

9.2 Transport in the Phloem of Plants

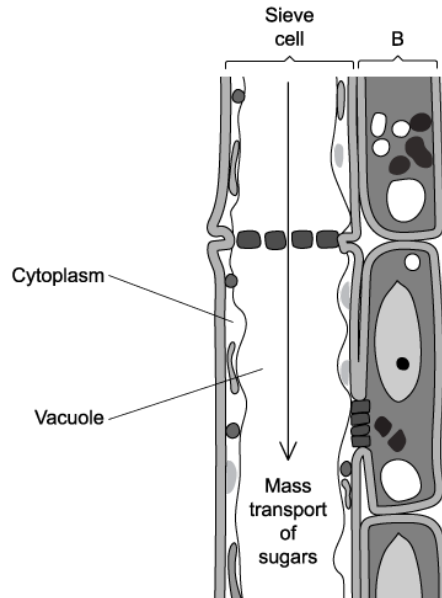
Question Paper

Course	DP IB Biology
Section	9. Plant Biology (HL Only)
Topic	9.2 Transport in the Phloem of Plants
Difficulty	Medium

Time allowed: 60
Score: /44
Percentage: /100

Question 1a

a)
The diagram below shows a longitudinal section (LS) of phloem tissue in a plant. Cell type **B** is characterised by a large number of mitochondria.



Suggest why this is advantageous.

[2 marks]

Question 1b

b)
Using the diagram in part a), suggest and explain a way in which the intracellular spaces of the sieve cells are adapted for mass transport.

[2 marks]

Question 1c

c)
Suggest and explain a way in which the cell walls of sieve cells are adapted for mass transport.

[2 marks]

Question 1d

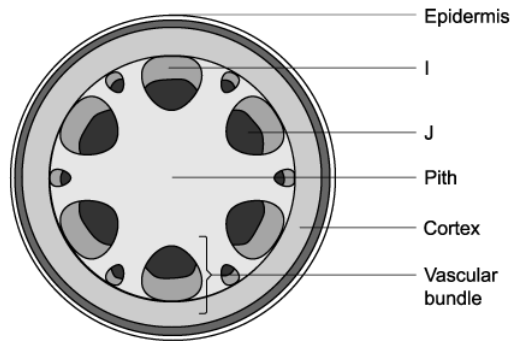
d)
Most of the sugars produced by plants are used up rapidly in respiration. However, sometimes plants can overproduce sugars during photosynthesis.

Describe what happens to excess sugars in plants

[1 mark]

Question 2a

a)
The diagram below shows a transverse section (TS) of a plant stem.



Identify the structure found at I and state its function.

[2 marks]

Question 2b

b)

A scientist used radioactive carbon dioxide to investigate the direction and rate of sucrose transport in a plant. Their results showed that during periods of plant growth, sucrose was mainly transported upwards.

Explain why this occurs.

[3 marks]

Question 2c

c)

Although most of the sugars produced by plants are used up rapidly in respiration, plants can sometimes overproduce sugars during photosynthesis. Excess sucrose in sink tissues can be converted to starch.

Suggest the benefits of this for maintaining translocation in the plant.

[2 marks]

Question 3a

a)

Translocation occurs from regions known as 'sources' to regions known as 'sinks'.

Describe what the term 'sink' refers to and state two examples of 'sinks'.

[3 marks]

Question 3b

b)

Plasmodesmata are present in the cell walls of companion cells.

Explain what these plasmodesmata are and their function in companion cells.

[3 marks]

Question 3c

c)

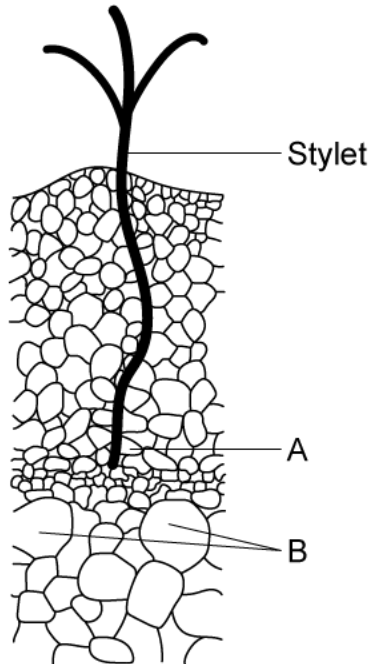
Referring to the movement of sucrose in your answer, explain how a high hydrostatic pressure is generated at 'source' sites in plants.

[3 marks]

Question 4a

a)

An aphid was allowed to feed on a plant stem. The aphid was anaesthetised and its head and body were then removed, leaving the stylet (mouthparts) still in place. The severed stylet of the aphid, still embedded in the plant tissue, is shown in the diagram below.



Identify tissue **B**.

[1 mark]

Question 4b

b)

Identify tissue **A** in the diagram above and state one piece of evidence to support your identification.

[2 marks]

Question 4c

c)

Describe how the movement of solutes through plant tissues can be studied and measured using aphid stylets.

[3 marks]**Question 5a**

One mark is available for clarity of communication throughout this question.

a)

Outline the symplast pathway for the loading of sucrose into sieve tubes.

[3 marks]**Question 5b**

b)

Describe how sugar is transported from the lower leaves of a plant to the growing leaf buds at the top of a plant.

[5 marks]

Question 5c

c)

Photosynthesis produces glucose, which is then transported and stored in plants.

Outline how this glucose is transported and stored.

[7 marks]