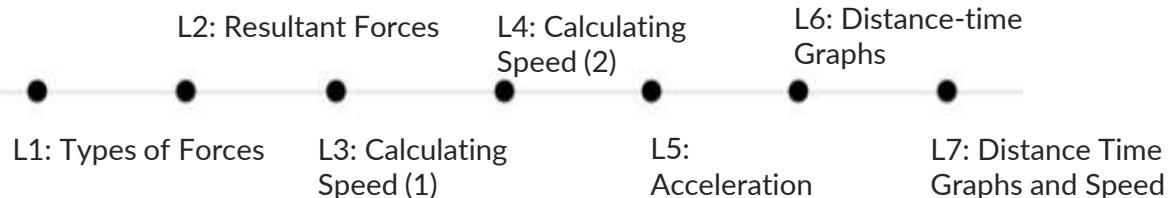




Y7 Forces: Speed Knowledge Organiser

Key Question: How do forces affect motion?



This unit develops your understanding of motion by introducing speed, average speed, acceleration and DT graphs. You will learn how to calculate speed using equations, interpret distance-time graphs, and explain how forces affect an object's motion. This knowledge provides the foundations required for success in AQA GCSE Combined Science, particularly Physics topics on P5 Forces. The key concepts of **forces** will be revisited throughout KS3 during units on gravity, contact forces and pressure

L1 Types of Forces

A force is a **push** or **pull** that acts on an object due to the interaction with another object. The units for force are **Newtons (N)**.

Forces can be:

Contact forces

Need physical contact.

- Friction
- Air resistance (drag)
- Normal contact force
- Tension
- Upthrust



Non-contact forces

Act at a distance.

- Gravity
- Magnetic force
- Electrostatic force



A contact force is where there are interacting surfaces- the two objects must be touching for the force to act. If the objects do not need to be touching for the force to act, the force is a non-contact force.

L2 Resultant Forces

The resultant force is the overall force on an object.

Balanced forces

Forces are equal and opposite.
Resultant force = 0 N
Object stays still or moves at constant speed.



Unbalanced forces

Forces are not equal.
Resultant force $\neq$ 0 N
Object speeds up, slows down or changes direction.



Resultant force = 20 N to the left

L3 & 4 Calculating Speed

Relative motion is how the movement of an object appears to an observer. An object can seem to move faster, slower, or even be stationary depending on the observer's own motion. **Example:** A passenger sitting on a train appears **stationary** to another passenger but **moving** to someone standing on the platform.

Vocabulary Power

Speed	The distance travelled in a given time.
Average Speed	Total distance travelled $\div$ total time taken.
Acceleration	The rate at which speed increases or decreases.
Relative Motion	The speed of an object compared with an observer.
Resultant Forces	The overall force acting on an object after all forces are combined

L3 & L4 Calculating Speed

Speed

$$\text{Speed} = \text{distance} \div \text{time}$$

Units:

m/s (metres per second)

Example:

If a car travelled 240 metres in 60 seconds – how fast was it travelling?

F: Speed = Distance / Time

I: Speed = 240 / 60

F: -

A: 4m/s

L5 Acceleration

Acceleration is how quickly speed increases or decreases.

$$\text{acceleration} = \frac{\text{change in speed}}{\text{time taken}}$$
$$a = \frac{\Delta v}{t}$$

Units: m/s² (metres per second squared)

Speeding up (positive acceleration)



Speed increases.

Slowing down (negative acceleration)

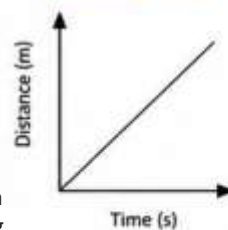


Speed decreases.

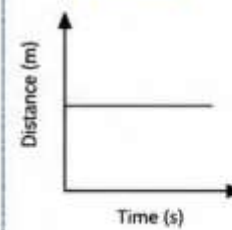
L6 and L7 Distance Time Graphs and Speed

Distance-time graphs show how distance changes over time.

Constant speed



Stationary



Changing speed (acceleration)



Speed = gradient of the line

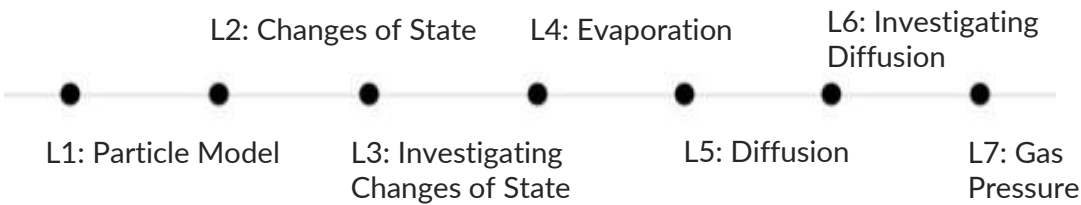
$$\text{speed} = \frac{\text{change in distance}}{\text{change in time}}$$

Steeper Speed =
Faster Speed
Shallower Gradient =
Slower Speed



Y7 Matter: Particle Model Knowledge Organiser

Key Question: What is matter made up of?

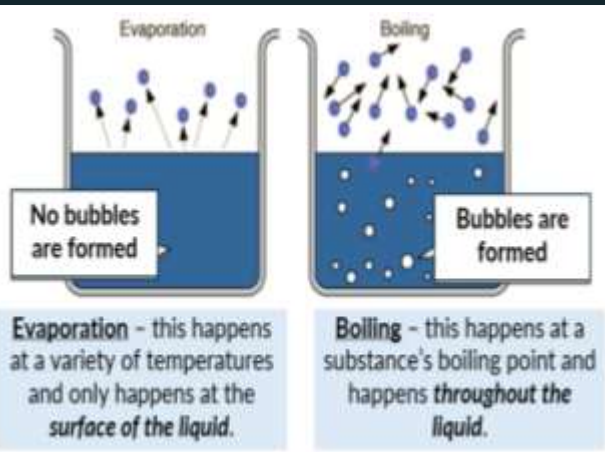


This unit develops the particle model, explaining particles, changes of state, diffusion and pressure, which provides you with the knowledge required to be successful at AQA GCSE Combined Science, particularly Chemistry topics on particle theory, states of matter and gas pressure, and Biology topics such as diffusion and exchange surfaces. The 'matter' key concept will be revisited throughout KS3 during the units separating mixtures, elements and periodic table.

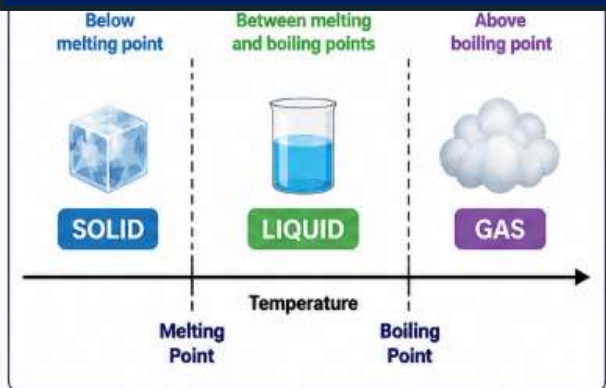
L1 Particle Model

SOLID	LIQUID	GAS
✓ Particles are close together.	✓ Particles are close together.	✓ Particles are spaced far apart.
✓ Particles are arranged in a regular pattern .	✓ Particles are arranged randomly .	✓ The space between particles is called a vacuum .
✓ Particles can only vibrate around their fixed position .	✓ Particles can move around each other.	✓ Particles move randomly .

L4 Evaporation



L2 and L3 Changes of State



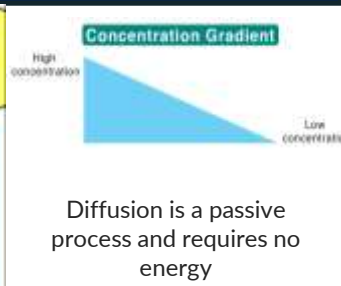
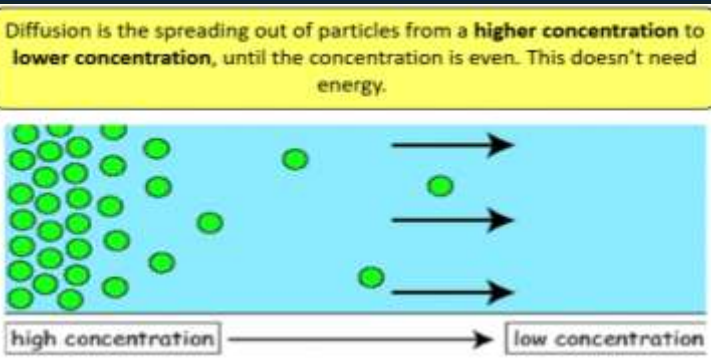
- In a liquid some particles have more energy than others.
- A particle with more energy is closer to the surface of the liquid.
 - It breaks free from the bonds with other particles.
 - The particle leaves the liquid.
 - It becomes part of the gas above the surface.
 - It has now evaporated



Vocabulary Power

Particle	A tiny piece of matter that makes up all substances (e.g. atoms, molecules, or ions).
Melt	The change of state when a solid becomes a liquid
Freeze	The change of state when a liquid becomes a solid
Evaporate	The process where a liquid changes into a gas at the surface of the liquid.
Condense	The change of state when a gas becomes a liquid
Diffusion	The spreading out of particles from an area of high concentration to an area of low concentration.
Pressure	The force exerted on a surface per unit area

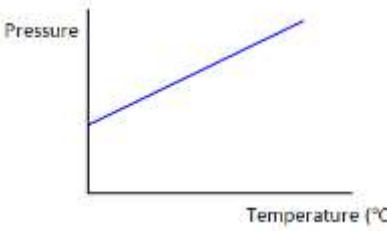
L5 and L6 Diffusion



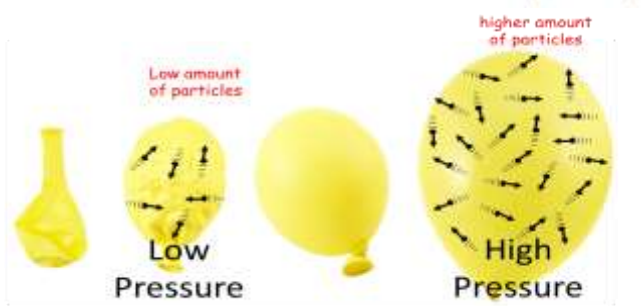
L7 Gas Pressure

What is gas pressure?

- The **particles** in a gas move randomly in different directions.
- The particles **collide** with the walls of the container
- This exerts a **force** on the walls of the container.



- Pressure is force per unit **area**, so the particles exert a **pressure**.
- Temperature and the number of particles in the container increase gas pressure

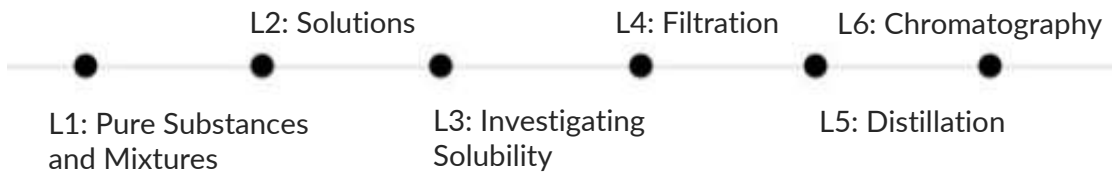




Y7 Matter: Separating Mixtures

Knowledge Organiser

Key Question: How can we separate mixtures?



This unit develops your understanding of pure substances, mixtures and the methods used to separate them based on their properties. You will learn how substances dissolve to form solutions, investigate solubility, and use techniques such as filtration, evaporation, distillation and chromatography to separate mixtures. This knowledge provides the foundations required for success in AQA GCSE Combined Science, particularly Chemistry topic C8 Chemical Analysis. The key concept 'matter' will be revisited throughout KS3 during the units: particle model, elements and the periodic table.

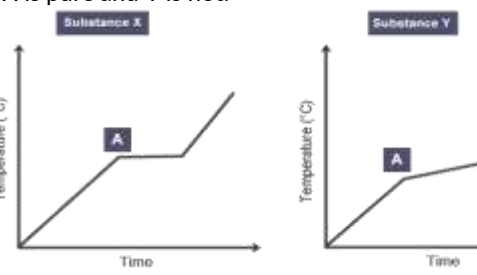
L1 Pure Substances and Mixtures

Pure substances are a single element or compounds not mixed with any other substance (e.g. pure water or sodium chloride)

Mixtures
Made of two or more substances not chemically joined. Can be separated using physical methods.



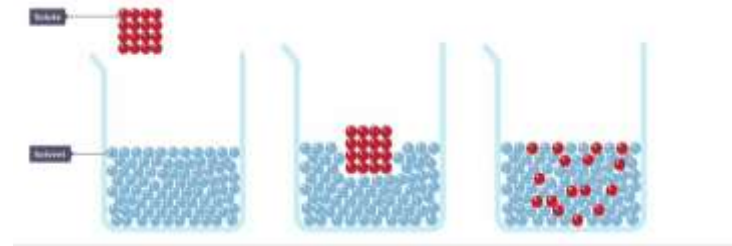
A pure substance has a fixed melting point and a fixed boiling point. Mixtures melt over a range of temperatures. Substance X is pure and Y is not.



L2 Solutions

A solution is made when a soluble solute is dissolved into a solvent

- Key points**
- Solute + solvent → solution
 - Soluble substances dissolve.
 - Insoluble substances do not dissolve.
 - Solutions are clear and do not settle.



Dissolving occurs when particles of a solvent collide with the particles of a solute.

They surround the particles of the solute gradually moving them away from each other until they are evenly spread throughout the solvent.

L3 Investigating Solubility

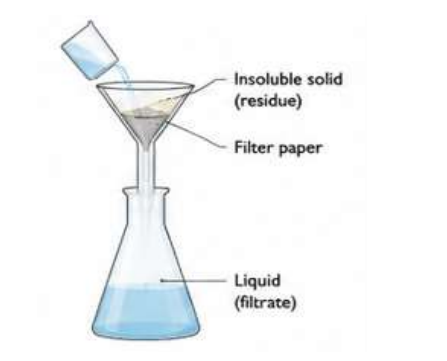
- When a solute is added to a solvent:
- It dissolves until no more will dissolve.
 - The maximum mass that will dissolve in a given volume at a certain temperature is the solubility.
 - Solubility increases with temperature (for most solids).

A solution in which no more substance can be dissolved at that temperature is called a **saturated solution**.

Vocabulary Power	
Solvent	A substance, usually a liquid, that dissolves a solute.
Solute	A substance that is dissolved in a solvent
Dissolve	When a solute mixes completely with a solvent
Solution	A mixture formed when a solute dissolves in a solvent
Soluble	A substance that can dissolve
Solubility	How easily a solute dissolves in a given volume of solvent (the maximum mass that has the highest solubility)
Pure	Something made up from only one substance
Mixture	Two or more different substances not chemically joined together.
Formulation	A mixture designed for a specific purpose
Filtration	Separates an insoluble solid from a liquid using a filter.
Distillation	Separates a solvent from a solution by boiling and condensing it.
Evaporation	Separates a soluble (dissolved) solute by heating the solution so the liquid turns into a gas
Chromatography	Separates dissolved substances because they travel at different speeds through paper.

L4 Filtration

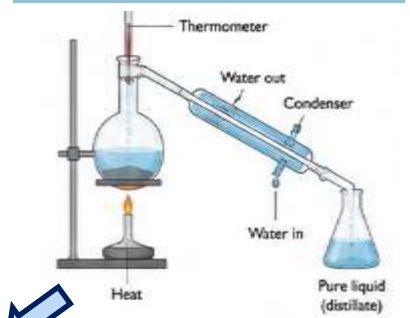
Used to separate an **insoluble** solid from a liquid using a filter to produce a solution called 'filtrate'. This could be used to separate sand from water.



The solution is heated so the solvent evaporates. The vapour passes into a condenser, where it cools and condenses back into a pure liquid (the distillate) leaving the solute in the original round bottomed flask

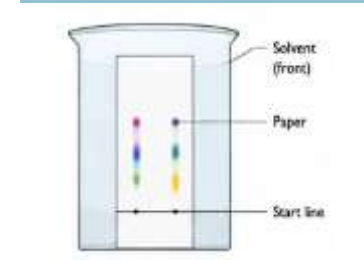
L5 Distillation

Used to separate a solvent (liquid) from a solution (e.g. inks/dyes/water from salt water) to produce a pure liquid called the 'distillate'.



L7 Chromatography

Used to separate mixtures of soluble (dissolved) substances from a solvent often seen with coloured inks or dyes. The start line must be drawn in pencil.



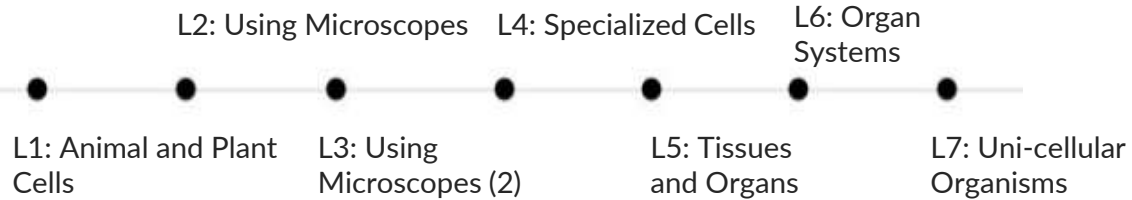
On a chromatogram like this - one spot in a vertical column means the substance is pure; whereas two or more spots means it is impure





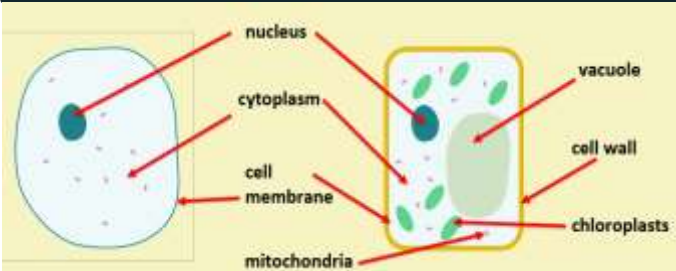
Y7 Organisms: Cells Knowledge Organiser

Key Question: What are living organisms made of?



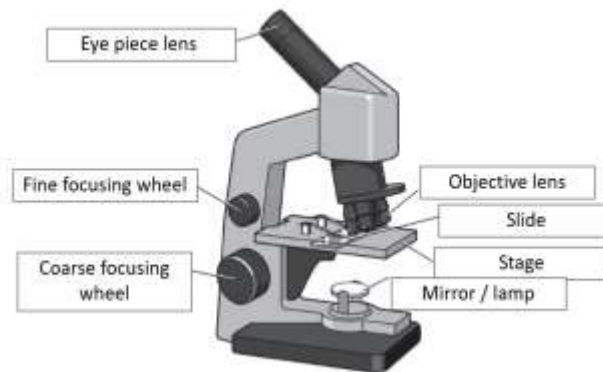
This unit develops your understanding of cells. You will study unicellular and multicellular organisms, the structure of animal and plant cells, how microscopes work, specialised cells, and how cells are organised. This knowledge provides the foundations required for success in AQA GCSE Combined Science, particularly Biology topics on cell structure, microscopy, cell division, transport in cells, organisation, and specialised cells. The "organisms" key concept will be revisited throughout KS3, during units on movement, breathing and respiration, digestion, and microbes and disease.

L1 Animal and Plant Cells



Organelle	Function (Job)
Nucleus	Controls the cell, contains DNA
Cytoplasm	The jelly-like substance inside cells chemical reactions take place
Cell Membrane	Controls what enters / leaves the cell
Cell Wall	Gives structure and support to the cell
Vacuole	Stores sugars/salts in a liquid called sap
Chloroplast	Contains chlorophyll and carries out photosynthesis for the plant
Mitochondria	Where aerobic respiration happens
Ribosomes	Where protein synthesis happens / makes proteins

L2 and 3 Microscopes



Using a Microscope

1. Select the **lowest power objective lens**.
2. Place a **thin specimen on a slide on the stage**.
3. Use the **coarse focusing wheel** to bring the objective lens close to the slide.
4. Look through the **eyepiece lens**.
5. Turn the coarse focus wheel slowly, **moving the stage away** until the image begins to **focus**.
6. Then, turn the fine focus adjustment wheel to fully focused the image
7. To see a bigger image, **increase the magnification** by turning to a **higher power objective lens**.

$$\text{Magnification} = \frac{\text{size of image}}{\text{size of real object}}$$

Vocabulary Power

Cell	The basic building block of all living organisms.
Tissue	A group of the same type of cells working together to perform a function.
Organ	A structure made of different types of tissue working together to carry out a
Multicellular	An organisms made of many cells.
Unicellular	An organism made up of a single (one) cell.

L4 Specialized Cells

What are specialised cells?

A cell that has **structural adaptations** enabling it to carry out a particular **function**.

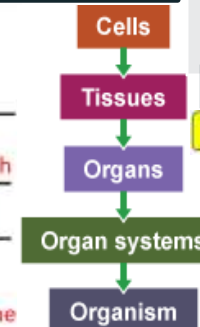
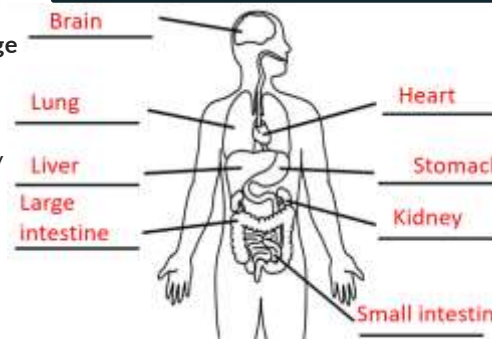
Function = job

Structural adaptation = physical features of an organism that help it to survive and succeed in its environment

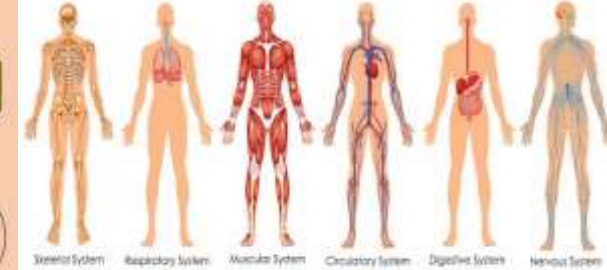


Example	Adaption
Sperm	Tail to swim, many mitochondria for respiration
Red Blood Cell	No nucleus to carry more oxygen
Root Hair Cell	Large surface area and many mitochondria to absorb water and mineral ions quickly

L5 Tissues and Organs



L5 Organ Systems



Example	Main Organs	Function
Respiratory	Lungs, trachea	Gas exchange
Reproductive	Testes, penis, ovaries, uterus	Produces offspring
Musculo-skeletal	Muscles, bones	Movement & support
Immune	Spleen, lymph nodes	Fights infection
Digestive	Stomach, intestines, liver, pancreas	Digests food and absorbs nutrients
Circulatory	Heart, blood vessels	Transports substances

L6 Unicellular Organisms

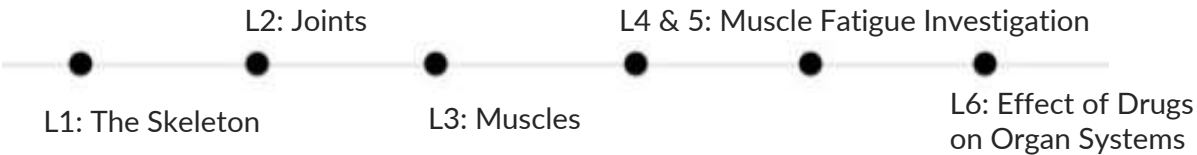
A unicellular organism is a living thing that is just **one cell**.

Amoebas and euglenas are **unicellular** organisms, so they are made up of only **one** cell. Both reproduce by a type of cell division called **binary fission**. Amoebas must **eat** food to survive, but euglenas have chloroplasts so can carry out **photosynthesis** to produce their own food.



Y7 Organisms: Movement Knowledge Organiser

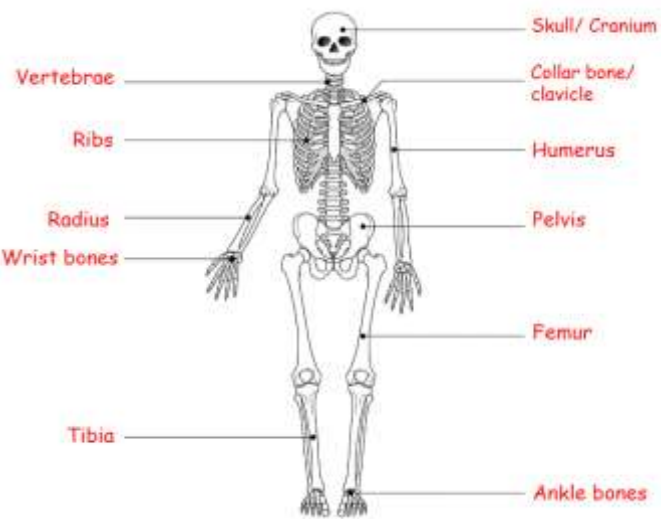
Key Question: How do humans move?



This unit develops your understanding of the human skeletal and muscular systems and how they work together to produce movement. You will learn about the functions of the skeleton, different types of joints, how antagonistic muscles create movement, investigate muscle fatigue, and explore how drugs can affect organ systems. This knowledge provides the foundations required for success in AQA GCSE Combined Science, particularly Biology topics on organisation, homeostasis and health. The key concept of 'organisms' will be revisited throughout KS3 during units on cells, breathing and respiration, digestion and microbes and disease.

Vocabulary Power	
Joints	The place where two or more bones meet to facilitate movement
Bone Marrow	Soft tissue inside bones where new blood cells are made
Ligaments	Strong tissue that connects bone to bone
Tendons	Tough tissue that connects muscle to bone
Cartilage	Smooth tissue that covers the ends of bones to reduce friction and absorb shock
Antagonist	Two muscles that work together to produce movement; if one contracts, the other relaxes
Musculoskeletal	The body system made up of the bones, muscles and joints
Muscle	Tissue that contracts to produce movement.
Skeleton	The framework of bones that supports and protects the body
Contract	When a muscle shortens to produce movement

L1 The Skeleton

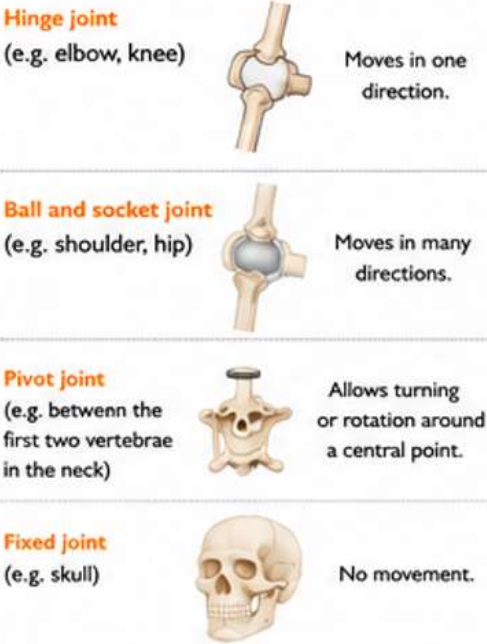


Functions:
Supports the body (vertebrae)
Protects organs (ribs)
Allows for movement (joints)
Produce blood cells



L2 Joints

Types of joints



Synovial Fluid fills the space between the ends of bones in a joint . It acts as a **lubricant** in the joint.

L3 Muscles

Muscles can **only pull** and can't push. This means two muscles have to work together at a joint. This is called an Antagonistic pair. When one **contracts** the other relaxes.



There are 3 different types of muscle:

Cardiac muscle cells contract and relax to pump blood around our bodies.

Smooth muscle cells make up thin sheets of muscle, such as the stomach lining.

Skeletal muscle is joined to bones. Its cells contract to make bones move and joints bend.

Tendons attach muscles to bones and pull on bones to create movement.

Ligaments attach bone to bone, holding joints together and keeping them stable.

L4 & 5 Muscle Fatigue

Muscles become **fatigued** or tired when used for long periods of time or on very strenuous activities due to the build-up of **lactic acid** because of low oxygen supply to the tissue (anaerobic respiration).

L6 Effect of Drugs on Organ Systems

A **drug** is a chemical substance that has an effect on your body by altering the chemical reactions and processes that take place

Types of drugs
Medicines help treat pain or disease to improve health
Recreational drugs are taken because people like their effects as they can affect the brain and body and may be harmful.

Stimulants (e.g. caffeine, amphetamines, cocaine) speed up the brain and nervous system.
Depressants (e.g. alcohol and heroin) slow them down.
Hallucinogens (e.g. cannabis and ecstasy) alter perception and the senses.
Painkillers (e.g. paracetamol) decrease symptoms of pain by blocking pain signals

Caffeine, paracetamol and alcohol are legal (with age restrictions for alcohol and paracetamol), while heroin, cocaine, ecstasy, cannabis and amphetamines are illegal if not prescribed by a doctor for medical use