**1** **(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.*

.....

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.....

..... **[4]**

**[Total: 10]**

**2** **(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.

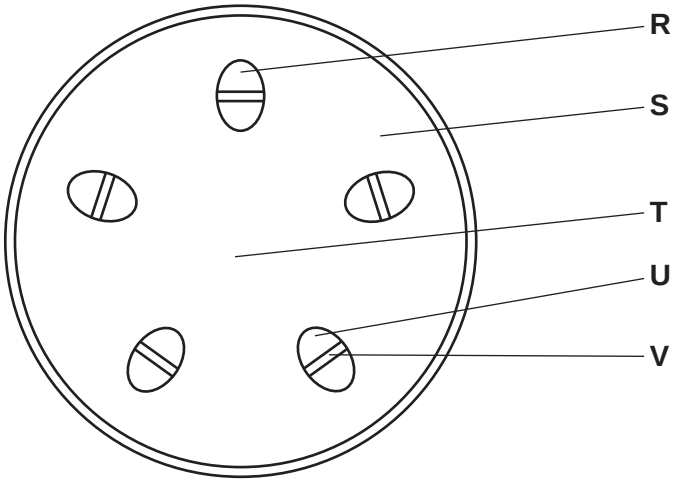


**Fig. 4.1**

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

xylem .....

phloem .....

cambium ..... **[3]**

**(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]**

**(c) (i)** Define th

.....

.....

.....

..... **[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.*

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..... **[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.

.....

.....

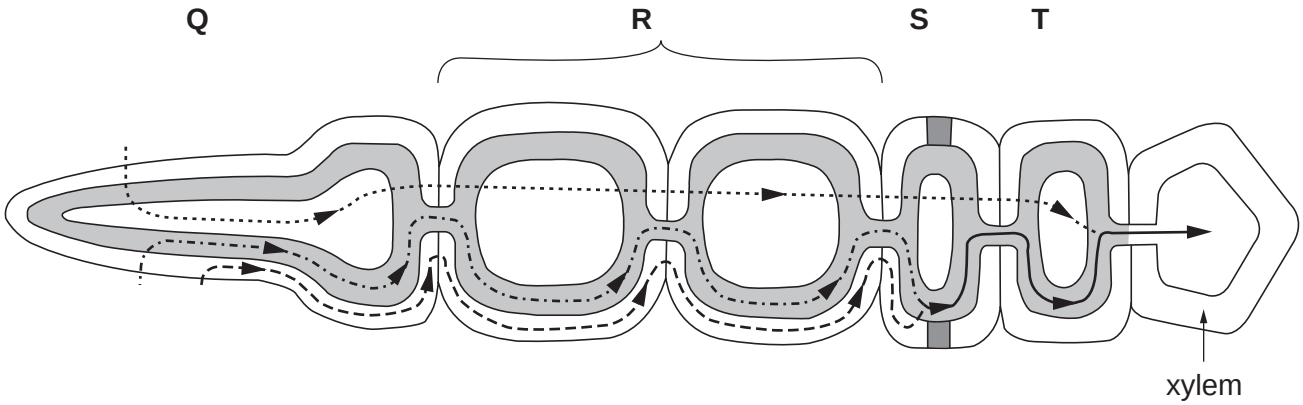
.....

.....

..... **[2]**

**[Total: 14]**

**3** 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.

pathway 2 .....

pathway 3 ..... **[2]**

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

..... **[1]**

**(b)** Describe **and** the leaves.

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

.....

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..... **[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.

**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 | | |

**[4]**

**[Total: 13]**

**4** Fig. 4.1 shows a potometer, a piece of apparatus used for estimating the rate of transpiration.

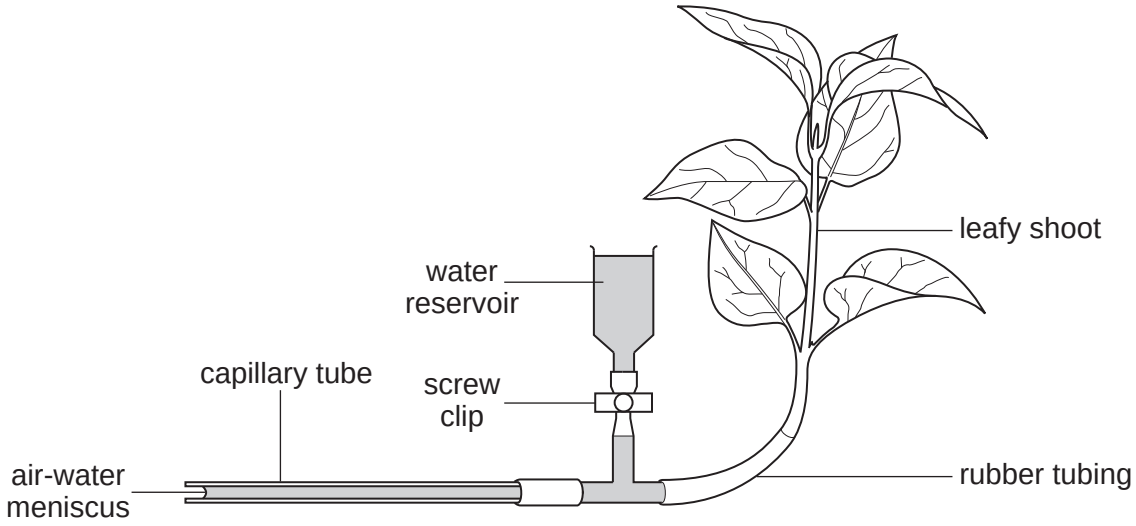


**Fig. 4.1**

**(a)** State **one** essential component of the apparatus, not shown in Fig. 4.1, that must be added before any results can be recorded.

..... **[1]**

**(b)** Describe **three** steps a student should take when **setting up** the potometer to ensure that the apparatus works correctly.

1 .....

.....

2 .....

.....

3 .....

..... **[3]**

**(c)** A student used the apparatus shown in Fig. 4.1 to investigate how transpiration rates vary during the day. The student placed the potometer on a window ledge in the laboratory and estimated the rate of transpiration four times during the day.

The results are shown in Table 4.1.

**Table 4.1**

| time of day | rate of transpiration (arbitrary units) | | | |
|---|---|---|---|---|
| | replicate 1 | replicate 2 | replicate 3 | mean |
| 10.00 | 32 | 29 | 31 | 30.7 |
| 12.00 | 37 | 35 | 38 | 36.7 |
| 14.00 | 23 | 26 | 25 | 24.7 |
| 16.00 | 25 | 27 | 24 | |

**(i)** Calculate the mean value for the rate of transpiration at 16.00 hours.

Give your answer to **one decimal place**.

Answer = ..... **[1]**

**(ii)** Explain why, for each time of the day, the student carried out three replicates to calculate a mean.

.....

.....

.....

..... **[2]**

**(iii)** Suggest **two** possible reasons, other than light and temperature, why the rate of transpiration was **lower** in the afternoon than in the morning.

1 .....

.....

2 .....

..... **[2]**

**(iv)** Explain why the potometer only gives an **estimate** of the rate of transpiration.

.....

.....

.....

..... **[2]**

**5** **(a)** Complete the following paragraph about the loss of water from plants.

The loss of water from the aerial parts of a plant is known as ..... .

The majority of water is lost from the leaves. Water is transported up the stem in the ..... and passes into the mesophyll cells of the leaf by ..... . Water evaporates from the surface of these cells. From the air spaces in the leaf, the water vapour diffuses out of the leaf through the ..... . **[4]**

**(b)** **(** Explain why water loss from the leaves of a plant is unavoidable.

.....

.....

.....

..... **[2]**

**(ii)** Name the **type** of plant adapted to reduce water loss from its leaves.

..... **[1]**

**(iii)** State **and** explain **two** adaptations of leaves that reduce evaporation.

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

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..... **[5]**

**[Total: 12]**