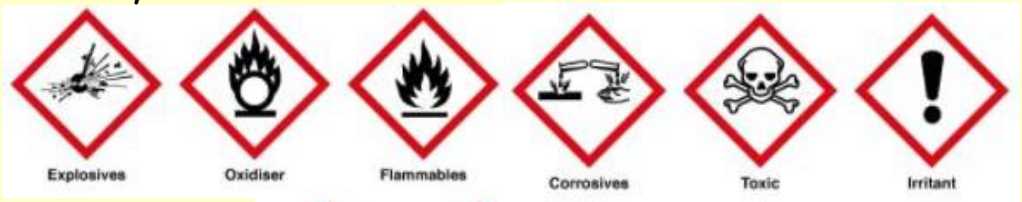
Year 7 Introduction

Key vocabulary

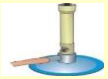
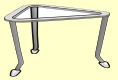
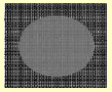
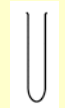
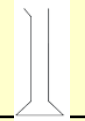
Control Measure	An action taken to remove the hazard or reduce exposure
Control Variable	A factor that remains the same in an investigation
Corrosive	A substance that can burn you skin or eyes
Dependent Variable	What you measure or observe in an investigation
Hazard	A situation that presents a threat to people
Hypothesis	An explanation that you can test which includes a reason
Independent Variable	The factor you change in an investigation
Investigation	An experiment or set of experiment designed to answer a scientific question
Irritant	A substance that makes your skin itch
Microscope	An optical instrument used to magnify objects
Risk	How likely something is to be harmful
Risk Assessment	A description of how you will make it less likely that people will be injured or equipment damaged
Variable	A factor that can be changed, measured or controlled

Hazard symbols



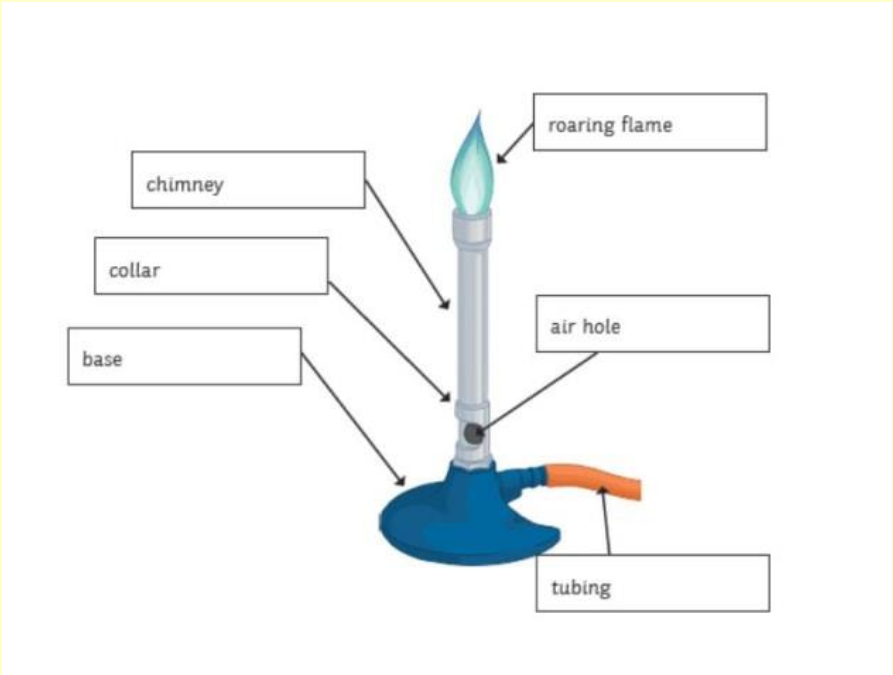


Common Equipment

Bunsen burner		Used to heat substances	heat
Tripod		Holds containers over the Bunsen burner	
Gauze		Prevents containers falling through the tripod	xxxxxxx
Beaker		To hold and mix liquids and solids	
Heatproof mat		To protect the table for heat and chemicals	_____
Test tube		Holds small volumes of chemicals	
Measuring cylinder		To measure volumes of liquid	
Thermometer		To measure the temperature	
Scales		To measure the mass of substances	No diagram
Funnel		Holds filter paper when separating liquids and solids	

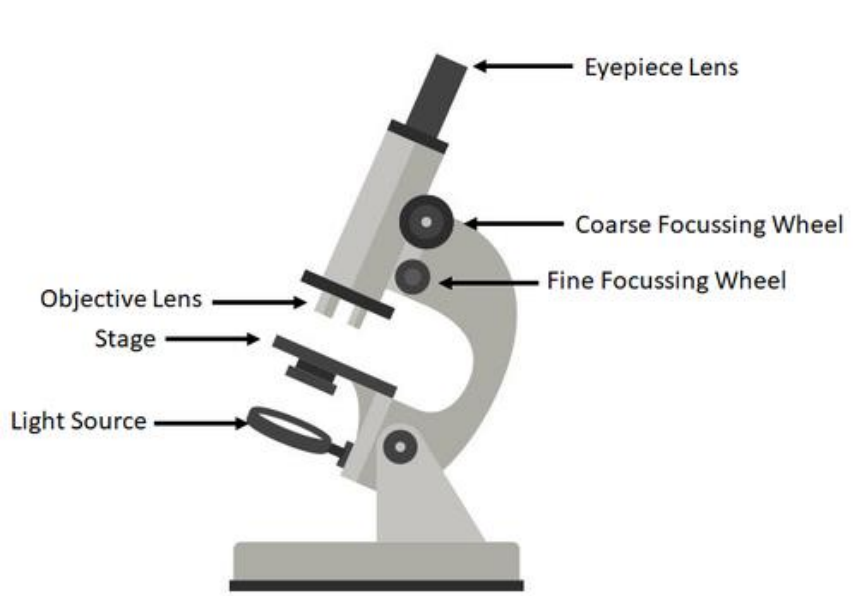
Year 7 Introduction

Bunsen Burners



Air hole	Hole at the bottom of the Bunsen which can be opened or closed
Base	The bottom of the Bunsen, the safest place to hold a Bunsen
Roaring flame	A higher energy flame, created by opening the air hole
Safety flame	A lower energy flame, created by closing the air hole. This flame should be used when lighting a Bunsen

Microscopes



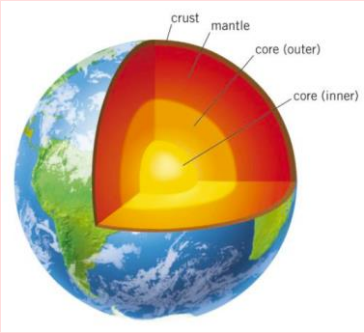
Coarse Focussing Wheel	When turned, this will move the specimen closer to the objective lens by moving the stage
Eyepiece Lens	This is where you look through to see the specimen
Fine Focussing Wheel	When turned, this will sharpen the quality of the image
Magnification	To make an image larger
Objective Lens	Can be twisted to change magnification
Stage	Where the specimen is placed

Year 7 Earth

Key vocabulary

Ceramic	A compound such as a metal silicate or oxide that is hard, strong and has a high melting point
Core	The innermost layer of the Earth, which extends about halfway from the centre of the Earth to the surface
Crust	The rocky outer layer of the Earth
Erosion	The breaking of a rock into sediments and their movement away from the original rock
Igneous Rock	Formed when liquid rock cools and freezes. Their minerals are arranged in crystals
Magma	Liquid rock below the Earth's surface
Mantle	The layer of Earth that is below the crust. It is solid bur can flow very slowly
Metamorphic Rock	Formed from existing rock exposed to hear and/or pressure over a long time
Rock Cycle	Sequence of processes where rocks change from one type to another over millions of years
Sediment	Pieces of rock that have broken away from their original rock
Sedimentary Rock	Formed from layers of sediment which can contain fossils
Strata	Layers in sedimentary rock
Transport	Movement of sediments, far from their original rock
Weathering	The breaking down of rock into smaller pieces by physical, chemical or biological processes

Structure of the Earth

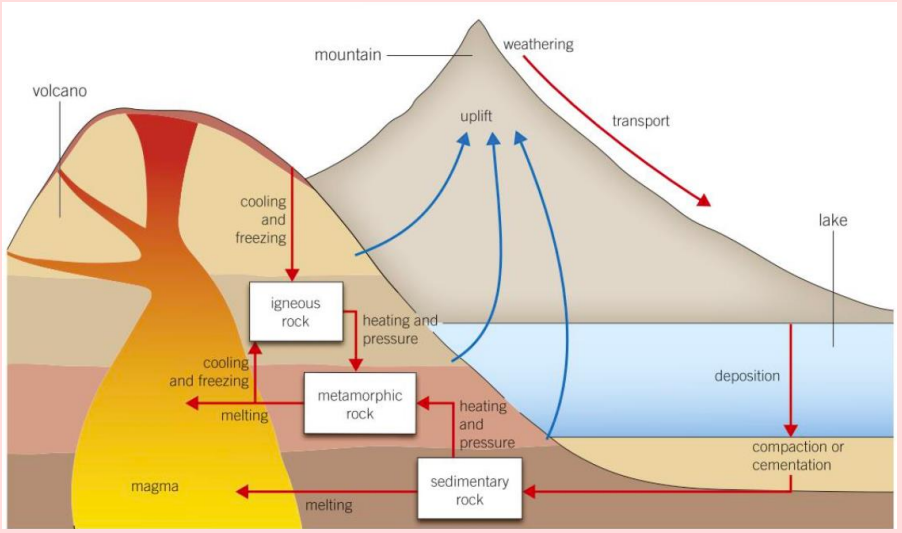


Crystals in Igneous Rock

If igneous rock forms at <u>high temperatures</u> the crystals will form <u>quickly</u>. This leads to <u>small crystals</u> being formed

If igneous rock forms at <u>low temperatures</u> the crystals will form <u>slowly</u>. This leads to <u>large crystals</u> being formed.

Rock Cycle



Types of Weathering

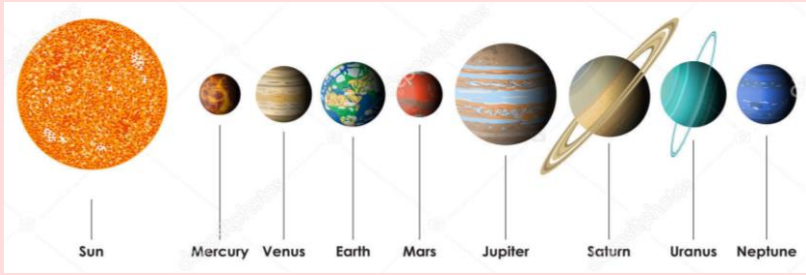
- <u>Chemical</u>- Caused by acid rain reacting with chemicals in the rock
- <u>Physical</u>- Caused by water freezing and expanding inside cracks in the rock
- <u>Biological</u>- when plants and animals break up rocks

Year 7 Earth

Key vocabulary

Artificial Satellite	A man-made spacecraft that orbits a planet
Asteroid	Lump of rick orbiting the Sun. Left over from when the Solar system formed
Axis	The imaginary line the Earth spins around
Day	The time it takes for a planet to make one full spin on its axis
Earth	A rocky inner planet, third from the Sun in the Solar System
Exoplanet	Planet that orbits a star outside our Solar System
Galaxy	Collection of stars held together by gravity. Our galaxy is the Milky Way
Geocentric Model	A model of the Solar System with the Earth in the centre
Gravity	A non-contact force that acts between two masses
Heliocentric Model	A model of the Solar System with the Sun at the centre
Light Year	The distance light travels in a year. Over 9 million, million kilometres
Milky Way	The galaxy containing out Sun, Solar System and billions of other stars and planets
Moon	A rocky body orbiting a planet. These are natural satellites
Orbit	Path taken by one object moving around a larger object
Planet	Any large body that orbits a star in a solar system
Solar System	The Sun and the planets and other bodies in orbit around it
Star	Bodies that give out light and that may have Solar Systems
Sun	The Star at the centre of our Solar System
Universe	Everything that exists
Year	The length of time it takes for a planet to orbit the Sun

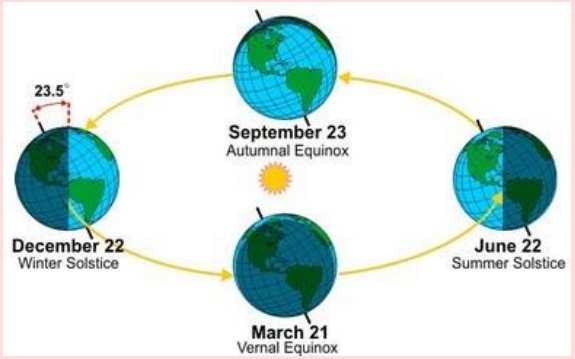
The Solar System



Seasons

The Earth is tilted on its axis.

In the <u>winter</u> the Earth is <u>angled away</u> from the Sun so the energy is <u>more spread out</u>. This leads to <u>colder</u> weather.



In the <u>summer</u> the Earth is <u>angled towards</u> from the Sun so the energy is <u>less spread out</u>. This leads to <u>warmer</u> weather

Changing Ideas

People used to believe that the Earth was in the center of the Solar System. This is called the geocentric model.

When telescopes were developed scientists gained more evidence so they changed the model to the heliocentric model with the Sun in the centre

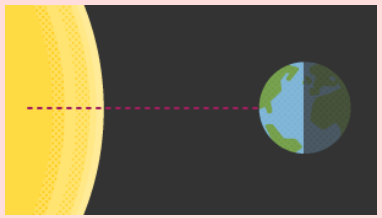
Day and Night

The Earth spins on its axis.

The Sun rises in the East and sets in the West

When we face the Sun it is day.

When we face away it is night.



Year 7 Forces

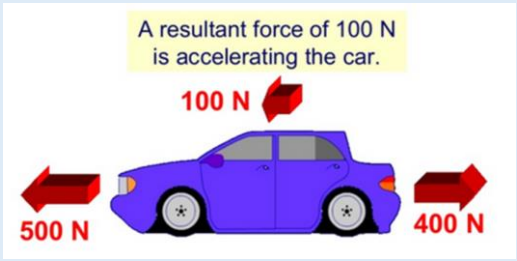
Key vocabulary

Air resistance	The force on an object moving through air that causes it to slow down
Balanced forces	Forces acting on an object that are the same size but in opposite directions
Contact force	Force that acts by direct contact. E.g. friction
Driving force	The force that is pushing or pulling something
Equilibrium	State of an object where all the forces are balanced
Friction	Force opposing motion which is caused by the interaction of surfaces moving over one another
Gravitational field strength	The force from gravity on 1kg. Measured in N/kg
Gravity	A non-contact force that acts between two masses
Kilogram	A unit of mass
Mass	The amount of stuff in an object. Measured in kg
Newton	A unit for measuring force
Newtonmeter	A piece of equipment used to measure the size of a force
Non-contact force	Force that acts without direct contact. E.g. magnetism
Resultant force	Single force that can replace all the forces acting on an object and have the same effect
Unbalanced forces	Opposing forces on an object that are unequal
Weight	The force of gravity due to the Earth (or other planet) on an object. Measured in Newtons

Resultant Forces

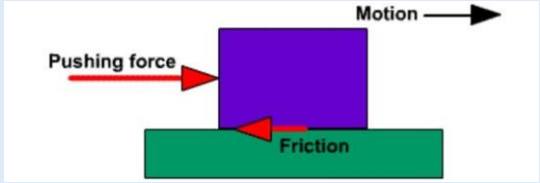
The resultant force is the overall force acting on an object

- When two forces act in the same direction you add them together
- When forces act in opposite directions you subtract



Friction

A force opposing motion when surfaces move over each other.



Mass and Weight

Mass	Weight
The amount of matter in an object	The force of an object due to gravity
Measured in kg	Measured in N
Is the same everywhere in the Universe	Changes depending on gravitational field strength

Weight, mass and gravity are linked by the following equation:

Weight = mass x gravitational field strength

Year 7 Forces

Key vocabulary

Acceleration	How quickly speed increases or decreases
Average Speed	The overall distance travelled divided by the overall time for the journey
Distance time graph	A graph that shows how far an object moves each second
Metres per second	A unit for speed
Speed	How much distance in covered in a given time

Calculating Speed

Speed, distance and time are linked by the following equations:

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Distance} = \text{Speed} \times \text{Time}$$

$$\text{Time Taken} = \frac{\text{Distance}}{\text{Speed}}$$

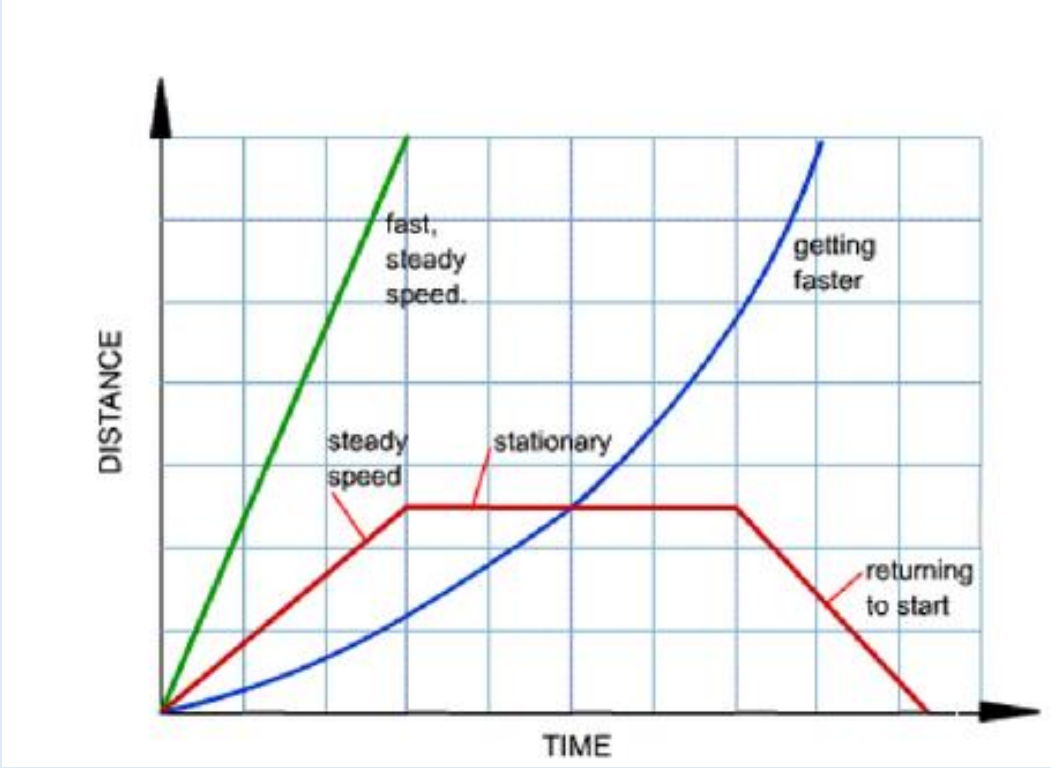


Distance-Time Graphs

Distance time graphs show for far an object has travelled over time.

- A straight line shows forward movement
- A steeper line shows a faster speed
- A curved line shows the change in speed
- A horizontal line shows that the object is not moving
- A line going down shows the object is moving back

You can calculate the speed from a distance time graph by reading the distance travelled from the y-axis and the time taken from the x-axis.

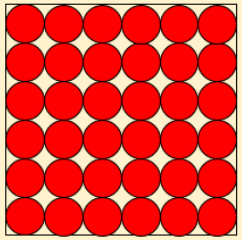
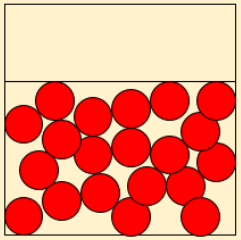
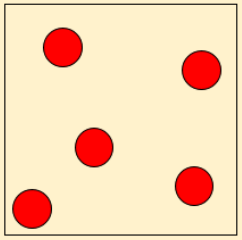


Year 7 Matter

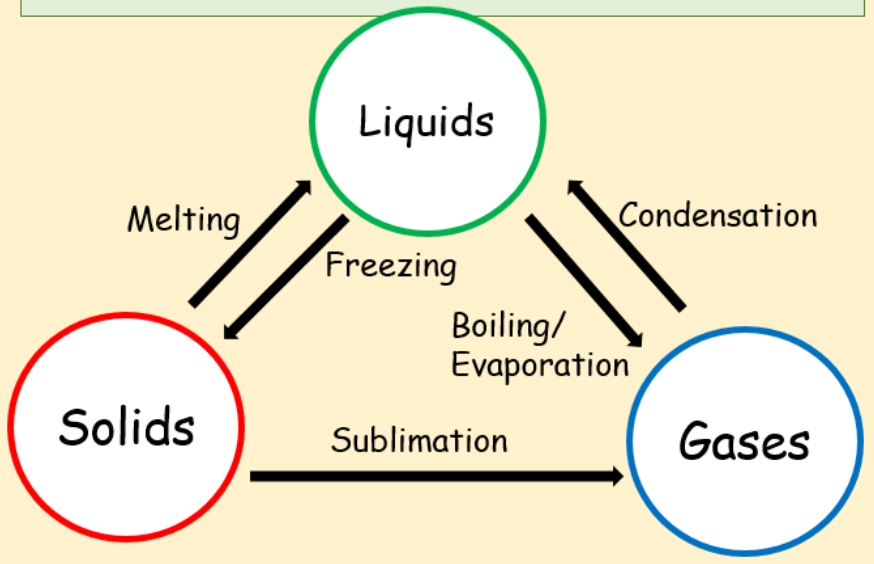
Key vocabulary

Solid	A substance which **cannot** be compressed and **cannot** flow.
Liquid	A substance which **cannot** be compressed but **can** flow.
Gas	A substance which **can** be compressed and **can** flow.
Particle	A very tiny object such as an atom or molecule, too small to be seen with a microscope.
Particle Model	A way to think about how substances behave in terms of small, moving particles.
Diffusion	Process by which particles in liquids or gases spread out through random movement from a region where there are many particles to one where there are fewer.
Gas pressure	Caused by collisions of particles with the walls of a container.
Density	How much matter there is in a particular volume, or how close the particles are.
Evaporate	Change from liquid to gas at the surface of a liquid, at any temperature.
Boil	Change from liquid to a gas of all the liquid when the temperature reaches boiling point.
Condense	Change from gas to liquid when the temperature drops to the boiling point.
Melt	Change from solid to liquid when the temperature rises to the melting point.
Freeze	Change from liquid to a solid when the temperature drops to the melting point.
Sublime	Change from a solid directly into a gas.
Mixture	Substance that containing more than one type of atom or element not chemically bonded

Properties of solids, liquids and gases

Solids:	Liquids:	Gases:
• Have their own shape • Have a fixed volume • Cannot be compressed	• Take the shape of the bottom of the container • Have a fixed volume • Cannot be compressed	• Take the shape of their container • Don't have fixed volume • Can be compressed easily
		

States of Matter



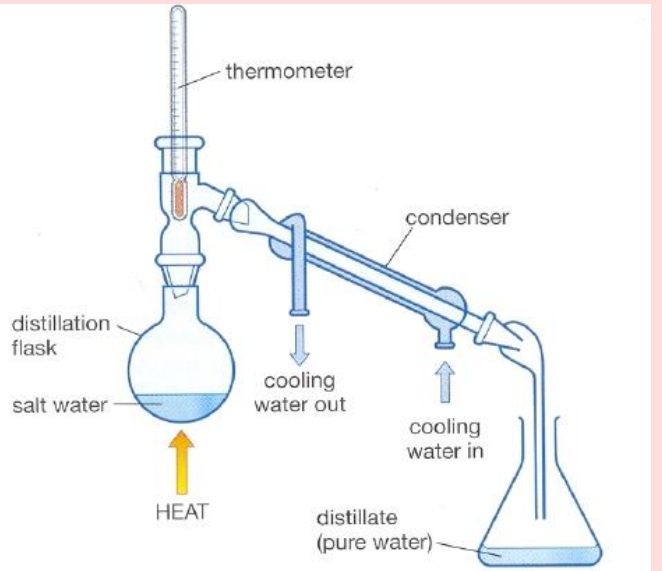
Year 7 Matter

Key vocabulary

Solvent	A substance, normally a liquid, that dissolves another substance.
Solute	A substance that can dissolve in a liquid.
Dissolve	When a solute mixes completely with a solvent.
Solution	Mixture formed when a solvent dissolves a solute.
Soluble (insoluble)	Property of a substance that will (will not) dissolve in a liquid.
Solubility	Maximum mass of solute that dissolves in a certain volume of solvent.
Saturated solution	A solution in which no more solute can dissolve.
Pure substance	Single type of material with nothing mixed in.
Mixture	Two or more pure substances mixed together, whose properties are different to the individual substances.
Filtration	Separating substances using a filter to produce a filtrate (solution) and residue.
Distillation	Separating substances by boiling and condensing liquids.
Evaporation	A way to separate a solid dissolved in a liquid by the liquid turning into a gas.
Chromatography	Used to separate different coloured substances or mixtures of soluble substances
Conservation of mass	Mass of reactants = Mass of the products

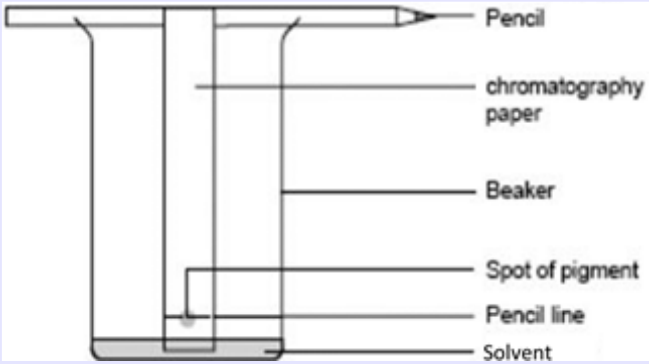
Distillation

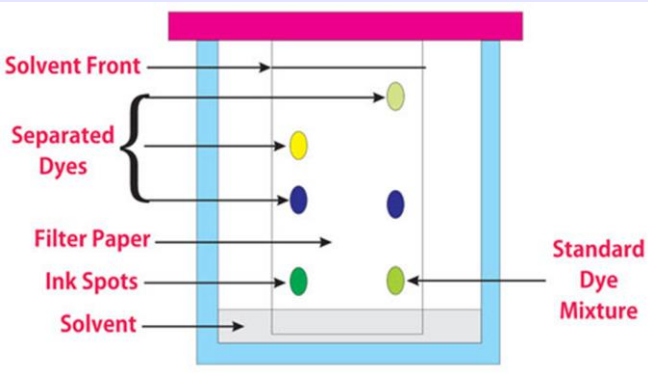
1. Salt water / inky water is heated.
2. The water evaporates and forms steam. The ink / salt does not evaporate.
3. The steam goes into the condenser.
4. The steam condenses to form pure water.
5. The pure water runs into the beaker.



Chromatography

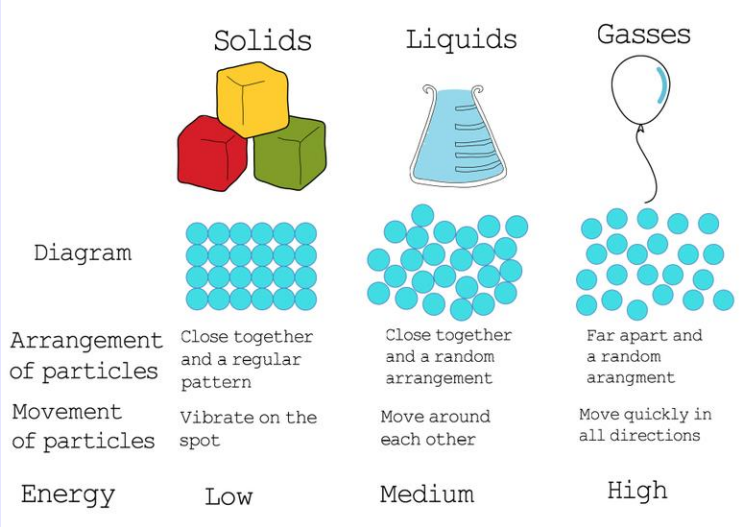
1. Using a ruler and PENCIL, draw a line across the chromatography paper
2. Place a dot of the ink you are testing on the centre of the pencil line. Test 3 colours.
3. Attach the top of the paper to a pencil using sellotape.
4. Pour a small amount of the solvent into a beaker
5. Balance the pencil across the top of the beaker, making sure the paper is just touching the solvent, but not touching the sides of the beaker
6. Use the Chromatogram to identify the different separated dyes for each coloured pen.



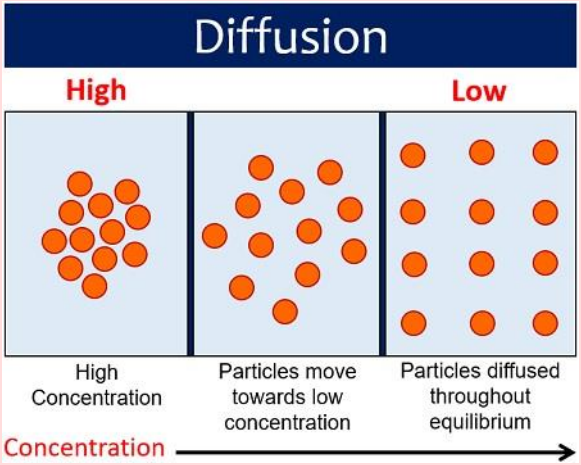


Year 7 Matter

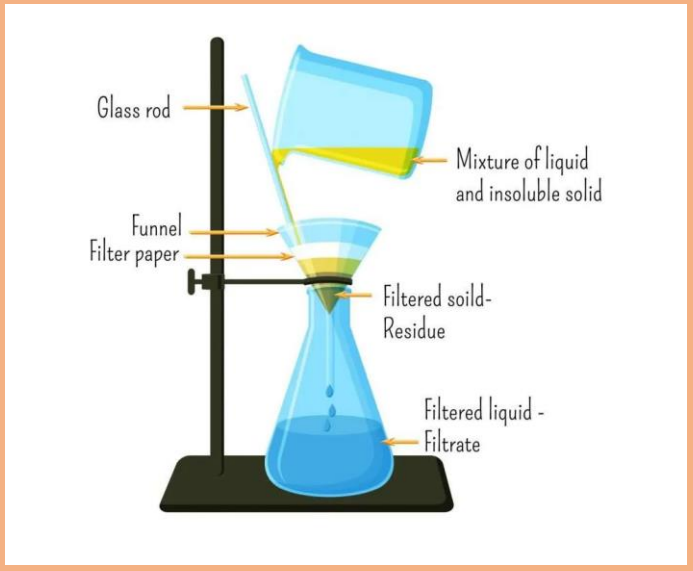
Energy stored in materials



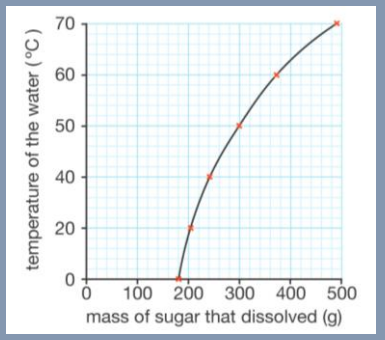
Diffusion



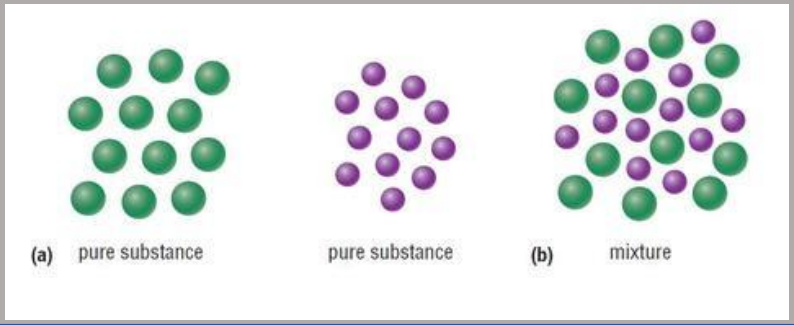
Filtration



Solubility and temperature



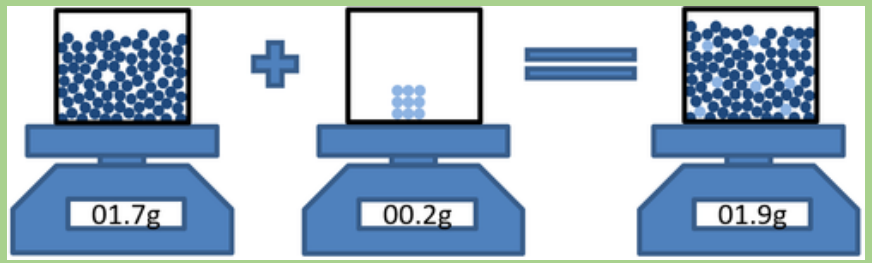
Pure substance vs mixture

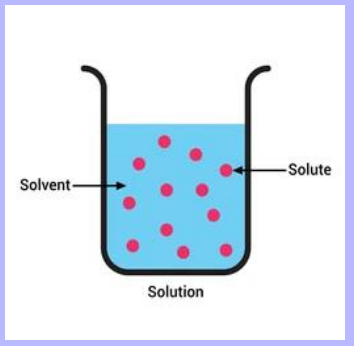


Evaporation



Conservation of mass



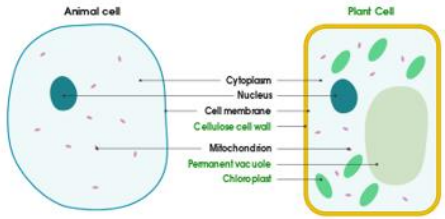


Year 7 Organisms

Amoeba	*Single cell organisms that has no fixed shape.*
Cell membrane	*Controls what goes in and out*
Cell wall	*Found in plant cells. Made of cellulose. Supports the cell*
Cells	*Building block that all living things are made up of.*
Chloroplasts	*Found in plant cells and contain a pigment called chlorophyll. Site of photosynthesis*
Haemoglobin	*A protein found in red blood cells that binds to oxygen*
Cytoplasm	*Is a jelly-like substance found in cells where most chemical reactions take place.*
Diffusion	*The passive movement of particles from a high concentration to a low concentration*
Euglena	*Unicellular organism that can photosynthesise*
Flagellum	*like a tail and allows the unicellular organism to move around.*
Leaf cells	*Cells in plants that have chloroplasts and can photosynthesise.*
Mitochondria	*Where aerobic respiration happens and energy is released*
Multicellular	*An organism made up of more than one cell.*
Nerve cells	*A very long cell found in animals. It carries messages to and from the brain from other parts of the body.*
Nucleus	*Controls the cell and is where the DNA is found.*
Observation	*Looking at something to see its features or behaviour.*
Organisms	*A living thing like a plant, animal or bacteria etc.*
Red blood cells	*A cell found in the blood of animals. It carries oxygen around the body to the cells.*
Respiration	*Chemical reaction used to release energy from glucose*
Root hair cells	*Plant cell that is found in the roots. It does not contain chloroplasts. It absorbs water and minerals from the soil.*
Specialised Cells	*A cell that carries out a particular function.*
Sperm cells	*A cell that contains the genetic material of a male.*
Unicellular	*An organism containing only one cells.*
Vacuole	*Stores water and sugar*
Ribosomes	*Makes protein*

Plant and animal cells

All plant and animal cells have three main structures, the nucleus, cytoplasm and cell membrane



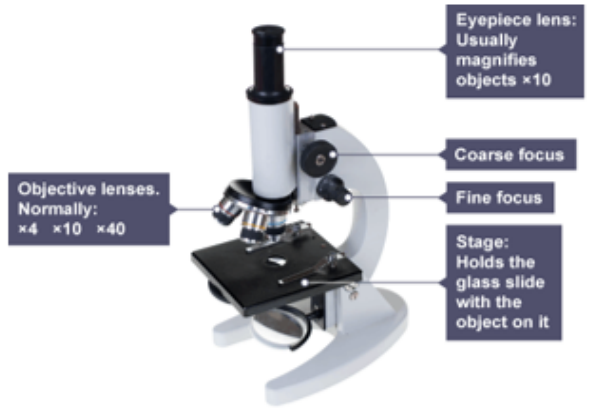
Observing Cells

All living things are made up of cells. These are the building blocks of life. To observe cells in detail you will need to use a microscope. Microscopes magnify the object that you are looking at.

Plant cells can be seen using a light microscope.

You should be able to describe how to prepare a microscope slide of stained onion cells. Here is a typical method:

1. Cut open an onion
2. Use forceps to peel a thin layer of skin from the inside
3. Lay the layer of epidermis on a microscope slide
4. Add a drop of iodine solution to the layer
5. Carefully place a cover slip over the layer



The iodine solution stains starch in the cells blue-black, making the cell features easier to see.

Magnification

To work out the total magnification of specimen you would need to find the eyepiece lens magnification (usually 10) and then the objective lens that you have selected (usually 4, 10 or 40 times magnified). Here is an example of how to set out the calculation:-

Total magnification = eyepiece lens magnification x Objective lens magnification

= 10 x 20

= 200

Organisation- How do cells make organisms

Cells -------tissue ---------organ--------organ system--------organism

Specialised Cells

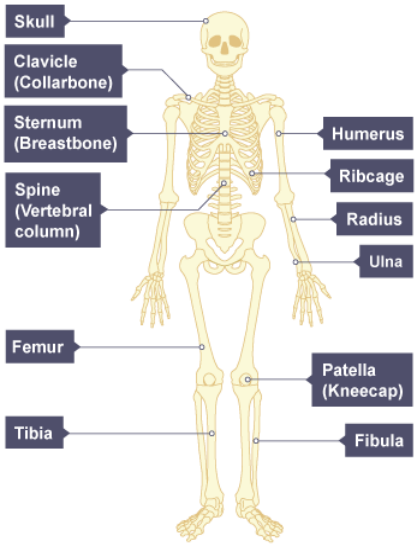
Cells have different shapes and features so that they can do a particular job. Here are some examples:

	Type of cell	Function	Special features
Animal cells	 Red blood cells	To carry oxygen	• Large surface area, for oxygen to pass through • Contains haemoglobin, which joins with oxygen • Contains no nucleus
	 Nerve cells	To carry nerve impulses to different parts of the body	• Long • Connections at each end • Can carry electrical signals
	 Male reproductive cell (sperm cell)	To reach female cell, and join with it	• Long tail for swimming • Head for getting into the female cell
Plant cells	 Root hair cell	To absorb water and minerals	• Large surface area
	 Leaf cell	To absorb sunlight for photosynthesis	• Large surface area • Lots of chloroplasts

Unicellular Organisms

Unicellular organisms are very small and consists of only one cell, they are usually found in water. Some of these can make their own food through photosynthesis. Euglena can make its own food by photosynthesis

The skeleton



Function of the skeleton

The skeleton has four main functions:

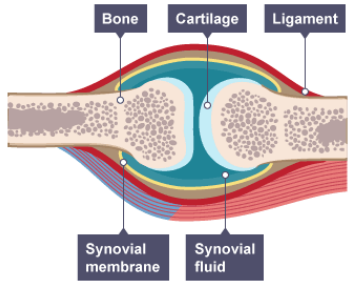
- to support the body
- to protect some of the vital organs of the body
- to help the body move
- to make blood cells

Joints

Bones are linked together by joints. Most joints allow different parts of the skeleton to move. The human skeleton has joints called **synovial joints**.

The synovial joint

If two bones just moved against each other, they would eventually wear away. This can happen in people who have a condition called arthritis. To stop this happening, the ends of the bones in a joint are covered with a tough, smooth substance called cartilage. This is kept slippery by a liquid called synovial fluid. Tough **ligaments** join the two bones in the joint and stop the joint falling apart.



Muscles work by getting shorter. We say that they **called** contraction. Muscles are attached to bones by strong **tendons**. When a muscle contracts, it pulls on the bone, and the bone can move if it is part of a joint.

Antagonistic muscles

Muscles can only pull and cannot push. This would be a problem if a joint were controlled by just one muscle. As soon as the muscle had contracted and pulled on a bone, that would be it, with no way to move the bone back again. This problem is solved by having muscles in pairs, called **antagonistic muscles**. **contract**, and the process is

Type of joint	Examples	Movement allowed
Hinge joint	Knee, elbow	The same as opening and closing a door, with no rotation (turning)
Ball and socket	Hip, shoulder	Back and forth in all directions, and rotation

Year 7 Energy

Energy Stores

Thermal	The total kinetic and potential energy of the particles in a system. In hotter objects, the particles have more internal energy and vibrate faster.
Kinetic	Moving objects have kinetic energy. The more mass and speed they have, the more kinetic energy.
Chemical	The energy stored in chemical bonds, such as those between molecules.
Gravitational potential	The energy of an object at height. The higher the object, the more gravitational potential energy stored.
Elastic potential	The energy stored when an elastic object is stretched or squashed.

Energy Resources

Non-renewable (can't be replaced)	Renewable (can be replaced)
Fossil fuels – coal, oil & gas	• Wind • Tidal • Wave • Biomass • Solar power • Hydroelectric • Geothermal





The Law of Conservation of Energy

Energy cannot be created or destroyed; it can only be transferred.



Energy Transfers

Energy can be transferred from one store to another by an electrical current or by sound or light waves.

E.g. When you switch on a torch, energy is transferred from the chemical store of the battery to the thermal store of the bulb by an electrical current

Efficiency

Energy can transfer to useful or wasted energy stores. The energy that is 'wasted' is **dissipated**.

$$\text{Efficiency (\%)} = \frac{\text{useful energy output}}{\text{energy input}} \times 100$$

Power

Power is the amount of energy transferred per second. It is measured in Watts.

$$\text{Energy (J)} = \text{Power (W)} \times \text{time (s)}$$

Power Stations



Fuel is burnt to heat up water and produce steam

The turbine drives a generator which produces an electrical current

The steam turns a turbine, which is a bit like a big fan

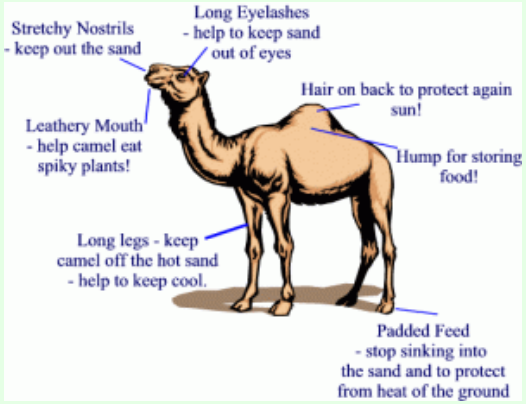
Year 7 Genes

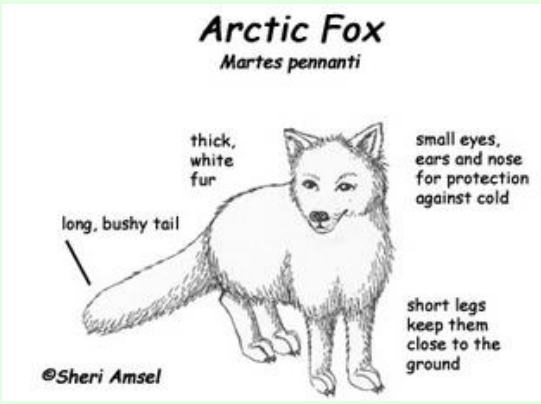
Key vocabulary

Adaptation	Characteristics that help an organisms survive in its environment
Bar chart	A graph that displays the values of categories
Categoric variable	A variable that has values that are words
Continuous	A variable that has values that can be any number
Discontinuous	A variable that has values that are words or discrete numbers
Discrete variable	A variable that can only have whole number values
Environmental variation	Variation between organisms caused by environmental factors
Inherited variation	Variation between organisms caused by genetic factors
Variation	The differences between and within a species

Adaptations

Many animals have structural adaptations that help them to survive the conditions in their habitats





Variation

The differences between individuals are known as variation.

These differences can be caused by:

- Genetics only (inherited variation)
- Environment only (environmental variation)
- Both genetics and the environment

Inherited Variation	Both inherited and environmental	Environmental Variation
Blood group Inherited disorders Ear lobe shape Eye colour	Height Weight Intelligence	Tattoos Hair style Piercings Accent

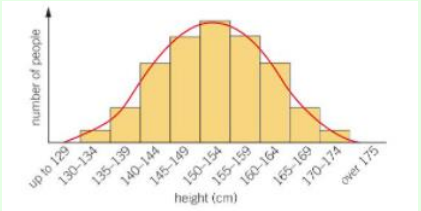
Seasonal Adaptations

Some animals and plants have adaptations to cope with seasonal changes

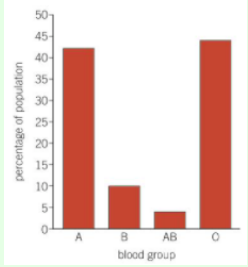
- Hibernation
  - Bears find somewhere warm to sleep through winter
- Migration
  - When birds move to warmer places
- Thicker fur
  - Warm winter coats
- Deciduous trees
  - Trees lose leaves in winter to save energy

Variation Data

- Continuous data is always plotted on a histogram



- Discontinuous data is always plotted on a bar graph

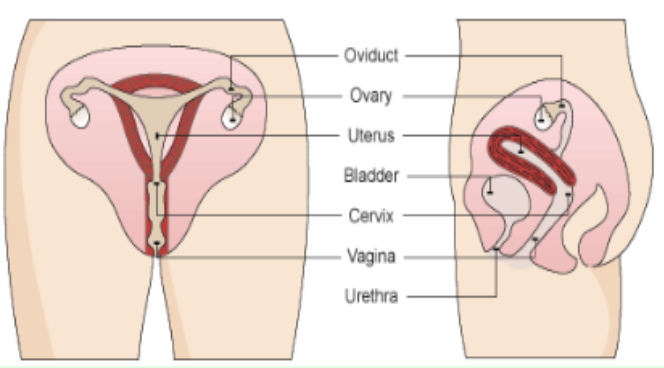


Year 7 Genes

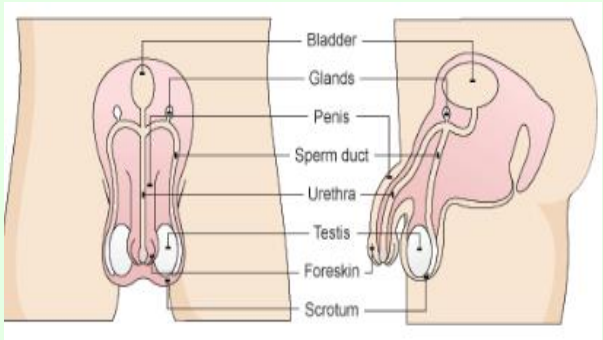
Key vocabulary

Adolescence	The period of time when an adult changes into a child
Amniotic fluid	Liquid that surrounds and protects the foetus
Cervix	The ring of muscle at the entrance to the uterus
Contraception	A method of preventing pregnancy
Ejaculation	When semen is released from the penis
Embryo	A ball of cells that forms when the fertilised egg cell divides
Fertilisation	Joining of a nucleus form a male and female sex cell
Fetus	The developing baby during pregnancy (from 8 weeks)
Gamete	The name given to sex cells. Sperm in males and eggs in females
Gestation	Where a baby develops during pregnancy. In humans this lasts 40 weeks
Implantation	The process where an embryo attaches to the lining of the uterus
Ovary	Organ that contains eggs
Oviduct	Carries eggs from the ovary to the uterus and where fertilisation occurs
Ovulation	Release of an egg during the menstrual cycle
Penis	Organ that carries sperm out of the male body
Placenta	Organ that provides the fetus with nutrients and removes waste
Puberty	The physical changes that take place during adolescence
Scrotum	The bag of skin that holds the testicles
Semen	Fluid containing semen
Sex hormones	Hormones that are involved in the reproductive system
Sexual intercourse	The process where the penis releases semen into the vagina
Sperm duct	Tube that carries sperm from the testes to the penis
Testes	Organ where sperm are produced
Umbilical cord	Connects the fetus to the placenta
Uterus	Where a baby develops during pregnancy

Female Reproductive system



Male Reproductive system



Menstrual cycle

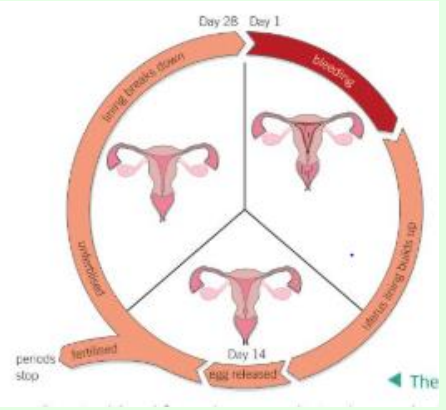
A 28 day cycle in girls

Day 1-5: Period

Day 6-14: Uterus lining develops

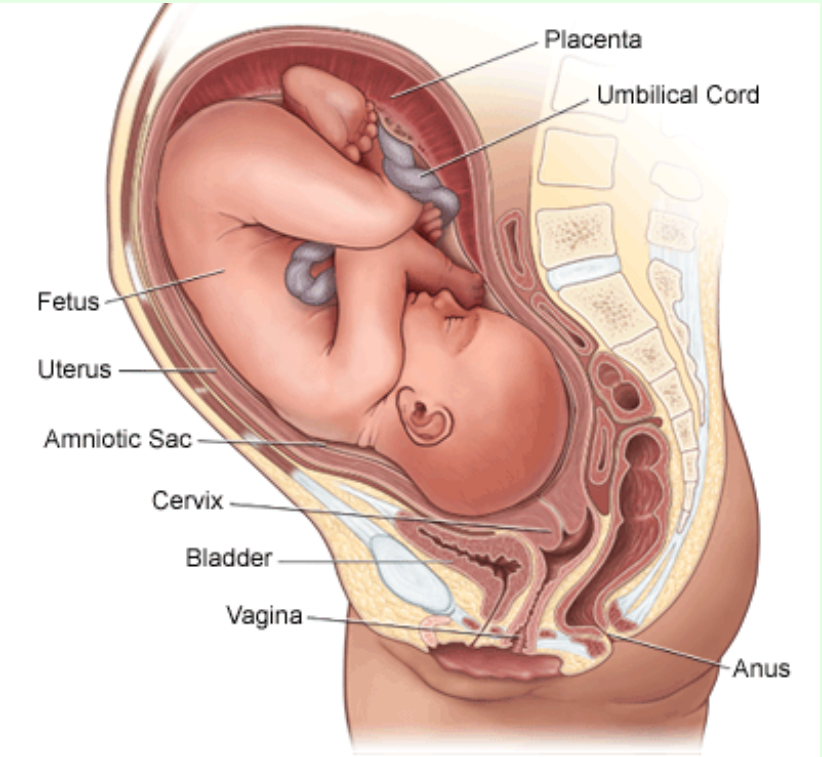
Day 14: Ovulation

Day 14-28: Uterus lining is maintained



Year 7 Genes

Gestation and Birth



In humans, pregnancy lasts around 9 months

The length of gestation varies for different species

Changes in girls during puberty

- Breasts develop
- Hips get wider
- Ovaries start to release egg cells (menstrual cycle starts)

Changes in boys during puberty

- Voice breaks
- Testes and penis get bigger
- Testes start to produce sperm
- Shoulders get wider
- Hair grows on face and chest

Changes in both genders during puberty

- Underarm hair grows
- Pubic hair grows
- Body smell gets stronger
- Emotional changes
- Growth rate increases

Fertilisation

- Sperm and cell egg fuse to produce a zygote

