Choosing a transport explanation

Student activity • observation and reasoning

YEAR 10 / LESSON 19 / BIOLOGY + SCIENCE (DOUBLE AWARD)

The question

Which evidence supports each transport mechanism?

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: Shared Biology / Double Award: 2.15–2.16. Diffusion, osmosis and active transport.

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

YEAR 10 / LESSON 19 / BIOLOGY + SCIENCE (DOUBLE AWARD)

1. Draw a comparison table for diffusion, osmosis and active transport: substance, direction, membrane requirement and energy supply.

2. Classify oxygen moving from a higher to lower concentration, water entering a cell across its membrane, and mineral ions accumulating against a gradient.

3. Explain why the presence of a membrane alone does not establish that movement is active transport.

4. Consider a model cell at equal water potentials inside and outside. Draw continued water movements both ways and explain zero net change.

5. Analyse the claim “a faster rate proves active transport”. Explain why temperature, surface area, gradient and distance must also be considered.

6. Apply your comparison to root uptake and an alveolar exchange surface, identifying which transported substance and gradient you mean.

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

Use mechanism-specific evidence. A net movement against the relevant concentration gradient supports active transport; membrane presence alone does not. Osmosis refers specifically to water through a partially permeable membrane. Random movement continues even when net movement is zero.

Example / trial	Observation / evidence	Explanation / limit
Mechanism comparison		
Evidence for three examples		
Misconception and correction		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

YEAR 10 / LESSON 19 / BIOLOGY + SCIENCE (DOUBLE AWARD)

1. Does every movement through a membrane require energy from respiration?

2. Which process specifically describes net water movement?

3. What evidence suggests active ion transport?

4. Why can diffusion continue when net change is zero?

5. Name two structural features that favour rapid exchange.

6. Why does a rate increase alone not identify the mechanism?