

EduTrend Contents

W4C · BIOLOGY & LIFE SCIENCES · MIDDLE SCHOOL

Cells Up Close

Prepare slides and compare plant cells under a microscope.

Ages 11–14 | Level: Intermediate | 60 minutes | Pairs · up to 30 | Activity 03

Inside: activity at a glance · step-by-step session plan · facilitator notes · 3 student worksheets · assessment checklist

ACTIVITY 03 · AT A GLANCE

Cells Up Close

Students learn to use a light microscope and prepare their own slides. They examine onion epidermis stained with iodine and a pondweed leaf, draw accurate scientific diagrams, estimate cell size and compare the two cell types. The activity builds practical microscopy skills and understanding of cell structure.

Learning outcomes

By the end of the session students can:

- prepare a wet mount slide safely;
- use a light microscope to focus at low and high power;
- draw and label cells as a scientific diagram;
- compare cell structures and link them to function.

KEY WORDS

cell · nucleus · cell wall · cytoplasm · chloroplast · magnification · stain

CURRICULUM LINKS

Science: cells and organisation. Maths: calculating magnification and size. Links to careers in medicine and research.

1	2	3	4	5	6
QUESTION	**PREDICT**	**PLAN**	**OBSERVE**	**RECORD**	**EXPLAIN**
What do we want to know?	What will happen?	Keep it fair	Look closely	Measure and note	What does it show?

Materials (per pair)

- Light microscope
- Slides, cover slips, forceps, mounted needle
- Onion, pondweed (Elodea)
- Dilute iodine solution, dropper
- Paper towels
- Worksheets 1, 2 and 3

Before the session

- Check all microscopes and lamps.
- Cut onions into quarters.
- Put pondweed in a beaker of water under light.
- Prepare a demonstration slide for the visualiser.
- Set out stain in dropper bottles.

SAFETY

Goggles when using iodine. Iodine stains skin. Mounted needles and cover slips are sharp: handle with care. Never point microscope mirrors at the sun.

ACTIVITY 03 · SESSION PLAN

Step by step

Timings are for 60 minutes. If microscopes are shared, run onion and pondweed as a carousel.

Time	What happens	Say or ask
0–5 min Hook	Show a photo of cells at high magnification. How small is a cell?	*"Could you see one with your eyes?"*
5–15 min Microscope skills	Model setting up the microscope: lowest objective, coarse focus, then fine focus.	*"Why start with the lowest magnification?"*
15–30 min Onion slide	Pairs peel a thin epidermis, mount it in iodine and add a cover slip at an angle.	*"Why add the cover slip at an angle?"*
30–40 min Pondweed slide	Pairs mount a pondweed leaf in water and observe chloroplasts.	*"What green structures can you see?"*
40–52 min Draw	Students draw one cell of each, labelled, with a magnification.	*"What makes a good scientific drawing?"*
52–60 min Compare	Complete the comparison table and discuss why onion has no chloroplasts.	*"Why would onion cells not need chloroplasts?"*

CHALLENGE CARD (print or copy onto the board)

Prepare a slide clear enough for a partner to see the nucleus at high power. Draw one cell accurately and calculate how many times it has been magnified.

ACTIVITY 03 · FACILITATOR NOTES

The biology in brief

All living things are made of cells. Plant cells have a nucleus, cytoplasm, cell membrane, a cell wall made of cellulose and often a large vacuole. Many plant cells in leaves also contain chloroplasts, where photosynthesis happens. Onion bulb cells grow underground, so they have no chloroplasts.

Total magnification = eyepiece magnification × objective magnification. Iodine stains the nucleus so it is easier to see. A scientific drawing uses clear single lines, no shading, and labels with ruled lines, and shows only what can actually be seen.

Common ideas to listen for

- "The bubbles are cells." Air bubbles are round with thick dark edges; cells have straight walls.
- "All plant cells have chloroplasts." Only cells that receive light usually do.
- "Higher magnification is always better." The field of view gets smaller and dimmer.

Adapting the activity

Support

Provide a prepared slide and a partly labelled drawing frame.

Stretch

Use a calibrated eyepiece graticule or a ruler on low power to estimate cell length.

WORKSHEET 1

Microscope skills

Name: _____ Class: _____ Date: _____

Tick each step as you complete it.

Checklist

Tick when done:

- ☐ lowest objective in place before starting
- ☐ slide centred on the stage
- ☐ coarse focus used only on low power
- ☐ fine focus used on high power

Why do we start on low power?

WORKSHEET 2

Scientific drawings

Draw one cell of each type. Label at least four parts.

Onion cell

Magnification: _____

Pondweed cell

Magnification: _____

WORKSHEET 3

Compare and explain

Complete the table.

Comparison

Structure	Onion	Pondweed	Function
Nucleus			
Cell wall			
Chloroplast			
Vacuole			

Why does the onion cell have no chloroplasts?

FOR THE TEACHER

Assessment checklist

Use during the session. One sheet covers up to eight students; copy as needed.

Student	Prepares slide safely	Uses microscope correctly	Draws and explains accurately

Suggested codes: W = working towards · E = expected · G = greater depth

ABOUT THIS ACTIVITY

Cells Up Close is a sample activity from the EduTrend Contents W4C Biology & Life Sciences programme (middle school, level: intermediate). Every activity in the programme follows the same format: a practical challenge, a clear session plan, facilitator notes and ready-to-print worksheets, so that teachers, club leaders and parents can run it without extra preparation.

Full 15-, 20- and 32-week programmes are available from EduStore at edutrend.org.

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