

# Transport in plants

## Question Paper 4

Level	A Level
Subject	Biology
Exam Board	OCR
Module	Exchange and transport
Topic	Transport in plants
Booklet	Question Paper 4

**Time allowed:** 65 minutes

**Score:** /48

**Percentage:** /100

### Grade Boundaries:

A*	A	B	C	D	E
>69%	56%	50%	42%	34%	26%

- (a) A student used a potometer to investigate the effect of light intensity on the rate of transpiration in a healthy leafy shoot.

The results obtained are shown in Table 5.1.

**Table 5.1**

light intensity in arbitrary units (a.u.)	rate of transpiration ( $\text{mm min}^{-1}$ )			
	trial 1	trial 2	trial 3	mean
10	5.0	7.0	5.0	5.7
20	5.0	7.0	5.0	5.7
30	12.0	12.0	11.0	11.7
40	24.0	23.0	26.0	24.3
50	32.0	33.0	32.0	32.3

- (i) Describe the trend shown in the mean rate of transpiration as light intensity increases from 20 to 50 a.u. [2]
- (ii) Suggest why the rate of transpiration did not change between light intensities 10 a.u. and 20 a.u. [1]
- (b) (i) Explain why transpiration is unavoidable during the day. [3]
- (ii) Fig. 5.1, **on the insert**, is a photograph of a transverse section of a leaf taken from a xerophyte. Describe the xerophytic features of this leaf **and** explain how each feature reduces loss of water vapour.



*In your answer you should use appropriate technical terms, spelt correctly.*

**[5]**

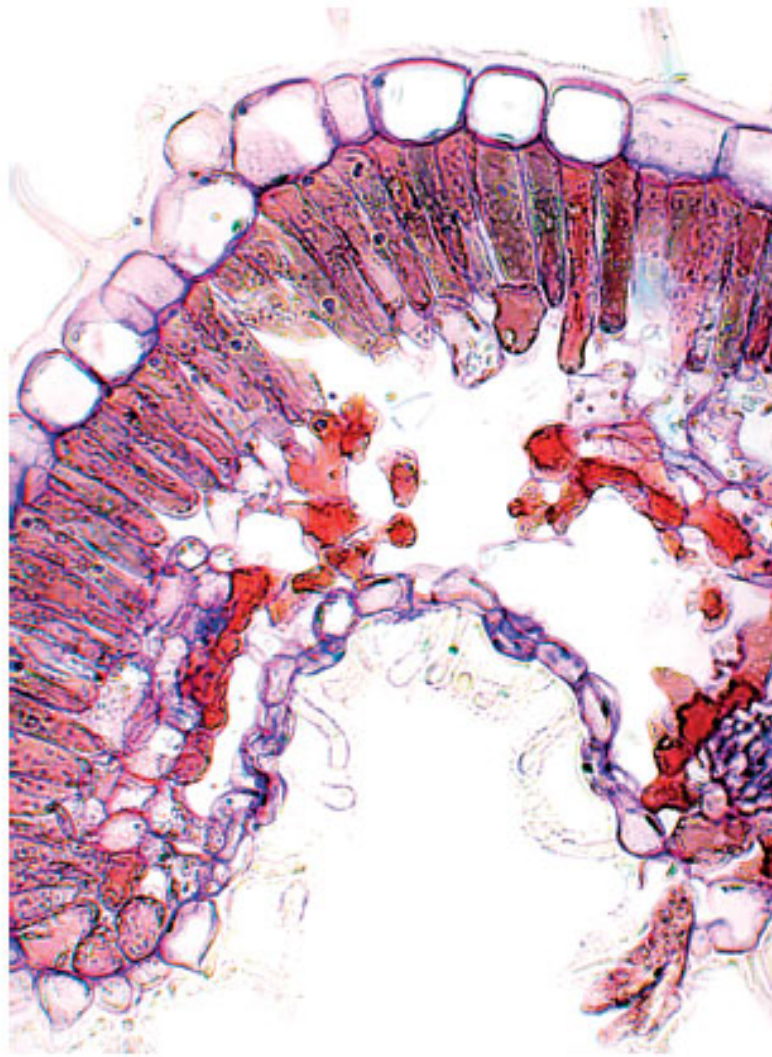


Fig. 5.1

[Total: 11]

## Question 2

(a) Translocation is the movement of assimilates along the phloem from one part of a plant to another.

(i) Name the sugar molecule most commonly translocated. [1]

(ii) A tissue may act as a source or a sink at different times.

For each tissue listed below, state whether it is acting as a source, a sink or neither. The first one has been done for you.

tissue	source, sink or neither
a leaf in summer	source
a developing bud	
xylem	
an actively growing root tip	

[3]

(b) The sap in the phloem sieve tubes is moved by mass flow.

State **two** adaptations of sieve tubes that enable mass flow to occur. [2]

(c) Describe how assimilates are loaded into the phloem.



*In your answer, you should use appropriate technical terms, spelt correctly.*

[4]

[Total: 10]

### Question 3

(a) Fig. 4.1 is a diagram showing the position of the vascular bundles in a transverse section of the stem of a young dicotyledonous plant.

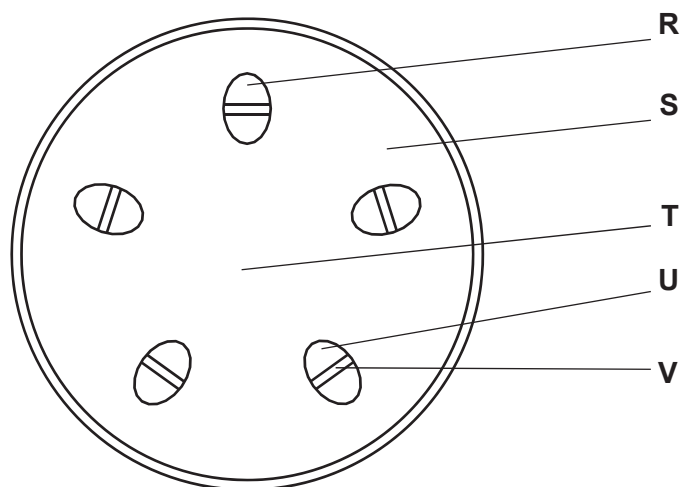


Fig. 4.1

Select the correct letter from Fig. 4.1 to identify each of the following tissues in the stem. [3]

xylem .....

phloem .....

cambium .....

(b) Fig. 4.2, **on the insert**, shows the cut end of a stem from a woody plant. The other end of the stem is being heated in a fire. Steam can be seen coming from the vascular tissue at the cut end of the stem.

Describe the features of the xylem that enable the steam to pass from the heated end of the stem to the cut end.

[2]

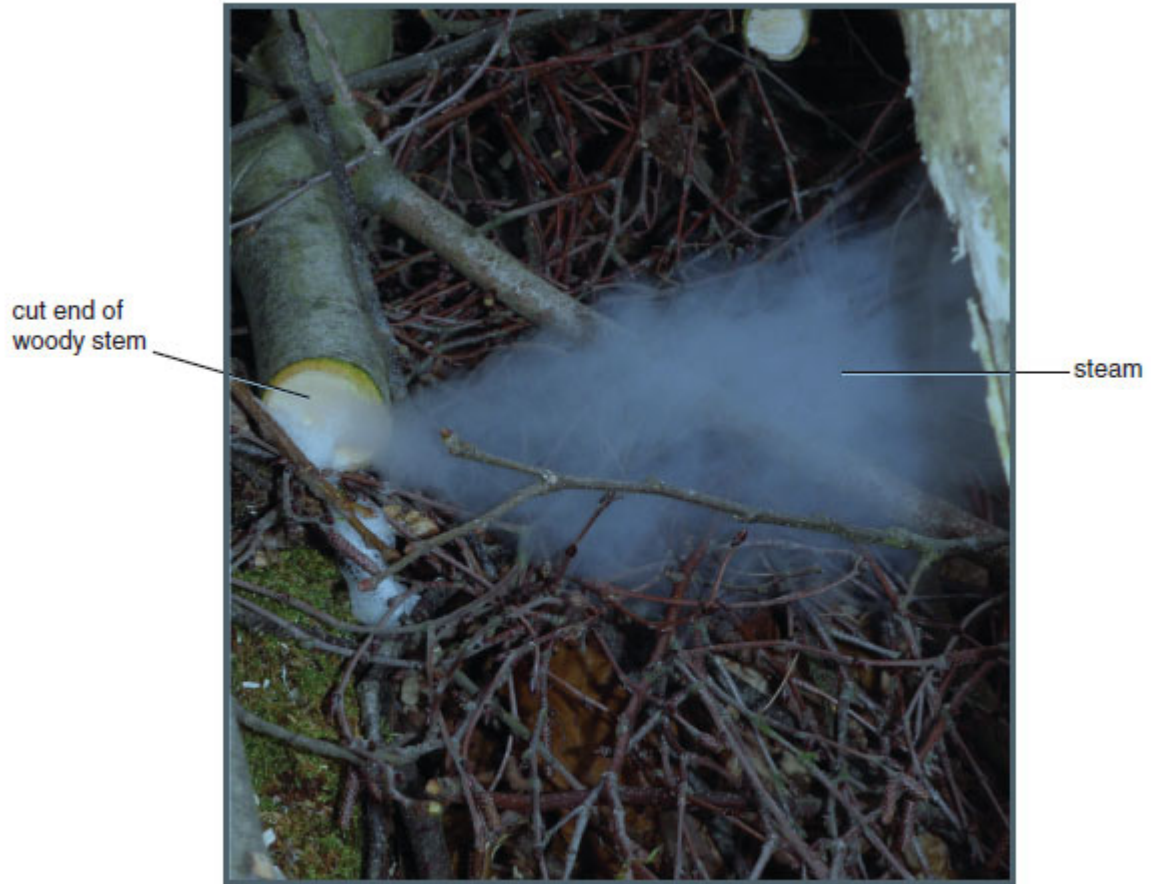


Fig. 4.2

(c) (i) Define the term *transpiration*. [2]

(ii) Describe **and** explain how transpiration contributes to the mechanism of water transport up the stem.

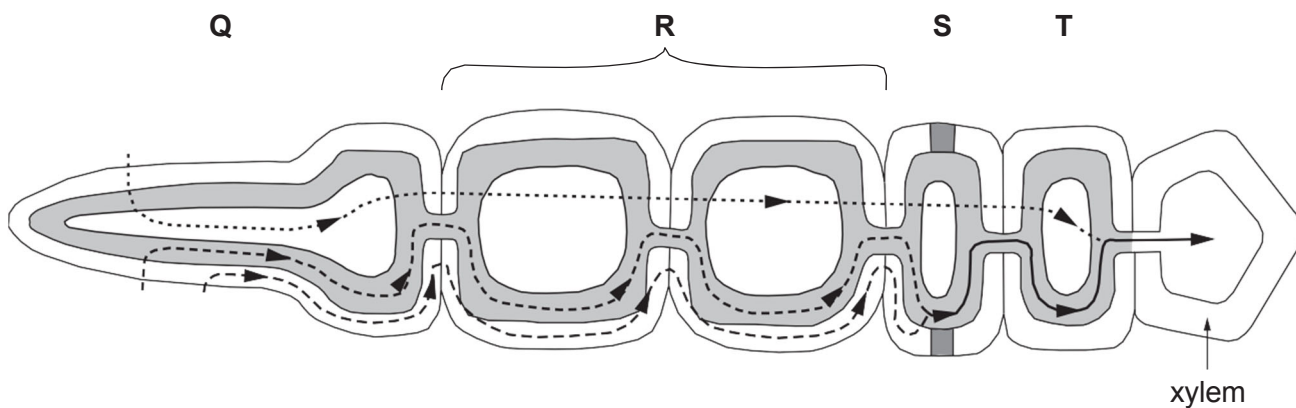


*In your answer, you should use appropriate technical terms, spelt correctly.* [5]

(iii) Suggest why a bunch of flowers may survive longer if the ends of the stems are removed immediately before the flowers are placed in water. [2]

[Total: 14]

Fig. 5.1 shows the possible pathways taken by water across the root of a plant.



Key:


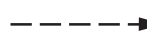
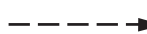

-  pathway 1
-  pathway 2
-  pathway 3
-  common pathways

Fig. 5.1

(a) (i) Name the process by which water enters cell Q from the soil. [1]

(ii) Pathway 1 is known as the vacuolar pathway, as the water passes into and through the cell vacuoles.

Name pathway 2 and pathway 3. [2]

pathway 2

pathway 3

(iii) State which letter, Q, R, S or T, on Fig. 5.1, represents the endodermis. [1]



(b) Describe **and** explain how water is moved up the xylem from the roots to the leaves.

**[5]**

(c) Table 5.1 shows a comparison of xylem vessels and phloem sieve tube elements.

Complete the table. The first row has been done for you.

**[4]**

**Table 5.1**

feature	xylem vessel	phloem sieve tube element
cells living or dead	dead	living
bordered pits present or absent		
lignin present or absent		
substances transported		
direction of transport		

**[Total: 13]**