Year 7 Science test revision list

What to learn	Website links	You tube links
States of matter	https://www.bbc.co.uk/bitesize/topics/z9r4jxs/articles/zqpv7p3 https://www.bbc.co.uk/bitesize/topics/zkr4jxs/articles/z3qyydm	https://youtu.be/2i0gv8btYBM
Separating mixtures	https://www.bbc.co.uk/bitesize/guides/zrqbbdm/revision/4	https://youtu.be/HHMuxploYEY
Diffusion	https://www.bbc.co.uk/bitesize/topics/zych6g8/articles/znqbcj6	https://youtu.be/EKt4afCtO8U
Change of state	https://www.bbc.co.uk/bitesize/topics/z9r4jxs/articles/zyhntrd https://www.bbc.co.uk/bitesize/guides/zyt4y4j/revision/2	https://youtu.be/2mFD9UNY3Ms
Forces	https://www.bbc.co.uk/bitesize/topics/z4brd2p/articles/zs3896f https://www.bbc.co.uk/bitesize/topics/z4brd2p/articles/zhnfp4j	https://youtu.be/CyHTYdgWXzI https://youtu.be/YGGxf6cp3Lo
Friction	https://www.bbc.co.uk/bitesize/topics/z4brd2p/articles/z6s4r2p	https://youtu.be/JjypCDNSavw

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What to learn	Website links	You tube links
Types of energy	https://www.bbc.co.uk/bitesize/topics/zc3g87h/articles/zg2sn9q	https://youtu.be/VUworhvk5rw SCAN ME
Efficiency	https://www.bbc.co.uk/bitesize/guides/z8k9v9q/revision/8 https://www.bbc.co.uk/bitesize/guides/zqkvtv4/revision/7	https://youtu.be/qTaaErZJJHI SCAN ME
Cells	https://www.bbc.co.uk/bitesize/topics/znyycdm/articles/zkm7wnb	https://youtu.be/CyBWIuWuBKI SCAN ME
Reproductive systems	https://www.bbc.co.uk/bitesize/topics/zybbkqt/articles/zwb6xbk	https://youtu.be/QkqDoF9KK60 SCAN ME https://youtu.be/o7Z9XrTA5sM SCAN ME
Variables	https://www.bbc.co.uk/bitesize/topics/zsg6m39/articles/zyc9r2p	https://youtu.be/wYKwzVDB-N0 SCAN ME
Equipment	https://www.bbc.co.uk/bitesize/topics/zsg6m39/articles/zrf2qfr	
Planning an experiment	https://www.bbc.co.uk/bitesize/topics/zsg6m39/articles/zxn896f	https://youtu.be/oPVoLcuaVIo SCAN ME

Energy- Energy transfer

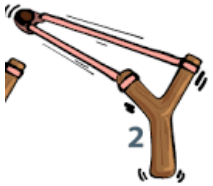
All objects have **internal energy**. This includes:
•energy caused by the movement of particles in the object, called **thermal energy**
•energy due to the bonds between particles, called **chemical energy**

Energy Stores
Energy is a quantity measured in joules (J). It is NOT a material or 'thing'.

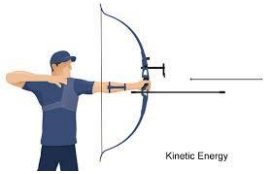
Gravitational potential energy. It depends upon:
•the mass of the object
•the extra height it gains
•the gravitational field strength

Magnetic energy
Some objects can be magnetised and create magnetic fields.

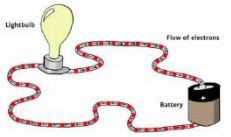
Elastic potential energy is stored in stretched or squashed materials.



All moving things have **kinetic energy**, even very large things like planets, and very small ones like atoms. The amount of kinetic energy an object has depends upon:
•the mass of the object
•the



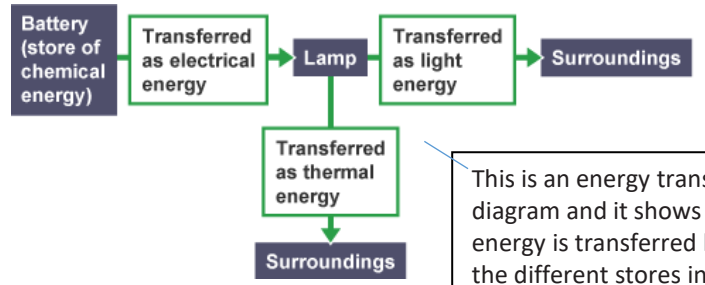
Electrical energy
Some objects carry electrical charges and create electric fields. These charged objects can exert forces on each other.



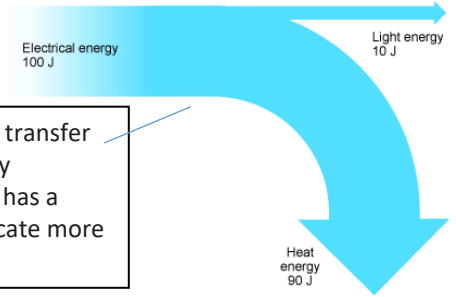
Electric current, radiation (like light), waves (like sound), and heating are ways of **transferring** energy between stores.

Energy Transfer
An energy transfer is when energy changes from one store to another. The **total amount of energy does not change**. Energy cannot be created or destroyed. All that can be changed is how it is stored.
This idea is called **the law of conservation of energy.**

When you cannot transfer energy to another store that you want it to go to, so it is effectively 'wasted'. In that case, scientists say that energy is **dissipated.**



This is an energy transfer diagram and it shows how energy is transferred between the different stores in a light bulb. We don't use a light bulb to heat up a room, so the arrow pints downwards, this energy is dissipated.



This is a type of energy transfer diagram called a Sankey diagram. This diagram has a scale, thicker lines indicate more energy.

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Key Terms	Definitions
Conservation of energy	Energy cannot be created or destroyed, only transferred.
Thermal energy store	Filled when an object is warmed up.
Chemical energy store	Emptied during chemical reactions when energy is transferred to the surroundings.
Kinetic energy store	Filled when an object speeds up.
Gravitational potential energy store	Filled when an object is raised.
Elastic energy store	Filled when a material is stretched or compressed.
Dissipated	Become spread out wastefully.

<u>Calculations on efficiency</u>

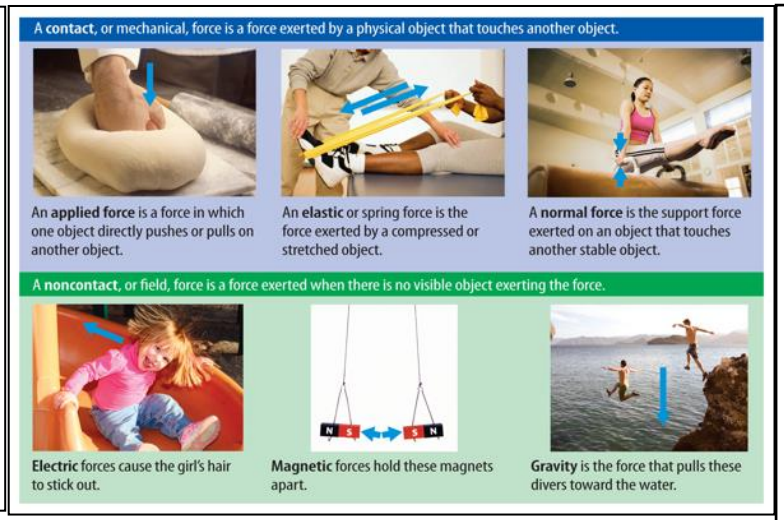
We can show how much energy us transferred usefully, and how much is dissipated (wasted), using the equation for efficiency.

Efficiency (%) = (Useful energy output (J) ÷ energy input (J) x100

Worked example
This diagram shows the energy transferred in a doorbell.

Efficiency = (20 ÷ 80) x 100 = 25%

A **force** can be a **push** or a **pull**. For example, when you push open a door you have to apply a force to the door. You also have to apply a force to pull open a drawer.
You cannot see a force but often you can see what it does. When a force is exerted on an object, it can change the object's:
•speed
•direction of movement
•shape (for example, an elastic band gets longer if you pull it).
Forces always comes in pairs. The pairs are called **interaction** pairs.



Measuring forces
Forces can be measured using a force meter, also called a newton meter. Force meters contain a spring connected to a metal hook. The spring stretches when a force is applied to the hook. The bigger the force applied, the longer the spring stretches and the bigger the reading. The unit of force is called the **newton**, and it has the symbol N. The greater the force, the bigger the number, so 100 N is a greater force than 5 N.

Force diagrams
We can show the forces acting on an object using a force diagram. In a force diagram, an arrow represents each force. The arrow shows:
•the size of the force (the longer the arrow, the bigger the force)
•the direction in which the force acts

The arrow should be labelled with the name of the force and its size in newtons. Textbooks often show a force with a thick coloured arrow so that it looks nice, but it is more accurate if you just use a ruler and pen or pencil to draw an arrow with a single line.

Key Terms	Definitions
Forces	Are pushes or pulls
Newton meter	What you measure force with in Newtons (N)
Interaction pair	Forces always exist as pairs and are produced when objects interact.
Effect of forces	Forces can deform, compress or stretch objects or change their speed or direction of motion.
Contact forces	Occur when objects are touching. Examples are friction, air resistance and water resistance.
Balanced forces	When forces acting on an object are equal in size and acting in opposite directions, they are balanced. The object is in equilibrium.
Resultant force	A single force that can replace all the other forces acting on an object and still have the same effect on the object.
Weight	The force of gravity of an object (N)
Non-contact force	One that acts without direct contact. Examples are gravitational, electrostatic and magnetic forces.
Mass	The amount of stuff in an object (kg)
Gravitational field strength, g	The force from gravity on 1 kg (N/Kg)
Field	The area where other objects feel a gravitational force

Forces- Balanced and unbalanced

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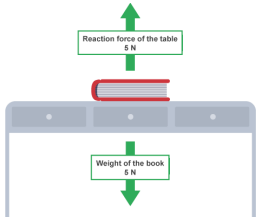
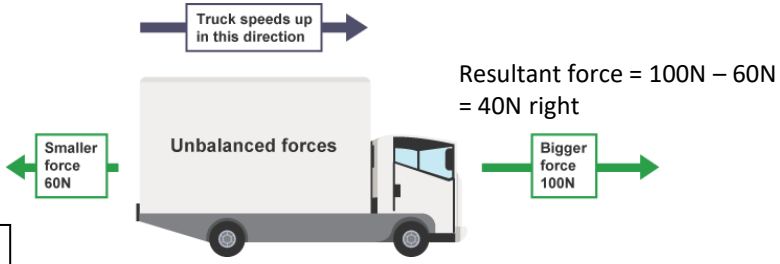
When two forces acting on an object are equal in size but act in opposite directions, we say that they are **balanced forces**. The object is in **equilibrium.** If the forces on an object are balanced (or if there are no forces acting on it), this is what happens:
- a stationary object stays still
- a moving object continues to move at the same speed and in the same direction
Remember that an object can be moving, even if there are no forces acting on it.

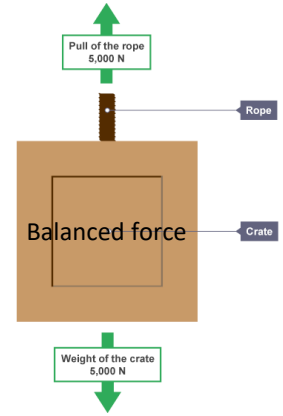


When two forces acting on an object are not equal in size, we say that they are **unbalanced forces**.
If the forces on an object are unbalanced, this is what happens:
•a stationary object starts to move in the direction of the resultant force
•a moving object changes speed and/or direction in the direction of the resultant force



Resultant force = 100N – 60N = 40N right

Resultant forces
The overall force acting on the object is called the **resultant force**.
When the resultant force is zero, the object will move at a steady speed or remain at rest. The forces are balanced.
When the forces are unbalanced, either:
-Resultant force in direction of movement causes acceleration.
-Resultant force in opposite direction causes deceleration.



Resultant force
= 5000N – 5000N
= 0N

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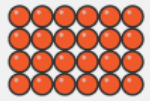
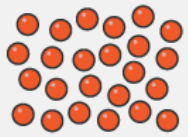
Matter- Particle model

State	Solid	Liquid	Gas
Diagram			
Arrangement of particles	Regular arrangement	Randomly arranged	Randomly arranged
Movement of particles	Vibrate about a fixed position	Move around each other	Move quickly in all directions
Closeness of particles	Very close	Close	Far apart

Density

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

Density = Mass ÷ Volume

… so the density of the gas is much smaller than the density of the solid.

Diffusion

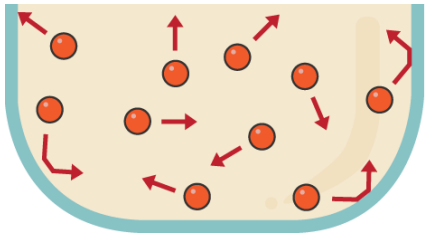
Particles in a liquid or a gas **spread** out from an area of **high concentration** to an area of **low concentration** until the concentrations are equal.

The **higher** the concentration **gradient** the **faster** the net diffusion.
The **higher** the **temperature** the **faster** the net diffusion. Diffuusion is also faster with smaller particles and in gases.
If the particles that are spreading are **water** molecules we call this process **osmosis**.

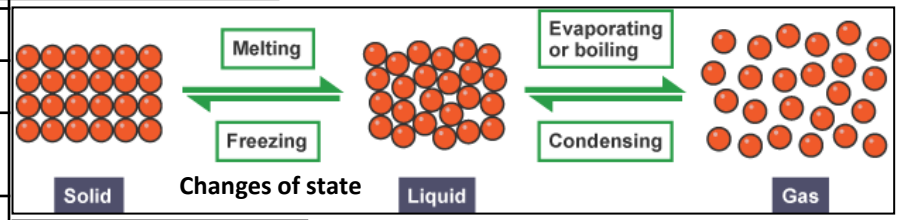
Gas pressure

Gas Pressure

Gas pressure is **caused by gas particles colliding with the walls of the container.** A container also experiences pressure on the outside. Air particles on the outside collide with the outside wall. **An imbalance between the pressure on the inside and outside can cause the container to change its shape.**
There are **3 factors** affecting gas pressure:
1. Number of particles:
2. Temperature:
3. Volume:

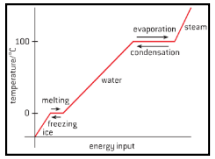


Key Terms	Definitions
Particle	A very tiny object such as an atom or molecule, too small to be seen without a microscope.
Particle model	A way to think about how substances behave in terms of small, moving particles.
Diffusion	The process by which particles in liquids of gases spread out through random 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.
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 then the temperature reaches the boiling point.
Condense	Change of state 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.
Atom	The smallest part of an element that can exist.
Element	A substance that cannot be broken down into other substances
Compound	Pure substances made up of atoms of two or more elements, strongly joined together.



State graph

As a substance is heated it gains **energy**. When the particles gain enough energy they overcome the **forces** between them and change state.
Whilst a **change of state** is happening the **temperature** of the substance does not change. (flat line on graph)



Change in state experiment

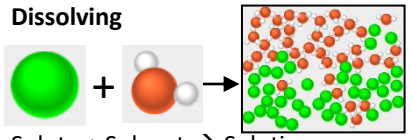
Pour the liquid or solid into a beaker. Measure the starting temperature. Heat the solid or liquid up using a Bunsen burner.
Measure the temperature every minute until it has changed state.
Plot a graph of temperature (y-axis) and time (xx-axis).

Using melting and boiling points

Silver has a melting point of 961◦C and a boiling point of 2210 °C. At 20 ° C silver is a solid because 20 ° C is not hot enough to melt or boil it. However, at 1000 ° C silver would be a liquid as it is hot enough to melt the silver but not to boil it.

Matter- Separating mixtures

Dissolving



Solute + Solvent → Solution
20g + 30g → 50g
The Law of Conservation of Mass states that **mass cannot be created or destroyed.**

Pure substances and mixtures
Chemists make mixtures that are suitable for their purpose. They have fixed amounts of each substance added to the mixture and are called formulations. Examples are toothpaste, paint and medicines.
A pure substance has a fixed melting point and a fixed boiling point.

Solubility
Every substance has its own solubility. For example, sugar has a solubility of 202 g/100g of water at 20◦C and salt has a solubility of 36 g/100g. Most substances get more soluble as temperature increases.

Distillation
Separating substances with different boiling points, for example when salt water mixture is heated.

At 100°C water boils and the particles gain enough energy to become a gas (water vapour).

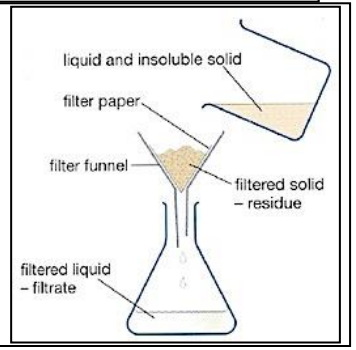
The boiling point of salt is 1413°C so it does not boil and stays in the flask.

Water vapour rises and travels past the thermometer into the condenser.

Thermometer checks the temperature to identify the gas.

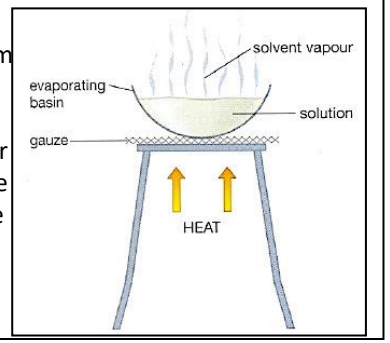
Condenser cools the water vapour so that it condenses back to liquid water.

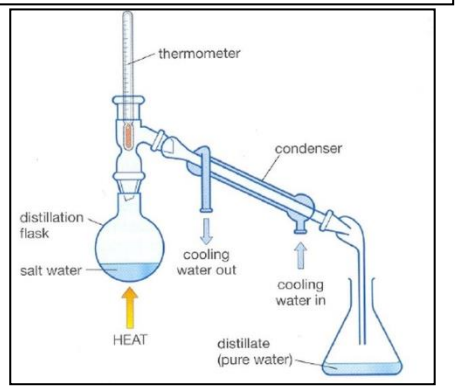
Filtration
Separates an insoluble solid from a liquid.
The solid pieces are too big to fit through the holes in the filter paper.



Evaporation
Separating a soluble solid from a liquid.

Crystallisation
Heat until almost all the water has evaporated. Leave for the remaining water to evaporate slowly to form crystals.





Key Terms	Definitions
Solvent	A substance, normally a liquid, that dissolves another substance.
Solute	A substance that can dissolve 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.
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.
Saturated	A solution in which no more solute can dissolve.

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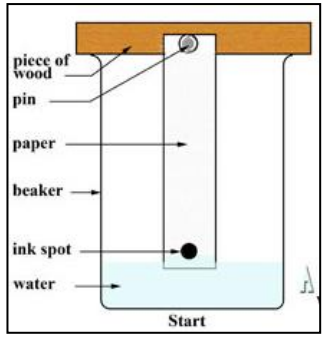
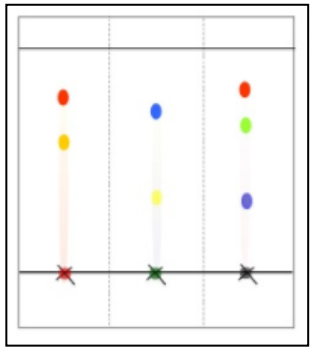
Chromatography

Method
Draw pencil line.
Put dot of colour on line.
Hang bottom edge (below dot) in the water.
Leave until water soak up to almost the top of the paper..
Compare with known substances.





Chromatogram

Chromatography relies on two different 'phases':
1. The **stationary phase**, which in paper chromatography is very uniform, absorbent paper
2. The **mobile phase** is the **solvent** that moves through the paper, carrying different substances with it
The different **dissolved** substances in a mixture are attracted to the two phases in different proportions. This causes them to move at different rates through the paper.

Organisms- Cells

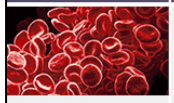
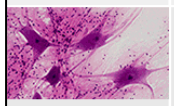
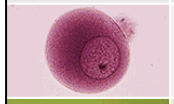
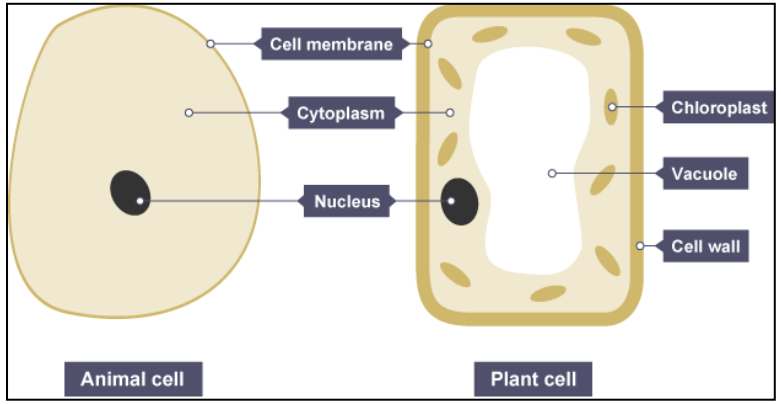
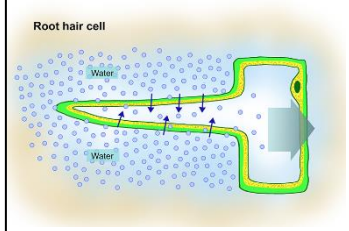
Image	Type of animal cell	Function	Special features
	Red blood cells	To carry oxygen	• Large surface area, for oxygen to pass through • Contains haemoglobin, which joins with oxygen • Contains no nucleus
	Nerve cells	To carry nerve impulses to different parts of the body	• Long • Connections at each end • Can carry electrical signals
	Female reproductive cell (egg cell)	To join with male cell, and then to provide food for the new cell that's been formed	• Large • Contains lots of cytoplasm
	Male reproductive cell (sperm cell)	To reach female cell, and join with it	• Long tail for swimming • Head for getting into the female cell

Image	Type of plant cell	Function	Special features
	Root hair cell	To absorb water and minerals	• Large surface area
	Leaf cell	To absorb sunlight for photosynthesis	• Large surface area • Lots of chloroplasts

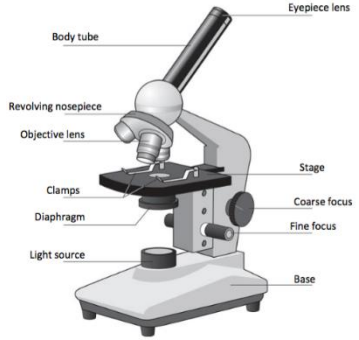


A **unicellular organism** is a living thing that is just one cell. There are different types of unicellular organism, including: bacteria; protozoa; amoeba and Euglena. They have **adaptations** that make them very well suited for life in their environment. Euglena are a unicellular organism. They have a flagellum (tail) to help them move and chloroplasts so they can make their own food. Amoeba are also unicellular organisms. They form pseudopods (false feet) that let them move about and can surround food so that the cell can take it in.



Diffusion is the movement of a substance from an **area of high concentration** to an **area of low concentration**. Diffusion happens in **liquids** and **gases** because their particles move randomly from place to place. Diffusion is an important process for living things; it is how substances move in and out of cells.

Water diffuses into plants through their root hair cells. The water moves from an area of high concentration (in the soil) to an area of lower concentration (in the root hair cell). This is because root hair cells are **partially permeable**. The diffusion of water like this, is called **osmosis**.



Observing cells using a microscope

1. Move the stage to its lowest position.
2. Place the object you want to observe on the stage.
3. Select the objective lens with the lowest magnification.
4. Look through the eyepiece and turn the coarse-focus knob slowly until you see your object.
5. Turn the fine-focus knob until your object comes into focus.
6. Repeat steps 1 to 5 using an objective lens with a higher magnification to see the object in greater detail.

Key Terms	Definitions
Uni-cellular	Living things made up of one cell.
Multi-cellular	Living things made up of many types of cells.
Diffusion	One way for substances to move into and out of cells.
Structural adaptations	Special features to help a cell carry out its functions.
Cell membrane	Surrounds the cell and controls movement of substances in and out.
Nucleus	Contains genetic material (DNA) which controls the cell's activities.
Vacuole	Area in a cell that contains liquid, and can be used by plants to keep the cell rigid and store substances.
Mitochondria	Part of the cell where energy is released from food molecules by respiration.
Cell wall	Strengthens the cell. In plant cells it is made of cellulose.
Chloroplast	Absorbs light energy so the plant can make food by photosynthesis.
Cytoplasm	Jelly-like substance where most chemical processes happen.

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<u>Calculations using the magnification equation</u>

The eyepiece lens and objective lens in a microscope have different magnification. The total magnification can be calculated using an equation

Total magnification= eyepiece lens magnification x objective lens magnification

Worked example
Calculate the magnification with an eyepiece lens of x10 and an objective lens of x20.
Total magnification = 10 x20 = 200

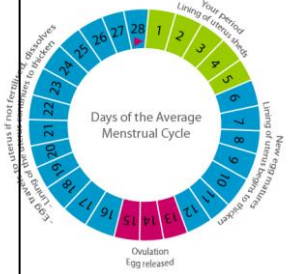
The female reproductive system includes a cycle of events called the **menstrual cycle**. It lasts about 28 days, but it can be slightly less or more than this. The cycle stops while a woman is pregnant. These are the main features of the menstrual cycle:

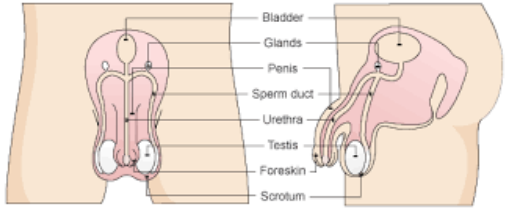
•The start of the cycle, day 1, is when bleeding from the vagina begins. This is caused by the loss of the lining of the uterus, with a little blood. This is called **menstruation** or having a period.

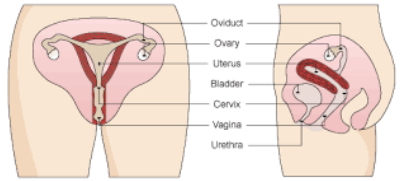
•By the end of about day 5, the loss of blood stops. The lining of the uterus begins to re-grow and an egg cell starts to mature in one of the ovaries.

•At about day 14, the mature egg cell is released from the ovary. This is called **ovulation**. The egg cell travels through the oviduct towards the uterus.

•If the egg cell does not meet with a sperm cell in the oviduct, the lining of the uterus begins to break down and the cycle repeats.







1. When a man and a woman have sexual intercourse, the man's penis enters the woman's vagina. Sperm are released from the penis into the vagina.
2. The sperm start to swim from the vagina into the uterus. The sperm swim through the uterus and then into both oviducts.
3. •If there is an egg in the oviduct then the sperm will surround it. The first sperm to reach the egg burrows into it.
   •The nucleus of the sperm joins with the egg. This is called fertilisation.

Genes- Human reproduction

Key term	Definition
Gamete	The male gamete (sex cell) in animals is a sperm, the female an egg.
Fertilisation	Joining of a nucleus from a male and female sex cell.
Ovary	Organ which contains eggs.
Testicle	Organ where sperm are produced.
Oviduct, or fallopian tube	Carries an egg from the ovary to the uterus and is where fertilisation occurs.
Uterus, or womb	Where a baby develops in a pregnant woman.
Ovulation	Release of an egg cell during the menstrual cycle, which may be met by a sperm.
Menstruation	Loss of the lining of the uterus during the menstrual cycle.
Reproductive system	All the male and female organs involved in reproduction.
Penis	Organ which carries sperm out of the male's body.
Vagina	Where the penis enters the female's body and sperm is received.
Foetus	The developing baby during pregnancy.
Gestation	Process where the baby develops during pregnancy.
Placenta	Organ that provides the foetus with oxygen and nutrients and removes waste substances.
Amniotic fluid	Liquid that surrounds and protects the foetus.
Umbilical cord	Connects the foetus to the placenta.
Puberty	Time during which sexual maturity happens.

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Puberty happens because of sex hormones produced by the testes in boys and by the ovaries in girls. Some changes happen in boys and girls, while others just happen in boys or girls. Here are some changes that happen to both boys and girls:

•underarm hair grows
•pubic hair grows
•body smell gets stronger
•emotional changes
•growth rate increases

Boys

Here are some changes that happen only to boys:

- voice breaks (gets deeper)
- testes and penis get bigger
- testes start to produce sperm cells
- shoulders get wider
- hair grows on face and chest

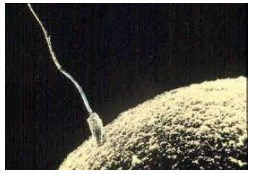
Girls

Here are some changes that happen only to girls:

- breasts develop
- ovaries start to release egg cells (the menstrual cycle starts)
- hips get wider

Fertilisation is when a sperm cell (male gamete) and an ovum fuse. Sperm cells are released into the female reproductive system during sexual intercourse (ejaculation). Only one sperm cell breaks through the cell membrane and enters the ovum, and only the head enters.

The nuclei fuse together, putting the mother and father's genetic information together. The fertilised ovum is now an embryo.



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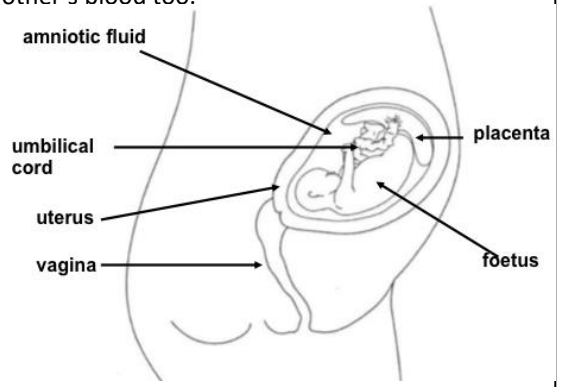
Genes- Human reproduction

Gestation

After fertilisation of an ovum, a woman is pregnant. The embryo grows as cells divide and travels to the uterus. Ciliated cells in the oviduct help it to move to the uterus.

The embryo implants into the uterus wall, where is gets oxygen and nutrients from the mother's blood. As it grows bigger and cells become specialised, we call it a foetus. It grows a placenta and umbilical cord.

At the placenta, the foetus gets oxygen and nutrients from the mother's blood (but their blood does NOT mix). The foetus gets rid of waste like carbon dioxide into the mother's blood too.



Birth

After about 40 weeks of pregnancy (for humans), the foetus is ready to be born.

The muscles in the wall of the uterus contract (contractions)

These contractions get stronger and faster – this is 'labour'

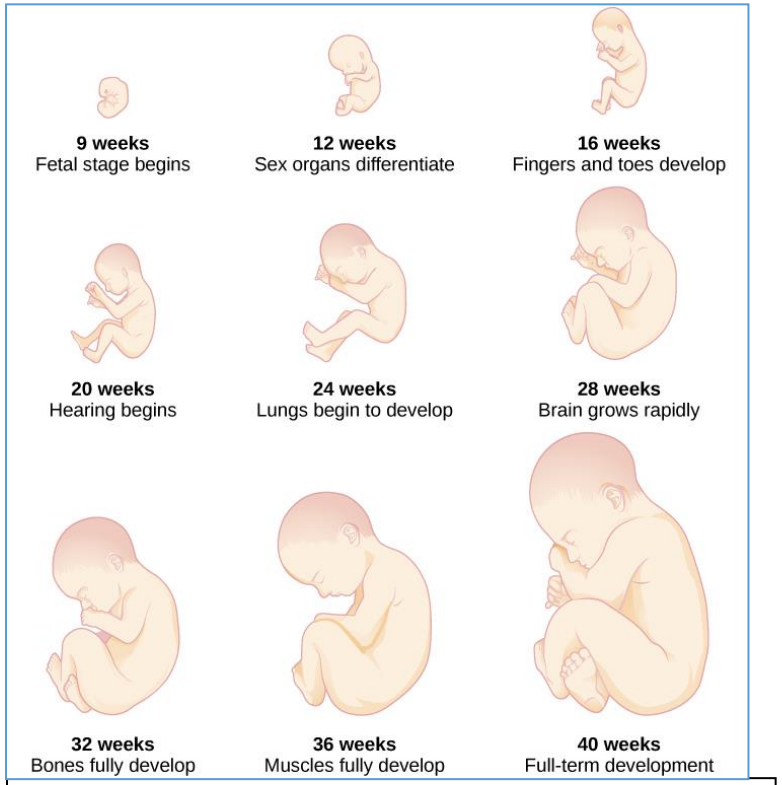
After some time of labour, the amniotic sac breaks, which releases the fluid (the 'waters break')

Contractions push the baby headfirst through the birth canal – through the cervix and out through the vagina.

When the baby is born it is still joined to its mother by the umbilical cord. This needs to be cut. The placenta is then pushed out.

Risks to the baby

Harmful Substance		Effect on baby
Smoking		Baby may be born underweight or brain damaged
Rubella Virus		Blood vessels and heart may be damaged. Baby may be born small, born early, or born dead
Drugs		Embryo infected and cannot develop properly. It may be born deaf or blind
Alcohol		Foetus may be infected with life-threatening disease before it is born
HIV		Oxygen supply is reduced by nicotine and carbon monoxide



Why do some couple have difficulties getting pregnant?

There are a number of reasons why people may have difficulty having a baby. This is known as low fertility (or infertility).

Difficulties in women may be problems with ovulation or blockages in the oviducts. Whilst men may experience a low sperm count or sperm that do not swim properly.

Type of contraception	How does it work?
Condom	Barrier- prevents semen being released into the woman's vagina. Also prevents transfer of sexually transmitted infections.
Contraceptive pill	Stops ovulation by containing hormones.
Sperm	The male sex cell, or gamete
Egg	The female sex cell or gamete