Transpiration and water movement

Student activity • observation and reasoning

YEAR 10 / LESSON 40 / BIOLOGY ONLY

The question

How does water leave a leaf and contribute to the transport stream?

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

Equipment

- Student booklet, paper models, pencil and ruler

Paper, modelling and written reasoning only. No chemicals or biological samples are handled.

Course coverage: Biology only: 2.56B. Transpiration.

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. Draw liquid water in mesophyll cell walls and water vapour in leaf air spaces. Label evaporation as the phase change.

2. Show water-vapour diffusion from air spaces through open stomata to surrounding air down its gradient.

3. Trace replacement water from xylem to leaf tissues, then along the plant from roots to leaves.

4. Explain that water cohesion supports a continuous column under tension; do not draw xylem cells actively pumping each water molecule upwards.

5. Link the stream to mineral transport, water supply for photosynthesis and maintenance of cell turgor.

6. Explain the cooling effect of evaporation and why excessive water loss can still lead to wilting and stomatal closure.

Cleanup

- Return models and keep the corrected work.

Record your evidence

Blank spaces are for your own work

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Reference and task data

Transpiration is loss of water vapour from plant surfaces, chiefly leaves. Evaporation within the leaf and diffusion through stomata are distinct stages. Water loss can contribute to tension in xylem; cohesion supports continuity of the water column. Cooling is a benefit under some conditions, not a guarantee that a plant avoids heat stress.

Example / trial	Observation / evidence	Explanation / limit
Evaporation / diffusion diagram		
Transport stream and uses		
Water-loss balance		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. Distinguish evaporation from diffusion in this process.

2. What passes through stomata during water loss?

3. What helps maintain continuity in the xylem water column?

4. Give two uses of the transported water.

5. Why can evaporation cool a leaf?

6. Why can a plant wilt despite an active transport stream?