

Transport in plants practice questions

23 questions • 67 marks • mark scheme at the back

For Cambridge IGCSE Biology 0610 (and 0970, which has the same content). **Supplement** is Extended content, only examined on Papers 2 and 4.

Name

Total / 67

Xylem and phloem **Spec 8.1**

1 Which statement about phloem is correct? [1 mark]

- A. ☐ It transports water and mineral ions.
- B. ☐ It transports sucrose and amino acids.
- C. ☐ It supports the plant.
- D. ☐ It absorbs water from the soil.

2 State two functions of xylem and one function of phloem. [3 marks]

3 Describe where xylem and phloem are found in a cross-section of the stem of a non-woody dicotyledonous plant. [3 marks]

4 Describe the position of the xylem and phloem in a cross-section of a root. [3 marks]

5

Supplement

[4 marks]

Describe how the structure of a xylem vessel is related to its function.

[illegible]

6

Supplement

[1 mark]

Which feature of xylem vessels allows water to move up in a continuous column?

- A. ☐ thick walls
- B. ☐ lignin in the walls
- C. ☐ no cross walls between cells
- D. ☐ a nucleus in each cell

Water uptake Spec 8.2

Spec 8.2

7

Why do root hair cells have long extensions?

[1 mark]

- A. ☐ to increase the surface area for absorption
- B. ☐ to store water
- C. ☐ to carry out photosynthesis
- D. ☐ to transport sucrose

8

State two functions of root hair cells and explain how the root hair is adapted to carry them out.

[3 marks]

[illegible]

9

Outline the pathway taken by water from the soil to the mesophyll cells of a leaf.

[4 marks]

[illegible]

10 Which list shows the pathway of water through a plant in the correct order? **[1 mark]**

- A . ☐ xylem, root hair cell, root cortex, mesophyll
- B . ☐ root hair cell, root cortex, xylem, mesophyll
- C . ☐ root cortex, root hair cell, mesophyll, xylem
- D . ☐ mesophyll, xylem, root cortex, root hair cell

11 A student places a freshly cut stem of a white flower in water containing a red stain. After 24 hours the petals have red veins. Describe how the student could use the stem to show where water travels, and state what they should see. **[4 marks]**

12 Suggest two variables the student should control when comparing the uptake of stain in two different plants. **[2 marks]**

Transpiration Spec 8.3

13 Describe how water leaves a leaf. **[3 marks]**

14 A student uses a potometer to investigate the effect of wind speed on the rate of transpiration. Describe how the student could do this. **[4 marks]**

- 15** In a potometer experiment, an air bubble moved the distances shown in the table. [2 marks]
Calculate the rate of water uptake with the fan on, in mm / min.

Potometer results		
conditions	distance moved by bubble / mm	time / min
still air	18	6
fan on	54	6

Answer =

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- 16** **Supplement** [4 marks]
Explain how the structure of a leaf allows it to lose water vapour quickly.

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- 17** **Supplement** [5 marks]
Explain why a plant loses water vapour faster on a hot, dry, windy day than on a cool, humid, still day.

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18

Supplement

[4 marks]

Explain how water moves up the xylem to the top of a tall tree.

19

Supplement

[3 marks]

Explain how and why wilting occurs.

Translocation

Spec 8.4

Supplement

20

Supplement

[1 mark]

Which part of a plant is a source of sucrose?

- A. ☐ a developing fruit
- B. ☐ a growing root tip
- C. ☐ a fully grown green leaf
- D. ☐ a young bud

21

Supplement

[3 marks]

Define the term translocation.

22

Supplement

[4 marks]

Describe what is meant by a source and a sink in a plant. Give one example of each.

23

Supplement

[4 marks]

A potato tuber stores carbohydrate as starch during the summer. In spring, the tuber grows new shoots and sucrose from the tuber is moved to them. Explain why the tuber is a sink in summer and a source in spring.

Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [1]

B B (1)

2. [3]

- (xylem) transport of water / mineral ions (1)
- (xylem) support (1)
- (phloem) transport of sucrose / amino acids (1) ignore 'food' alone

3. [3]

- in vascular bundles (1)
- arranged in a ring near the outside of the stem (1)
- xylem on the inside and phloem on the outside of each bundle (1)

4. [3]

- in the centre of the root (1)
- forms an X / star shape (1)
- phloem between the arms (of the X) (1)

5. [4] **Supplement**

- thick walls (1)
- containing lignin, which strengthens / supports / stops the vessel collapsing (1) ignore details of lignification
- no cell contents, so water flows without obstruction (1)
- no cross walls / cells joined end to end, forming a long continuous tube (1)

6. [1] **Supplement**

C C (1)

7. [1]

A A (1)

8. [3]

- absorb water (1)
- absorb mineral ions (1)
- long extension / root hair gives a large surface area (1)

9. [4]

- enters root hair cells (from soil) (1)
- moves through root cortex cells (1)
- enters and moves up the xylem (1)
- (from xylem in the leaf) to mesophyll cells (1)

10. [1]

B B (1)

11. [4]

- cut a thin transverse section (of the stem) (1)
- view with a hand lens / microscope (1)
- red stain seen in small areas / the vascular bundles (1)
- these are the xylem, so water moves in the xylem (1)

12. [2]

- same type / species / size of plant (1)
- same volume / concentration of stain (1)
- same time / temperature / light (1)
- Max 2

13. [3]

- water evaporates from the surfaces of the mesophyll cells (1)
- into the air spaces (1)
- water vapour diffuses out through the stomata (1)

14. [4]

- place a fan at different distances from the leafy shoot / use different fan speeds (1)
- measure the distance moved by the air bubble in a set time (1)
- keep other variables the same, for example temperature / light / same shoot (1)
- repeat and calculate a mean (1)

15. [2]

- rate = distance ÷ time = $54 \div 6$ (1)
- 9 mm / min (1)

16. [4] Supplement

- mesophyll cells surrounded by interconnecting air spaces (1)
- gives a large internal surface area for evaporation (1)
- many / large stomata (1)
- water vapour diffuses out through the stomata (1)

17. [5] Supplement

- higher temperature, so water evaporates faster (1)
- molecules have more energy / diffuse faster (1)
- wind blows water vapour away from the leaf (1)
- keeps a steep concentration gradient (1)
- low humidity so the concentration gradient is steeper, so faster diffusion (1)

18. [4] Supplement

- water evaporates from mesophyll cells / leaves (1)
- creates a transpiration pull (1)
- water molecules are held together / attracted to each other (1)
- so the column of water is pulled up the xylem (1)

19. [3] Supplement

- water lost by transpiration faster than it is taken up (1)
- cells lose water (by osmosis) / lose turgor / become flaccid (1)
- so leaves / stems are no longer supported and droop (1)

20. [1] Supplement

C C (1)

21. [3] Supplement

- movement of sucrose and amino acids (1)
- in the phloem (1)
- from sources to sinks (1)

22. [4] Supplement

- source: part of the plant that releases sucrose / amino acids (1)
- example: mature / green leaf (1) allow storage organ when new shoots are growing
- sink: part of the plant that uses or stores sucrose / amino acids (1)
- example: growing root tip / shoot tip / fruit / seed / storage organ (1)

23. [4] Supplement

- in summer it receives sucrose and stores it (as starch) (1)
- so it is a sink (1)
- in spring (starch is broken down and) sucrose is released (1)
- which moves to the growing shoots, so it is a source (1)