
conductor	Material that can carry electric current e.g. metals
insulator	Material that does NOT conduct electric current
friction	The force caused when two materials move past each other
potential difference	p.d. for short, and also known as voltage. This is the measure of the difference in electrical potential energy between two points
static electricity	Describes electric charges that are **<u>not</u>** flowing
electrons	Tiny, negatively charged, particles, found in all atoms
resistance	The property of materials that determines how much current they will carry and how much work they do

Insulators	Conductors
Can become charged (+ or -), but DO NOT let the charges flow	DO let charges flow (e.g. electrons)
Examples: almost any non-metal materials, like rubber, fabrics, paper, plastics, wood	Examples: all metals, and graphite (in your pencil!)
CANNOT be used in a circuit	To make a circuit, you MUST use conductors, joined in a complete loop
Insulators have extremely HIGH resistance, which is why current can't flow through them	Conductors have LOW resistance, which is why they let current flow through them

Year 8 Physics Knowledge Organiser – Pg 8
Topic 3: Electricity and Magnetism

Charge, current and circuits

- Electrical conductors (like metals) contain charges that are able to flow. The rate (speed) of flow of the charged particles is the current. Current is measured in amps (A). Usually the flowing charged particles are electrons.
- Charges flowing around a loop is called a circuit.
- Three ingredients are needed in a circuit:
  1. Conductors connected in a loop for the current to flow through
  2. A source of potential difference, like a battery. This causes a difference in electric potential energy between each end of the circuit.
  3. Components (like lamps) with resistance.

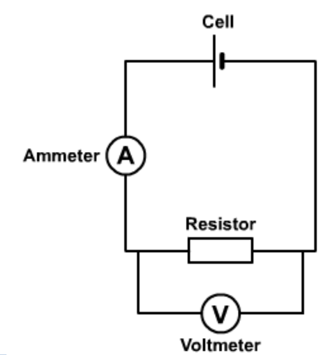


- The greater the resistance in a circuit, the lower the current in the circuit.
- The greater the resistance of a component, the more work it will do.

Key Terms	Definitions
circuit	A complete loop of conductors
current	The rate of flow of electric charge
potential difference	p.d. for short, and also known as voltage. This is the measure of the difference in electrical potential energy between two points
resistance	The property of materials that determines how much current they will carry and how much work they do
work	Transfer of energy from one store to another
component	A part of a circuit. See symbols below
series	Linking components one after another, making one loop
parallel	Linking components so they are in separate loops

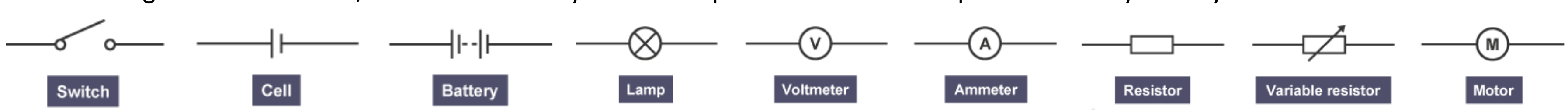
Measuring current and potential difference

- Current is measured with an ammeter. An ammeter is included in the circuit (in series with the other components).
- Potential difference (voltage) is measured with a voltmeter. Since voltmeters measure the difference in potential energy between two points, they must be added *across* the component whose potential difference you want to measure.



Circuit Symbols

When drawing an electric circuit, we use different symbols to represent different components. The symbols you need to memorise are:



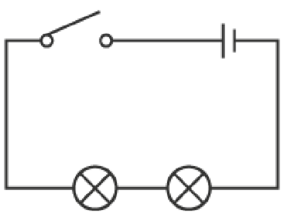
Year 8 Physics Knowledge Organiser – Pg 9
Topic 3: Electricity and Magnetism

Key Terms	Definitions
series	Linking components one after another, making one loop
parallel	Linking components so they are in separate loops

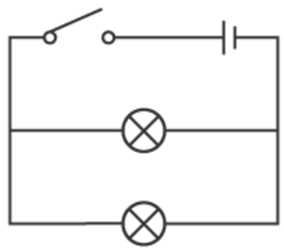
Equation	Meanings of terms in equation
$V = I R$	*V = potential difference (volts, V)* *I = current (amperes, A)* *R = resistance (ohms, Ω)*

Arranging Components in Circuits

Components (like bulbs/lamps) can be arranged in series with each other OR in parallel with each other.

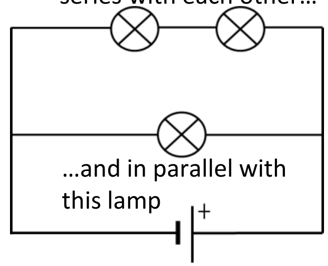


These two lamps are in series with each other



These two lamps are in parallel with each other

These two lamps are in series with each other…



Potential difference in series and parallel

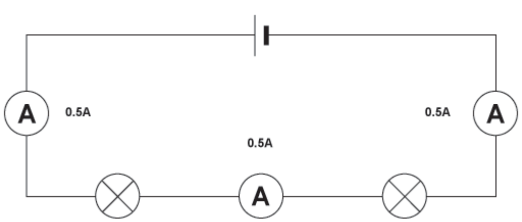
In a circuit with only one loop, so all components are in series, the potential difference from the supply is shared by all the components.

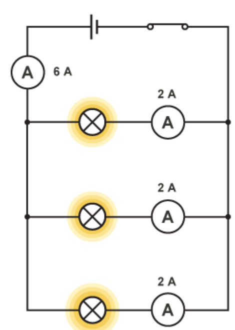
If a circuit includes components on different loops (in parallel), each loop receives ALL the potential difference from the supply. The parallel components don't have to share.

Current in series and parallel

In a circuit with only one loop, so all components are in series, the current is the same through every part of the circuit. In other words, the electrons flow at the same rate everywhere in the circuit. The diagram shows some example readings.

In different loops (in parallel), the current splits at the junctions in the circuit. The total current in all the separate loops adds up to the current before or after the split, as the diagram shows.





Resistance

Resistance, potential difference and current are linked in the equation *V = IR*. This is also known as Ohm's Law. This equation shows that:

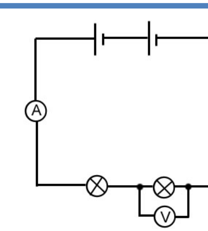
- If potential difference is kept constant… increasing resistance *decreases* current
- You could increase current EITHER by increasing potential difference OR decreasing resistance
- You can calculate the resistance of a component using *R = V/I* (worked example below)

If the reading on the ammeter is 0.2 A and the reading on the voltmeter is 5.5 V, what is the resistance of the lamp?

R = V/I

R = 5.5/0.2

R =27.5 Ω



Year 8 Physics Knowledge Organiser – Pg 10
Topic 3: Electricity and Magnetism

Key Terms	Definitions
permanent magnet	A magnet that always has its own magnetic field. Attracts magnetic materials, and can attract or repel other magnets.
electromagnet	A magnet created by the flow of electric current
magnetic field	The area around a magnet where a force acts on other magnets or on magnetic materials.
poles	The ends of a magnet. Named north and south, based on which way on Earth they'd point if left to spin.

Magnets and magnetic fields

Magnets have two poles, a north pole (N) and a south pole (S).

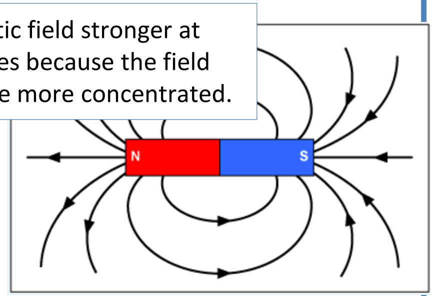
- opposite poles attract (N and S)
- like poles repel (N and N, OR S and S)

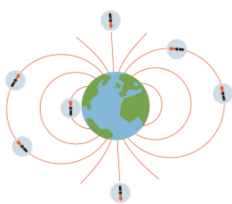
Magnets have magnetic fields (which are invisible). If a magnet or magnetic material enters the magnetic field of a magnet, it feels a force: either a force of attraction or a force of repulsion.

Although we cannot see magnetic fields, we can detect them and plot magnetic field lines on a diagram, as shown (they are really 3D, which is hard to show on the flat page). In the diagram, note that:

- field lines point from north to south pole
- field lines are more concentrated at the poles, therefore the magnetic field is strongest at the poles.

Magnetic field stronger at the poles because the field lines are more concentrated.

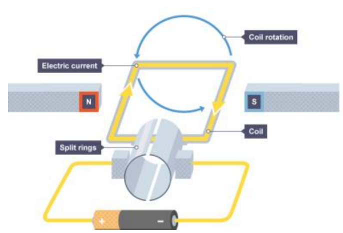




The Earth has a magnetic field because the core rotates. It acts like a giant bar magnet.

The motor effect: A simple electric motor can be built using a coil of wire that is free to rotate (spin) between two opposite magnetic poles, as the diagram shows.

1. When an electric current flows through the coil, the magnetic field around the coil and the magnetic field of the magnet produce forces of attraction and repulsion.
2. This causes the coil of wire to spin around.
3. This is called the motor effect.

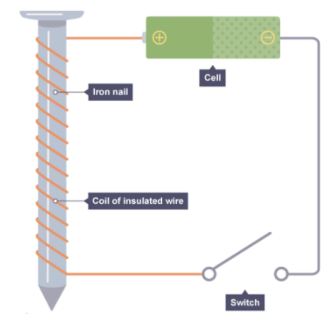


Electromagnets

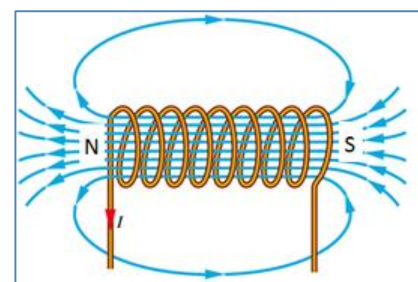
When an electric current flows through a wire, it creates a magnetic field around the wire. The wire can be used to make an electromagnet, by making the wire into a coil. It has a magnetic field just like a bar magnet (see diagram).

You can increase the strength of an electromagnet by doing three things:

1. Increase the number of turns on the coil
2. Increase the current
3. Add an iron core



A north pole, since another north pole brought to this end would be repelled.



Year 8 Biology Knowledge Organiser – Pg 11
Topic 4: Nutrition

Balanced diet

There are 7 food groups. A balanced diet will contain the correct proportions of all of these for the person's needs, *e.g. someone who does a lot of exercise will need a lot more carbohydrate than someone who does not.* The seven food groups are summarised below:

Food Group	Example	Function
protein	Fish, meat, dairy, pulses	For growth and repair.
fat	Butter, oils, nuts	To provide energy. Fat provides a long term store of energy. It also provides insulation for the body and is used to build cell membranes.
carbohydrate	Bread, pasta, sugar	To provide energy.
fibre	Vegetables, Bran	To help food move through the gut.
minerals	Dairy (calcium)	Required in small amounts to remain healthy. *For example calcium is crucial for healthy teeth and bones.*
vitamins	Oranges (vitamin C), Carrots (vitamin A)	Required in small amounts to remain healthy. *For example vitamin D is needed to absorb calcium.*
water	Water, fruit juice, milk	Needed to form the cytoplasm of the cells and other fluids.

Key Terms	Definitions
kilojoules (kJ)	A unit used to measure energy in foods
deficiency disease	A disease caused by the lack of a specific nutrient

Malnutrition
If a person has an unbalanced diet they are said to be malnourished. This can lead to people becoming overweight, underweight or having deficiency diseases.

Obesity
If a person eats too much food and does not do enough exercise they will gain weight. If someone becomes very overweight they are said to be obese. Obese people have a higher risk of certain diseases such as:
- Diabetes
- Heart disease
- Arthritis

Starvation
If a person does not eat enough food they will they will lose weight. In the extreme this can lead to starvation. Very underweight people are more at risk of having:
- A weakened immune system
- Fragile bones
- Fertility problems

Deficiency Diseases
Deficiency diseases develop when the body does not get enough of a certain nutrient.
- A lack of vitamin C can lead to scurvy which affects the gums.
- A lack of vitamin D can lead to rickets which affects the bones.

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Topic 4: Nutrition

Energy in Food

The energy in food is often measured in kJ. The amount of energy you need depends on different factors including:

1. Your age
2. Your gender
3. Your metabolic rate (rate of reactions within your cells)
4. Your lifestyle

Someone with a more active job, such as a builder, would most likely need more energy from their diet than someone with a less active job such as working in an office.

Labels on food packaging inform us about the energy and nutrients they contain and allow us to make informed choices about what we are eating.

Nutrition

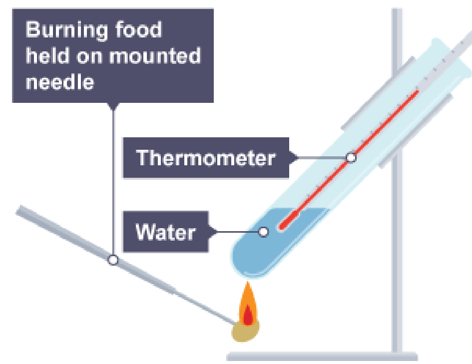
Typical values	100g contains	Each slice (typically 44g) contains	% RI*	RI* for an average adult
Energy	985kJ	435kJ		8400kJ
	235kcal	105kcal	5%	2000kcal
Fat	1.5g	0.7g	1%	70g
of which saturates	0.3g	0.1g	1%	20g
Carbohydrate	45.5g	20.0g		
of which sugars	3.8g	1.7g	2%	90g
Fibre	2.8g	1.2g		
Protein	7.7g	3.4g		
Salt	1.0g	0.4g	7%	6g

This pack contains 16 servings

*Reference intake of an average adult (8400kJ / 2000kcal)

Measuring Energy in Food

The energy in different foods can be measured using a simple experiment. If the food is set on fire, it can be used to heat up water and by measuring the temperature change, you should be able to see which foods cause the greatest rise in temperature and therefore stored the most energy.



Food Tests

There are some simple chemical tests that can be carried out, to see which food groups are present.

Iodine
If iodine is added to starch it will turn blue/black.
Sugar
If Benedict's solution is added to a sugar and heated it will form an orange precipitate (an orange solid).
Fat
To test for fat, mix the substance with a small amount of ethanol and distilled water. If a milky white emulsion appears, then fat is present.
Protein
If Biuret solution is added to protein it will turn purple.

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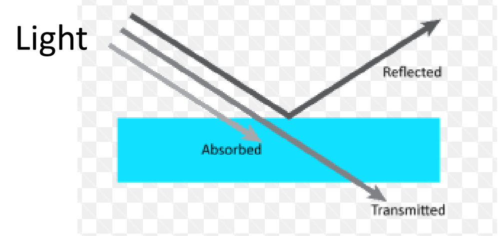
Topic 5: Light

Key Terms	Definitions
electromagnetic waves	A spectrum of waves including light, X-rays and microwaves
luminous	Describes something that emits light
transparent	Materials light completely travels through
translucent	Materials light can partially travel through
opaque	Materials light cannot travel through
emit	The giving out of light
vacuum	An area that contains no particles



General Properties of Light

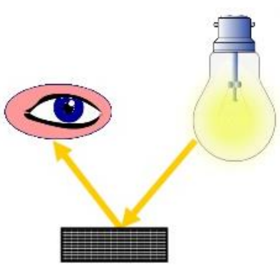
- Light is a type of an electromagnetic wave.
- Light can travel through gases, some liquids (e.g. water) and some solids (e.g. glass).
- Light travels fastest in a vacuum, slower in gases and liquids and slowest in solids, as solids are more dense.
- Light can interact with materials in three different ways:

1) Light is transmitted – it passes through
2) Light is absorbed – it does not pass through
3) Light is reflected – light bounces off the surface of the material

Transmission of Light Through Materials

- Something that gives out (emits) light is luminous e.g. a lamp or the sun

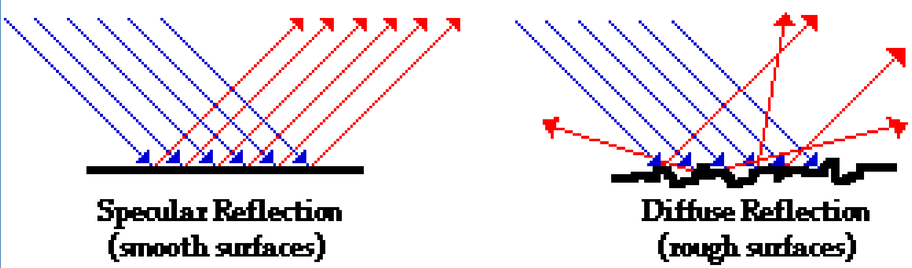
- Most objects you see are non–luminous. You see them because they reflect light into your eyes.



- Some materials completely transmit light, so light passes through and into your eye. These materials are transparent e.g. glass.
- Some materials only transmit some of the light, so you can't see through them clearly. These materials are translucent e.g. frosted glass
- Some materials do not transmit any light, so you can't see through them. These materials are opaque e.g. wood

Diffuse Scattering & Specular Reflection

- Reflection from a smooth surface is called specular reflection. This happens because the light rays reflect at the same angle.
- Reflection from a rough surface is called diffuse scattering. This happens because the light rays reflect at different angles.



- To form an image, the rays from each part of the object have to reflect off a surface at the same angle. This only happens with perfect reflectors e.g. mirrors. That is why you can see your reflection.

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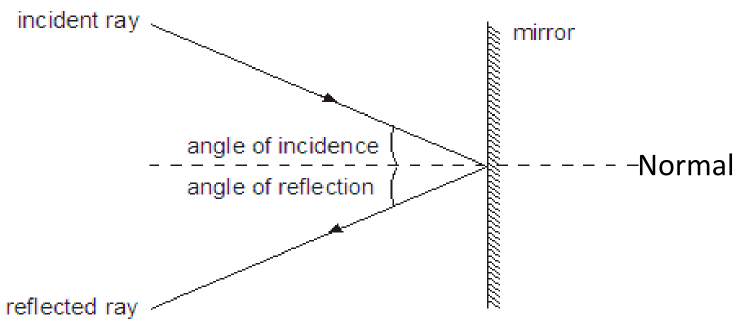
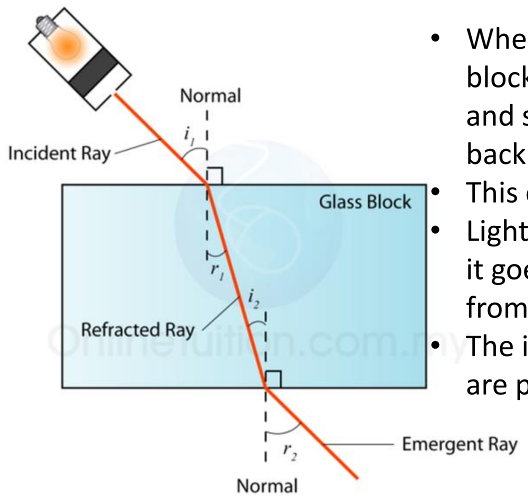
Topic 5: Light

Reflection

- Light needs to reflect off an object and into your eye for you to see it.
- When light is reflected from a mirror, the angle of incidence is equal to the angle of reflection. This is the law of reflection.



Refraction

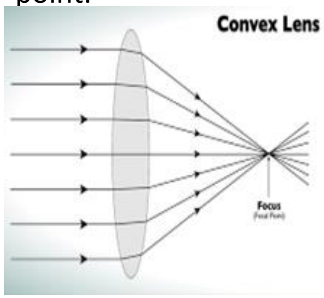


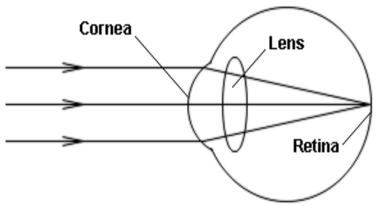
- When light travels through a glass block, it slows down when it goes in and speeds up again when it comes back out.
- This causes the light to refract (bend).
- Light bends towards the normal when it goes into glass and bends away from the normal when it comes out
- The incident ray and the emergent ray are parallel

Key Terms	Definitions
incident ray	The ray of light that hits the mirror or glass block from the ray box
reflected ray	The ray of light that reflects off the mirror
normal line	Imaginary line at 90 degrees to the mirror or glass block. Used to measure angles.
angle of reflection	The angle between the normal and reflected ray
angle of incidence	The angle between the normal and the incident ray
refraction	When light changes direction as it enters or leaves a different medium (material)
emergent ray	The ray of light that leaves the glass block
focus / focal point	The point near a lens where refracted light rays cross

Lenses

- There are two types of lenses: convex and concave
- A convex lens is a converging lens. Light is refracted as it goes into the lens and as it comes out, causing the light rays to converge (meet up on the other side). The eye contains a convex lens.
- The point where the light rays converge is called the focal point.





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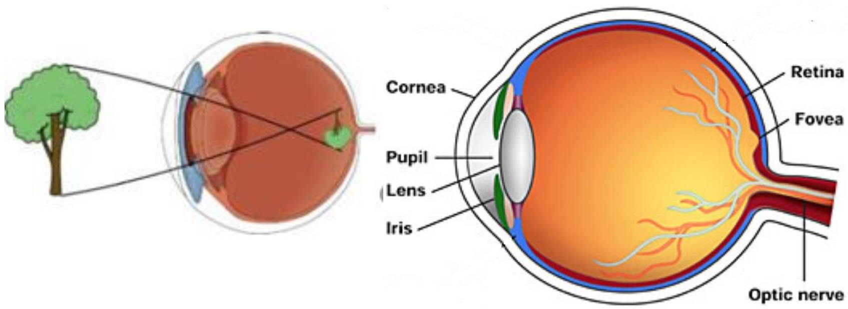
Topic 5: Light

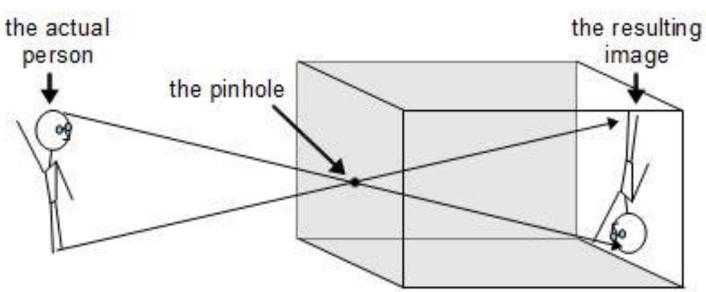
Key Terms	Definitions
photoreceptor cells	Cells which are sensitive to light found on the retina in the eye i.e. rods and cones
photo-sensitive	Sensitive to light

The Human Eye

- Your eye contains a convex lens
- When you look at an object, light travels from the object into your eye.
- The pupil is a hole that lets light in and the iris is a muscle that controls the size of the pupil
- The light is refracted by the cornea as it enters the eye and the lens, causing light rays to refract and converge as an image on the retina.
- The image is inverted (upside down – see diagram), but your brain corrects this so you see the image the right way up.



A Pinhole Camera



- A pinhole camera is a simple camera without a lens but with a tiny aperture called a pinhole.
- Light from a scene passes through the aperture and projects an inverted image on the opposite side of the box.
- The image is projected onto photosensitive paper on the back of the box.
- The aperture needs to be really small, otherwise too much light would enter and the image would be blurry.

Photosensitive materials in the eye and in cameras

- Both the retina in the eye and cameras contain photo-sensitive material.
- EYE: uses photoreceptors on the retina. Light hits these photoreceptors and chemical reactions take place to produce an electrical impulse. This impulse travels along the optic nerve to the brain, so you see.
- OLDER CAMERAS: use photosensitive paper. When light hits the film a chemical reaction takes place that changes the film so you can see an image.
- DIGITAL CAMERAS: use a grid of photosensitive pixels.

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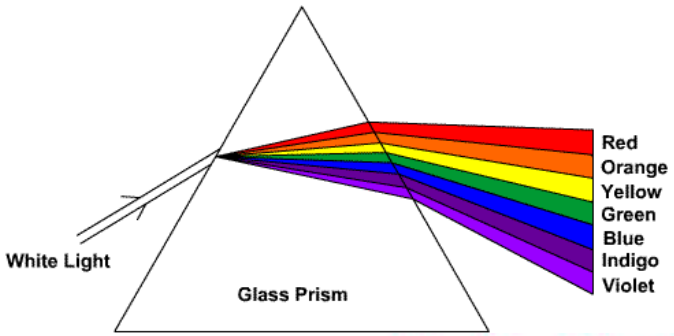
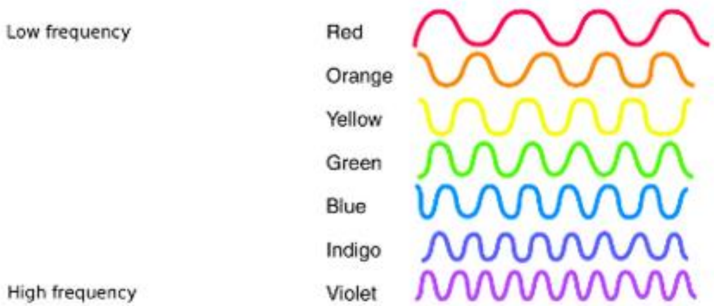
Topic 5: Light

Key Terms	Definitions
spectrum	The continuous range of seven colours in white light
filter	Removes colours from white light
prism	Pyramid shapes glass object used to disperse white light
dispersion	The separation of white light into colours according to frequency

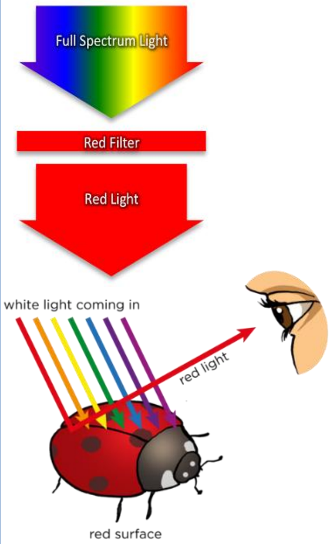
Dispersion of Light

- White light is made up of seven different colours, mixed together.
- You can use a prism to split white light into a spectrum. This is called dispersion.
- The spectrum of white light is continuous as there are no gaps between the colours.
- Dispersion happens because different colours of light are refracted by different amounts.
- Light with a higher frequency is refracted more than light with a lower frequency. Therefore violet is refracted the most as it has the highest frequency and red is refracted the least.

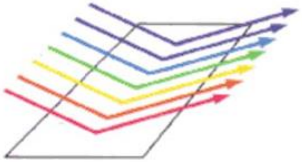




How We See Different Colours



- A filter only transmits certain colours of light, which changes the colour of the light on the other side e.g. a red filter transmits red light and absorbs all the others, so you see red
- Any coloured object reflects the colour that it is and absorbs the rest e.g. a blue object reflects blue light and absorbs all other colours, so you see blue
- Black objects absorb all colours
- White objects absorb no colours and reflect all the colours in white light.



- **Black – all colors absorbed, nothing reflected**
- **White – all colors reflected, nothing absorbed**

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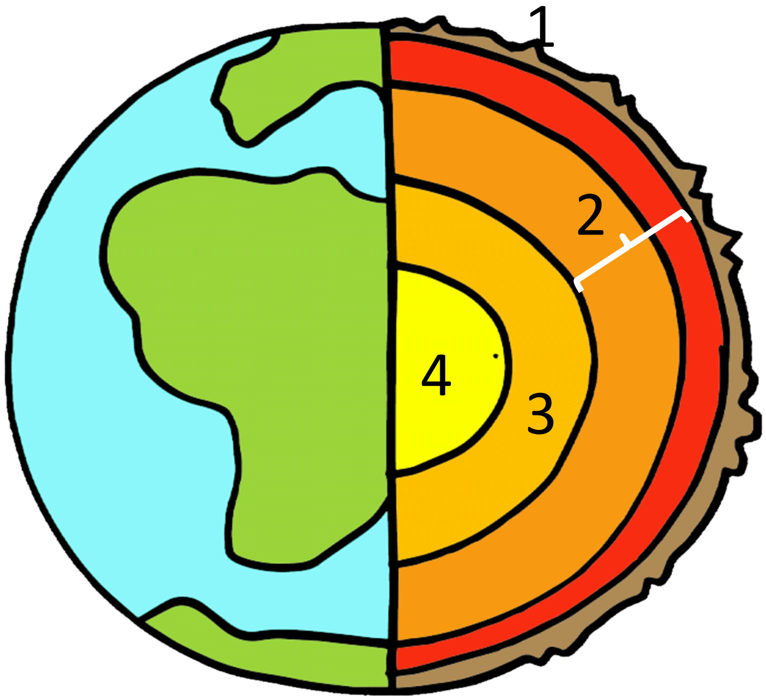
Topic 7: Geology

Composition and Structure of the Earth
The Earth has four layers, labelled on the diagram here:



1 – Crust: the outermost and thinnest layer of Earth's structure, which covers the surface of the Earth. It is rocky (the oceans sit on top of it) and we live on it.
2 – Mantle: the thick layer of solid rock below the crust. It is solid, but it is very hot and the rock can flow like a liquid.
3 – Outer core: the liquid part of the core. It is made from a molten mixture of iron and nickel. The liquid metal flows around, which produces Earth's magnetic field.
4 – Inner core: the centre of the Earth. It is also made from iron and nickel, but in the solid state due to the massive pressure there. This is the hottest part of the Earth's structure.

Key Terms	Definitions
igneous	A type of rock that is formed by the cooling of magma.
extrusive	Describes igneous rocks formed when magma cools rapidly above the surface.
intrusive	Describes igneous rocks formed when magma cools slowly below the surface.

Rocks
There are **three** main types of rock: igneous, sedimentary and metamorphic. The three are explored on this page and the next one.

1. <u>**Igneous rock**</u>
- Formed by cooling of magma.
- Igneous rocks have crystals in their structure.
- Rapid cooling of magma (e.g. after a volcanic eruption) forms <u>extrusive</u> igneous rock.
- Slow cooling of magma (under the Earth's surface) forms <u>intrusive</u> igneous rock.

	Extrusive	**Intrusive**
Magma cools	On surface	Underground
Speed of cooling	Rapid	Slow
Crystal size	Small	Large
Example	Basalt (used in construction)	Granite (also used in construction but can be polished e.g. kitchen counters)

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Topic 7: Geology

2. Sedimentary rock

- Formed by compression of layers of sediment at the bottom of the ocean.

Transport
↓
Deposition
↓
Sedimentation
↓
Compaction
↓
Cementation

- Once formed, sedimentary rock may be slowly moved to the Earth's surface by uplift, or remain underground where immense pressure and heat will turn it into metamorphic rock
- Limestone is an example of a sedimentary rock, which is used to manufacture glass and cement
- Sedimentary rocks have:
    - 1. Layers, because of the layers of sediment
    - 2. Fossils, because the sediment includes animal remains
    - 3. Rounded grains, because of weathering by the water

Key Terms	Definitions
sedimentary	A type of rock that is formed by the compression of many layers of sediment over time.
metamorphic	A type of rock that is formed when immense heat and pressure change the chemical properties of the minerals in other rocks.
transport	Movement of rock particles by rivers to the sea
deposition	The settling of rock particles on the sea floor
sedimentation	The build up of layers of sediment (including rock particles and dead sea life)
compaction	The process of putting pressure on layers of sediment as layers build up above them
cementation	The 'gluing' together of sediment to make sedimentary rock.
uplift	The pushing of rocks to the surface by the pressure of new rocks forming beneath them
magma	Melted rock; cools to form igneous rock

3. Metamorphic rock

- Formed when immense heat and pressure change the chemical properties of the minerals in other rock
- Properties depend on which rock was changed, and the conditions that caused the change.

e.g. Limestone becomes marble; Shale becomes slate

- If melted, metamorphic rock becomes magma, and if this magma cools, new igneous rocks form (as diagram shows to the left). This is a part of the rock cycle.

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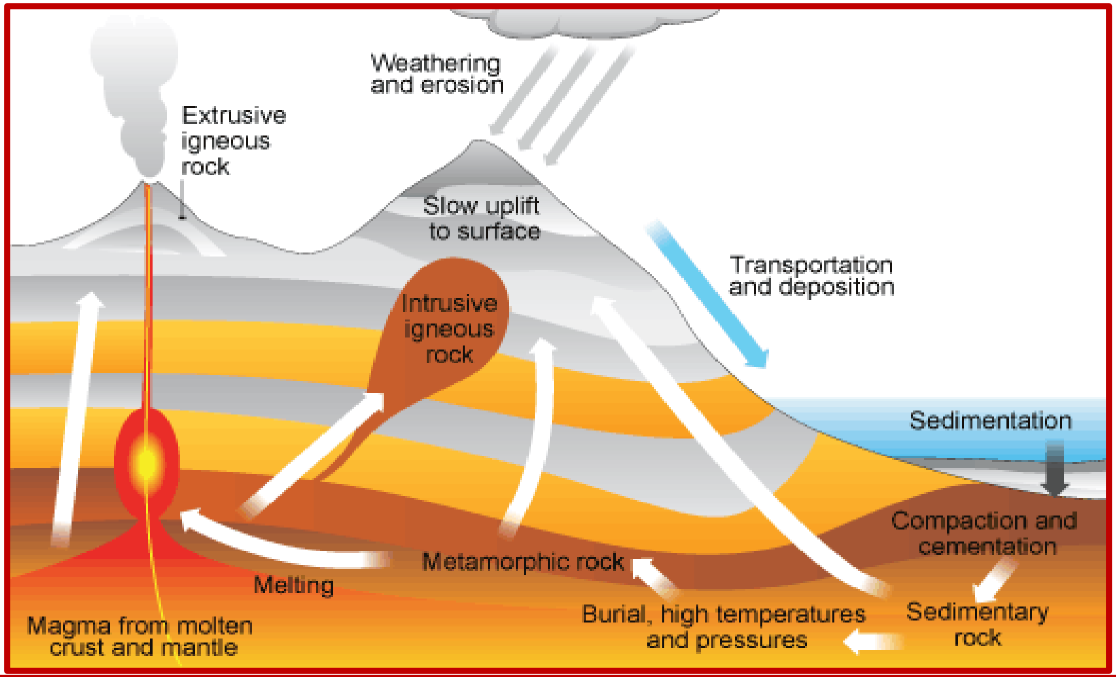
Topic 7: Geology

The Rock Cycle
This diagram below shows the rock cycle – how physical processes change rocks from being one type, to another. The key terms table gives descriptions of these processes.



How rocks change
Igneous or metamorphic rocks become sedimentary rocks through:
- Weathering, erosion, transportation, deposition, sedimentation, compaction, cementation

Sedimentary rocks become metamorphic rocks by:
- Burial (producing high pressure) and high temperatures

Metamorphic rocks become extrusive igneous rocks by:
- Melting to magma → eruption of volcano → rapid cooling above the surface

Metamorphic rocks become intrusive igneous rocks by:
- Melting to magma followed by slow cooling beneath the surface

Key Terms	Definitions
rock cycle	The constant changing of rocks from one type to another.
weathering	The breaking down of rock by natural processes: wind, ice and water, living organisms
erosion	The movement of that broken-down rock by natural processes: wind, ice, water and gravity (transportation is an example of erosion)
recycling	Treatment of resources so they may be used again
sustainable	Describes products and processes that don't excessively damage the environment

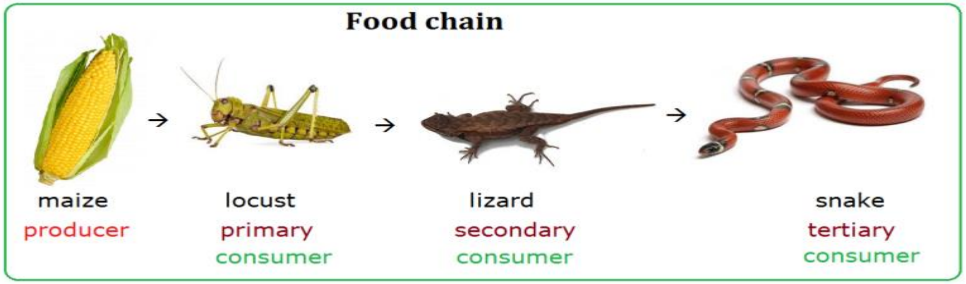
Resources and recycling
- The Earth's crust provides us with resources such as glass, plastic, paper and aluminium
- However, these resources are finite (they are not unlimited), which is why we recycle them

Resource	Made from	Recyclable?
Glass	Sand	Yes, but needs sorting
Plastic	Oil	Yes but needs sorting
Paper	Wood	Yes, but only a few times
Aluminium	Aluminium ore	Yes, if separated from other metals

Year 8 Biology Knowledge Organiser – Pg 23
Topic 8: Ecological relationships

Food Chains

All food chains start with a green plant (a producer), which don't need to eat because they make their own food (biomass) in photosynthesis. Arrows point to the eater and show the flow of energy in a food chain. Each position is called a trophic level. For example:



The first eater in a food chain is called the primary consumer and is usually a herbivore. The next organism is the secondary consumer and the next is the tertiary consumer. This is usually the top predator.

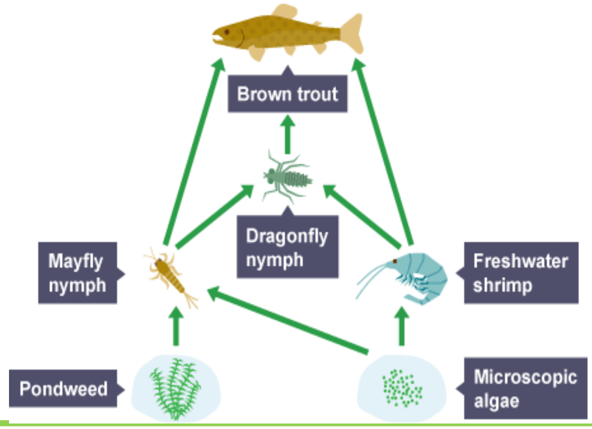
Food chains do not go on indefinitely as energy is lost at each stage of the food chain. Here's why:

- Energy moves through a food chain stored in biomass: the chemicals like carbohydrates, fats and proteins from which organisms' bodies are made.
- Plants make biomass in photosynthesis, and consumers eat biomass when they eat other organisms. However, not all the biomass is available for the next trophic level because:
- Not every individual at each trophic level gets eaten.
- All organisms respire so they can move, reproduce and keep warm. Respiration uses some biomass and transfers energy to the surroundings as heat
- Not all the biomass consumed can be digested: some is excreted (e.g. in faeces).

Key Terms	Definitions
producer	An organism that can produce its own food, through photosynthesis. Plants are producers.
biomass	The chemicals that build organisms' bodies.
herbivore	An animal that only eats plants
carnivore	An animal that eats other animals
omnivore	An animal that eats both plants and animals
primary consumer	The first eater in a food chain
secondary consumer	The second eater in a food chain
tertiary consumer	The third organism feeding in the food chain, usually the top predator
trophic level	Position in a food chain

Food chains show a simplistic view of who's eating who in an ecosystem. Organisms usually eat more than one food so food chains link together to make food webs. (Example below)

Removing an organism or adding an organism to a food web can have big implications on other organisms.



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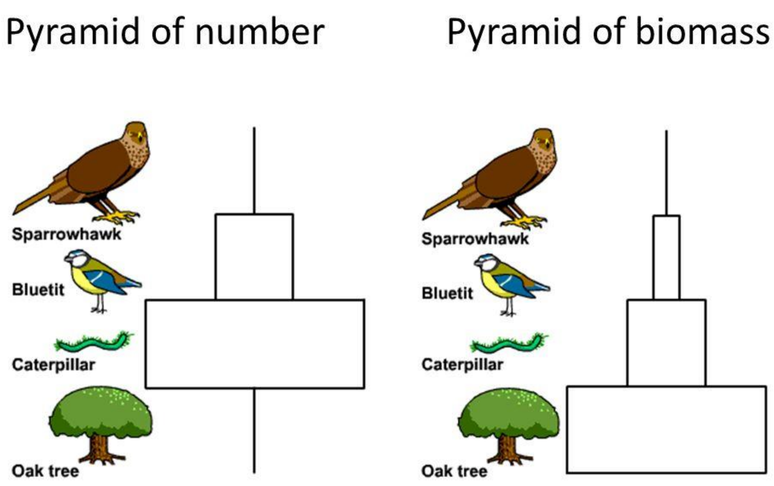
Topic 8: Ecological relationships

Pyramids of numbers and biomass

Pyramids of numbers show how many organisms are at each trophic level. The width of each box represents the number of organisms.

Pyramids of number can end up odd shapes (as in the diagram) when one producer is large in size e.g. one tree that supports lots of small organisms like caterpillars.

Pyramids of biomass show more accurately what is happening to the energy in a food chain than pyramids of number do, because the take into account the different *sizes* of the organisms in the food chain. Pyramids of biomass are always pyramid shaped because not all the biomass stored in a trophic level can ever be passed on to the next trophic level, for the reasons explained on the previous page.

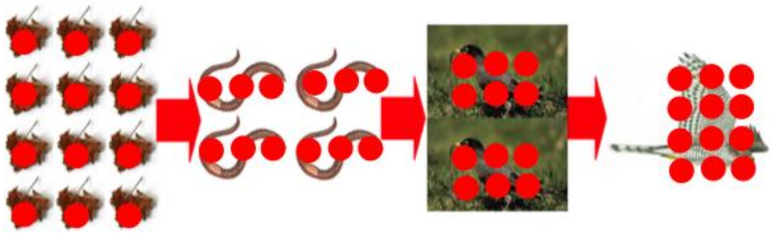


Key Terms	Function
pyramid of number	A diagram that shows the number of organisms at each trophic level in a food chain
pyramid of biomass	A diagram that shows the total biomass of all the organisms at each trophic level in a food chain
bioaccumulation	The build up of toxic substances in the food chain, affecting organisms at the top of food chains
ecosystem	A community of interacting organisms and their physical environment

Bioaccumulation

Some toxic substances, like pesticides, can be transferred through food chains.

Organisms near the bottom of the food chain absorb the toxic chemicals in small amounts. The concentration in these organisms is too low to cause significant harm. However, as these organisms cannot excrete these substances, when they are eaten by others higher up the food chain, the concentration gets higher and higher in each trophic level until it causes significant harm to consumers further up. DDT is an example of a pesticide that was used and built up in the food chain.



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Topic 8: Ecological relationships

Competition and adaptations

Organisms compete for resources like food, water, mates, space, light, and minerals.
There are two types of competition:

1. Interspecific competition is between individuals of different species
2. Intraspecific competition is between individuals of the same species.

Thanks to natural selection, all organisms have features known as adaptations to help them survive in their environment.

- All organisms have structural adaptations. These are physical characteristics that increase the chance of survival. e.g. camels carry very little body fat to avoid overheating, polar bears are white so they are camouflaged in the snow.
- Organisms also have behavioural adaptations, which are behavioural characteristics that increase the chance of survival. e.g. penguins huddle together to keep warm and brown bears hibernate


Key Terms	Definitions
camouflaged	When an organisms blends in to their environment
variation	Differences between organisms caused by genetics, their environment or both
natural selection	The process that explains evolution. Organisms better adapted to their environment tend to survive and produce more offspring.

Natural selection

Natural selection explains how organisms evolve over time. Charles Darwin came up with this theory in the 1800's. This is how natural selection takes place:

1. A population of organisms shows variation. Not all individuals of a species are the same.
2. The organisms within a species are in competition to survive, because there are only limited resources in the environment. The population cannot grow to infinite size!
3. Only the individuals of a species with the best adaptations to the environment get to survive. This is commonly known as survival of the fittest. The individuals not so well adapted die, often before they have a chance to reproduce.
4. The surviving individuals from the tough competition get to reproduce.
5. Genetic inheritance – their offspring inherit the genes from their parents, so the successful adaptation becomes more common in the next generation. This continues from generation to generation.

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Topic 8: Ecological relationships

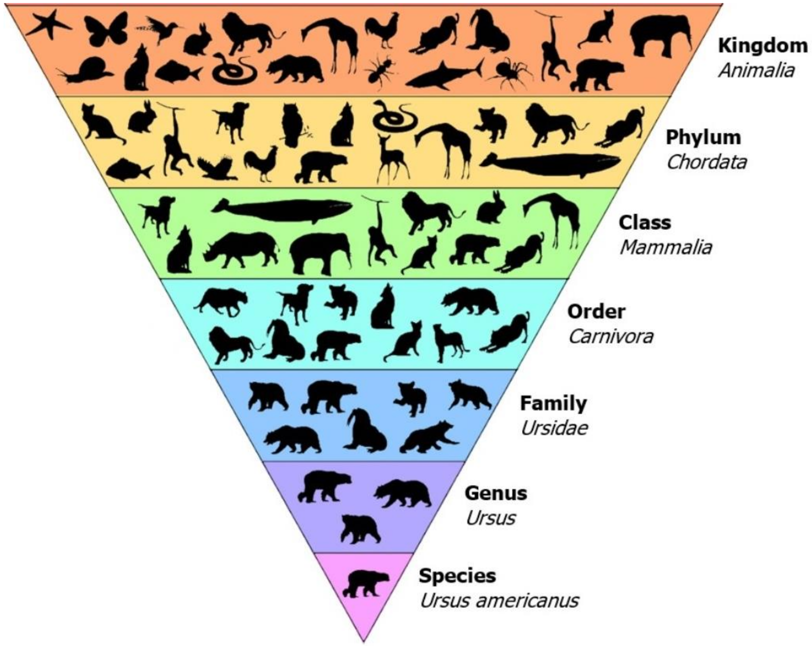
Classification

Classification is a way of sorting organisms into groups based on their similarities. One way of classifying organisms was described by Carl Linnaeus where he sorted organisms according to their structure and characteristics. He came up with a hierarchical system where the larger groups contain all the smaller groups below them. It is known as the Linnaean system and is shown opposite.

The largest group (which contains the most organisms) is Kingdom, followed by phylum, class, order, family, genus and species. A species is an individual type of organism, for example tigers or oak trees or great white sharks.

When giving the scientific Latin name of an organism, you give the genus and species. For example great white sharks are *Carcharodon carcharias*, humans are *Homo sapiens* and black bears are *Ursus americanus*. This is called the binomial system for naming species.

Key Terms	Definitions
classification	Sorting into groups. Traditional classification of organisms depends on their structure, but more modern methods involve analysing the biochemical similarities between organisms to classify them.
kingdom	The largest group in the Linnaean system. In this model, there are five kingdoms (animals, plants, fungi, bacteria and protists).



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Topic 9: Space

Gravitational forces

There is a gravitational force of attraction between all objects. However, this force only becomes noticeable when the objects are very large, like stars, planets and moons.
The size of the gravitational force between objects depend on two things:

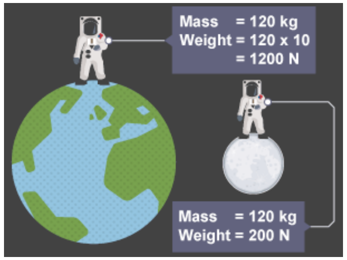
1. How large the objects are (their mass)
2. How far away the objects are from each other

For example all the planets are attracted to the Sun by a force of gravitational attraction, this keeps them in orbit and prevents them from flying off into space.
The Moon is also kept in orbit with the Earth due to gravitational attraction. As the Earth is much smaller than the Sun it can only keep the Moon in orbit as the Moon is close to the Earth.

Mass and Weight

Mass measures how much material there is (in kg), whereas weight measures the force acting on an object due to a gravitational field. Therefore the mass of an object never changes when its position changes.

The weight of an object depends on its mass AND the gravitational force that is acting on it, so weight can change with position. The diagram below shows the difference between mass and weight: note how the astronaut's mass remains constant but their weight is much smaller on the Moon.



Key Terms	Definitions
mass	Mass measures the amount of material in an object, and is measured in kilograms (kg).
weight	Weight is a force, caused by gravity acting on a mass. Since it is a force, it is measured in newtons.
gravitational field strength	The measure of the pull of gravity by an object on other objects.

Equation	Meanings of terms in equation
$W = m \times g$	*W = weight (newtons, N)* *m = mass (kilograms, kg)* *g = gravitational field strength (newtons per kilogram, N/kg) – on Earth, this is about 10 N/kg*

Weight on different planets

All objects have a gravitational field strength. This is a measure of how much force another object will experience thanks to its gravitational pull. For instance, the gravitational field strength on Earth is about 10 N/kg. This means that a force of 10 N acts on each kg of mass on Earth.
To calculate an object's weight you multiply the mass of the object by the gravitational field strength of the object it is near to (see the equation in the box above).
Below is an example of how much a 50kg mass would weigh on the surface of different objects in the solar system.

Planet	Weight of the 50 kg crate
Mercury	190 N
Venus	440 N
Earth	500 N
Mars	190 N
Jupiter	1245 N
Saturn	520 N
Uranus	520 N
Neptune	690 N
Pluto	14.5 N

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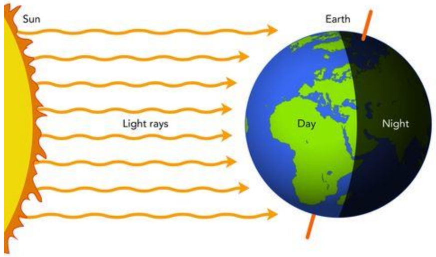
Topic 9: Space

Key Terms	Definitions
axis	The imaginary line in the Earth between North and South pole
day	The time taken for a planet to rotate once on its axis. On Earth this is 24 hours.
year	The time taken for Earth to completely orbit the Sun once: 365.25 days.

Day and Night, and Years

The Earth is constantly rotating on its axis. It rotates once every 24 hours, we call this a day. During this time, half of the Earth will be facing the Sun, this half of the Earth will be in daylight. It is night on the side not facing the Sun (see diagram to the right).

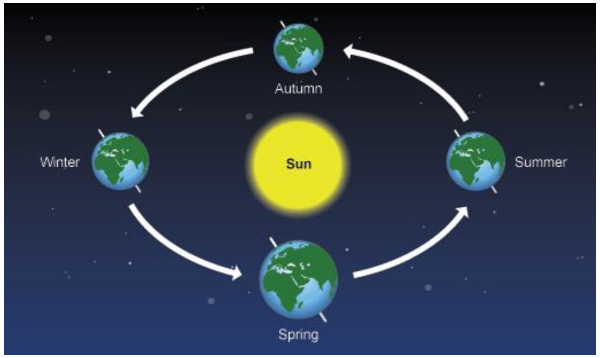
The Earth takes 365 ¼ days to orbit the Sun; we call this a year. The length of time to complete one orbit around the Sun is different for other planets. If the planet is further from the Sun the length of a year is longer, for example Jupiter takes 12 Earth years to orbit the Sun. This is because Jupiter has to travel much further in its orbit and it moves more slowly through space than Earth.

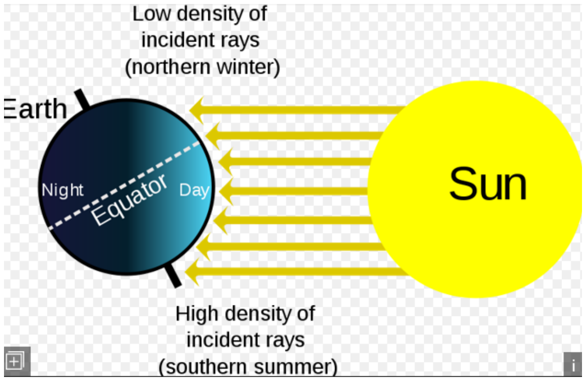


The seasons

The Earth's axis is tilted slightly. The angle of the tilt is approximately 23°. This means that different parts of the Earth are tilted towards or away from the Sun at different times of year.

- When the Northern Hemisphere is tilted towards the sun we get summer in the UK (longer days and warmer temperatures). It will be winter in the Southern Hemisphere.
- When the Northern Hemisphere is tilted away from the sun we get winter in the UK (shorter days and colder temperatures) It will be summer in the Southern Hemisphere.
- During the summer the Sun appears higher in the sky and the day is longer. During the winter, the Sun appears lower in the sky and the day is shorter.





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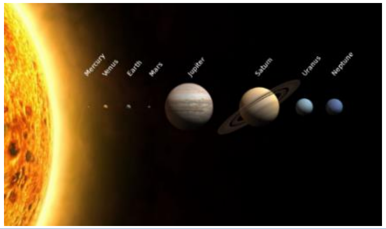
Topic 9: Space

Our solar system

Our solar system consists of:
- One star: the Sun (the Sun is about 333 000 times the mass of Earth);
- Eight planets, which orbit the Sun;
- Dwarf planets, such as Pluto, which also orbit the Sun;
- Natural satellites: the moons that orbit some of the planets;
- Other objects like asteroids and comets, which orbit the Sun.

Our solar system is a very small part of the Milky Way galaxy. Galaxies consist of millions of stars, held together by their gravitational attraction to one another.
The order of the objects in terms of size is:
asteroid → moon → planet → star → solar system → galaxy



Theories on the Solar System

Human's understanding of the Solar System has developed. During the time of the Roman Empire, the astronomer Ptolemy proposed the geocentric model. This placed the Earth at the centre of the Solar System, with other stars and planets orbiting the Earth while the Earth remained stationary.

In the 17th century Galileo invented the refracting telescope. With this he observed Jupiter and observed that Jupiter had moons. This showed that not everything orbited the Earth. This led to the development of the heliocentric model of the Solar System. In this model the Sun was stationary and at the centre, whilst the planets orbited the Sun. This was proposed by the scientist Copernicus.

The heliocentric model was an improvement but using modern telescopes we now know much more about the Universe and have discovered that our Solar System is also rotating as part of the Milky Way Galaxy.

Key Terms	Definitions
star	A huge (compared to Earth) sphere of superhot gas (plasma).
planet	A spherical object much smaller than a star, made of rocky or gaseous material, which orbits a star.
dwarf planet	Small planets that have not cleared their orbit of other material. Like planets, they orbit a star.
galaxy	A huge number of stars held together by their gravitational attraction to one another.
astronomical unit	Distance between the Earth and the Sun
the universe	All of space and time
light year	The distance travelled by light in one year.

Light Years

The distances between objects in the Universe are so large that we do not use units like kilometres; instead we use the light year.
A light year is a measure of distance equal to the distance light travels in one year (9400000000000 km).
The distance between the Sun and our next nearest star, Alpha Proxima, is 4.22 light years.
The distance between the Milky and our nearest other galaxy Andromeda is 2.5 million light years.
In our Solar System, the Astronomical Unit (AU) is often used as a unit of measurement. 1 AU is the distance from the Earth to the Sun or 149597870 km. The distance between Mars and the Sun is approximately 1.52 astronomical units.

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Topic 10: Atmosphere

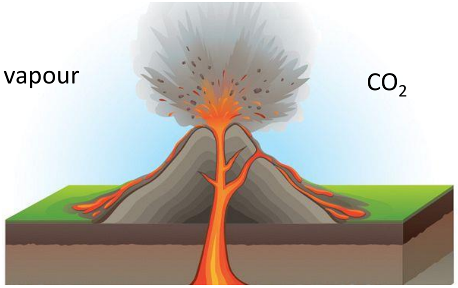
Key Terms	Definitions
atmosphere	A layer of gases surrounding a planet
photosynthesis	A chemical process that uses energy from light to produce glucose
ozone layer	A layer of the Earth's atmosphere that absorbs some harmful radiation from the sun

Evolution of the Earth's atmosphere

In the 4.5 billion years since the Earth formed, its atmosphere has changed considerably. This has happened in three main stages:

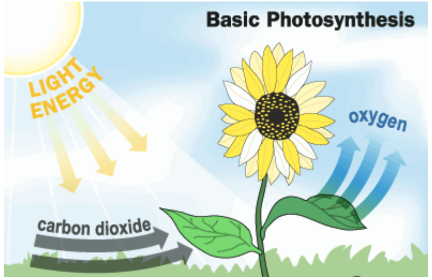
Stage 1 – Volcanoes

The Earth's surface was originally molten before it cooled and a thin crust formed. Volcanoes were continually erupting and the atmosphere was produced from the gases they emitted. The atmosphere was made mostly of carbon dioxide with little oxygen. There was also water vapour, ammonia and methane. As the Earth cooled the water vapour condensed to form the oceans.



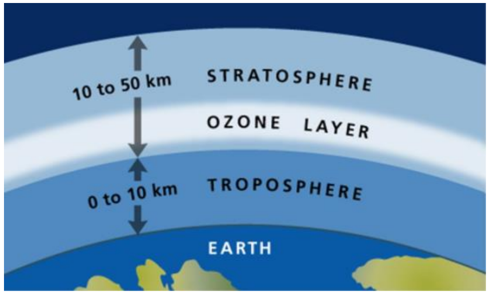
Stage 2 – Green plants

Green plants and algae evolved and were able to survive in the carbon dioxide rich atmosphere. They absorbed some of the carbon dioxide and released oxygen during photosynthesis. A lot of the carbon dioxide dissolved into the newly formed oceans and levels of the gas began to fall.



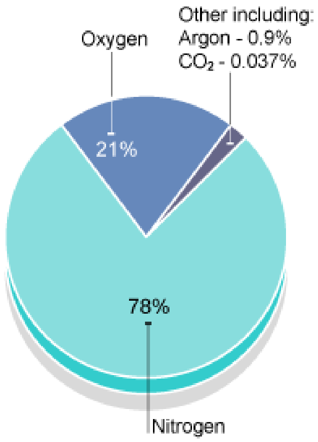
Stage 3 – Complex animals

The oxygen released during photosynthesis started to build up in the atmosphere and allowed more complex organisms to evolve. The build up of oxygen also created the ozone (O_3) layer which blocked the harmful rays from the sun reaching the planet leading to even more complex life forms developing. Carbon dioxide now makes up less than half a percent of the Earth's atmosphere.



Atmospheric composition

The Earth's atmosphere has remained much the same for the past 200 million years. The pie chart shows the proportions of the main gases in the atmosphere today.



Year 8 Chemistry Knowledge Organiser – Pg 30
Topic 10: Atmosphere

Key Terms	Definitions
carbon cycle	A series of processes that moves carbon through organisms, the Earth and the atmosphere
respiration	A chemical process that releases energy from food
global warming	The gradual increase in global temperatures due to the enhanced greenhouse effect

The Carbon Cycle

All cells - whether animal, plant or bacteria - contain carbon, because they all contain proteins, fats and carbohydrates.

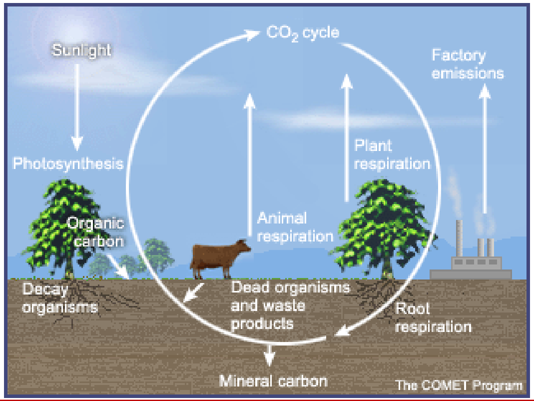
Carbon is passed from the atmosphere, as carbon dioxide, to living things, passed from one organism to the next in complex molecules, and returned to the atmosphere as carbon dioxide again. This is the carbon cycle. It involves:

- Removing carbon dioxide from the atmosphere

  Green plants remove carbon dioxide from the atmosphere in photosynthesis. The carbon becomes part of complex molecules such as proteins, fats and carbohydrates in the plants.
- Returning carbon dioxide to the atmosphere

  Organisms return carbon dioxide to the atmosphere in respiration. It is not just animals that respire. Plants and microorganisms do, too.
- Passing carbon from one organism to the next

  When an animal eats a plant, carbon from the plant becomes part of the fats and proteins in the animal. Microorganisms and some animals feed on waste material from animals, and the remains of dead animals and plants. The carbon then becomes part of these microorganisms and detritus feeders.

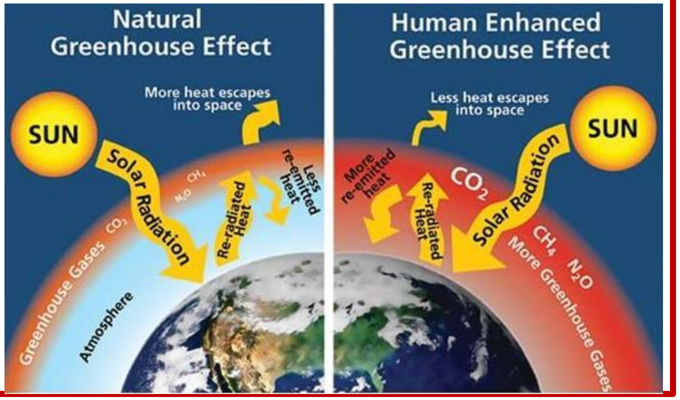


The greenhouse effect

The natural greenhouse effect is when gases in the Earth's atmosphere trap radiation from the sun and heat up the planet. Without the greenhouse effect the Earth would be too cold for us to survive on it. The gases involved are called greenhouse gases and include carbon dioxide, methane and water vapour.

The enhanced greenhouse effect and global warming

The extra greenhouse gases released by human activity lead to the enhanced greenhouse effect. More heat is trapped by the atmosphere, causing the planet to become warmer than it would be naturally. The increase in global temperature this causes is called global warming, which can cause changes to animals' habitats, sea levels rising, and ice melting (e.g. glaciers and ice caps).



The Climate Change Debate

Despite evidence, there are those who believe that climate change and global warming are:

1. Not real
2. Not as important as other problems facing the world's population
3. Not anthropogenic (caused by humans)

A dangerous position

- These views are dangerous because countries might stop helping to combat climate change, e.g. the USA withdrew from the Paris Climate Agreement

Year 8 Biology Knowledge Organiser – Pg 31
Topic 11: Conservation

Populations of a Species Change over Time

Populations change by natural selection, like this:

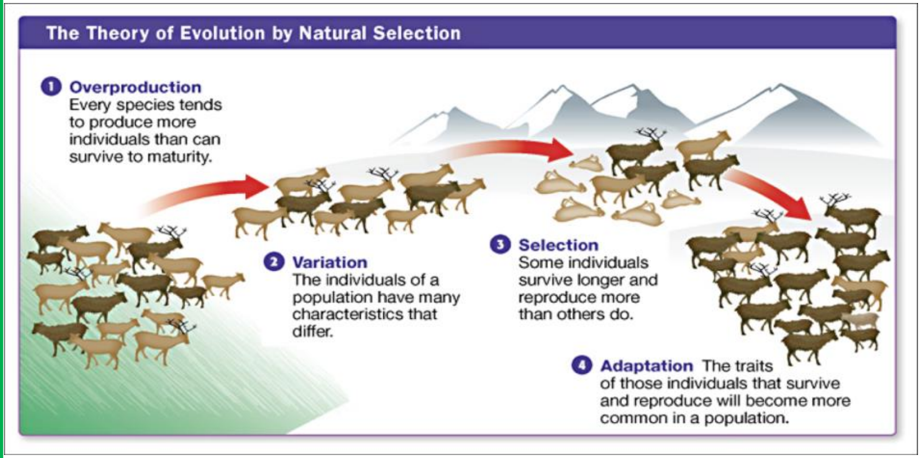
1. A population of organisms shows variation. Not all individuals of a species are the same.
2. The organisms within a species are in competition to survive, because there are only limited resources in the environment. The population cannot grow to infinite size!
3. Only the individuals of a species with the best adaptations to the environment get to survive. This is commonly known as survival of the fittest. The individuals not so well adapted die, often before they have a chance to reproduce.
4. The surviving individuals from the tough competition get to reproduce.
5. Genetic inheritance – their offspring inherit the genes from their parents, so the successful adaptation becomes more common in the next generation. This continues from generation to generation.

When the environment changes, the adaptations that help survival might be different. This can cause adaptations that once helped survival to become less useful, so individuals with them can die. These changes could be:

- climate change;
- natural disaster like an asteroid striking Earth;
- new diseases in the environment;
- a new predator in the environment;
- new competing species in the environment.

If a large change to conditions in the environment happens, it could be that NO individuals have suitable adaptations for survival. In this case, all the individuals can die: this is called extinction.

Key Terms	Definitions
species	One **type** of living organism
population	All the individuals of a species in an area
individual	One of a species (e.g. one lion, one beech tree)
adaptation	A feature of an organism that allows it to survive in its environment. Adaptations are the result of natural selection.
competition	The battle for survival in nature: individuals in a population compete for the limited resources (e.g. food) available.
natural selection	The natural process in which useful adaptations keep individuals alive to reproduce, and adaptations that don't help survival are filtered out. This is how evolution happens.
extinction	The complete destruction of all individuals of a species



Year 8 Biology Knowledge Organiser – Pg 32
Topic 11: Conservation

Key Terms	Definitions
endangered	Describes a species at risk of becoming extinct
reproduction	Making offspring (babies).
ecosystem	A group of populations of different species and their environment, linked by feeding relationships
biodiversity	A measure of how many different species of organism live on Earth, or in a certain ecosystem. High biodiversity means there are many different species present.
conserve	Keep an environment as it is.
gene bank	A store of genetic material in case the organisms die out.

Maintaining Biodiversity

High biodiversity is very important for keeping ecosystems going. An ecosystem with only one species won't last long. For humans, maintaining (keeping) biodiversity is important for a number of reasons:

1. All life in ecosystems and across the Earth is connected. Extinction of one species can cause the ecosystem to become unbalanced.
2. Humans use plants as a resource for new medicines.
3. Humans have rather a lot of control over nature, so we are responsible for looking after it.
4. Nature is beautiful and great to experience – we should look after it for future generations of people.

Two ways to maintain biodiversity:

1. Conserve the environment to protect ecosystems.
2. Conserve the genetic material of organisms that might be endangered using a gene bank.

Gene Banks

Scientists worried that species might become extinct can preserve them for the future using a gene bank. There are different types of gene bank:

1. Frozen seeds of plants that could be used in the future
2. Plant tissue bank – where small parts of plants are kept alive in containers of nutrients
3. Frozen sperm cells and egg cells from animals, or pollen and ova from plants, that can be used to produce offspring in the future
4. A field gene bank: land is used to grow many species of plants and keep them alive for the future.