Your notes

GCSE Biology: revision notes

Cell structure

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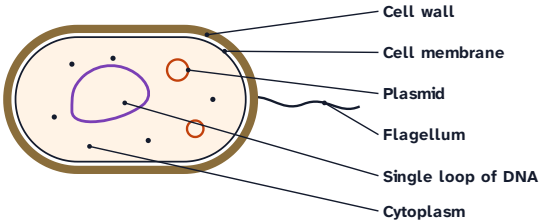
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Start here: what a cell is

- Every living thing is made of cells: tiny units, most too small to see without a microscope. Your body has about 37 trillion of them.
- Each cell has parts, called sub-cellular structures, and each part has one job, a bit like the rooms in a house.
- There are two main types. **Eukaryotic cells** (animals, plants, fungi) keep their DNA in a **nucleus**. **Prokaryotic cells** (bacteria) are much smaller and have no nucleus.
- Learn each part and its job first, then which cells have which parts: that is where most of the marks are.

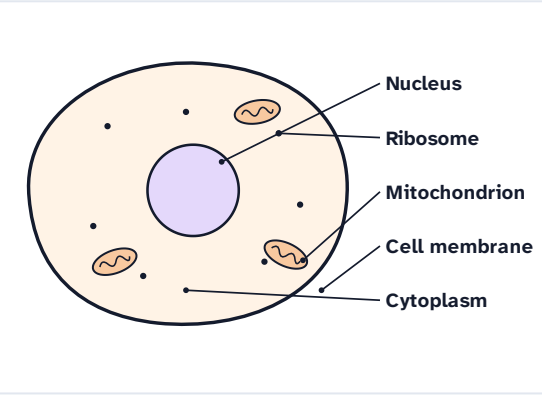
Eukaryotic and prokaryotic cells

- Animal and plant cells are eukaryotic: their genetic material is enclosed in a **nucleus**.
- Bacterial cells are prokaryotic: they are much smaller and their DNA is a single loop in the cytoplasm, not in a **nucleus**.
- Bacteria may also have small rings of DNA called **plasmids**.



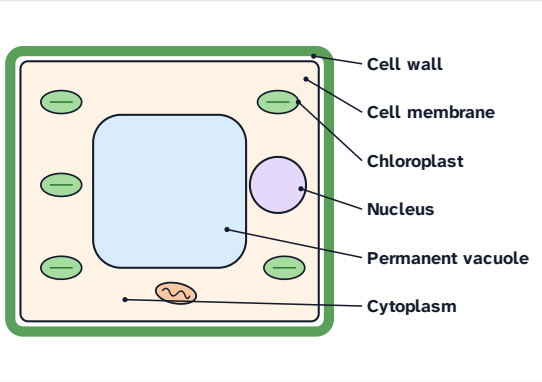
Parts of an animal cell

- **Nucleus**: contains the genetic material that controls the cell's activities.
- Cytoplasm: a gel where most chemical reactions happen, controlled by enzymes.
- Cell membrane: controls what enters and leaves the cell.
- **Mitochondria**: where aerobic respiration happens, releasing energy.
- **Ribosomes**: where proteins are made (protein synthesis).



Extra parts in plant cells

- **Cell wall**: made of cellulose; strengthens and supports the cell.
- **Chloroplasts**: contain chlorophyll, which absorbs light for photosynthesis.
- Permanent vacuole: filled with cell sap; keeps the cell rigid.



Specialised cells

- Sperm cells have a tail to swim and lots of **mitochondria** to release energy.
- Nerve cells are long, with branched endings, to carry electrical impulses around the body.
- Muscle cells contain protein fibres that contract, and many **mitochondria**.

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- Root hair cells have a large surface area to absorb water and mineral ions.
- Xylem cells form hollow tubes that carry water; phloem cells carry dissolved sugars.

Size and scale

- Cells are measured in micrometres (µm): 1 mm = 1000 µm.
- Bacteria are about 1–10 µm long; animal cells are about 10–100 µm.
- **Magnification** = image size ÷ actual size. Use the same units for both.

Culturing microorganisms (separate sciences)

- Bacteria multiply by simple cell division called **binary fission**, as often as once every 20 minutes if they have enough nutrients and a suitable temperature.
- Bacteria are grown in a nutrient broth or as colonies on an agar gel plate. Uncontaminated cultures are needed to study the effect of disinfectants and antibiotics.
- Aseptic technique: sterilise Petri dishes and culture media before use, and pass inoculating loops through a flame. Tape the lid on lightly (not sealed all round) and store the dish upside down.
- In school laboratories, cultures are incubated at no more than 25 °C, which reduces the chance of growing pathogens that could harm humans.
- Number of bacteria = starting number × 2^n, where n is the number of divisions.
- Required practical: put paper discs soaked in different antibiotics or antiseptics on an agar plate spread with bacteria. The bigger the clear **zone of inhibition** around a disc, the better it stops the bacteria. Area of a clear zone = πr^2.

Exam tip

- Learn each part with its job: marks usually come from linking them, such as '**mitochondria** release energy through aerobic respiration'.
- When comparing plant and animal cells, always mention the **cell wall**, **chloroplasts** and permanent vacuole.

Common mistakes

- Saying bacteria have a **nucleus**. Their DNA is loose in the cytoplasm.
- Saying **mitochondria** 'make' energy. Energy is released, never made.
- Saying plant cells don't have **mitochondria**. They do.

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Worked examples

A cell has a cell wall and a nucleus, but no chloroplasts. What kind of cell could it be?

A cell wall means it is a plant, fungus or bacterium (animal cells have no cell wall). **plant, fungus or bacterium**

A nucleus means it is eukaryotic, so it is not a bacterium. **plant or fungus**

No chloroplasts means it is not a cell that photosynthesises, like a leaf cell. **not a leaf cell**

Answer: A plant cell from a part that gets no light (such as a root hair cell), or a fungal cell such as yeast

Key terms

Eukaryotic cell	A cell whose genetic material is enclosed in a nucleus, e.g. animal and plant cells.
Prokaryotic cell	A cell with no nucleus; its DNA is a single loop in the cytoplasm, e.g. bacteria.
Nucleus	Contains genetic material that controls the activities of the cell.
Mitochondria	Where aerobic respiration happens, releasing energy for the cell.
Ribosome	The site of protein synthesis.
Chloroplast	Contains chlorophyll to absorb light for photosynthesis.
Cell wall	Made of cellulose in plants; strengthens and supports the cell.
Plasmid	A small ring of DNA found in bacterial cells.
Specialised cell	A cell with features that help it carry out a particular job.
Magnification	How many times bigger an image is than the real object: image size ÷ actual size.
Binary fission	The simple cell division by which bacteria reproduce.
Zone of inhibition	The clear area around an antibiotic or antiseptic where bacteria have not grown.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. Where does aerobic respiration happen in a cell?
2. What is the job of ribosomes?
3. Which structure is found in plant cells but not animal cells?
4. What is a plant cell wall made of?

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5. Which type of cell has its DNA in a single loop, not in a nucleus?
6. What are plasmids?
7. What does the cell membrane do?
8. What do chloroplasts contain to absorb light?

Answers

1. Mitochondria
2. Making proteins
3. Cell wall
4. Cellulose
5. Prokaryotic cell
6. Small rings of DNA in bacteria
7. Controls what enters and leaves the cell
8. Chlorophyll

What to do next

Practise 16 questions on this topic

Try 8 exam questions, with mark schemes

Read the lesson, one step at a time

Free revision for GCSE and KS3 at lycolearn.co.uk. Some notes are for one exam board only, and say so in brackets.

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