



EXAM PAPERS PRACTICE

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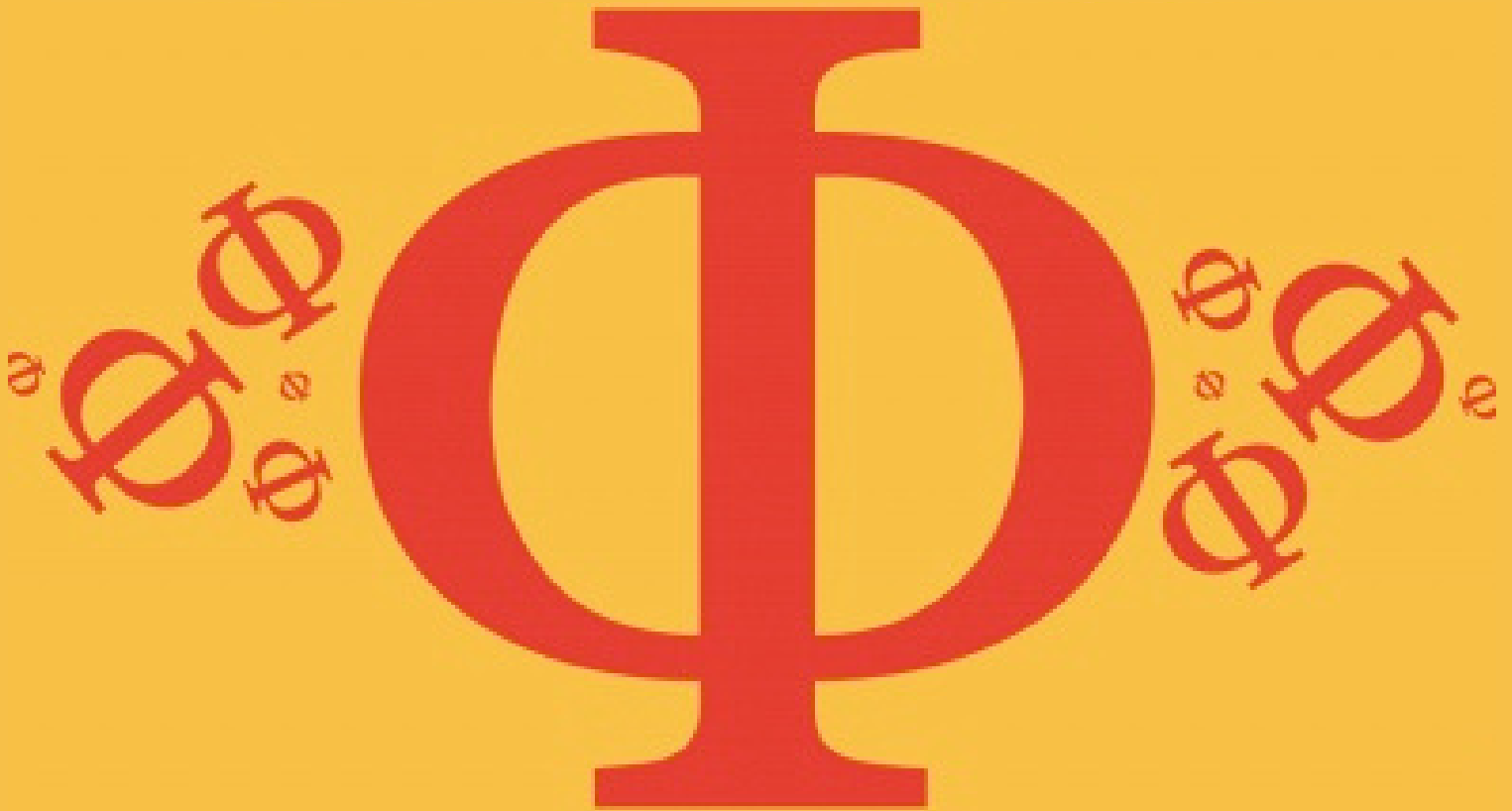
Detailed mark scheme

Suitable for all boards

Designed to test your ability and

9.2 Transport in the Phloem of Plants

Medium



BIOLOGY

IB HL

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

EXAM PAPERS PRACTICE

Time allowed: 20
Score: /10
Percentage: /100

Question 1

Which of the following correctly identifies a source and a sink in a plant?

	Source	Sink
A	Sprouting potato tubers	Growing apples
B	Growing apples	Sprouting potato tubers
C	Young, growing potato tubers	Mature leaves
D	Growing apples	Young, growing potato tubers

[1 mark]

Question 2

The following steps describe the process of translocation.

- I. The solute concentration in the phloem sieve tubes increases
- II. The increase in hydrostatic pressure causes phloem sap to flow towards sinks
- III. Organic compounds are actively loaded into phloem sieve tubes
- IV. Water moves into phloem vessels by osmosis

What is the correct order of the steps?

- A. III → II → IV → I
- B. III → I → IV → II
- C. I → III → IV → II
- D. I → IV → III → II

[1 mark]

Question 3

Which of the following statements apply to phloem sieve tubes?

- I. They transport organic compounds from sink to source
- II. They provides mechanical support to the plant
- III. They are closely associated with companion cells to assist with loading of sucrose
- IV. They consist of living cells that form a continuous tube for the transport of phloem sap

- A. I only
- B. II and III only
- C. I, II and IV
- D. III and IV only

[1 mark]

Question 4

Why can the symplastic pathway for loading sucrose be considered a passive process?

- A. Sucrose moves from the companion cell into the sieve tube through plasmodesmata
- B. Sucrose is carried against its concentration gradient into the companion cell through a co-transporter protein
- C. H^+ ions are pumped out of companion cells by proton pumps
- D. Transfer cells contain many mitochondria to provide energy for the proton pumps to work

[1 mark]

Question 5

Which of the following describes the apoplast route along which sucrose is loaded into phloem sieve tubes?

- I. H^+ ions are actively pumped out of the companion cell
- II. Sucrose travels along plasmodesmata to the companion cell
- III. H^+ ions flow down their concentration gradient through a co-transporter protein
- IV. Sucrose is carried across a sieve tube membrane

- A. I only
- B. I and II only
- C. I, II and IV
- D. I, III and IV

[1 mark]

Question 6

Which of the following does **not** contribute to generating a high hydrostatic pressure at the source?

- A. A high solute concentration in phloem sieve tubes due to the loading of sucrose
- B. The incompressibility of water molecules
- C. The rate at which sucrose is converted to starch in storage tissue
- D. Rigid plant cell walls made of cellulose

[1 mark]

Question 7

Girdling, or ring-barking, involves the removal of a strip of bark around the entire circumference of a tree trunk. This removes the outer part of the vascular bundles which results in the death of the entire tree over time.

What could be a possible explanation for this?

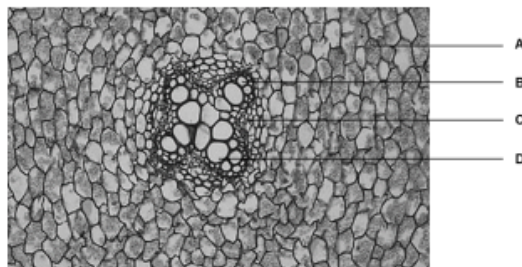
- A. Xylem is removed from the vascular bundles, so water and mineral salts cannot be transported to the leaves
- B. Phloem is removed from the vascular bundles, so sugars cannot be transported to the roots
- C. Xylem is removed from the vascular bundles, so sugars cannot be transported to the roots
- D. Phloem is removed from the vascular bundles, so water and mineral salts cannot be transported to the leaves

[1 mark]

Question 8

The following photomicrograph shows the vascular bundle in a root.

Which letter identifies the phloem?



[1 mark]

Question 9

Aphid stylets can be used to measure phloem transport rates in plants. It was found that the transport rate in stylets located close to a source was much higher compared to those located close to a sink.

What could be a possible explanation for this?

- A. The hydrostatic pressure at a sink is low due to the buildup of sucrose in the phloem sieve elements
- B. The hydrostatic pressure at a sink is high due to water moving into phloem sieve elements by osmosis
- C. There is a high hydrostatic pressure at the source due to the incompressibility of water
- D. There is a low hydrostatic pressure at the source due to a low solute concentration in the sieve tube elements

[1 mark]

Question 10

Why are radioisotopes considered to be such important tools in studying translocation?

- A. It provides a way to track the distribution of molecules between sources and sinks in a plant
- B. To determine the order in which carbon compounds are generated
- C. It provides a way to determine the rate of carbon fixation in a plant
- D. Radioactive molecules contribute to the hydrostatic pressure in xylem vessels

[1 mark]