Leaf structure under the microscope

Student activity • observation and reasoning

YEAR 10 / LESSON 29 / BIOLOGY + SCIENCE (DOUBLE AWARD)

The question

How do leaf tissues support photosynthesis and gas exchange?

Use the supplied examples, record your reasoning and correct it using evidence.

Equipment

- Microscope and permanent leaf cross-section slide
- Pencil, ruler and booklet; teacher's labelled covered-leaf setup

Handle slides by their edges and report broken glass. Carry microscopes securely, keep lenses clear of the slide and use fine focus at high power.

Course coverage: Shared Biology / Double Award: 2.21. Leaf adaptations; preparation for 2.23 starch investigation.

Plan, model or apparatus sketch

Draw and label the apparatus or biological model; identify one limitation.

Method and reasoning

Read the whole sequence before starting

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1. Place a permanent leaf cross-section on the microscope stage and begin with the lowest-power objective. Locate the section without allowing the lens to hit the slide.

2. Draw a low-power tissue plan showing relative positions, not individual cells. Record slide identity and total magnification.

3. Identify upper epidermis, palisade region, spongy region, air spaces and the vascular bundle where resolved. Compare the drawing with a reference diagram and label observations separately from inferred detail.

4. Move to a higher objective only after centring the region; use fine focus. Draw a few cells you can actually see, with clear label lines.

5. Explain the significance of chloroplast-rich palisade tissue, air spaces, a thin leaf, stomata and transport tissues.

6. Observe the teacher’s labelled light-exclusion setup for Lesson 30. Record which leaf area is covered on both surfaces and why a matched uncovered area is useful.

Cleanup

- Return labelled slides to their storage boxes; lower the stage, switch off and cover microscopes as directed.
- Leave the teacher’s covered-leaf preparation in its assigned light treatment and keep the treatment map.

Record your evidence

Blank spaces are for your own work

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Reference and task data

A tissue plan shows regions and proportions; a high-power drawing shows visible cells. A typical dicot leaf has chloroplast-rich palisade cells, spongy air spaces, epidermal layers and vascular tissues. Real species vary. The light-exclusion setup is preparation only; no starch result is assumed before testing.

Example / trial	Observation / evidence	Explanation / limit
Low-power tissue plan		
High-power cell drawing		
Adaptation / function		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. Why start at low power?

2. Calculate magnification for ×10 eyepiece and ×10 objective.

3. Why are air spaces useful?

4. How does a thin leaf help exchange?

5. What do xylem and phloem supply or transport?

6. Why record the covered pattern before a starch test?