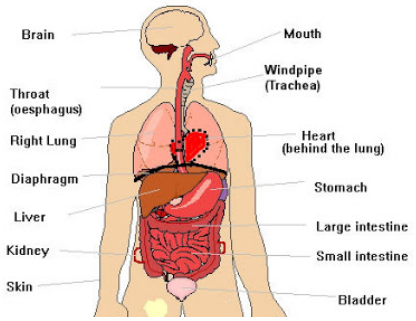
Science

Year 7 Knowledge Organisers

7A - Cells, Tissues, Organs and Systems

1. Life Processes	
Life Processes	If something can do all 7 life processes it is considered a 'living thing' They are; movement, reproduction, sensitivity, growth, respiration, excretion and nutrition.
Organism	A living thing.
Movement	Being able to move from place to place or move part of themselves.
Reproduction	Being able to make more living things like themselves.
Sensitivity	Being able to sense and react to things around them.
Growth	Being able to increase in size.
Respiration	Being able to release energy through respiration.
Excretion	Being able to get rid of waste materials.
Nutrition	Taking in substances (such as food) to help carry out the other processes.

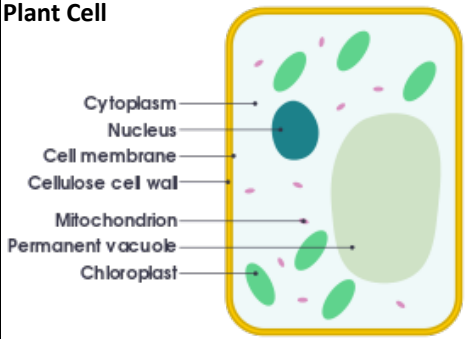
2. Organs	
Organ	A part of animals or plants that does an important job- made up of different tissues.
Function	The job or role something has.
Brain	Controls the body.
kin	The bodies biggest organ- used for protection and sensing things.

Lungs	Take in oxygen for respiration and excrete carbon dioxide.
Heart	Pumps blood around the body.
Liver	Makes and destroys substances.
Kidneys	Clean the blood and produce urine to excrete waste.
Bladder	Stores urine.
Stomach	Breaks up food.
Small Intestine	Breaks up food and absorbs it.
Large Intestine	Removes water from unwanted food.
Rectum	Stores faeces (waste material)
Human Organs	
Leaf	Traps sunlight to make food for a plant.
Stem	Carries substances around a plant.
Root	Holds the plant in place and takes in water and other substances.
Photosynthesis	The process by which a plant makes its own food.

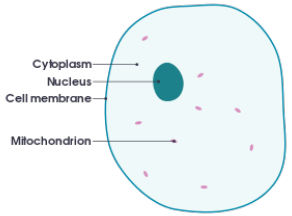
3. Tissues	
Tissues	Groups of the same cells doing the same job- make up organs.
The Heart	Made up of muscle tissue so it can move and pump the blood as well as fat tissue to protect it.
Root Hair Tissue	Small hairs on the outside of roots which help to take in as much water as possible.
Xylem Tissue	The tissue which carries water up through plants from the roots.

4. Cells	
Cells	The basic units from which all tissues and living things are made from.
Specialised	When something has features that allow it to do a particular job.
Cell Surface Membrane	Controls what enters and leaves the cell.
Nucleus	Controls the cell.
Cytoplasm	Jelly like substance where chemical reactions happen.
Mitochondria	(*mitochondrion- singular*) Where respiration happens.
Chloroplasts	Make food for the plant using photosynthesis- contains chlorophyll.
Cell Wall	Strengthens and supports the cell- made of cellulose.
Vacuole	Storage space filled with cell sap.

Plant Cell



Animal Cell



5. Organ Systems	
Organ Systems	A collection of organs working together.
Circulatory System	*Heart, blood vessels* Carries oxygen and nutrients around the body.
Digestive System	*Gullet, stomach, intestines* Breaks down food and takes nutrients into the blood.
Locomotor System	*Muscles, bones* Enables the body to move.
Urinary System	*Kidneys, bladder* Gets rid of waste materials produced in the body.
Breathing System	*Lungs, trachea* Allows exchange of gases between blood and lungs.
Nervous System	*Brain, nerves, spinal cord* Allows the body to sense things and react to them.
Water Transport System	*Roots, stem, leaves* Transports water around the plant.

7B - Sexual Reproduction in Animals

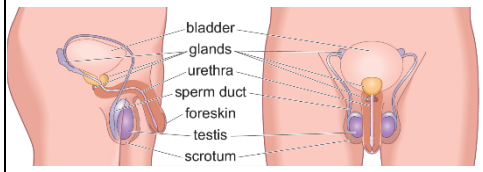
1. Animal Sexual Reproduction

Offspring	The new organisms produced by reproduction.
Sexual Reproduction	Reproduction that needs two parents to produce offspring.
Gametes	Sex cells
Sperm	Gamete that males make
Egg	Gamete that females make
Fertilisation	Sperm enters an egg cell and nuclei fuse forming a fertilised egg cell.
External Fertilisation	The sperm and egg cell meet outside of the body. e.g. fish
Internal Fertilisation	The sperm and egg cell meet inside the body.
Using External Fertilisation	Large numbers of eggs are produced because many get washed away. The parents don't look after their young.
Using Internal Fertilisation	Fewer egg cells produced because sperm is more likely to reach egg. The parents usually look after their young.

2. Reproductive Organs

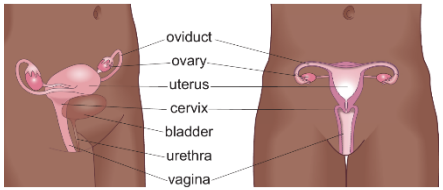
Testes	Where sperm cells are made.
Scrotum	Bag of skin containing the testes.
Sperm Ducts	Sperm travels through here after leaving the testes.
Glands	Fluids are added to the sperm- it is now called semen.
Urethra	The tube the semen leaves the body through.

Male Reproductive System



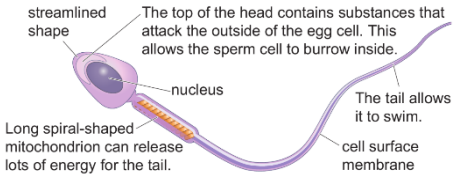
Ovary	Where the egg cells develop and are released from.
Oviduct	Tube lined with cilia (tiny hairs).
Uterus	Where the baby will develop if the egg is fertilised.
Cervix	Ring of muscle between uterus and vagina.
Vagina	Part that leads from the cervix to the outside.

Female Reproductive System

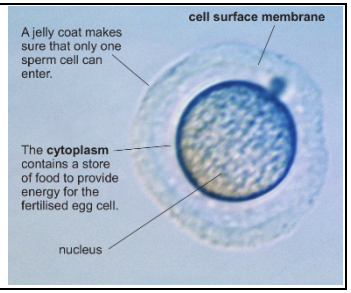


Puberty	When males start to produce sperm cells and egg cells in female start to mature.

Sperm Cell Adaptations



Egg Cell Adaptations



3. Becoming Pregnant

Sexual Intercourse	The erect penis is inserted into the vagina.
Ejaculation	Semen is pumped out of the urethra.
Route the sperm takes	Vagina → sucked up through cervix → uterus → oviduct → meets egg cell
Implantation	If fertilisation occurs the cell starts to divide forming an embryo which will then sink into the uterus lining. The woman is now pregnant.
Amniotic Fluid	Watery fluid to protect growing embryo / foetus.
Amnion	Bag containing the amniotic fluid.
Placenta	Allows oxygen, food and water to be passed from mother's blood into embryo's blood. Waste materials (like carbon dioxide) pass from embryo's blood into mother's blood.
Umbilical Cord	Carries the embryo's blood to and from the placenta.

4. Gestation and Birth

Gestation Period	The time from fertilisation until birth.
Foetus	When an embryo develops a full set of organs we call it a foetus (around 8 weeks).
Ultrasound Scans	Produce images of foetus to check for problems.
Harm to Baby	Alcohol, drugs, cigarette smoke and viruses can pass through placenta and harm foetus.
Premature	Baby born small and early.
Labour	The act of giving birth.
Stages of Giving Birth	1. contractions start and cervix begins to widen. 2. amnion breaks and amniotic fluid leaves vagina. 3. cervix at 10cm, stronger contractions pushes baby through. 4. Umbilical cord cut.
Afterbirth	The placenta is passed out of the vagina- end of labour.
Mammary Glands	Produces milk for babies- contains nutrients and antibodies to protect from disease

5. Growing Up

Sex Hormones	Released by brain, tests & ovaries- start puberty.
Changes to Boys During Puberty	Voice deepens, shoulders widen, hair grows, testes/ penis grow, sperm produced.
Changes to Girls During Puberty	Breasts develop, hair grows, hips widen, ovaries start to release eggs.
Menstrual Cycle	Days 1-5: uterus lining lost from body (**menstruation**) Days 6-14: egg cell starts to mature and is released around day 14 (**ovulation**) Days 14+: egg cell swept towards uterus, if not fertilised cycle starts again.

7C - Muscles and Bones

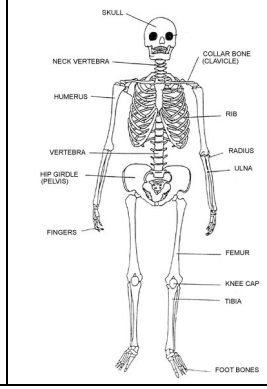
1. Muscles and Breathing

Breathing	The movement of muscles that allows us to take in and excrete gases.
Respiration	Process by which oxygen is used to release energy- produces carbon dioxide.
Gas Exchange	One gas is exchanged for another- oxygen goes into the blood, carbon dioxide leaves the blood.
Gas Exchange System	The organs that help with breathing / gas exchange- lungs, trachea, diaphragm
Muscle Cell Adaptations	Can change shape- contract (become short and fat) and relax (back to original shape)
Inhale	Breathing in
Exhale	Breathing out
Inhalation	The muscles in the diaphragm contract, moving it downwards. Muscles between the ribs contract, pulling the ribs up and out. Lungs increase in size allowing air to flow in.
Exhalation	The muscles in the diaphragm relax so it rises. Muscles between the ribs relax, moving the ribs down and in. Lungs decrease in size pushing air out.
Ventilation	The movement of air into and out of the lungs
Breathing Rate	Number of times you inhale and exhale in one minute.

2. Muscles and Blood

Pulse	The feeling of the heart beating that can be felt.
Pulse Rate	The number of pulse beats you feel in a minute.
How the Heart Pumps Blood	Chambers fill with blood and muscle tissue contracts pumping the blood out.
Blood Vessels	A tube that carries blood around the body.
Arteries	Carry blood away from the heart to capillaries.
Capillaries	Tiny blood vessels connecting arteries & veins.
Veins	Carry blood from capillaries towards heart.
Plasma	Main part of blood- the liquid part.
Red Blood Cells	Carry oxygen in the blood- haemoglobin in cells carries the oxygen.
Red Blood Cell Adaptations	No nucleus (more room for haemoglobin). Curved shape increases surface area to take in oxygen quickly.
White Blood Cells	Fight infections and keep us healthy.
Bone Marrow	Where red and white blood cells are made.

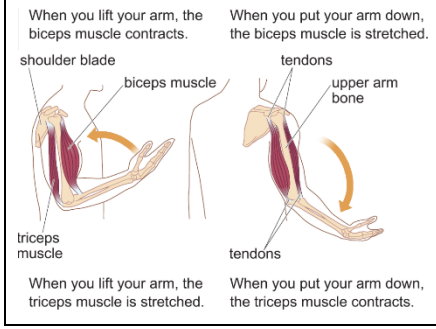
3. The Skeleton

Bone Structure	Spongy bone material keeps bones light. Compact bone material is hard and strong. Bone marrow inside bone reduces mass of bone.
Skeleton	Formed by the bones in the body- allows for support, protection and movement.
Backbone	Made up of smaller vertebrae- the bodies main support.
Skull	Made up of 22 bones- protects the brain.
Tendons	Connects muscle to bones.
Ligaments	Connects bones together.
Cartilage	Slippery tissue on the ends of bones.
Flexible Joint	Two or more bones meeting that can be moved.
The Human Skeleton	

4. Muscles and Moving

Locomotor System	The system that allows you to move parts of the body- muscles and bones.
Biomechanics	The study of how muscles and bones work together.
Movement	Muscles contract and pulls on bone it is attached to.
Antagonistic Pairs	Pairs of muscles that allow bones to move in two different directions.

Biceps and Triceps



Impulses	Messages sent from brain that tell muscles to contract.
Mitochondria	Where respiration happens in cells producing energy.

5. Drugs

Drug	Substances which changes the way the body works.
Medicine	Drugs used to help people with illness/injury.
Side-Effects	Harmful / unpleasant effects of using drugs.
Addictive	Feeling of not being able to cope without the drug.
Recreational Drugs	Drugs taken for pleasure- caffeine nicotine and alcohol are legal recreational drugs.
Cannabis	Can cause memory loss and mental illness.
Ecstasy	Can cause mental illness, kidney damage and death.
Cocaine	Addictive and blocks arteries.
Heroin	Addictive, collapses veins, causes vomiting & headaches
Reaction Time	The time taken to respond to a stimulus.
Stimulants	Decrease your reaction time- impulse carried faster. e.g. caffeine
Depressants	Increase your reaction time- impulses carried slower. e.g. alcohol

7D – Ecosystems

1. Variation

Habitat	The place where an organism lives.
Variation	The difference between organisms.
Continuous	Type of variation where the measurement can be any value in a given range. *e.g. height, mass*
Discontinuous	Type of variation where the measurement falls into certain categories. *e.g. eye colour, blood group*
Offspring	The new organism produced by reproduction.
Species	Group of organisms that can reproduce to produce offspring that can also reproduce.
Hybrid	The offspring of two different species. They cannot reproduce.

2. Adaptations

Environment	The conditions in a habitat.
Adaptations	Features that help an organism to survive in the environment where it lives.
Polar Bear Adaptations	• Thick fur to keep warm • small ears to stop heat loss • white fur for camouflage • rough soles to grip ice • large feed to spread out weight / swimming
Cactus Adaptations	• Stem stores water • roots cover large area to absorb water • no leaves to stop water loss
Jack Rabbit Adaptations	• large ears to allow heat to escape • large hind legs to increase running speed • gets all its water from food, doesn't drink
Community	All the animals and plants that live in a habitat.
Ecosystem	The community and all the physical environmental factors together.
Inherited Variation	Variation between features caused by an organism's DNA
Inherited Variation Between Same Species	Gametes contain different instructions for features. A different sperm and egg produce each offspring, so each has different features.
Identical Twins	Identical because they develop from one fertilised egg cell.

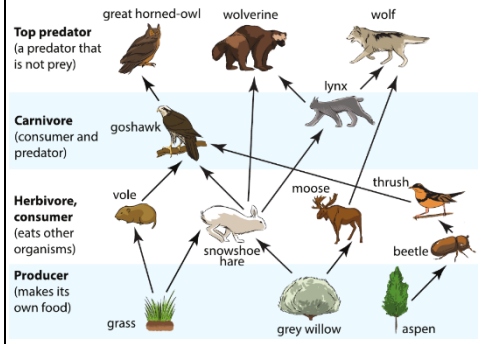
3. Effects of the Environment

Environmental Variation	Variation caused by environmental factors. *e.g. hairstyle, accent*
Daily Changes	Environmental changes during the day.
Seasonal Changes	Environmental changes during the year.
Nocturnal	Animals that are only active at night.
Nocturnal Animal Adaptations	Excellent eyesight Nocturnal owls have superb hearing as well and can fly.
Deciduous	Trees that lose their leaves in winter to stop water loss.
Evergreen	Trees with tougher leaves that don't lose much water so they keep them all year.
Hibernation	Organisms become inactive in winter so they don't need food.
Migration	Birds fly to warmer places for winter to find food.

4. Effects on the Environment

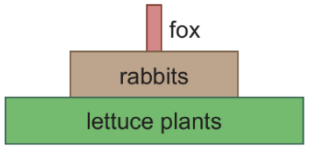
Resources	What an organism needs to survive and grow- oxygen, food, water, etc. for animals.
Population	The numbers of a specific organism.
Food Chain	Represents what eats what in a habitat Grass → hare → lynx
Competition	Organisms compete over the resources that they need.
Food Web	Formed by joining together all food chains in an ecosystem.

Food Web Example



Interdependent	Organisms in an ecosystem all depend on one another.
Predator	Eats another animal.
Prey	Eaten by another animal.

5. Transfers in Food Chains

Food Chain Arrows	Represent energy passed between organisms.
Energy Flow	Energy is lost at each stage along a food chain due to being released by respiration for movement etc. and some food remains undigested.
Pyramid of Numbers	Diagram showing number of each organism at each stage of a food chain. 
Pesticides	Poison that kills pests.
Pests	Organisms that cause problems.
Persistent	Poisons that are not broken down in nature.
Poisons in a Food Chain	Poisons get more concentrated the further along a food chain.
DDT	Persistent pesticide used in the UK that caused bird shells to become weak and break easily. Banned in 1984.

Lesson	Memorised?
1. Variation	
2. Adaptations	
3. Effects of the Environment	
4. Effects on the Environment	
5. Transfers in Food Chains	

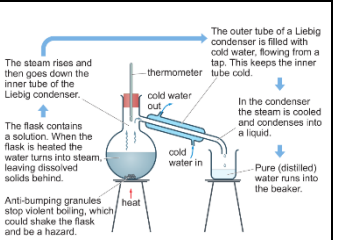
7E – Mixtures and Separation

1. Mixtures	
Mixture	Two or more substances jumbled together but not joined together.
Suspension	A mixture of a solid and liquid, where the solid bits are heavy enough to settle out if the mixture is left to stand.
Colloid	A mixture of a solid, liquid or gas in a solid, liquid or gas where the substances do not settle out if left to stand.
Dispersed	Spread out without settling out, such as the bits in a colloid.
Opaque	Cannot be seen through- colloids are opaque / cloudy.
Solution	When a substance has dissolved in a liquid.
Transparent	Light can pass through and it can be seen through- solutions are transparent.
Filter	Something through which a liquid is passed to remove suspended pieces of solid.

2. Solutions	
Solvent	The liquid in which a substance dissolves to make a solution.
Solute	The substance that has dissolved in a liquid to make a solution.
Dissolve	When a substance breaks up into such tiny pieces in a liquid that it can no longer be seen and forms a solution.
Soluble	Describes a substance that can dissolve in a liquid.
Conservation of Mass	The total mass of a solution is the same as the mass of the dissolved substance plus the mass of the liquid at the start.
Saturated	A solution that contains so much dissolved solute that no more solute can dissolve in it.
Solubility	The amount of a substance that dissolves in a particular solvent at a particular temperature to make a saturated solution.

3. Evaporation	
Evaporation	When a liquid changes into a gas. Can be used to separate a liquid from the solid dissolved in it.
Sodium Chloride	The scientific name for table salt that we use on our food.
Rock Salt	When sodium chloride is found in thick layers of rock underground.
Extracting Rock Salt	Can be dug up or mined. Water can be pumped into layers of salt underground, dissolving the sodium chloride which is then pumped to the surface and heated to evaporate the water, leaving behind sodium chloride.
Boiling	When there is liquid turning into a gas in all parts of a liquid- creates bubbles of gas in the liquid.
Boiling Point	The temperature at which a liquid boils.

4. Chromatography	
Chromatography	Used to separate substances dissolved in a mixture.
Paper Chromatography	A concentrated dot of a mixtures is placed at the bottom of special chromatography paper. The bottom of the paper is dipped into a solvent (such as water). As the solvent moves up the paper is carries the dissolved substances.
Concentrated	A solution that contains a large amount of solute dissolved in a small amount of solvent.
Chromatogram	The results of chromatography such as a dried piece of paper for paper chromatography showing when the dissolved solids have been separated.
How chromatography works	Different substances in a mixture are carried at different speeds, depending on how soluble they are, which separates them out from each other.

5. Distillation	
Desalination	Separating water from the salts in salty/sea water to produce fresh drinking water.
Distillation	The process of separating a liquid from a mixture by evaporating the liquid and then condensing it to be collected.
Steam	Water as a gas.
Condenses	When a substance changes from its gas state into its liquid state.
Pure	A single substance that does not have anything else in it. (Pure water only contains water and no dissolved solutes)
Distillation Apparatus	
Solar Still	Energy from the Sun is used to evaporate salty/dirty water which is then condensed, forming pure/clean water.

7F – Acids and Alkalis

1. Hazards

Hazard	Something that could cause harm.
Risk	The chance that a hazard will cause harm.
Hazard Symbols	Internationally agreed symbols representing the type of risk from using a substance.
	**Dangerous to Environment** Can cause long term damage to animal and plant life.
	**Toxic** Poisonous and can cause death if taken into the body.
	**Corrosive** Attacks certain substances like metals, stonework & skin.
	**Explosive** Heating may cause an explosion.
	**Flammable** These substances catch fire easily.
	**Caution** similar to toxic/corrosive but less serious- may cause skin irritation
Diluted	Dangerous substances are mixed with water to make them less dangerous.

2. Indicators

Indicator	A substance that changes colour in solutions of different acidity/alkalinity.
Litmus	An indicator made from a type of lichen.
Acid	Turns litmus indicator **red**.
Alkali	Turns litmus indicator **blue**.
Neutral	A substance that is neither acidic or alkaline.
Red Cabbage	Can be used as an indicator.

3. Acidity and Alkalinity

pH Scale	A scale measuring acidity and alkalinity in numbers.

The pH Scale

Acid	pH lower than 7- the lower the number the more acidic.
Neutral	pH of 7
Alkali	pH higher than 7- the higher the number the more alkaline.
Universal Indicator	Indicator that gives a range of colours depending on the pH.
Acid Rain	Rainwater more acidic than usual due to pollution.

4. Neutralisation

Neutralisation	A reaction where an acid and alkali are mixed together forming a neutral substance.
Chemical Reaction	A change in which one or more new substance is formed.
Word Equation	Used to model chemical reactions.
Reactants	The starting substances- written on left of word equation.
Products	The new substances made- written on right of word equation.
Neutralisation General Word Equation Acid + alkali → salt + water	
Neutralisation Word Equation Example Hydrochloric acid + sodium hydroxide → sodium chloride + water	
Salts	Formed when acids and alkalis react. Different acids and alkalis will form different salts.
Sodium Chloride	The chemical name for common/table salt.

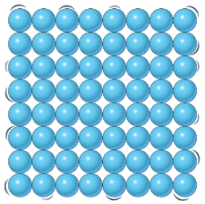
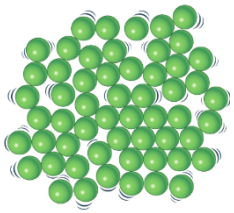
5. Neutralisation in Daily Life

Base	Any substance that neutralises an acid forming a salt and water.
Alkali	A soluble base
Antacids	Remedy for indigestion that neutralise the stomach acid
Antacid Word Equation Example Magnesium hydroxide + hydrochloric acid → magnesium chloride + water	
Toothpaste	Contains bases that neutralise acids in your mouth from food that you eat.
Bee Sting Remedy	A bee sting, being acidic can be treated with a weak alkali like baking soda.
Wasp Sting Remedy	A wasp sting, being alkali, can be treated with a weak acid like vinegar.
Cleaning Metals	Acids clean the rust off metals using a neutralisation reaction.
Waste Gases	Acidic waste gases from industries are sprayed with calcium hydroxide to neutralise them.

7G – The Particle Model

1. Solids, Liquids and Gases	
States of Matter	The three forms that a substance can be in; solid, liquid or gas.
Solid Properties	Do not flow Fixed shape Fixed volume Cannot be compressed
Liquid Properties	Can Flow No fixed shape Fixed volume Cannot be compressed
Gas Properties	Can flow No fixed shape No fixed volume Can be compressed
Flow	To move and change shape smoothly.
Volume	The amount room something takes up. Measured in cubic centimetres (cm^3).
Compressed	Squashed into a smaller volume.
Pressure	The amount of force pushing on a certain area.

2. Particles	
Particle Theory	A theory used to explain the different properties and observations of solids, liquids and gases.
Particles	Tiny pieces of matter that everything is made out of.
Forces	Tiny forces of attraction hold the particles together.

Solid Particle Properties	Fixed arrangement of particles held closely together that cannot move over each other but vibrate.
Liquid Particle Properties	Held closely together but not in a fixed arrangement and can move over each other.
Gas Particle Properties	Far apart from each other and free to move about in all directions.
Solid Particle Diagram	
Liquid Particle Diagram	
Gas Particle Diagram	
Vibrate	To move backwards and forwards.

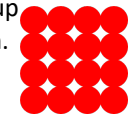
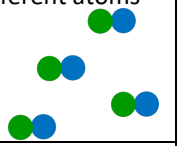
3. Brownian Motion	
Brownian Motion	An erratic movement of small specks of matter caused by being hit by the moving particles that make up liquids or gases.
Trace	Used to plot the movement of a particle and used as evidence for Brownian motion.
Molecule	Two or more atoms joined together in a group.
Nanometre	A unit of measurement. 1 nanometre (nm) is 0.000 000 001 metres (m)

4. Diffusion	
Diffusion	The movement of particles spreading out and mixing with each other without anything moving them.
Particle Theory and Diffusion	Occurs quickly in gases because they are able to move freely in all directions. Diffusion is slower in liquids because the particles are still moving but not as freely as in a gas. Diffusion cannot occur in solids because the particles are in a fixed positon.
Small Intestine	Diffusion of particles of essential substances in our food pass through the wall of the small intestine.

5. Air Pressure	
Air Pressure	The force on a certain area caused by air molecules hitting it.
High Air Pressure	Makes sure tyres are inflated. Can also affect the weather making it dry and settled.
Vacuum	A completely empty space containing no particles (not even air).
Straws	Straws work because when you suck, you reduce the pressure inside the straw so the air pressure outside the straw is grater and the liquid is pushed up.

7H – Atoms, Elements and Molecules

1. The Air We Breathe

Particles	Tiny pieces of matter that make up everything.
Atoms	The simplest particles of matter that make up everything.
Elements	A substance made up of one type of atom. 
Molecules	Two or more atoms joined together in a group. 
Compound	Two or more different atoms joined together. 
Mixture	Two or more substances jumbled together but not chemically joined together. 
Periodic Table	A table that lists all of the known elements.
Air	A mixture of different gases- nitrogen, oxygen, argon, carbon dioxide
Pure	A substance made up of a single element/compound and nothing else.

2. Earth's Elements

Chemical Symbols	The 1 or 2 letters given to each element
Earth's Crust	Made up of oxygen, iron, silicon, aluminium, calcium and other elements.
Naturally Occurring Elements	Usually found as compounds, some found pure. Can be extracted from compounds by simple chemical reactions.
Properties	What an element is like, its appearance and how it behaves.
Recycling	Using a material again to save resources and make sure we don't run out.
Carbon	Can be found as diamond and graphite. The different properties of each form are due to the ways the atoms are joined together.

3. Metals and Non-Metals

Common Metal Properties	Solid, high melting point, strong, flexible, malleable, shiny and good conductors of heat and electricity.
Metals	Three-quarters of all elements are metals- found on the left side of the periodic table.
Common Non-Metal Properties	Low melting points, brittle, not shiny and poor conductors of heat and electricity.
Malleable	Able to be beaten and bent into shape.
Flexible	Able to bend without breaking.
Conductor	A substance that allows something to pass through it (e.g. heat, electricity).
Brittle	Not easily bent- breaks under pressure.
Magnetic	Iron, nickel and cobalt are the only magnetic elements.
Mercury	The only metal that is liquid at room temperature.

4. Making Compounds

Silicon Dioxide	The most common compound in the Earth's crust- found in sand, quartz and granite.
Forming Compounds	The first stage often involves heating a mixture of elements. Energy is often given out when elements react to form compounds.
Iron Sulfide	Compound formed by heating a mixture of iron and sulfur.
Bonds	Formed between atoms when compounds are formed.
Iron Sulfide Properties	Iron can be separated from sulfur using a magnet but iron sulfide is not magnetic.
Metal Ores	A rock containing a compound of a metal.
Naming Compounds	If one of the elements in the compound is a metal its name goes first. The non-metal at the end of the compound's name has its name changed so it sends in -ide.

5. Chemical Reactions

Chemical Reaction	A change in which one or more new substance is formed.
Word Equation	Used to model chemical reactions.
Reactants	The starting substances- written on left of word equation.
Products	The new substances made- written on right of word equation.
Thermal Decomposition	Using heat to break down a compound- used to extract metals from their compounds.

Thermal Decomposition of Mercury Oxide
Mercury oxide → mercury + oxygen

Carbonates	Compounds containing a metal, carbon and oxygen.
Calcium Carbonate	Found in limestone, chalk and marble.

Thermal Decomposition of Calcium Carbonate
Copper carbonate → copper oxide + carbon dioxide

Test for Carbon Dioxide	Carbon dioxide turns limewater cloudy.
-ate	A compound that contains two elements plus oxygen will end in -ate. (e.g. zinc sulfate contains zinc, sulfur and oxygen)

7I - Energy

1. Energy from Food	
Energy	Needed to live, helps us to grow and repair our bodies, move and keep warm. Food is a source of energy.
Joule	A unit for measuring energy.
Kilojoule	1000J = 1kJ
Diet	The food that a person eats.
Weight	The amount of force with which gravity pulls things- measured in Newtons (N).
Balanced Diet	Eating a variety of foods to provide all the things that the body needs.
Nutrients	Substances needed from food.

2. Energy Stores and Transfers	
Transferred	When energy is moved from one store into another.
Forces	A push, pull or twist and a type of energy transfer.
Electricity	A way of transferring energy through wires.
Stored	When energy is captured within an object and can be moved to another store by energy transfers.
Chemical Energy	Energy stored in chemicals (such as food, fuel and batteries).
Kinetic Energy	Energy stored in moving things.
Thermal Energy	Energy stored in hot objects.
Strain Energy	Energy stored in stretched or squashed objects. Also called elastic potential energy.
Gravitational Potential Energy	Energy stored in objects in high places that can fall down.
Nuclear Energy	Energy stored inside materials (also called atomic energy).
Law of Conservation of Energy	The idea that energy can never be created or destroyed, only transferred from one store to another.

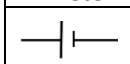
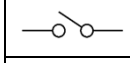
3. Fuels	
Fuel	A substance that contains a store of chemical or nuclear energy that can easily be transferred.
Nuclear Fuels	Used in nuclear power stations to generate electricity.
Uranium	A radioactive metal that can be used as a nuclear fuel.
Generate	To produce electricity.
Fossil Fuels	A fuel formed from the dead remains of organisms over millions of years.
Coal	A fossil fuel made from the remains of plants.
Oil	A fossil fuel made from the remains of microscopic dead plants and animals that lived in the sea.
Natural Gas	A fossil fuel made from the remains of microscopic dead plants and animals that lived in the sea.
Non-Renewable	An energy resource that will run out because we cannot renew our supplies of it.
Renewable	An energy resource that will never run out (such as solar power)
Biofuels	A fuel made from plants or animal droppings.
Hydrogen	Can be used as a fuel by combining with oxygen from the air to produce electricity.

4. Other Energy Resources	
Solar Power	Generating electricity using energy from the Sun.
Solar Panel	Flat plats that use energy from the Sun to heat water.
Solar Cell	Flat panels that use energy transferred by light from the Sun to produce electricity.
Solar Power Station	A large power station using the Sun to heat water to make steam which then generates electricity.
Wind Turbine	Generates electricity using energy transferred from the wind.
Hydroelectric Power	Electricity generated by moving water turning turbines and generators.
Geothermal Power	Electricity generated using heat from rocks underground.
Photosynthesis	Carbon dioxide + water → glucose + oxygen

5. Using Resources	
Fossil Fuel Advantages	Cheap compared to the others and convenient to use in cars/vehicles.
Fossil Fuel Disadvantages	Non-renewable Releases polluting gases when burnt.
Nuclear Advantages	No polluting gases generated.
Nuclear Disadvantages	Non-renewable Very expensive Dangerous waste materials
Renewable Advantages	No polluting gases Renewable
Renewable Disadvantages	Most not available all the time and only available in specific locations.
Climate Change	Fossil fuels are making the earth warmer due to the carbon dioxide given off when they are burnt.
Efficiency	How much of the energy transferred by a machine is useful.
Using Less Fossil Fuels	Using efficient appliances, insulating homes, public transport/walking/cycling

7J – Current Electricity

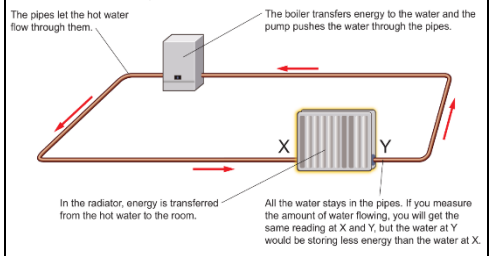
1. Switches and Current

Component	Something in a circuit.
Switch	Closing a switch completes the circuit allowing the current to flow.
Bulbs	Electricity flowing through makes the filament glow.
Current	The amount of electricity flowing around a circuit. Measured in amperes (A).
Current in a Series Circuit	Current is not used up as it goes around the circuit, it is the same everywhere.
Ammeter	Used to measure current.
	Cell circuit symbol
	Bulb circuit symbol
	Switch circuit symbol
	Ammeter circuit symbol

2. Models for Circuits

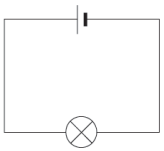
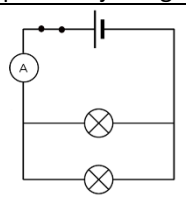
Models	A way of showing or representing something.
Advantages of Using Models	Allow us to help think about complicated ideas in science.
Charges	An electric current is a flow of charges carrying energy from the cells to the components.
Conductors	Charges can move through them easily (e.g. metals).
Insulators	Charges cannot move through them easily.

Model Example

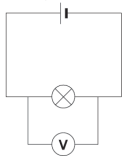
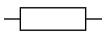
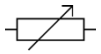


Model Example Explanation	•Boiler represents the cell •Pipes represent the wires •The radiator represents a component •Water represents the current

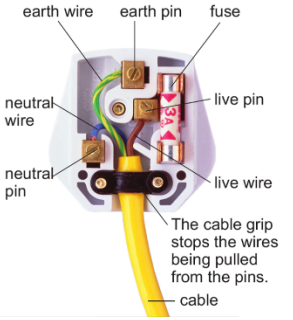
3. Series and Parallel Circuits

Series Circuit	A circuit with all the components in one loop.
Series Circuit Diagram	
Parallel Circuit	A circuit with branches that split apart and join again.
Parallel Circuit Diagram	
Parallel Circuit Advantages	Each bulb/component can be turned on individually. If one bulb/component breaks the components in other branches stay on (unlike a series circuit).
Current in a Parallel Circuit	The current splits when it reaches a branch. The current in all the branches add up to the current in the main part of the circuit.
Adding Bulbs	If you add bulbs into a series circuit the current gets smaller and the bulbs dimmer. In a parallel circuit if you add bulbs on different branches they stay bright.

4. Changing the Current

Voltage	A way of saying how much energy is transferred by electricity. The voltage of the cell helps push the charges around the circuit. Measured in volts (V).
Voltmeter	Used to measure voltage.
Connecting a Voltmeter	Voltmeters are connected across a component. 
Voltage in a Series Circuit	The voltage across all the components adds up the voltage across the cell.
Resistance	How difficult it is for electricity to flow through something.
Resistor	A component that makes it difficult for electricity to flow- reduces size of current.
	Voltmeter circuit symbol
	Resistor circuit symbol
	Variable resistor circuit symbol

5. Using Electricity

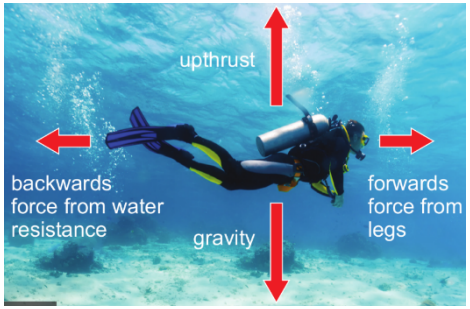
Hazard	Something that could cause harm.
Risk	The chance that a hazard will cause harm.
Electricity Risks	Can cause fires, burns to the body and stop the heart from working.
Reducing Risks	Don't touch bare metal parts of plugs, don't poke things into sockets, keep water away from electricity, don't plug too many things into a socket and never use a damaged wire.
Fuse	A wire that melts if the current is too high, breaking the circuit.
Circuit Breaker	Cuts off the current if it is too high.
Plug Wires	**Live** and **neutral** wires make an appliance work; **earth** wire is for safety.
Plug Diagram	

7K – Forces

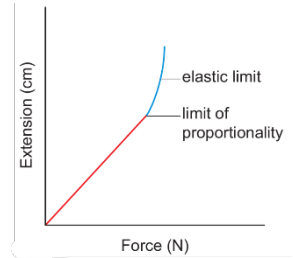
1. Different Forces	
Force	A push or a pull.
Contact Forces	The thing providing the force needs to touch an object to affect it. *Friction, air resistance, water resistance, upthrust*
Upthrust	The force that makes things float.
Air Resistance	A force acting on objects moving through the air.
Water Resistance	A force acting on objects moving through water.
Non-Contact Forces	Forces that can affect an object from a distance. *Gravity, static electricity, magnetism*
Gravity	A force that pulls objects downwards.
Static Electricity	A force that attracts things.
Magnetism	A force that attracts objects made of iron, nickel or cobalt.
Newton (N)	The units for measuring forces.
Weight	The force of gravity pulling on something- measured in Newtons (N)
Mass	The amount of matter that makes up something- measured in kilograms (kg)

Representing Forces	We draw arrows on force diagrams to show the direction of a force; a bigger arrow shows a bigger force.

Force Diagram



2. Springs	
Stretched	Made longer
Compressed	Made shorter
Spring	Made from coils of wire,
Extension	The difference between the original length and the stretched length.
Elastic	An object that returns to its original length when the force is removed.
Investigating Extension	Hang a spring from a clamp and measure its length. Add increasing numbers of masses and measure the extension each time.
Hooke's Law	Extension is proportional to the force applied.
Proportional	A relationship between two variables where if one doubles, the other will double.
Limit of Proportionality	The point at which the extension and force are no longer proportional.

Elastic Limit	The point at which the spring cannot return to its original length.
Force Meter	Springs are used inside to measure the force.
How Extension Depends on Force	

3. Friction	
Friction	Force between two touching objects.
Increasing Friction	Using certain materials like rubber (used on racing cars to stop them from sliding off the road).
Reducing Friction	Make surfaces smooth or by using lubricants such as oil or grease.
Lubrication	Adding a lubricant
Friction Damage	Friction can wear things away like brake pads on a bike. Friction between parts of a car can cause it to overheat and stop working.

4. Pressure	
Pressure	The amount of force pushing on a certain area.
The Size of Pressure	Depends upon the size of the force and the size of the area it is pushing on.
Pressure in Sport	Snowshoes spread out weight, reduce pressure and stop people sinking into soft snow.
Pressure in Everyday Life	It is easier to cut something with a sharp knife because it has a smaller edge so the force is concentrated over a smaller area.
Pressure formula	$\text{pressure} = \frac{\text{force}}{\text{area}}$
Pascal (Pa)	The units for measuring pressure. 1Pa = 1N/m^3

5. Balanced and Unbalanced Forces	
Balanced Forces	Two forces of the same size acting upon an object in opposite directions. Balanced forces will not change the speed of a moving object.
Unbalanced Forces	When one of the forces acting upon an object is larger than the other. If acting on a moving object unbalanced forces will change its speed.
Stationary	Not moving- stationary objects have balanced forces acting on them.

Force Diagram