

GCSE Biology B (Twenty First Century Science)
J257/04 Depth in Biology (Higher Tier)

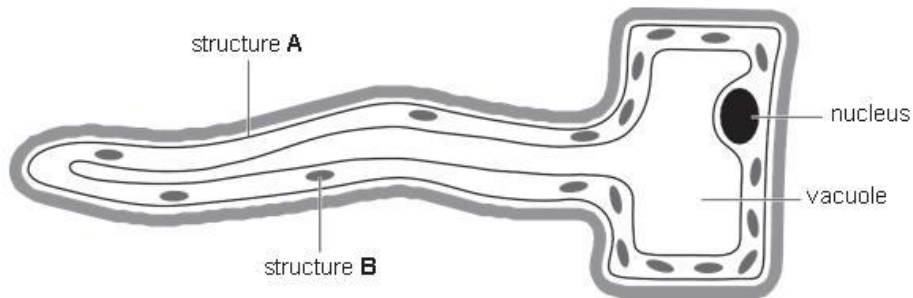
Question Set 1

1 Nina is learning about substances absorbed by plants. She finds out that plants absorb nitrate ions from the soil.

(a) Explain why nitrate ions are essential for plant growth and survival.

Only source of Nitrogen for plants which they need to make amino acids and proteins.

(b) Nitrate ions are absorbed into a plant root through root hair cells. Nina finds this diagram of a root hair cell.



(i) State the names of structures A and B. [2]

A = membrane B = Mitochondrion

(ii) Explain the roles of A and B in transporting nitrate ions into the root hair cell. [2]

A transports nitrate ions into cells using active transport.
B provides energy from respiration for active transport.

(iii) The shape of the root hair cell is an adaptation.

Explain how this adaptation helps the root hair cell to absorb nitrate ions more effectively.

Increased surface area to volume ratio so there is more uptake of nitrate ions. [2]

(c) The root hair cells also absorb water from the soil.

Complete the sentences below to describe how water is transported through a plant.

Choose the correct words from the list. [2]

Each word may be used once, more than once or not at all.

Diffusion flowers meristem osmosis phloem stomata xylem

Water is transported from the soil into the root cells by osmosis

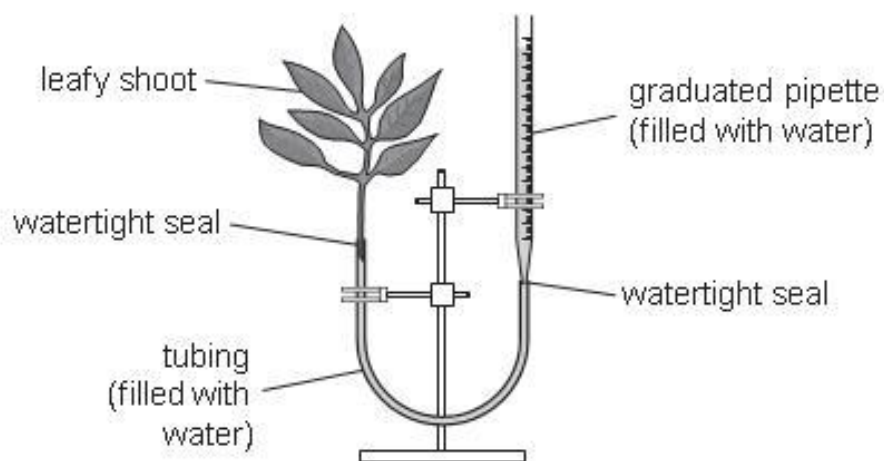
Water is pulled from roots to leaves through the xylem tissue in the plant stem. Water molecules are lost from the leaves into the

atmosphere because of

..... diffusion through open stomata [4]

- (d) Nina wants to investigate how changing the light intensity affects the rate of water uptake by a leafy shoot.

She sets up a leafy shoot in a simple potometer as shown in the diagram.



Nina has access to other apparatus including:

Fan glass tank filled with water lamp metre ruler
small heater stopwatch thermometer

She does **not** have to use all the apparatus.

Describe the experimental procedure Nina should follow and how she should process her results.

[6]

She should use the lamp to vary the light intensity by placing it at different distances from the leafy shoot. She should use a metre ruler to measure the distance of lamp from leafy shoot. She needs to use at least four different distances. At each distance use the stopwatch to record 30 minutes of time. Repeat the experiment several times at each distance. Control air movement by closing windows and control temperature by shining lamp through tank of water. Draw a table for the results with set distances on the side and volume of water taken in by plant on top side. As she will do multiple repeats make such a table that she can record volume taken up for all the repeats at each distance. Then work out mean volume of water drawn up by plant at each distance and record in table. Finally plot a graph with distances on x-axis and mean volume of water drawn up on y-axis and draw line of best fit.

Total Marks for Question Set 1: 18

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