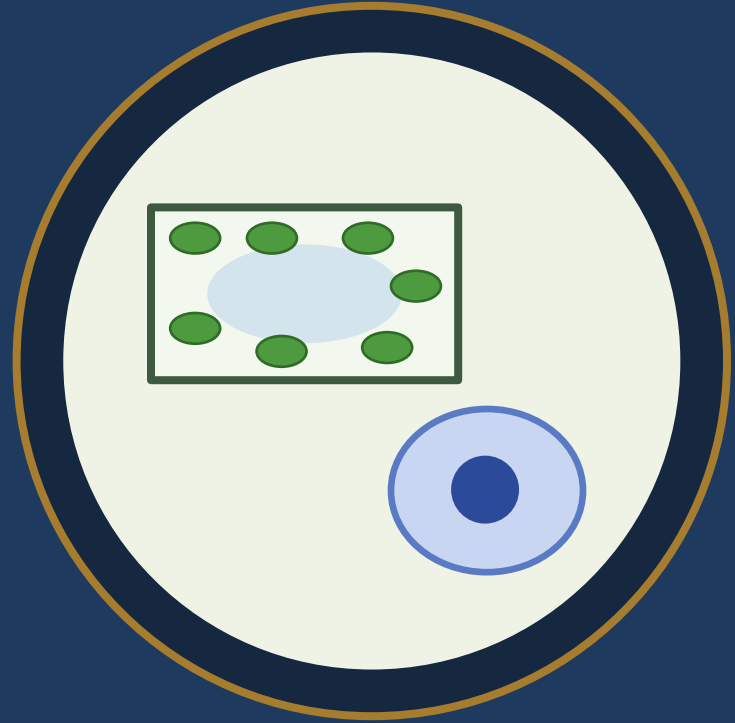


Virtual Microscope

Plant and animal cells: leaf cells and
cheek cells

Biology lesson with worksheet



Learning objectives



Use a microscope correctly

Focus the image, change lens power and adjust the light.



Identify cell structures

Find the cell wall, chloroplasts, vacuole and nucleus.



Calculate magnification

Work out total magnification and the magnification of a drawing.

Starter: quick recall

1

Name two structures found in plant cells but not in animal cells.

2

What is the job of the nucleus?

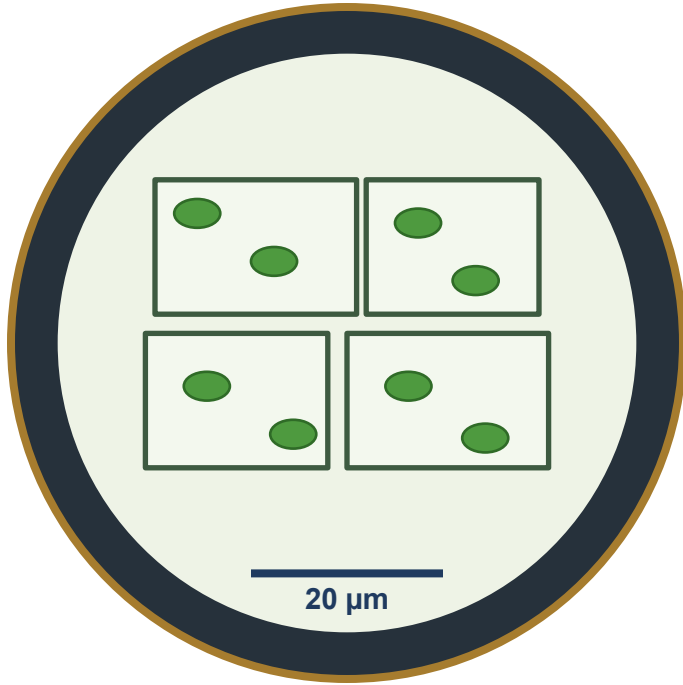
3

What does a microscope do to a specimen?



5 minutes. Answer in your book, then share.

Meet the virtual microscope



The eyepiece view

Objective lens

10×

40×

Coarse focus



Fine focus



Stage: left and right



Stage: forward and back



Lamp brightness



Diaphragm



Measure tool

Measure

Total magnification

total magnification = eyepiece magnification × objective magnification

Low power



eyepiece

×



objective

=

100x

High power



eyepiece

×



objective

=

400x

Focusing on a slide

- 1 Check the 10× objective is in position.
- 2 Turn the coarse focus until the cells are roughly clear.
- 3 Turn the fine focus until the image is sharp.
- 4 Switch to the 40× objective.
- 5 Use only the fine focus to sharpen again.



Why only the fine focus at 40×?

At high power the lens sits very close to the slide. The coarse focus moves it too far, too fast, so it could hit and break the slide.

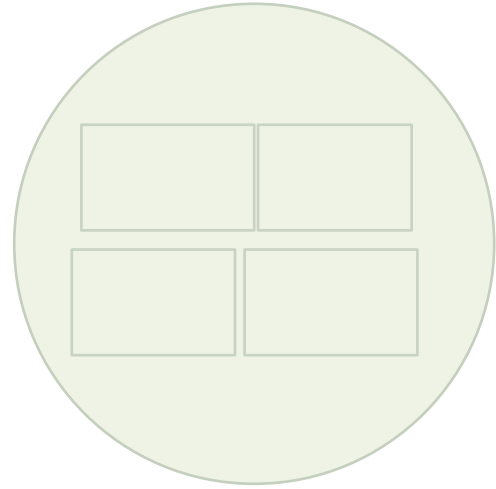
Controlling the light



Diaphragm closed

darker image, higher contrast

VS



Diaphragm open

brighter image, lower contrast

Lamp brightness lights the whole image. Use it with the diaphragm to get a clear view.

Your task

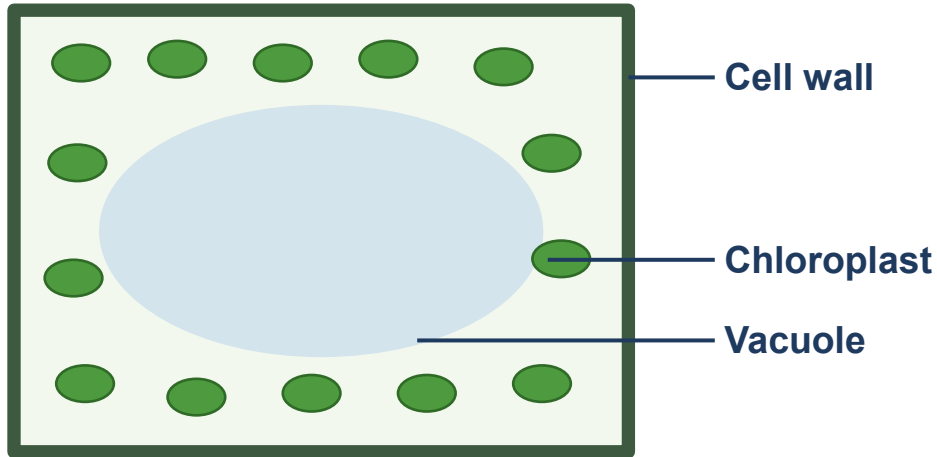
Open the virtual microscope and use the slide named in each part.

A	Using the microscope	Magnification, focusing steps and light	5 min
B	Leaf cells	Observe, draw, measure and calculate	10 min
C	Cheek cells	Observe, stain, draw and measure	8 min
D	Comparing cells	Table and explanations	4 min
E	Exam-style questions	Homework or extension	Homework



The scale bar is an estimate, so your measurements may differ from your classmates'.

Leaf cells: what to look for



Elodea leaf cell (drawing)

At 100×

Rows of small rectangular cells. A dark band is the midrib.

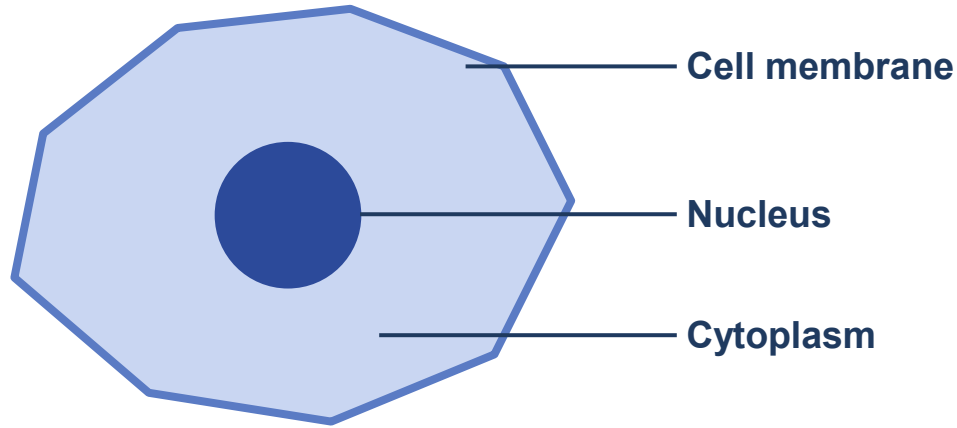
At 400×

A cell wall, green chloroplasts and a large clear vacuole.

Why green?

Chloroplasts contain chlorophyll.

Cheek cells: what to look for



Cheek cell (drawing)

At 100×

Irregular, flat cells in groups that overlap.

At 400×

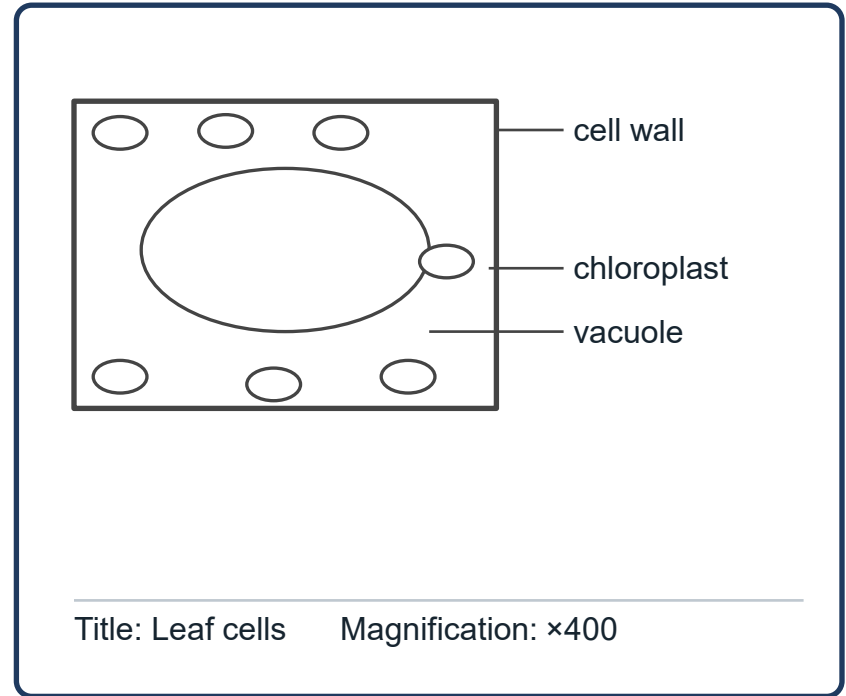
An oval/round dark blue nucleus near the centre.

Why blue?

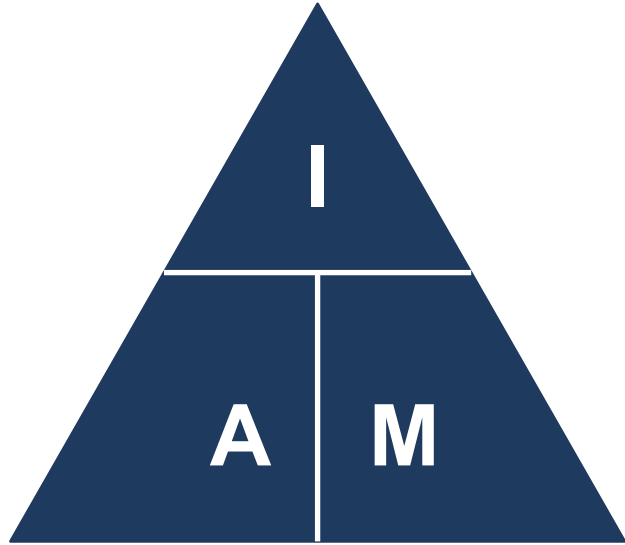
The cells are colourless. The stain makes the nucleus and cell easy to see.

Drawing rules

- ✓ Write a title and the magnification.
- ✓ Use a sharp pencil. No shading.
- ✓ Draw large: fill more than half the box.
- ✓ Label with ruled lines that do not cross and that touch the structure.



Measuring and magnification



I = image size A = actual size M = magnification. Cover the one you want to find.

**magnification =
image size ÷ actual size**

- 1 Measure with the Measure tool (μm).
- 2 Use the same units: 1 mm = 1000 μm .
- 3 Divide the image size by the actual size.

Worked example

Chloroplast: 8 μm . Drawing: 3.2 mm.

3.2 mm = 3200 μm , so $3200 \div 8 = \times 400$

Comparing plant and animal cells

Structure	Leaf cell	Cheek cell
Cell wall	✓	✗
Chloroplasts	✓	✗
Large central vacuole	✓	✗
Nucleus	✓	✓
Cell membrane	✓	✓

Green tick: present. Red cross: absent.



Why is the cheek cell outline irregular?

It has no cell wall, only a flexible cell membrane. The leaf cell's rigid wall holds a fixed rectangular shape.

Plenary: exit questions

Leaf cells

1

Which structure makes leaf cells look green?

2

What fills most of the clear space inside each cell?

3

At 100× you can see the cells but not individual chloroplasts. What should you do to see them clearly?

Cheek cells

1

What is the dark blue circle in the middle of each cheek cell?

2

Which structure do leaf cells have that cheek cells do not?

3

Why is the cheek cell stained blue?

Key points



Total magnification =
eyepiece $\times$ objective.



Focus at low power first.
Use only the fine focus at 40 $\times$.



Plant cells have a cell wall,
chloroplasts and a large
vacuole. Animal cells do not.



Magnification =
image size $\div$ actual size.
Use the same units.