

Ages 11–14 · Science

LESSON SLIDES

Plant and Animal Cells

Biology · The building blocks of every living thing

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Plant and Animal Cells

SPEAKER NOTES

Hold up a leaf and point to your own hand. Ask: what do these two things have in common? Collect ideas, then reveal that both are built from cells. Today we find out what is inside a cell and why plant cells and animal cells are not quite the same.

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By the end of this lesson you can

- 🎯 Explain why cells are called the basic unit of life
- 🎯 Name five parts found in both plant and animal cells
- 🎯 Name three parts found only in plant cells
- 🎯 Say what each cell part does
- 🎯 Describe cells seen through a light microscope

By the end of this lesson you can

SPEAKER NOTES

Read the objectives aloud. Tell students to draw a two-column table in their books headed 'plant' and 'animal' and fill it in as the lesson goes on. They will need it for the quick check and the quiz.

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What is a cell?

- Every living thing is made of one or more cells
- A cell is the smallest unit that carries out life processes
- New cells only come from existing cells dividing
- Robert Hooke named cells in 1665 after looking at cork

What is a cell?

SPEAKER NOTES

These three ideas together are called the cell theory. Hooke saw the empty, box-like walls of dead cork cells through his lenses and called them cells. Some organisms, such as bacteria and yeast, are a single cell; you are made of trillions.

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Cells are tiny

10–100
 μm

typical width of a plant or
animal cell

- 1 millimetre = 1,000 micrometres (μm)
- Most cells need a microscope to be seen

Cells are tiny

SPEAKER NOTES

Ask students to find 1 mm on a ruler, then imagine splitting it into 1,000 parts. Ten to a hundred of those parts is one cell. An adult human body is estimated to contain somewhere between 10 and 100 trillion cells, so there is a huge range of estimates; the point is that the number is enormous.

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Parts found in both plant and animal cells

- Nucleus: holds the DNA and controls the cell
- Cell membrane: controls what enters and leaves
- Cytoplasm: jelly-like fluid where most reactions happen
- Mitochondria: release energy from food by respiration
- Ribosomes: build proteins

Parts found in both plant and animal cells

SPEAKER NOTES

Use a school analogy if it helps: the nucleus is the head teacher's office holding the instructions, the membrane is the security gate, the cytoplasm is the corridors where work happens, the mitochondria are the boiler room and the ribosomes are the workshops. Remind students that analogies are not perfect. Ribosomes are too small to see with a school light microscope.

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Plant and animal cells side by side

- Both have a nucleus, membrane, cytoplasm, mitochondria and ribosomes
- Plant cells add a cell wall, chloroplasts and a large vacuole

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Plant vs Animal Cells

Plant cells have every part an animal cell has, plus three extras: a cell wall, chloroplasts and a large vacuole.

Plant cell	VS	Animal cell
NUCLEUS		
Yes. Holds the DNA and controls what the cell does.		Yes. Holds the DNA and controls what the cell does.
CELL MEMBRANE		
Yes, just inside the wall. Controls what enters and leaves.		Yes, as the outer layer. Controls what enters and leaves.
CYTOPLASM		
Yes, jelly-like fluid where most reactions happen.		Yes, jelly-like fluid where most reactions happen.
MITOCHONDRIA		
Yes. Release energy from glucose by respiration.		Yes. Release energy from glucose by respiration.
RIBOSOMES		
Yes. Build proteins.		Yes. Build proteins.
CELL WALL		
Yes. Tough cellulose layer that supports the cell.		No. Only a flexible membrane.
CHLOROPLASTS		
Yes, in green parts. Carry out photosynthesis.		No.
VACUOLE		
One large permanent vacuole of cell sap keeps the cell firm.		Small temporary vacuoles, if any.
TYPICAL SHAPE		
Regular and box-like, held by the wall.		Irregular and rounded.

Common mix-up
Plant cells have mitochondria too. Chloroplasts make glucose by photosynthesis; mitochondria release energy from it by respiration, day and night.

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Plant and animal cells side by side

SPEAKER NOTES

Use the comparison poster to point to each structure in turn. Ask students to tick off each part in their two-column table. Stress that the shared parts come first: plant cells have everything an animal cell has, plus three extras.

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Three extra parts in plant cells

- Cell wall: tough layer of cellulose that supports the cell
- Chloroplasts: contain green chlorophyll and carry out photosynthesis
- Large permanent vacuole: stores cell sap and keeps the cell firm

Three extra parts in plant cells

SPEAKER NOTES

The cell wall sits outside the cell membrane; it does not replace it. Chloroplasts are found in the green parts of a plant that photosynthesise, such as leaves. Animal cells may have small, temporary vacuoles, but not one large permanent vacuole.

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Plant cell vs animal cell

Plant cell

- Cell wall made of cellulose
- Chloroplasts in green parts
- One large permanent vacuole
- Often a regular, box-like shape

Animal cell

- No cell wall, only a membrane
- No chloroplasts
- Small temporary vacuoles, if any
- Often an irregular, rounded shape

Plant cell vs animal cell

SPEAKER NOTES

Ask students why animal cells can change shape more easily: without a rigid wall, only the flexible membrane holds them in. Then ask why plants need walls at all. That leads into the next slide on support.

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Why plants need walls and vacuoles

- Plants have no skeleton to hold them up
- A full vacuole presses the cell against its wall
- Firm cells keep stems and leaves upright
- Short of water, vacuoles shrink and the plant wilts

Why plants need walls and vacuoles

SPEAKER NOTES

Show a wilted plant or a photo of one if you can. Explain that when the vacuole loses water it no longer pushes outwards, so the wall is left unsupported and the plant droops. Watering refills the vacuoles and the plant can stand upright again.

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 Example

Example: two cells under the microscope

- 1 Onion skin: box-shaped cells in neat rows
- 2 Onion skin: clear cell walls and a stained nucleus
- 3 Cheek cells: rounded, irregular and separate
- 4 Cheek cells: thin membrane, no wall, stained nucleus

Example: two cells under the microscope

SPEAKER NOTES

If you run this as a practical, follow your school's risk assessment for stains and for collecting cheek cells. A school light microscope magnifies up to about 400 times. Ask students to draw one cell of each with a sharp pencil, label only what they can actually see and write the magnification next to the drawing.

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Specialised cells: shape fits the job

- Root hair cells grow long thin extensions
- These extensions give a large surface for absorbing water and minerals
- Leaf cells near the upper surface are packed with chloroplasts
- Same basic parts, different shapes for different jobs

Specialised cells: shape fits the job

SPEAKER NOTES

This bridges to later lessons. Ask: why would a root hair cell not need chloroplasts? (It is underground, with no light.) Ask students to suggest one specialised animal cell they already know, such as a nerve cell or a red blood cell, and guess how its shape helps.

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From cells to whole organisms

- Cells: the smallest units of life
- Tissues: groups of similar cells doing one job
- Organs: several tissues working together, such as a leaf or the heart
- Organ systems and organisms: organs working as a team

From cells to whole organisms

SPEAKER NOTES

Keep this brief: it shows where cells fit in the bigger picture and sets up the next lesson. Give one plant and one animal example at each level if time allows.

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Common mix-ups

- Plant cells have mitochondria too: they respire all the time
- Plant cells have a membrane as well as a wall
- Not every plant cell has chloroplasts
- The nucleus is not the same as the cell

Common mix-ups

SPEAKER NOTES

These are the errors that come up most in tests. Ask students to vote true or false on each statement before revealing the bullet. The mitochondria point matters most: many students think chloroplasts replace mitochondria in plants, but plants need to release energy from glucose just as animals do.

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 **Quick check**

Which part is found in plant cells but not in animal cells?

A Nucleus

B Cell membrane

C Chloroplast

D Mitochondrion

Quick check

SPEAKER NOTES

Answer: chloroplast. Ask students to show the answer on fingers (1 to 4) before you reveal it. If many choose mitochondrion, revisit the common mix-ups slide.

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Key takeaways

- ✓ All living things are made of cells
- ✓ Plant and animal cells share a nucleus, membrane, cytoplasm, mitochondria and ribosomes
- ✓ Plant cells also have a cell wall, chloroplasts and a large vacuole
- ✓ Each part has a job that keeps the cell alive
- ✓ Cell shape often matches the cell's job

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Key takeaways

SPEAKER NOTES

Ask students to check their two-column table against this slide and fill any gaps. Then move to the five-question quiz on the page. Homework idea: draw and label a plant cell and an animal cell from memory, then check against the poster.