AQA, OCR, Edexcel

A Level

A Level Biology

Mass Transport in Plants Questions

Name:

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Total Marks: /40

Mass Transport in Plants

Plants are multicellular organisms that are specially adapted for transporting water and nutrients to all the plant cells.

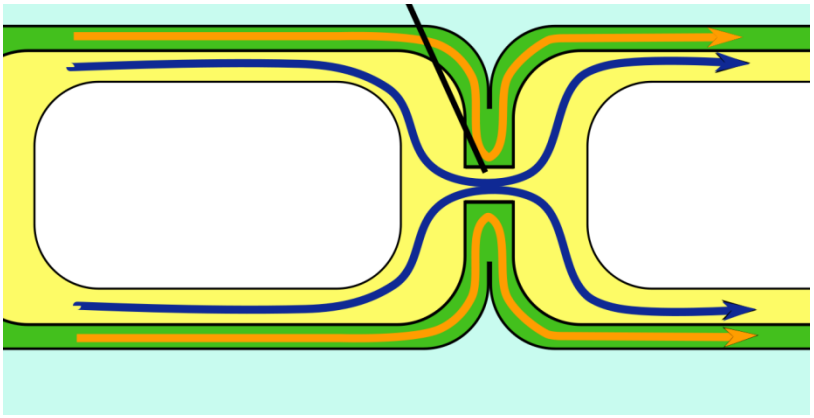
1. Water enters a plant via the roots. The roots are specially adapted for efficient water uptake.

a) i) The roots are covered in root hairs. What is the purpose of root hairs? (2 marks)

ii) Once in the root hairs, water is drawn into the roots, down a water potential gradient. Explain how this process occurs. (3 marks)

b) Once in the root, the water must enter the xylem in order to be transported up the plant to the leaf. This occurs through two different pathways.

i) The diagram below indicates one of these pathways, shown by the blue arrows. What is the name of this pathway and how does it work? (4 marks)



ii) What is the other pathway and how does it work? (3 marks)

iii) Which pathway is considered to be the most effective and why? (2 marks)

2. The water is now in the xylem. The xylem vessels are adapted for transporting water and ions around the plant.

a) i) Why do plants have to use a specialised tissue such as the xylem for water transport rather than direct osmosis? (1 mark)

ii) The xylem vessel is a tube-like structure that runs from the roots to the leaves. How is the structure of the xylem related to its function? (3 marks)

b) The movement of water up the xylem to the leaves is called transpiration.
Transpiration involves cohesion and tension.

i) Why are cohesion and tension essential in transpiration? (1 mark)

ii) What causes tension in the xylem? (1 mark)

iii) 'Water molecules are cohesive' what is meant by this term in relation to the movement of water in the xylem? (3 marks)

c) Transpiration occurs through evaporation of water on the leaf surface.

i) The loss of water from a plant occurs through gas exchange. Explain this process. (2 marks)

ii) There are a number of different factors that affect the rate of transpiration. Temperature is one of these factors.
Explain how a change in temperature affects the transpiration rate? (2 marks)

d) Apparatus can be set up to estimate how the rate of transpiration is affected by changing factors – this equipment is called a potometer.

i) The plant sample being used in the experiment must have its shoot cut underwater – why is this important? (1 mark)

ii) How is the air bubble in the system used to measure the rate of transpiration? (3 marks)

iii) Identify two other factors that affect the rate of transpiration. (2 marks)

3. The other transport mechanism in plants involves the phloem. The role of the phloem is to transport solutes around the plant for example sugars like sucrose.

a) The phloem is a tube network made up of sieve tube cells and companion cells.

i) Explain how the structure of the sieve tube cells is adapted for its function. (3 marks)

ii) Explain how the structure of the companion cells is related to their function. (2 marks)

b) Transport of substances in the phloem occurs through translocation. This process transports molecules such as sucrose from sources to sinks within the plant.

i) What is meant by the terms 'source' and 'sink'? (2 marks)