

7.2 Transport Mechanisms

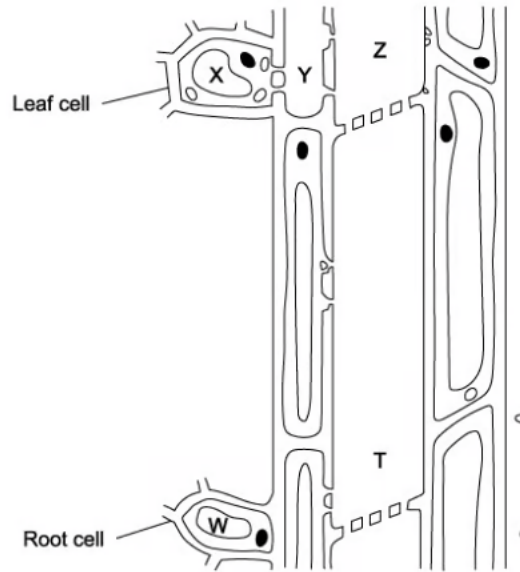
Question Paper

Course	CIEA Level Biology
Section	7. Transport in Plants
Topic	7.2 Transport Mechanisms
Difficulty	Hard

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

Question 1

This diagram represents part of the phloem pathway, from leaf to root in a plant.



Which process is occurring at each stage?

	between X and Y	water potential at Z	hydrostatic pressure at T
A	active transport of sucrose	lowers	decreases
B	active transport of sucrose	raises	increases
C	passive transport of sucrose	lowers	increases
D	passive transport of sucrose	raises	decreases

[1 mark]

Question 2

Which processes are involved in transport in the phloem and xylem?

	xylem			phloem		
	diffusion	mass flow	osmosis	diffusion	mass flow	osmosis
A	✓	✓	X	X	✓	✓
B	X	✓	✓	✓	✓	X
C	✓	✓	✓	✓	✓	✓
D	X	X	✓	✓	✓	✓

[1 mark]

Question 3

A leafy shoot was attached to a potometer and the time taken for the meniscus to move along the capillary tubing was recorded. The capillary tubing has a 0.5 mm diameter.

In one session, the student measured the bubble to be moving at a rate of 3 mm min^{-1}

How much water would the plant absorb in 30 minutes at this rate in mm^3 to two significant figures?

- A. 18
- B. 90
- C. 45
- D. 17.67

[1 mark]

Question 4

Which of these statements provides the best evidence that translocation occurs due to pressure-driven mass flow?

- A. flow of sugars in phloem is 10,000× faster than diffusion alone
- B. translocation stops in the presence of a metabolic poison that inhibits mitochondrial enzymes
- C. positive pressure from inside the phloem forces sap out through aphid stylets (mouth parts) and this pressure lowers closer to the source
- D. sieve tube plates allow for uninterrupted flow of solutes from source to sink

[1 mark]

Question 5

Which feature of xylem vessel elements allows them to stay open as transpiration increases?

- A. the narrow lumen of the xylem vessel tubes
- B. the absence of cross walls between xylem vessel elements
- C. the lignification of the walls of the xylem vessel elements
- D. the cohesion of water in the xylem vessel elements

[1 mark]

Question 6

Which of these statements indicates that the mass flow of sap through sieve elements is an active process?

- A. sap in the phloem can move against the pull of gravity
- B. sucrose is loaded into the phloem against the concentration gradient
- C. movement of sucrose in the phloem occurs many times faster than the speed of diffusion
- D. water enters the phloem via osmosis down a concentration gradient

[1 mark]

Question 7

All of these scenarios involve the movement of water by either the symplast pathway or the apoplast pathway.

Which pathway is being used in each instance?

	water moves between cells via plasmodesmata	water crosses the endodermis in the root	water passes through cell membrane into cytoplasm	water enters a plants cell wall
A	apoplast	symplast	apoplast	symplast
B	apoplast	apoplast	symplast	symplast
C	symplast	symplast	symplast	apoplast
D	symplast	apoplast	apoplast	apoplast

[1 mark]

Question 8

What determines the speed of water movement in the xylem?

- A. the amount of water absorbed by the roots
- B. diffusion of water through the stomata
- C. evaporation of water from the mesophyll cells
- D. the maintaining of a diffusion gradient in the leaves

[1 mark]

Question 9

Which statement best explains why the glucose produced by photosynthesis is converted into sucrose before is transported by phloem?

- A. sucrose is a larger molecule and is more easily converted to starch
- B. sucrose is a non-reducing sugar, so is less reactive than glucose
- C. sucrose can pass through plant cell surface membranes more easily
- D. sucrose is insoluble and therefore doesn't affect water potential

[1 mark]

Question 10

How will the root pressure in a plant be affected by waterlogged soil?

- A. no change
- B. increase due to a low water potential in the soil
- C. increase due to an increased transpiration pull
- D. decrease due to a lack of oxygen in the soil

[1 mark]