

Transport mechanism

Question Paper 1

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Transport in plants
Sub Topic	Transport mechanism
Booklet	Theory
Paper Type	Question Paper 1

Time Allowed : 66 minutes

Score : / 55

Percentage : /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	77.5%	70%	62.5%	57.5%	45%	<45%

1 Fig. 1.1 shows the structures of four biological molecules **A**, **B**, **C** and **D**.

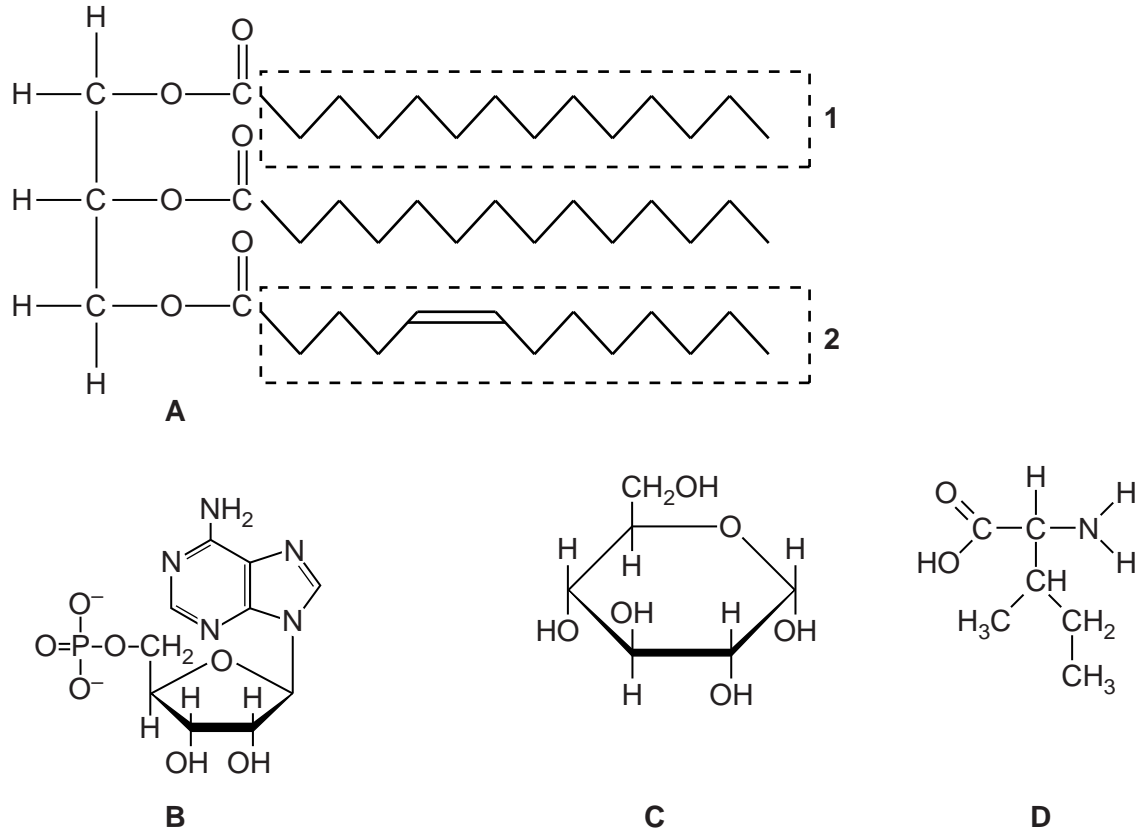


Fig. 1.1

(a) Give the letter, **A** to **D**, of the molecule in Fig. 1.1 which:

(i) is a nucleotide

(ii) can form peptide bonds

(iii) contains ester bonds.

[3]

(b) Some of the molecules in Fig. 1.1 can form polymers.

(i) Name a polymer which can be formed only from many molecules of **C**.

..... [1]

- (ii) State one way, visible in Fig. 1.1, in which the part labelled **1** of molecule **A** differs from the part labelled **2**.

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

- (iii) Molecule **D** can form macromolecules with other similar monomers.

These macromolecules have three dimensional shapes held in place by interactions or bonds other than those between adjacent monomers.

Name two of these interactions or bonds.

1.
2.
[2]

[Total: 7]

- 2 (a) With reference to the structure of a leaf, explain the difference between evaporation and transpiration.

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..... [4]

- (b) Apple, *Pyrus malus*, sour cherry, *Prunus cerasus*, and peach, *Prunus persica*, are dicotyledonous trees that are of importance to commercial growers for the fruit that they produce.

A student chose a small area of land where all three species of fruit tree were growing. Leaf samples were removed and, using a microscope, the mean number of stomata per square millimetre was estimated for each species.

The rate of transpiration of each species was then measured on each of three separate occasions. The student performed the investigation outside where the trees were located and recorded the weather conditions on each day.

The mean transpiration rate was calculated per unit area of leaf.

The results are shown in Table 3.1.

Table 3.1

fruit tree	mean number of stomata/mm ⁻²	mean transpiration rate/cm ³ h ⁻¹		
		hot dry day	warm dry day	warm rainy day
apple	266	0.19	0.35	0.21
sour cherry	284	0.09	0.28	0.25
peach	190	0.03	0.08	0.07

(i) With reference to Table 3.1, describe **and** explain the results of the investigation.

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..... [4]

(ii) The mean transpiration rate of each species was calculated over a 24 hour period.

Describe how the transpiration rate during the night would differ from the transpiration rate during the day.

Explain your answer.

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..... [3]

(iii) Suggest which of the three species of fruit tree has been described as 'drought-resistant' and would be economical to grow in areas where water is scarce.

..... [1]

- (c)** Many fruits are thought to have beneficial health effects. Sour cherries and peaches may contribute to improved health for tobacco smokers.

Read the following statements. For each, explain how the fruit contributes to protecting smokers from smoking-related diseases.

- (i)** Glutathione is a protein known to be involved in the repair of damaged DNA. Regularly eating sour cherries increases the level of glutathione in the body.

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..... [2]

- (ii)** A diet rich in peaches can help reduce inflammation of the bronchi and bronchioles.

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..... [2]

[Total: 16]

- 3 Fig. 2.1 shows an apparatus used to measure the rate of water uptake by leafy parts of plants.

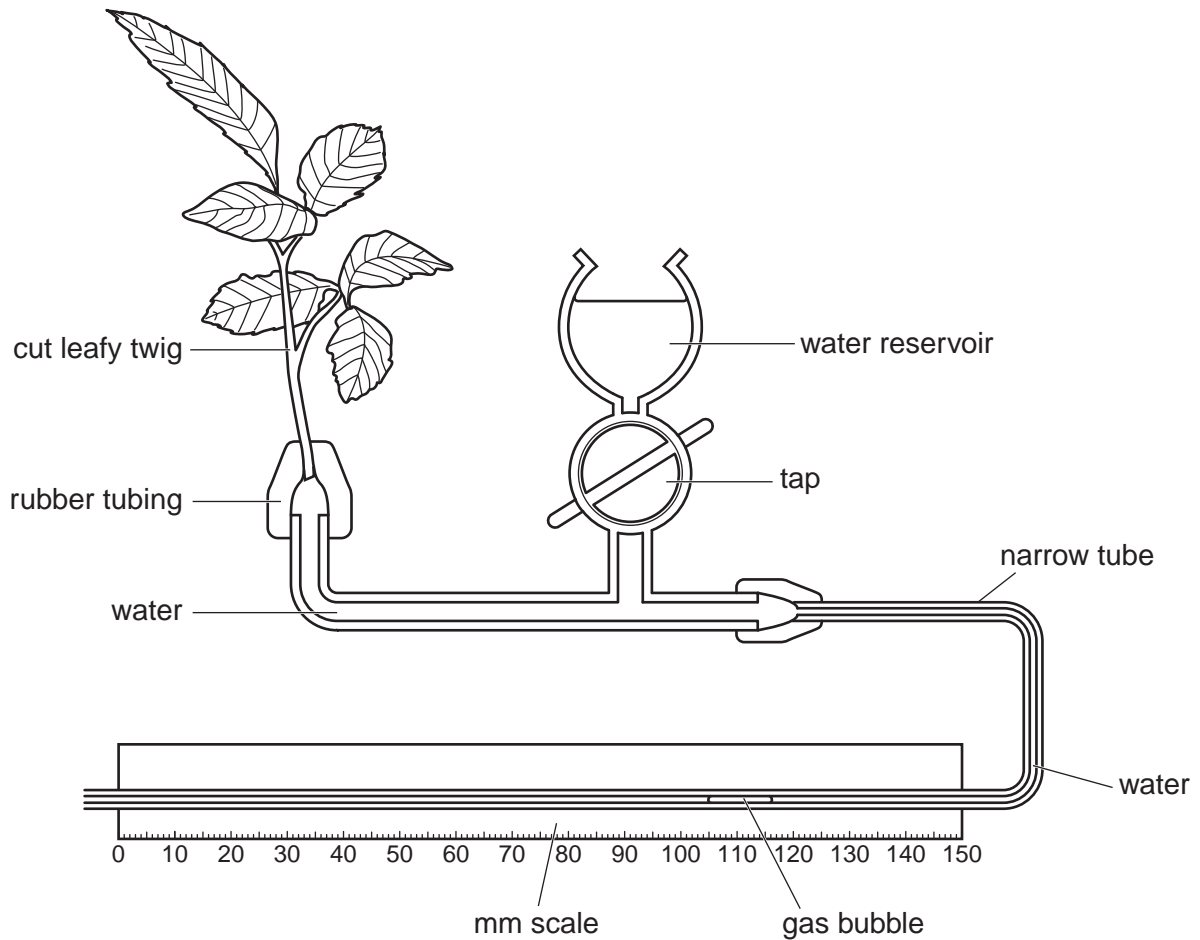


Fig. 2.1

- (a) State the name of this apparatus.

..... [1]

- (b) Explain why the rate of water uptake by the leafy part of the plant shown in Fig. 2.1 will **not** be the same as the rate of transpiration.

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..... [2]

(c) Using the apparatus as shown in Fig. 2.1, the rate of water uptake at 25 °C was found to be greater than at 20 °C.

(i) Explain the effect of increasing the temperature on the rate of water uptake.

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..... [3]

(ii) State two environmental conditions, **other than temperature**, which will affect the rate of water uptake of a leafy twig as shown in Fig. 2.1.

1.
2. [2]

(d) Transpiration is sometimes described as an ‘inevitable consequence of gas exchange’ in plants.

Explain this statement.

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..... [3]

[Total: 11]

4 (a) Plants take in mineral ions through their root hair cells. This may happen by a process which moves the ions from a low concentration in the soil to a higher concentration in the root hair cell.

(i) Name and describe this process by which mineral ions are taken in.

name

description

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..... [3]

(ii) Phosphate is an example of an ion transported in this way. State **one** use for this ion in plant cells.

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..... [1]

Fig. 3.1 is a plan diagram of a transverse section of a plant root.

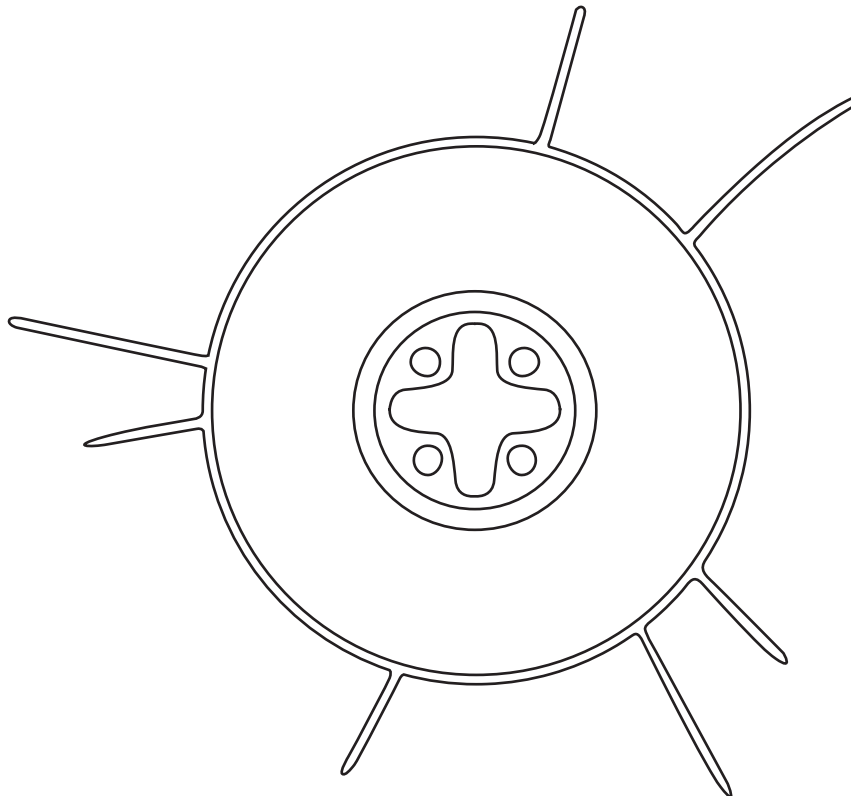


Fig. 3.1

(b) (i) Write the letter **W** on Fig. 3.1 in the area where cells are specialised for the transport of water and mineral ions. [1]

(ii) Water is also absorbed from the soil by the root hair cells.

Outline the mechanism by which this occurs.

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..... [2]

(iii) Describe the pathway taken by water as it passes from the root hair cells into the cells which are specialised for transport of water and mineral ions.

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..... [4]

[Total: 11]

5 Fig. 5.1 is an electron micrograph of a transverse section through part of a plant stem.

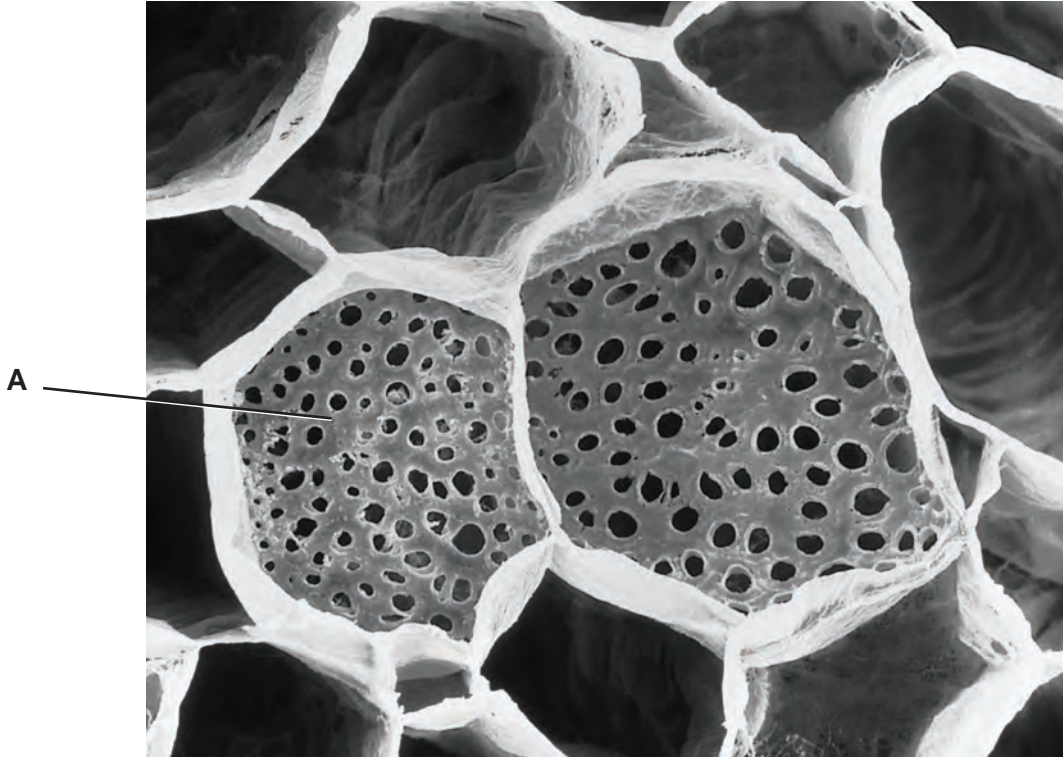


Fig. 5.1

(a) Name structure A.

..... [1]

(b) Specialised cells visible in Fig. 5.1 are involved in transporting assimilates through the plant from source to sink.

(i) Name **one** assimilate transported by these cells.

..... [1]

(ii) Give **one** example of a source and **one** example of a sink.

source

sink [2]

(c) Describe how the assimilate you have named in (b)(i) is transported from the source to the sink.

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..... [5]

(d) Aphids are insects with mouthparts adapted to penetrating the cells of plants which transport assimilates.

Suggest why aphids feed specifically from these cells.

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..... [1]