8. Transport in plants

8.3 Transpiration

Paper 1 and 2

Question Paper

Paper 1

Questions are applicable for both core and extended candidates

1 What is a description of transpiration?

A the breakdown of nutrient molecules to release energy

B the flow of energy through living organisms

C the loss of water vapour from leaves

D the pressure of water inside cells pressing outwards on the cell wall

2 Some environmental factors are listed.

1 carbon dioxide concentration

2 temperature

3 oxygen concentration

4 wind speed

Which factors directly affect the rate of transpiration?

A 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

3 Which statement describes transpiration?

A Water is pulled upwards by active transport.

B Water is pulled up from the roots by phloem.

C Water moves by osmosis inside the xylem vessels.

D Water vapour diffuses out of the leaves.

4 What is a description of transpiration?

A exchange of gases between the leaf and the atmosphere

B loss of water vapour from the leaves of a plant

C movement of water from the roots to the leaves

D movement of water through the cells of the leaf

5 From which part of a leaf does **most** water evaporate during transpiration?

A the cuticle

B the guard cells

C the spongy mesophyll cells

D the xylem vessels

6 Which row shows the transpiration rate for the conditions described?

	wind speed	atmospheric temperature	transpiration rate
A	low	low	fast
B	high	high	slow
C	low	high	slow
D	low	low	slow

7 Which process occurs during transpiration?

A evaporation of water from the xylem

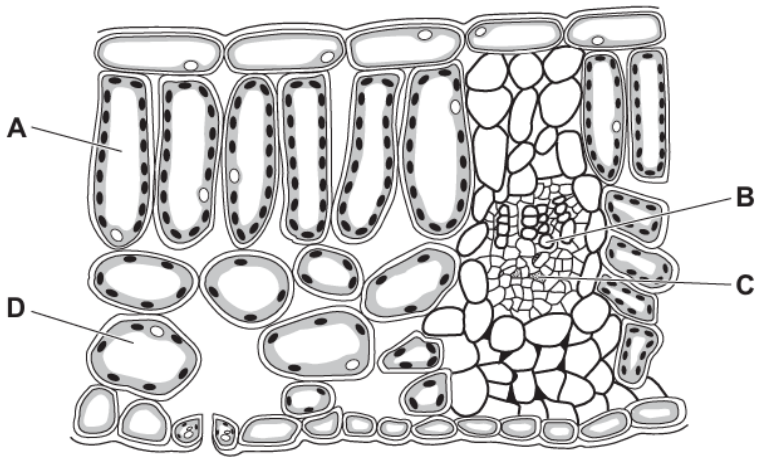
B loss of water by osmosis from the guard cells

C movement of water vapour through the spongy mesophyll by active transport

D movement of water vapour through the stomata by diffusion

8 The diagram shows a cross-section through a leaf.

From which cell will most water evaporate during transpiration?



9 In a leaf, water moves from the surface of a mesophyll cell and then out of the leaf into the atmosphere.

What is the correct order of the processes involved?

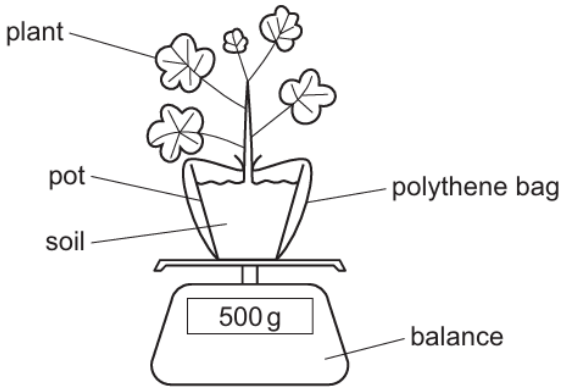
A active transport → osmosis

B diffusion → evaporation

C evaporation → diffusion

D osmosis → active transport

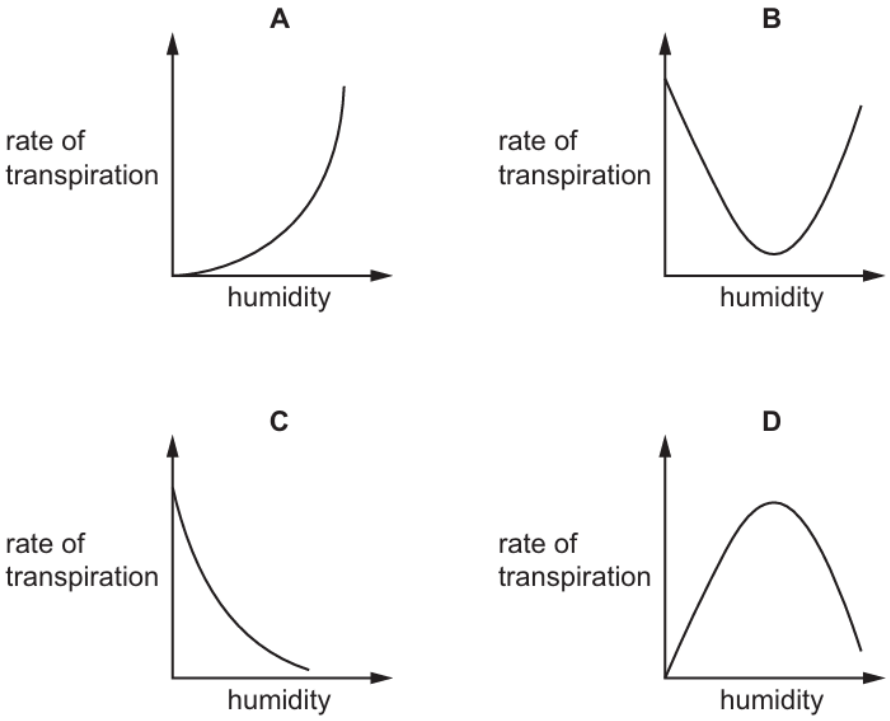
10 The apparatus shown can be used to investigate the effect of temperature and humidity on the rate of transpiration.



Which set of conditions would give the highest rate of transpiration and the greatest decrease in mass?

	temperature	humidity
A	cool	high
B	cool	low
C	warm	high
D	warm	low

11 Which graph shows the effect of increasing humidity on the rate of transpiration?



12 A plant shoot is placed in a solution of dye.

The dye moves up the stem.

Under which conditions will the dye move most slowly?

	temperature	humidity
A	high	high
B	high	low
C	low	high
D	low	low

13 From which part of a leaf does most water evaporate during transpiration?

A the cuticle

B the guard cells

C the spongy mesophyll cells

D the xylem vessels

14 The diagram shows an experiment to investigate transpiration.

Plant 1 is not covered. Plant 2 and its pot are covered by a transparent plastic bag.

The mass of each plant and its pot is measured. The masses are measured again after two hours.

What is the result?

A The mass of both plants decreases by the same percentage.

B The mass of both plants stays the same.

C The mass of plant 1 decreases more than the mass of plant 2.

D The mass of plant 2 decreases more than the mass of plant 1.

Paper 2

Questions are applicable for both core and extended candidates unless indicated in the question

15 Which change in an environmental factor will **increase** the rate of transpiration? **(extended only)**

A decreasing humidity

B decreasing light intensity

C decreasing temperature

D decreasing wind speed

16 Which conditions lead to the lowest rate of transpiration in a plant? **(extended only)**

A cool and high humidity

B cool and windy

C warm and low humidity

D warm and windy

17 Which row explains why a plant wilts? **(extended only)**

	water loss at the leaf surface	water uptake in the roots	state of the plant cells
A	low	high	flaccid
B	low	high	turgid
C	high	low	flaccid
D	high	low	turgid

18 What is a description of transpiration?

A exchange of gases between the leaf and the atmosphere

B loss of water vapour from the leaves of a plant

C movement of water from the roots to the leaves

D movement of water through the cells of the leaf

19 From which part of a leaf does **most** water evaporate during transpiration?

A the cuticle

B the guard cells

C the spongy mesophyll cells

D the xylem vessels

20 Which statement describes the effect of atmospheric humidity on the rate of transpiration? **(extended only)**

A In high humidity, the transpiration rate is high because there is slow diffusion of water vapour through stomata.

B In high humidity, the transpiration rate is low because there is rapid diffusion of water vapour through stomata.

C In low humidity, the transpiration rate is high because there is rapid diffusion of water vapour through stomata.

D In low humidity, the transpiration rate is low because there is slow diffusion of water vapour through stomata.

21 Humidity and wind speed are two factors that affect the rate of transpiration.

How do these two factors affect the concentration gradient of water molecules between the inside of the leaf and the outside atmosphere? **(extended only)**

	high humidity	high wind speed
A	lowers concentration gradient	raises concentration gradient
B	raises concentration gradient	raises concentration gradient
C	lowers concentration gradient	lowers concentration gradient
D	raises concentration gradient	lowers concentration gradient

22 What holds the water molecules together during the transpiration pull in the xylem? **(extended only)**

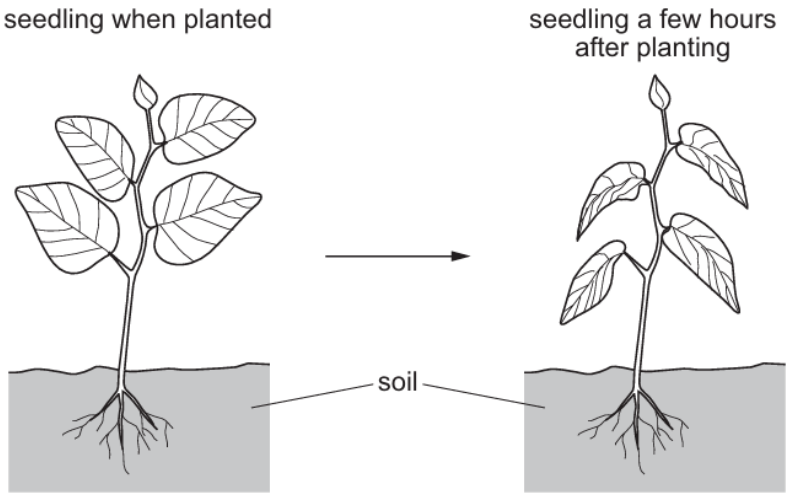
A active transport

B cohesion

C diffusion

D turgor pressure

23 The diagram shows a newly planted seedling and the same seedling a few hours after being planted.



What is the correct explanation for the change in the appearance of the leaves? **(extended only)**

A Transpiration is faster than water uptake by root hairs so cells have become flaccid.

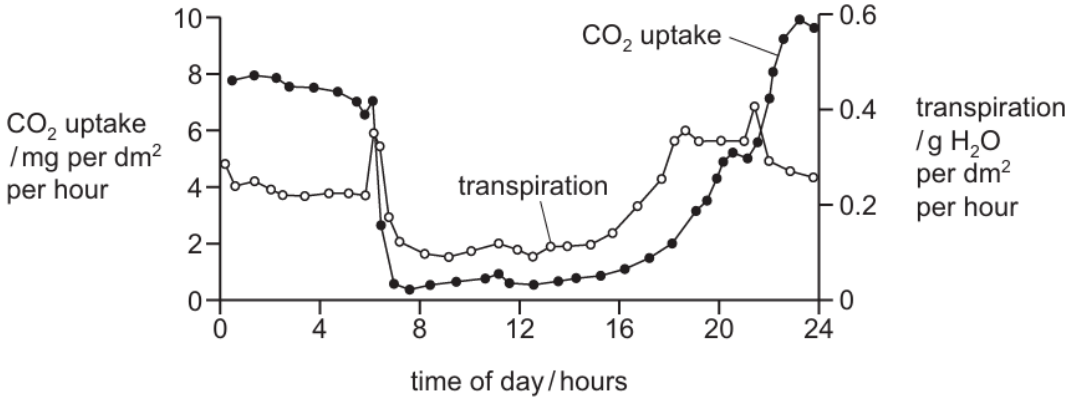
B Transpiration is faster than water uptake by root hairs so cells have become turgid.

C Transpiration is slower than water uptake by root hairs so cells have become flaccid.

D Transpiration is slower than water uptake by root hairs so cells have become turgid.

24 The graph shows daily carbon dioxide uptake and transpiration by the plant *Agave americana*.

The plant is adapted to live in very dry conditions.



What can be concluded from this graph? **(extended only)**

A More stomata are closed during dark periods.

B More stomata are closed during light periods.

C There is no carbon dioxide uptake during dark periods.

D There is no water uptake during light periods.

25 What will increase the rate of transpiration in a plant? **(extended only)**

A an increase in the humidity of the atmosphere surrounding the leaf

B an increase in the surface area of the cell surfaces inside the leaf

C a decrease in the number of stomata present on the surface of the leaf

D a decrease in the temperature of the atmosphere surrounding the leaf

26 A student is investigating the effect of temperature on the rate of transpiration.

Which environmental conditions should be kept constant during this investigation? **(extended only)**

	humidity	light intensity	temperature	wind speed
A	✓	✓	✓	✓
B	✓	✓	✗	✓
C	✗	✓	✗	✓
D	✗	✗	✓	✗