

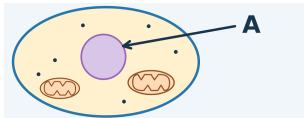
B1 Cell biology

Biology Paper 1 | AQA Combined Science Trilogy | Key ideas to remember

Cells have jobs

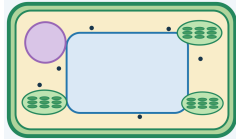
1 Cell parts and their jobs

Animal cell



A = nucleus

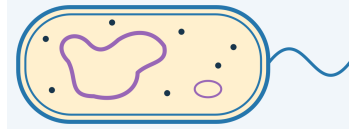
Plant cell



Nucleus: genetic material; controls activities.
Cytoplasm: most chemical reactions.
Membrane: controls what enters/leaves.
Mitochondria: aerobic respiration.
Ribosomes: make proteins.
Plant cells also: cellulose wall for support; chloroplasts for photosynthesis; permanent vacuole containing cell sap.

Use the same units

2 Bacteria and specialised cells



Bacteria: smaller than plant/animal cells; no nucleus. Circular DNA lies in cytoplasm; small DNA rings are **plasmids**. They have a membrane, wall and ribosomes.
Specialised cells: adapted for their job.

- Sperm: tail to swim; many mitochondria.
- Nerve cell: long to carry impulses.
- Muscle: contracts; many mitochondria.
- Root hair: large area for absorption.

Water moves by osmosis

3 Microscopes and magnification

Light microscope practical: thin specimen on slide; add stain and lower coverslip. Start on low power; focus, then increase magnification. Draw clear outlines and label.

Electron microscopes: greater magnification and resolution (finer detail).

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

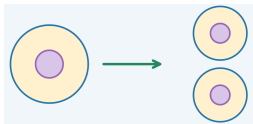
Use the same units first.

1 mm = 1000 μm ; 1 μm = 1000 nm.

Example: image 10 mm, real size 0.02 mm.

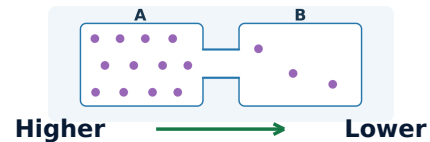
Magnification = $10 / 0.02 = \times 500$.

4 Cell division and stem cells



Cell cycle: cell grows; DNA is copied.
Mitosis: nucleus divides. Cytoplasm and membrane then divide, making **two genetically identical cells** for growth/repair.
Differentiation: becoming specialised.
Stem cells: can differentiate. Found in embryos, adult bone marrow and plant meristems.
Uses: replace damaged cells. Consider risks (such as viruses) and ethical issues.

5 Diffusion, osmosis, active transport



Diffusion: net particle movement from higher to lower concentration; no energy from respiration needed.
Osmosis: net water movement from a dilute to a more concentrated solution through a **partially permeable membrane**.
Active transport: lower to higher concentration; **needs energy** from respiration. Example: mineral ions into roots.

6 Exchange and the osmosis practical

Faster diffusion: larger surface area, higher temperature, steeper concentration gradient.

Exchange surfaces: large area and short diffusion distance. Blood flow/ventilation can maintain the gradient.

Potato practical: equal-sized pieces in a range of sugar/salt concentrations. Keep time and temperature the same. Blot dry before measuring mass; repeat and find means.

% change = $\frac{\text{final mass} - \text{initial mass}}{\text{initial mass}} \times 100$

Mass rises: net water enters. Mass falls: net water leaves.