

# Transport in plants

## Multiple Choice

### Model Answers 1

Level	A Level
Subject	Biology
Exam Board	OCR
Module	Exchange and transport
Topic	Transport in plants
Booklet	Model Answers 1

**Time allowed:** 15 minutes

**Score:** /11

**Percentage:** /100

**Grade Boundaries:**

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

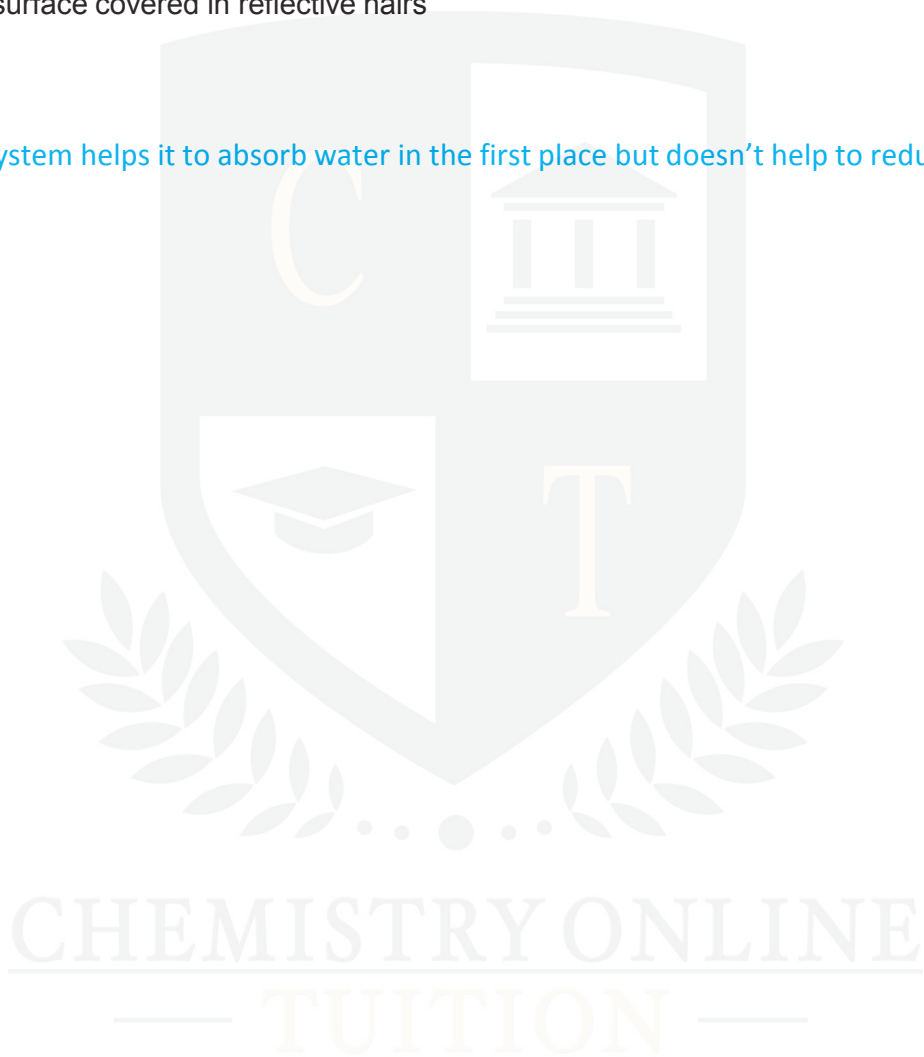
## Question 1

Which of the following, **A** to **D**, is **not** an adaptation to reduce water loss in plants?

- A. an extensive root system that extends far from the plant
- B. leaves that are reduced to spines that prevent damage from animals
- C. the ability to store carbon dioxide so stomata only need to open at night
- D. the surface covered in reflective hairs

[1]

The root system helps it to absorb water in the first place but doesn't help to reduce it



## Question 2

During translocation of photosynthetic products in the phloem sieve tube, hydrogen ions are moved out of companion cells, then sucrose enters the companion cells and moves through plasmodesmata into the sieve tube.

Which of the rows, **A** to **D**, correctly identifies how these substances enter or leave companion cells?

	hydrogen ions out of companion cell	sucrose into companion cell	sucrose out of companion cell
<b>A</b>	diffusion	facilitated diffusion	diffusion
<b>B</b>	diffusion	active transport	active transport
<b>C</b>	active transport	facilitated diffusion	diffusion
<b>D</b>	active transport	active transport	facilitated diffusion

[1]

Hydrogen ions are pumped out of the companion cell by active transport, sucrose then diffuses back into the companion cell attached to the hydrogen ion (via cotransporter proteins). Sucrose then diffuses out of the companion cell into the sieve tube through the plasmodesmata

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### Question 3

Which of the statements, **A** to **D**, applies to transpiration **and** evaporation?

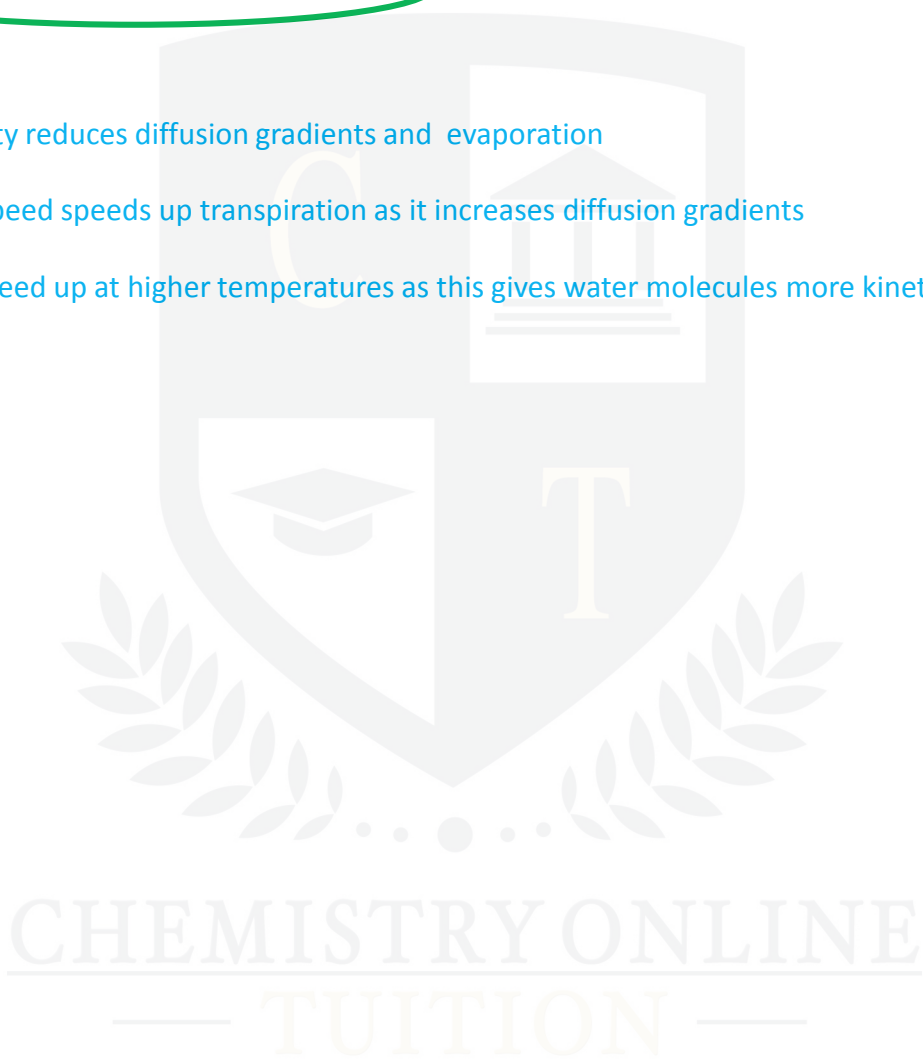
- A. It occurs at a faster rate at higher humidity.
- B. It occurs at a slower rate at greater wind speed.
- C. It occurs at a slower rate at higher temperature.
- D. It occurs at the surface of leaves.**

[1]

Humidity reduces diffusion gradients and evaporation

Wind speed speeds up transpiration as it increases diffusion gradients

Both speed up at higher temperatures as this gives water molecules more kinetic energy



## Question 4

Which of the options, **A** to **D**, is a reason why plants require specialised transport tissue?

- A. to allow osmosis to take place
- B. because they all have a large surface area to volume ratio
- C. to carry sucrose to their leaves
- D. to overcome the limitations of diffusion over large distances

[1]

Diffusion is only effective over short distances, larger organisms have smaller surface area : volume ratio so need a transport system

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## Question 5

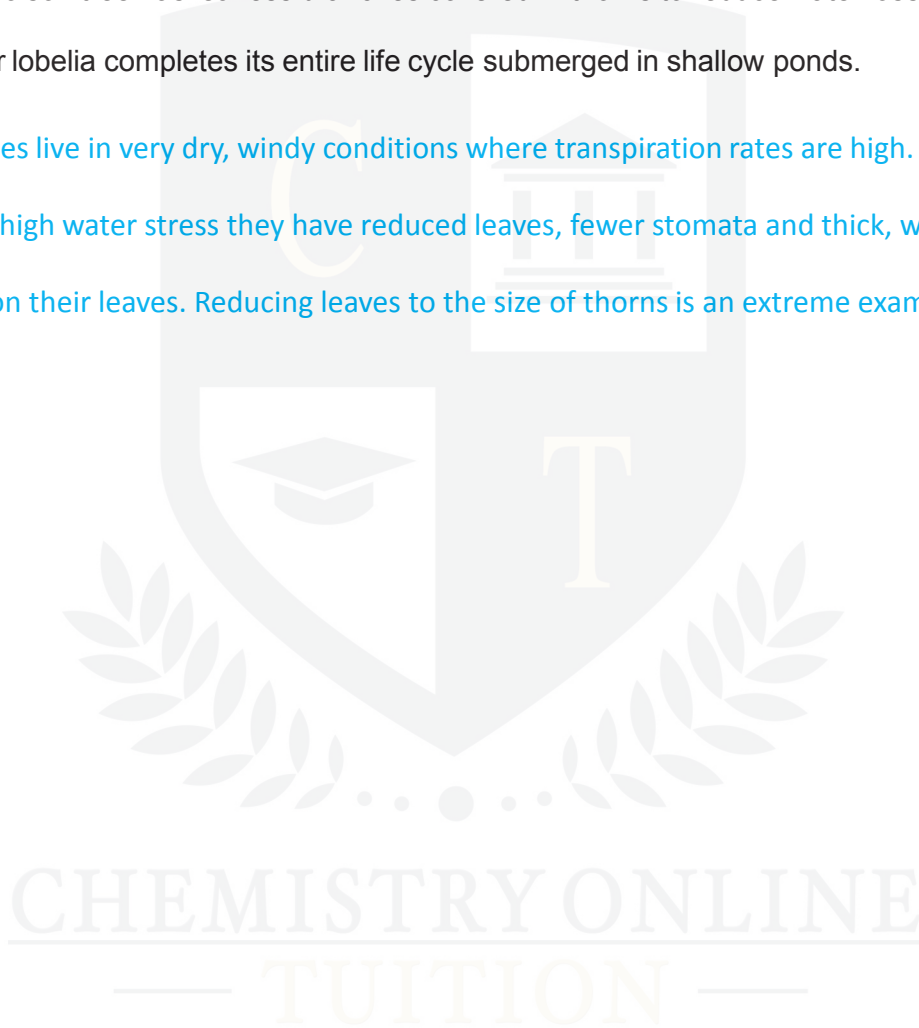
Many plants are adapted to the availability of water in their environment; one group of these plants is the xerophytes.

Which one of the following statements correctly describes a xerophyte?

- A. Smooth cordgrass grows in highly saline marine estuary environments.
- B. The water lily has aerenchyma tissue to allow the movement of gases to submerged roots.
- ☒ C. The poison tree has leafless branches covered in thorns to reduce water loss.
- D. Water lobelia completes its entire life cycle submerged in shallow ponds.

[1]

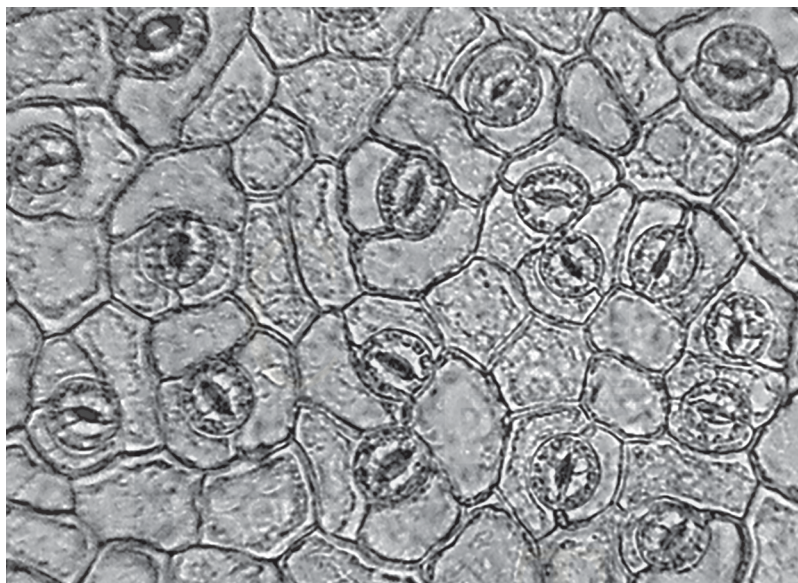
Xerophytes live in very dry, windy conditions where transpiration rates are high. To adapt to high water stress they have reduced leaves, fewer stomata and thick, waxy cuticles on their leaves. Reducing leaves to the size of thorns is an extreme example.



## Question 6

A student counted stomata on a leaf using a light microscope. The image below shows the stomata that were visible.

The image magnification is  $\times 60$ .



Which of the options, **A** to **D**, is the correct stomatal density of this leaf?

**A** 7.50 stomata  $\text{mm}^{-2}$

**B** 0.13 stomata  $\text{mm}^{-2}$

**C** 2428 stomata  $\text{mm}^{-2}$

**D** 0.21 stomata  $\text{mm}^{-2}$

[1]

Measure the sides of the photograph in mm

Multiply them together to get the area

Divide by 60 as this is the number of times it's been magnified

Count the number of stomata which is 17 Divide this by the area to find the number  $\text{mm}^2$

## Question 7

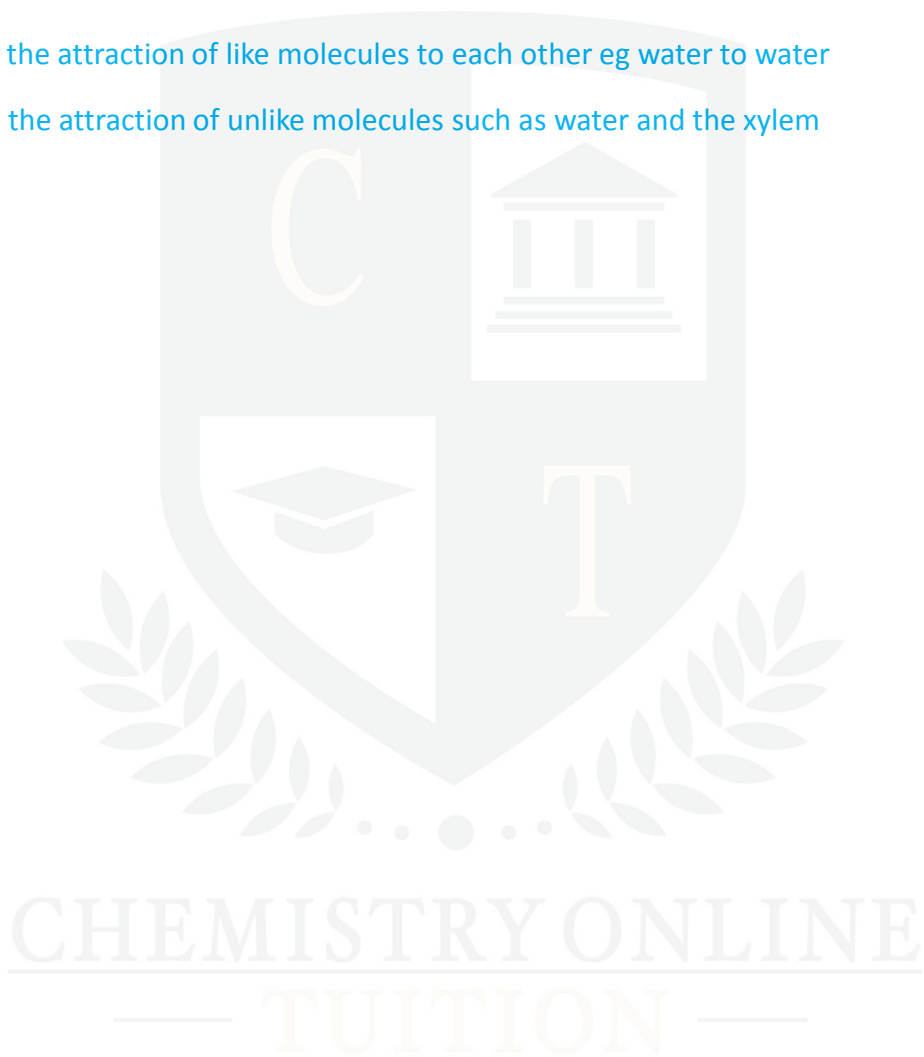
Which of the statements, **A** to **D**, correctly describes the process of adhesion?

- A. attraction of water molecules to the impermeable walls of xylem tissue
- B. attraction of water molecules to other water molecules in the xylem tissue
- C. active transport of water molecules into phloem tissue
- D. attraction of water molecules to other water molecules in the phloem tissue

[1]

Cohesion is the attraction of like molecules to each other eg water to water

Adhesion is the attraction of unlike molecules such as water and the xylem





## Question 8

Mistletoe is a plant parasite that lives on the stems of other plants. It survives by removing water and assimilates from the host plant.

The mistletoe binds to the stem of the host plant and grows a specialised root-like tissue called a haustorium that attaches to different tissues in the stem.

One species of mistletoe, *Viscum minimum*, contains no chloroplasts.

Which of the options, **A** to **D**, explains why *V. minimum* does not need chloroplasts?

- A. the haustorium of *V. minimum* attaches to sieve tube elements
- B. the haustorium of *V. minimum* attaches to xylem vessels
- C the haustorium of *V. minimum* attaches to meristem cells
- D the haustorium of *V. minimum* attaches to cambium tissue

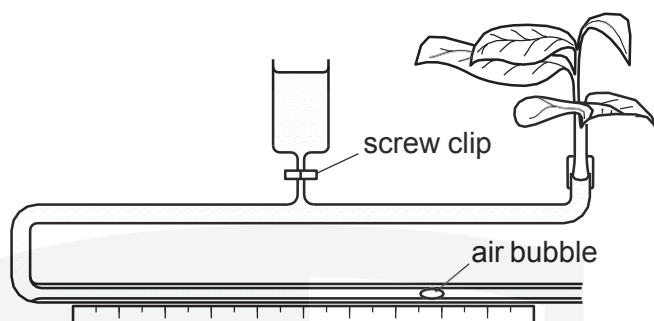
[1]

If it attaches to sieve tube elements it will gain sucrose and other assimilates from the phloem, so it will not need to photosynthesise. Hence no chloroplasts.

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## Question 9

A diagram of a potometer is shown below.



Which of the following options, **A** to **D**, is a precaution that is **not** needed when setting up a potometer?

- A. Remove excess water from the surface of the leaves before readings are taken.
- B. The screw clip must be opened while taking the readings.
- C. The shoot should be cut whilst under water.
- D. There should be no extra air bubbles.

[1]

If you open the screw clip then the water from the reservoir will flow into the capillary tube and push the bubble you are trying to measure out of the tube.

All the rest are legitimate precautions

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## Question 10

The following statements refer to the movement of water from the cortex of the root into the xylem.

Which of the following statements is/are true?

**Statement 1:** Most of the water moves across the root cortex by the apoplast pathway.

**Statement 2:** At the endodermis water has to enter the symplast pathway.

**Statement 3:** Casparian strips in the endodermis contain the chemical lignin.

A 1, 2 and 3

**B** Only 1 and 2

C Only 1 and 3

D Only 1

[1]

Most water moves across the cell walls by capillary action (apoplast) then is diverted into the symplast pathway by the Casparian strip in the endodermis, which is made of suberin and not lignin

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## Question 11

The following mechanisms are used to move water through plants:

- i) diffusion
- ii) osmosis
- iii) mass flow.

Which row correctly identifies the mechanism used at each point of the transpiration stream?

	Into root cells	Across root via symplast pathway	Up the stem in the xylem	Across leaf via apoplast pathway	Out of leaf via stomata
<b>A</b>	osmosis	osmosis	mass flow	mass flow	diffusion
<b>B</b>	diffusion	osmosis	osmosis	mass flow	diffusion
<b>C</b>	diffusion	osmosis	osmosis	mass flow	osmosis
<b>D</b>	osmosis	osmosis	mass flow	mass flow	osmosis

[1]

Water enters the root by osmosis, then travels via plasmodesmata by osmosis. Xylem is mass flow in one direction, and apoplast via the cell wall by capillary action. Finally it diffuses out through the stomata as water vapour.

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