

The need for transport and transport in plants: practice questions

7 questions • 21 marks • mark scheme at the back

For Pearson Edexcel International GCSE Biology 4BI1 and Science (Double Award) 4SD0. **Biology only** is not in the Double Award and is only examined on Paper 2.

Name

Total / 21

1 Which statement explains why a unicellular organism can rely on diffusion to move substances in and out of the cell? **[1 mark]**

- A. ☐ It has a large surface area compared with its volume, so diffusion distances are short
- B. ☐ It has a transport system to carry substances
- C. ☐ It has a small surface area compared with its volume
- D. ☐ It uses active transport for all substances

2 Explain why a large multicellular organism needs a transport system. **[3 marks]**

3 State what is transported by (a) the xylem and (b) the phloem in a flowering plant. **[4 marks]**

4 **Biology only** **[3 marks]**

Describe how water is absorbed by a root hair cell.

5

Biology only

[1 mark]

Which of these is the correct definition of transpiration?

- A. ☐ The movement of sucrose from the leaves to the roots
- B. ☐ The absorption of water by the root hair cells
- C. ☐ The evaporation of water from the surface of a plant
- D. ☐ The movement of water through a partially permeable membrane

6

Biology only

[3 marks]

In a potometer investigation, an air bubble moved 48 mm in 8 minutes along a capillary tube with a cross-sectional area of 0.5 mm^2 . Calculate the volume of water taken up by the shoot per minute.

Answer =

[illegible]

A student used a potometer to investigate the transpiration of a leafy shoot in four conditions. The table shows the distance moved by the bubble in 10 minutes. Describe and explain the effect of wind speed, temperature and humidity on the rate of transpiration.

Distance moved by the bubble in 10 minutes	
Condition	Distance moved (mm)
Room temperature, still air	24
Room temperature, fan on	41
Warm room, still air	38
Shoot enclosed in a clear plastic bag	9

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Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [1]

A A (1)

2. [3]

- it has a small surface area : volume ratio (1)
- many cells are deep inside the body / far from the surface, so the diffusion distance is long (1)
- diffusion alone would be too slow to supply oxygen and food / remove waste (1)

3. [4]

- (a) water (1)
- mineral ions (1)
- (b) sucrose (1)
- amino acids (1)

4. [3] **Biology only**

- the soil water has a higher concentration of water molecules / is more dilute than the cell sap (1) allow higher water potential in the soil
- water moves into the cell by osmosis (1)
- through the partially permeable cell membrane (1)

5. [1] **Biology only**

C C (1)

6. [3] **Biology only**

- distance moved per minute = $48 \div 8 = 6$ mm/min (1)
- volume per minute = cross-sectional area $\times$ distance per minute = 0.5×6 (1)
- $3 \text{ mm}^3/\text{min}$ (1) (allow 24 mm^3 in 8 minutes with correct working for 2 marks)

7. [6] **Biology only**

Level 3 5-6	A detailed description and explanation covering all three factors, supported by data from the table. Each explanation links the factor to evaporation or the diffusion gradient of water vapour. The answer is logical and uses correct terms.
Level 2 3-4	Describes the effect of at least two factors, with some correct explanation and some use of the data. Some links may be incomplete.
Level 1 1-2	Describes the effect of one or two factors with little or no explanation, or uses the data without explanation.

Indicative content

- wind speed: bubble moved further with the fan on (41 mm compared with 24 mm), so the rate of transpiration increased
- moving air carries water vapour away from the stomata, keeping a steep concentration gradient, so diffusion is faster
- temperature: bubble moved further in the warm room (38 mm compared with 24 mm), so the rate increased
- water evaporates faster at higher temperature, and water vapour diffuses out faster
- humidity: the bag traps water vapour, so humidity is high and the bubble moved least (9 mm)
- high humidity means a smaller concentration gradient of water vapour between the leaf and the air, so diffusion is slower and the rate decreases
- transpiration is the evaporation of water from the surface of the plant followed by diffusion through the stomata