

Animal and plant cells

GCSE Biology — notes

Starting with what they share

Animal cells and plant cells have far more in common than most revision guides suggest. Both are built the same way, and both do the same core jobs. Plant cells simply have three extra structures on top.

Learning it in that order — the shared parts first, then the extras — is quicker than memorising two separate lists, and it makes the comparison questions much easier.

The parts both cells have

Nucleus. Contains the genetic material, and controls what the cell does.

Cytoplasm. The jelly-like substance filling the cell. Most of the chemical reactions happen here.

Cell membrane. Holds the cell together and controls what passes in and out. Both animal and plant cells have one.

Mitochondria. Where aerobic respiration happens, releasing energy for the cell to use. Cells that need a lot of energy, such as muscle cells, contain more of them.

Ribosomes. Where proteins are made.

The three extras in a plant cell

Cell wall. Made of cellulose. It sits *outside* the cell membrane and gives the cell strength and support, stopping it bursting when it fills with water.

Chloroplasts. Contain chlorophyll, the green pigment that absorbs light for photosynthesis.

Permanent vacuole. A large space filled with cell sap. When it is full it pushes outwards and keeps the cell firm, which is what holds a plant upright.

Not every plant cell has chloroplasts

This one catches people out. Root cells have no chloroplasts, because there is no light underground and so nothing for them to do. A plant cell is defined by having a cell wall and a vacuole, not by being green.

Why the extras exist

A plant cannot move. It cannot find food, and it cannot escape being eaten or dried out. The three extra structures are all answers to that problem:

- It must make its own food where it stands, so it needs **chloroplasts**
- It must hold itself up to reach the light without a skeleton, so it needs a **cell wall** and a **vacuole** working together

An animal solves those problems by moving and by having a skeleton, so it needs none of the three. Questions often ask you to explain a difference rather than state it, and this reasoning is what earns those marks.

Size and scale

Plant and animal cells are typically in the region of 10 to 100 micrometres across — far too small to see without a microscope. One micrometre (μm) is a thousandth of a millimetre.

You are not expected to recall an exact size for either, but you should know they are measured in micrometres rather than millimetres, and be able to work with that scale in a calculation.

The mistakes that cost marks

- 1 **Writing that a plant cell has a cell wall instead of a cell membrane.** It has both. The wall is outside the membrane, and they do different jobs.
- 2 **Saying every plant cell contains chloroplasts.** Root cells do not.
- 3 **Calling the vacuole "a vacuole" rather than a permanent vacuole.** Animal cells can contain small temporary ones, so the mark is usually for the word *permanent*, or for *large*.
- 4 **Describing the cell wall as protecting the cell from disease.** Its job is structural — strength and support.
- 5 **Giving the difference without the reason.** "Plant cells have chloroplasts" answers a *state* question. An *explain* question wants what chloroplasts are for.

Quick checklist

- List the five structures found in both animal and plant cells, and what each one does
- Name the three found only in plant cells
- Explain why a root cell has no chloroplasts
- Explain why a plant cell needs both a cell wall and a cell membrane
- State the unit cell sizes are usually given in