

Cambridge International AS & A Level

BIOLOGY (9700) P1

TOPIC WISE QUESTIONS + ANSWERS | COMPLETE SYLLABUS



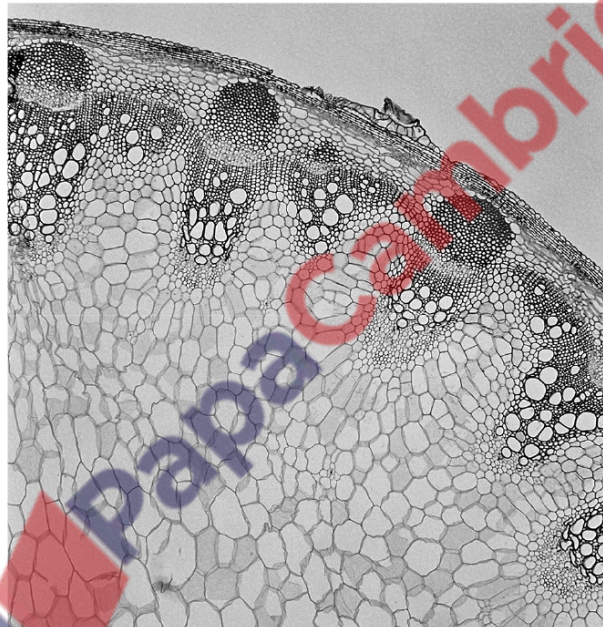
Chapter 7

Transport in plants

7.1 Structure of transport tissues

934. 9700_m20_qp_12 Q: 25

The photomicrograph shows a section of a plant organ.



Students were asked to study the photomicrograph and identify the organ, giving a reason to support their answer.

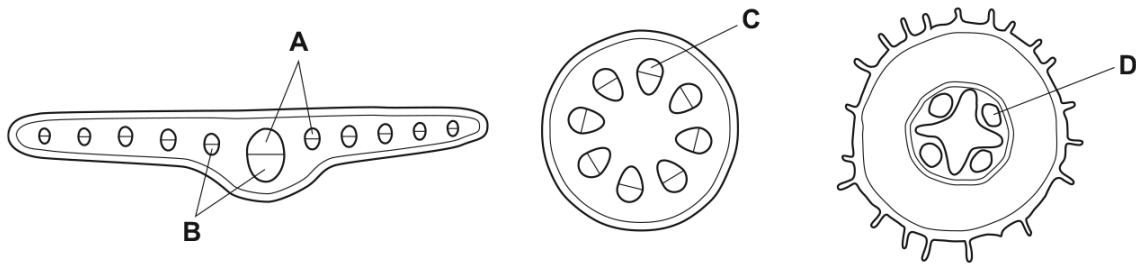
Which statement written by the students correctly identifies the organ and provides a correct reason to support this identification?

- A It is a leaf because the xylem is located on the inner side of each vascular bundle.
- B It is a stem because there is a ring of endodermis visible around the edge of the vascular tissue.
- C It is a stem because the vascular bundles are arranged in a ring near the epidermis.
- D It is a xerophytic leaf because there is a thick epidermis made up of many layers of cells.

935. 9700_s20_qp_13 Q: 24

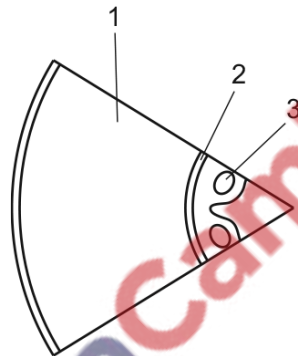
The diagrams show transverse sections through parts of plants.

Which of the labelled regions contains cells which are dead?



936. 9700_s20_qp_13 Q: 25

The diagram shows the distribution of tissues in part of a transverse section through a plant organ.



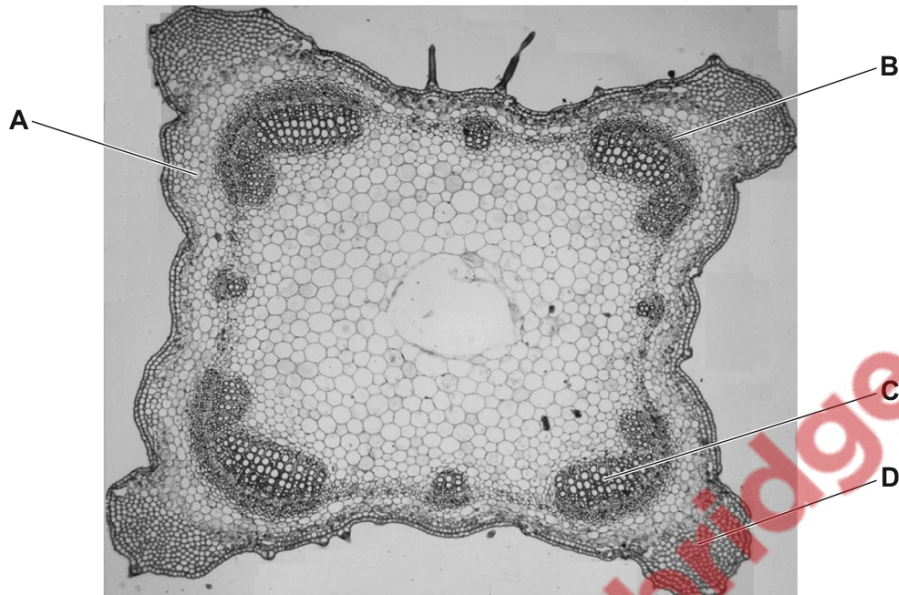
Which row correctly identifies tissues 1, 2 and 3?

	1	2	3
A	cortex	endodermis	phloem
B	cortex	epidermis	xylem
C	endodermis	epidermis	pith
D	pith	endodermis	phloem

937. 9700_w20_qp_11 Q: 23

The photograph shows a section of a stem.

Which labelled part is the xylem?



938. 9700_w20_qp_11 Q: 24

Some fungi cause wilting in crop plants by growing within the xylem vessel elements.

Which process will be directly affected by these fungi?

- A cohesion between water molecules
- B development of root pressure
- C mass flow during movement of assimilates
- D uptake of water by root hair cells

939. 9700_w20_qp_12 Q: 23

Which combination of features is correct for a phloem sieve tube element as it unloads into a sink?

	water potential	lignified cell wall
A	higher than sink	absent
B	higher than sink	present
C	lower than sink	absent
D	lower than sink	present

940. 9700_w20_qp_13 Q: 25

Some of the features present in transport tissues in plants are listed.

- 1 lignified walls
- 2 cytoplasm
- 3 many mitochondria
- 4 pits
- 5 plasmodesmata
- 6 sieve plates

Which of these features are present in xylem vessel elements?

- A** 1, 2, 4 and 5 **B** 1 and 4 only **C** 2, 3, 5 and 6 **D** 2, 3 and 5 only

941. 9700_m19_qp_12 Q: 23

Which terms describe the method by which water is transported within xylem vessel elements?

- 1 mass flow
- 2 cohesion-tension
- 3 osmosis

- A** 1 and 2 **B** 1 and 3 **C** 2 only **D** 3 only

942. 9700_m19_qp_12 Q: 24

Which combination of features is characteristic of a phloem sieve tube element as it is loaded from a source?

	water potential of the phloem sieve tube element	lignification of the cell wall
A	less negative than source	absent
B	less negative than source	present
C	more negative than source	absent
D	more negative than source	present

943. 9700_s19_qp_11 Q: 26

The photomicrograph shows a transverse section of part of a dicotyledonous leaf.



What are the correct labels for 1, 2, 3 and 4?

	1	2	3	4
A	phloem	xylem	palisade mesophyll	spongy mesophyll
B	phloem	xylem	spongy mesophyll	palisade mesophyll
C	xylem	phloem	palisade mesophyll	spongy mesophyll
D	xylem	phloem	spongy mesophyll	palisade mesophyll

944. 9700_s19_qp_11 Q: 27

Some of the features present in transport tissues in plants are listed.

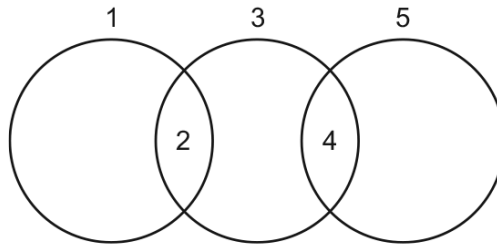
- 1 lignified walls
- 2 cytoplasm
- 3 mitochondria
- 4 pits
- 5 plasmodesmata

Which of these features are present in phloem sieve tube elements?

- A** 1, 2 and 5 **B** 1, 3 and 4 **C** 2, 3 and 5 **D** 2, 4 and 5

945. 9700_s19_qp_11 Q: 28

The diagram shows the relationship between phloem sieve tube elements, xylem vessel elements and companion cells.



Which row is correct?

	1	2	3	4	5
A	companion cells	endoplasmic reticulum	phloem sieve tube elements	no nucleus	xylem vessel elements
B	companion cells	nucleus	phloem sieve tube elements	cytoplasm	xylem vessel elements
C	phloem sieve tube elements	mitochondria	companion cells	nucleus	xylem vessel elements
D	xylem vessel elements	no cytoplasm	phloem sieve tube elements	vacuole	companion cells

946. 9700_s19_qp_12 Q: 22

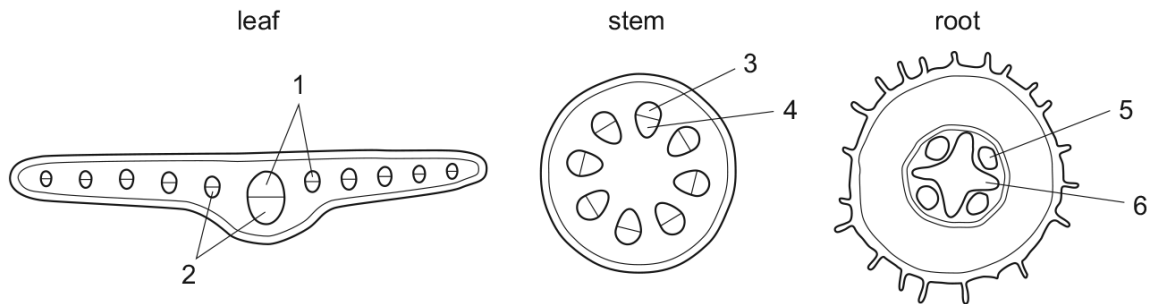
What is correct for phloem sieve tube elements?

- A** Companion cells provide structural support to the phloem sieve tube elements.
- B** Lignified walls of phloem sieve tube elements prevent transport of mineral salts by mass flow.
- C** Phloem sieve tube elements become narrower as movement of sucrose occurs.
- D** Plasmodesmata allow movement of water and solutes across cell walls of phloem sieve tube elements.

947. 9700_s19_qp_12 Q: 23

The diagrams show transverse sections of parts of a plant.

Transport tissues are labelled 1 to 6.



Which combination shows the tissues that have a main function of transporting water?

	1	2	3	4	5	6
A	✓	✓	x	x	✓	✓
B	✓	x	x	✓	x	✓
C	x	✓	✓	x	✓	x
D	x	✓	x	✓	✓	x

key

✓ = transporting water is a main function

x = transporting water is **not** a main function

948. 9700_s19_qp_12 Q: 24

The statements are descriptions of how water moves across the root to the xylem vessel elements.

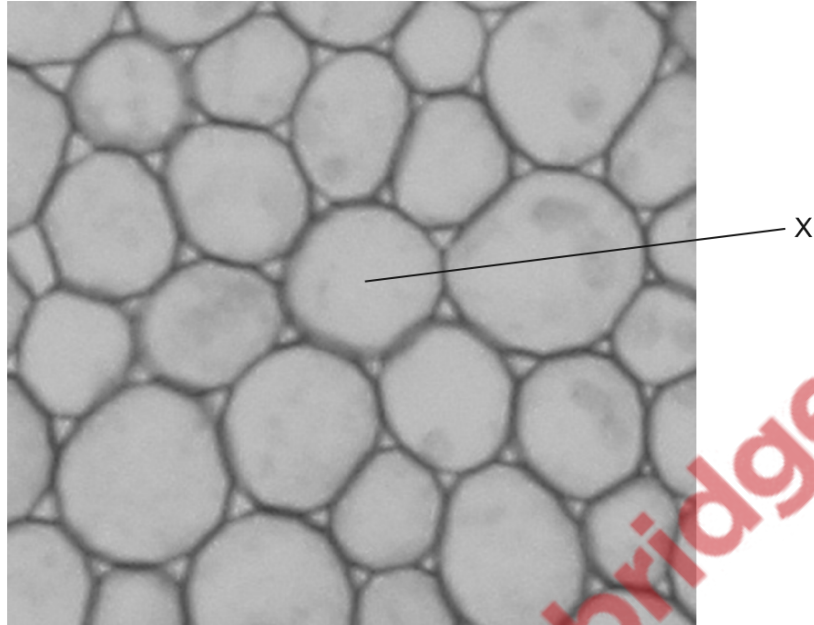
- 1 Water enters cell walls.
- 2 Water enters cytoplasm by osmosis.
- 3 Water moves from cell to cell through plasmodesmata.
- 4 Water moves through cell walls.

Which statements describe the apoplast pathway?

- A** 1, 2, 3 and 4
- B** 1, 2 and 3 only
- C** 1 and 4 only
- D** 4 only

949. 9700_s19_qp_13 Q: 29

A group of students were asked to look at the photomicrograph of a cross-section of unfamiliar material and make observations.

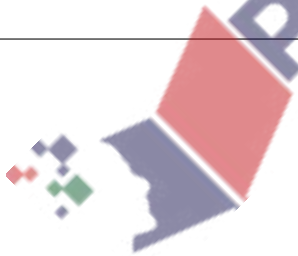


The students described X as:

- 1 circular
- 2 a hollow tube
- 3 a spherical structure.

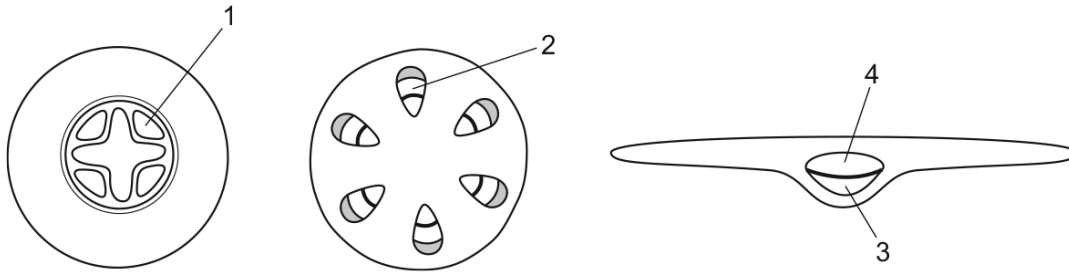
Which descriptions are correct?

- A** 1, 2 and 3 **B** 1 and 2 only **C** 1 only **D** 3 only



950. 9700_w19_qp_11 Q: 24

The diagrams show some tissue types in plant organs.



Which row identifies the tissue types?

	1	2	3	4
A	phloem	phloem	phloem	xylem
B	phloem	xylem	phloem	xylem
C	xylem	phloem	xylem	phloem
D	xylem	xylem	phloem	xylem

951. 9700_w19_qp_11 Q: 25

Which row correctly describes the adaptations of companion cells, phloem sieve tube elements and xylem vessel elements for their roles?

	companion cell	phloem sieve tube element	xylem vessel element
A	a thin layer of cytoplasm to reduce resistance to flow	strong, lignified cell walls for supporting the plant	many plasmodesmata for communication between cells
B	empty cells allowing water to flow freely	many plasmodesmata for communication between cells	strong, lignified cell walls for supporting the plant
C	many plasmodesmata for communication between cells	a thin layer of cytoplasm to reduce resistance to flow	empty cells allowing water to flow freely
D	strong, lignified cell walls for supporting the plant	empty cells allowing water to flow freely	a thin layer of cytoplasm to reduce resistance to flow

952. 9700_w19_qp_12 Q: 25

Which features have a role in the transport of water in xylem vessel elements?

- 1 capillary action
- 2 cohesion
- 3 hydrogen bonding

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 3 only

953. 9700_w19_qp_13 Q: 24

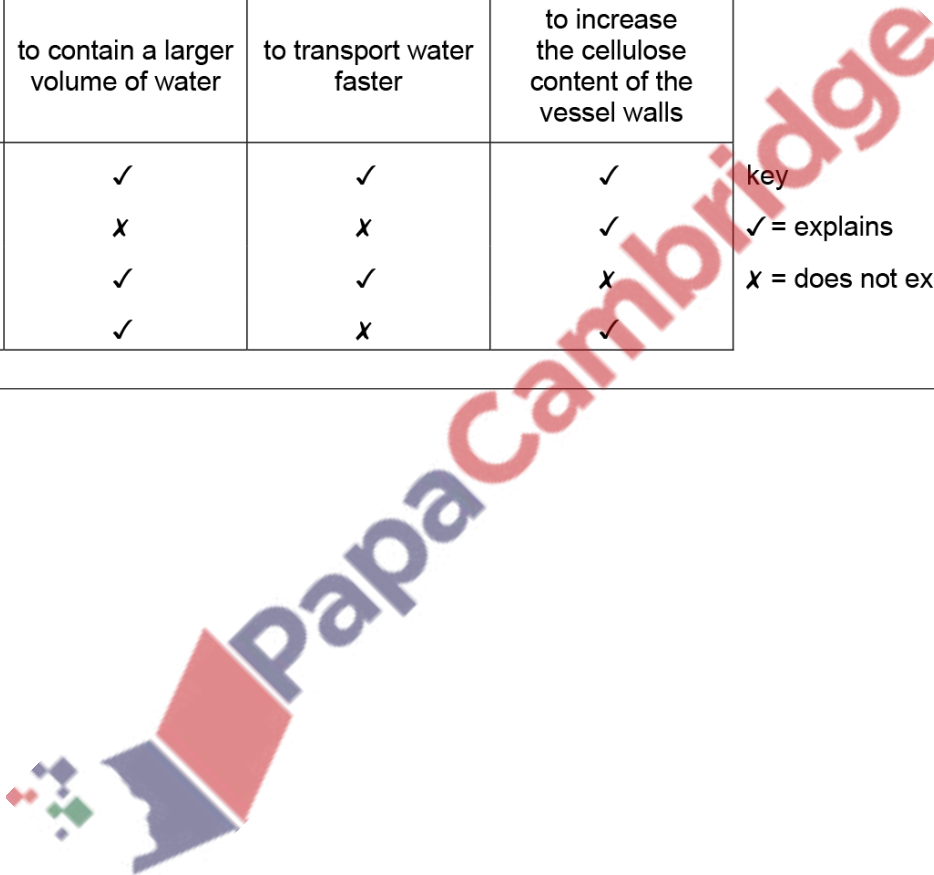
Which row explains why xylem vessels have no cytoplasm?

	to contain a larger volume of water	to transport water faster	to increase the cellulose content of the vessel walls
A	✓	✓	✓
B	x	x	✓
C	✓	✓	x
D	✓	x	✓

key

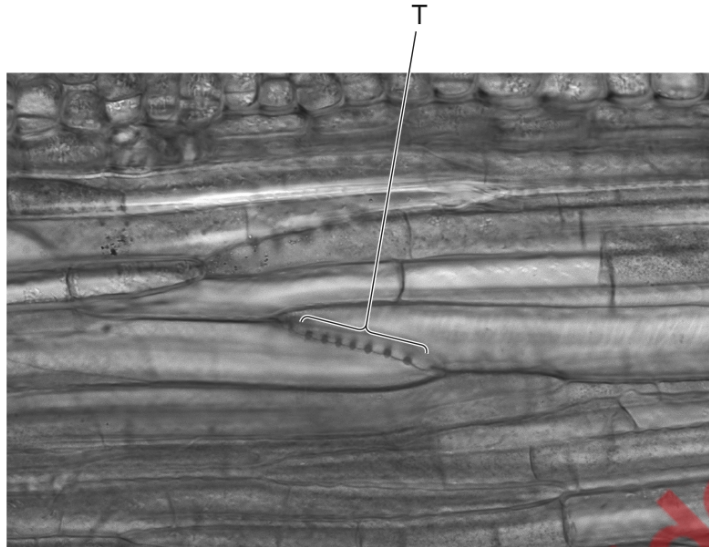
✓ = explains

x = does not explain



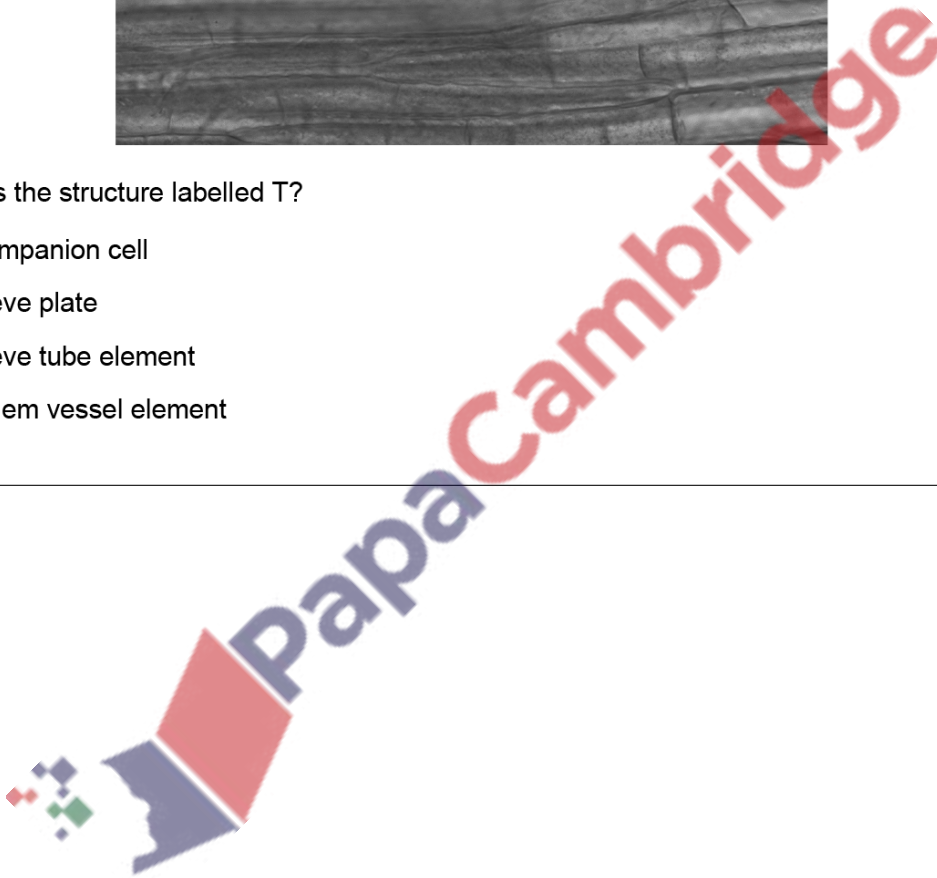
954. 9700_m18_qp_12 Q: 26

The photomicrograph shows a transport tissue in the stem of a grape vine.



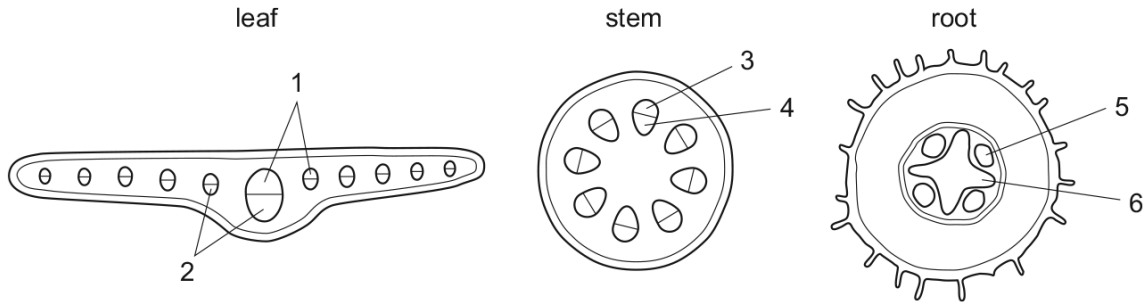
What is the structure labelled T?

- A companion cell
- B sieve plate
- C sieve tube element
- D xylem vessel element



955. 9700_m18_qp_12 Q: 27

The diagrams show transverse sections of parts of a plant. Transport tissues are labelled 1 to 6.

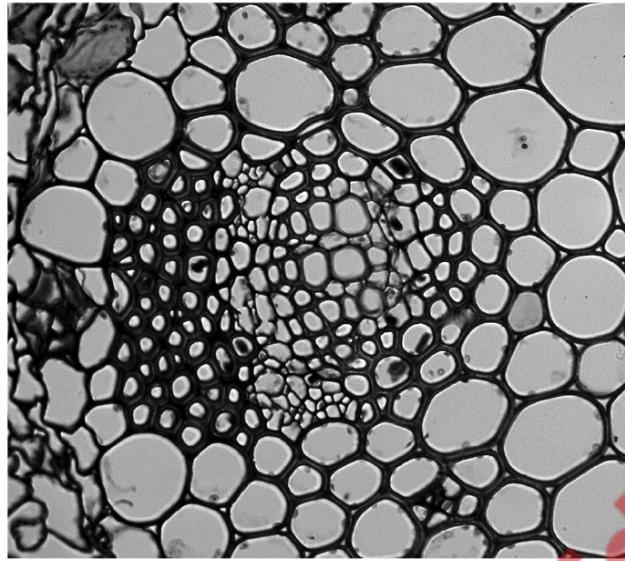


Which row shows tissues that mainly transport water and tissues that mainly transport sucrose?

	mainly transport water	mainly transport sucrose
A	1 and 3	4 and 6
B	2 and 3	4 and 5
C	3 and 5	2 and 6
D	4 and 6	2 and 3

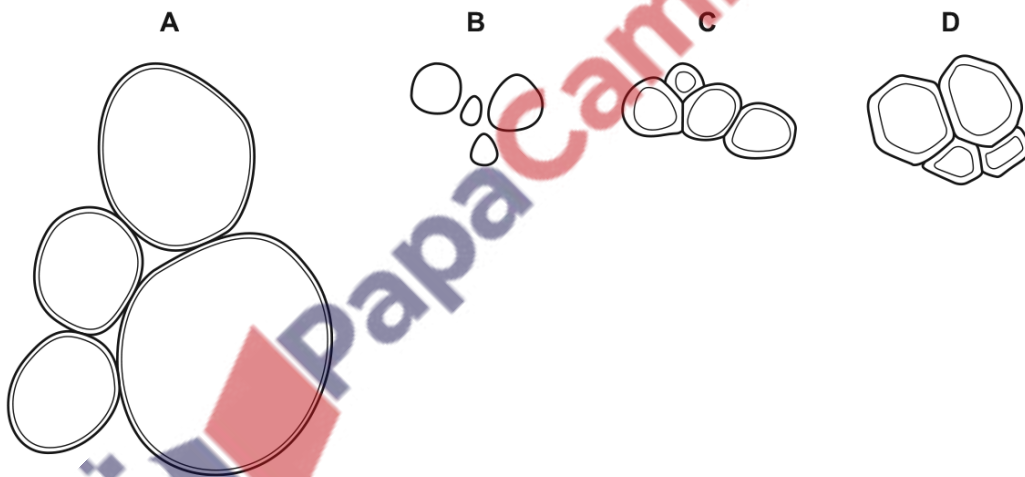
956. 9700_s18_qp_11 Q: 24

The photomicrograph shows tissues in a stained transverse section of a plant stem.



Students are asked to draw four adjacent xylem vessel elements.

Which drawing, all drawn to the same scale, is correct?



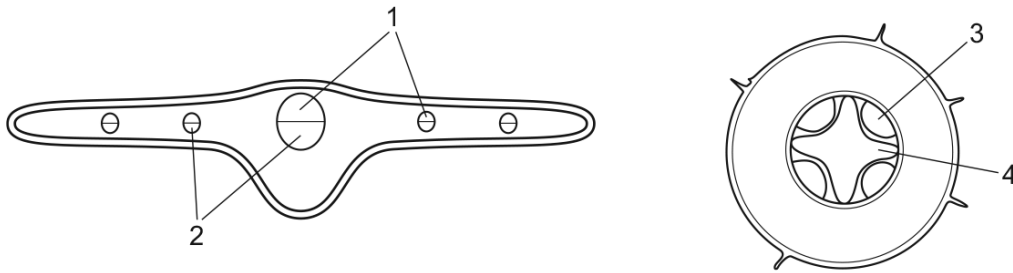
957. 9700_s18_qp_12 Q: 26

What is the role of ATP in a companion cell when sucrose is loaded into a sieve tube element?

- A moving sucrose into the sieve tube element
- B removing protons from the sieve tube element
- C removing protons out of the cytoplasm of the companion cell
- D taking up sucrose into the cytoplasm of the companion cell

958. 9700_s18_qp_12 Q: 29

The diagrams show transverse sections of parts of a plant.



Which structures, labelled 1 to 4, transport water and sucrose?

	1	2	3	4
A	✓	✗	✓	✗
B	✓	✗	✗	✓
C	✗	✓	✓	✗
D	✗	✓	✗	✓

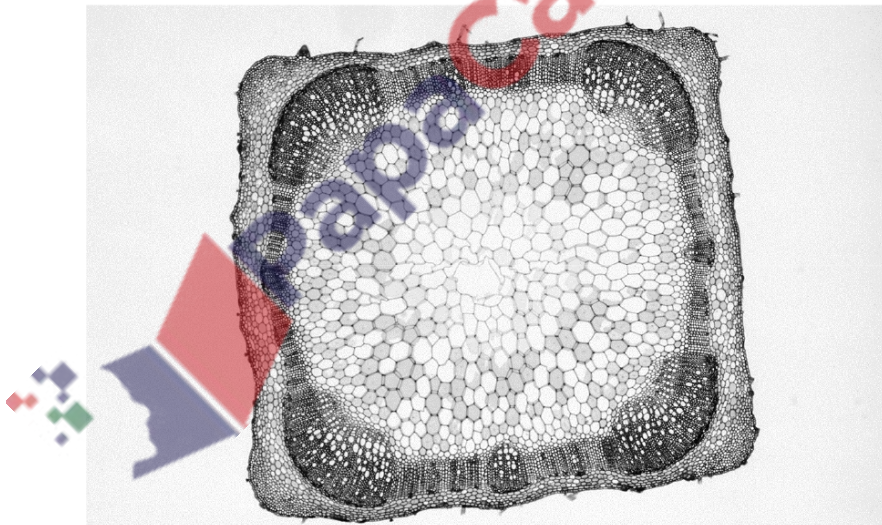
key

✓ = correct

✗ = incorrect

959. 9700_s18_qp_13 Q: 26

The photomicrograph shows a section through a plant organ.



Which statement could be used to describe this organ?

- A** The central region of this organ has supporting tissue.
- B** The endodermis tissue is a thick layer around the edge of the organ.
- C** The epidermis tissue in this organ has unicellular extensions (trichomes).
- D** The xylem tissue is found in greatest density in the centre of the organ.

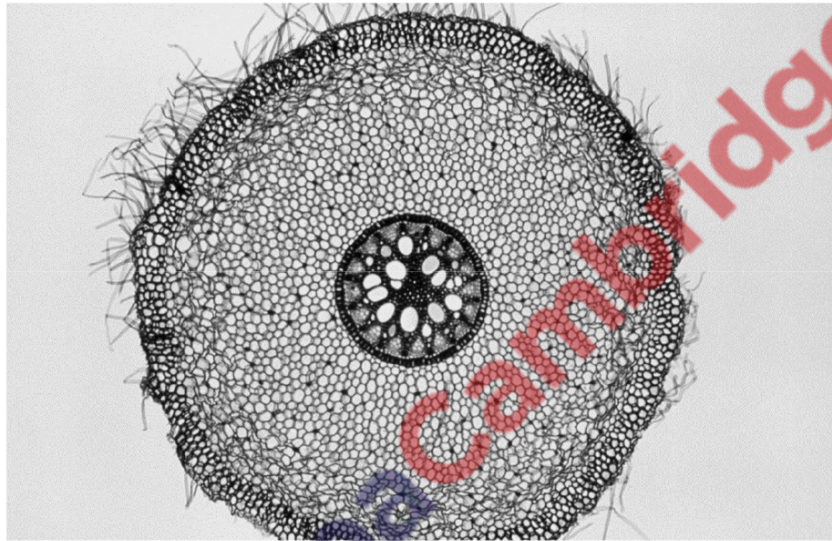
960. 9700_s18_qp_13 Q: 28

Which of the processes involved in water movement through xylem vessels depends on hydrogen bonding between water molecules?

- A adhesion
- B cohesion
- C evaporation
- D hydrostatic pressure

961. 9700_w18_qp_11 Q: 25

The photomicrograph shows a transverse section through a root.



What is the simplest ratio of the diameter of the root (excluding root hairs) to the diameter of the vascular tissue and endodermis?

- A 40 mm : 11 mm
- B 40 : 11
- C 8 cm : 2.2 cm
- D 80 : 22

962. 9700_w18_qp_11 Q: 26

Which properties of water molecules are important in the upward flow of water through xylem?

- 1 Water molecules are attracted to each other by hydrogen bonding.
- 2 Water molecules are attracted to cellulose by adhesion.
- 3 Water molecules have high cohesion in water columns.

- A 1, 2 and 3
- B 1 and 2 only
- C 1 and 3 only
- D 2 and 3 only

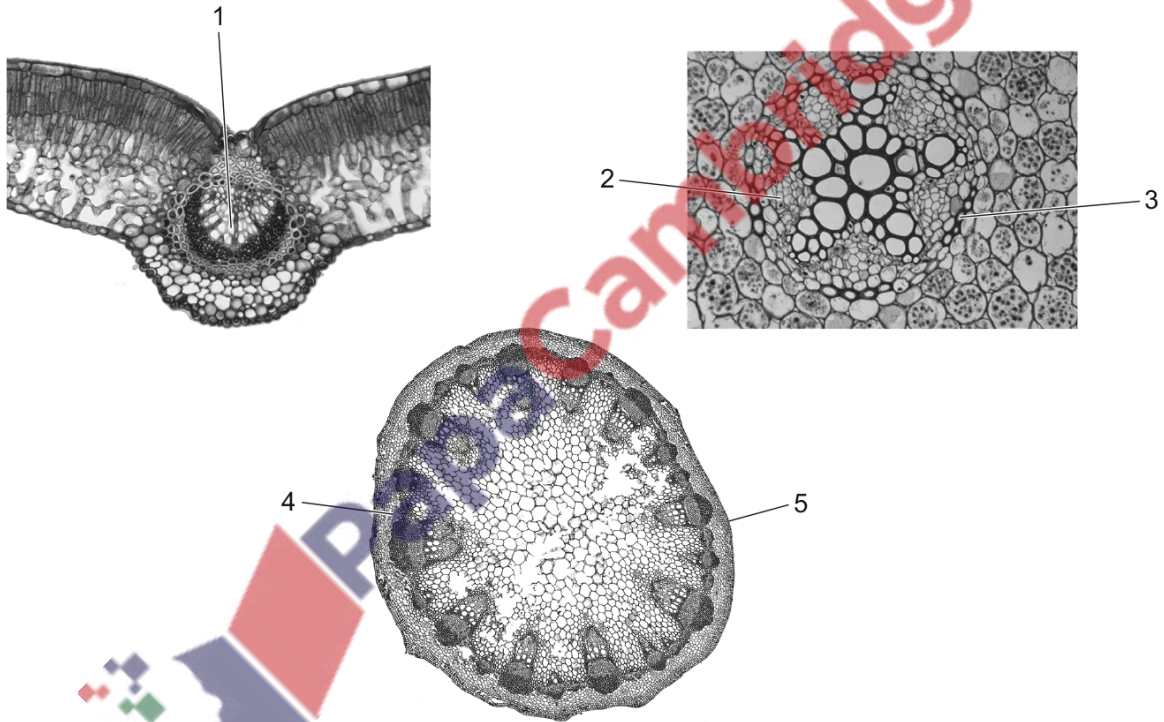
963. 9700_w18_qp_11 Q: 27

What is correct for a phloem sieve tube element that is unloading to a sink?

	water potential of the phloem sieve tube element becomes	lignification of the cell wall
A	less negative than sink	absent
B	less negative than sink	present
C	more negative than sink	absent
D	more negative than sink	present

964. 9700_w18_qp_12 Q: 25

Photomicrographs of a dicotyledonous plant root, stem and leaf are shown.



Which row is correct for the labels 1 to 5 on the photomicrographs?

	1	2	3	4	5
A	cortex	phloem	epidermis	parenchyma	endodermis
B	phloem	parenchyma	xylem	epidermis	cortex
C	phloem	xylem	endodermis	cortex	epidermis
D	xylem	phloem	endodermis	cortex	epidermis

965. 9700_w18_qp_12 Q: 26

Which features apply to phloem sieve tube elements and to xylem vessel elements?

- 1 no cytoplasm
- 2 no end walls
- 3 no nucleus

A 1, 2 and 3 **B** 1 and 3 only **C** 2 only **D** 3 only

966. 9700_w18_qp_12 Q: 27

Which statement correctly describes an event in the process of mass flow in phloem sieve tube elements?

- A** Any part of a plant where sucrose is loaded into a sieve tube element is called a sink.
- B** Loading sucrose into a sieve tube element increases the water potential inside it.
- C** Mass flow in the phloem is a passive process occurring at the same rate as diffusion.
- D** Sucrose moves down a hydrostatic pressure gradient in the phloem from source to sink.

967. 9700_w18_qp_13 Q: 24

Four students were asked to suggest a set of four labels to add to a plan diagram of a transverse section of a dicotyledonous leaf.

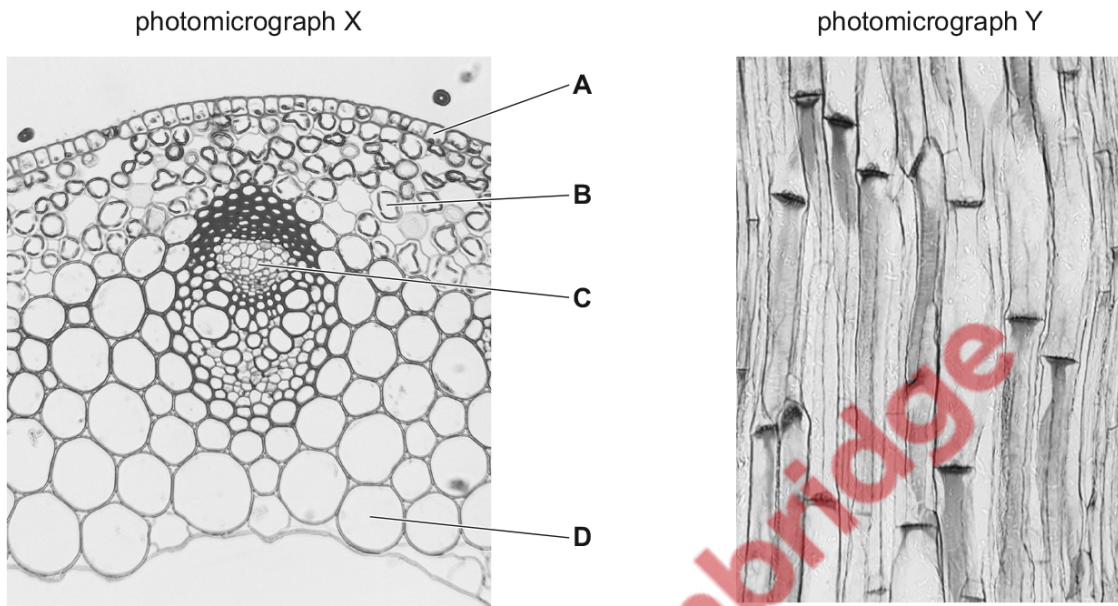
Which student suggested a correct set of labels?

	label 1	label 2	label 3	label 4
A	lower epidermis	phloem	spongy mesophyll	palisade mesophyll
B	phloem sieve tubes	upper epidermis	spongy mesophyll	xylem vessel elements
C	spongy mesophyll	endodermis	xylem vessel elements	palisade mesophyll
D	waxy cuticle	xylem	companion cells	spongy mesophyll

968. 9700_w18_qp_13 Q: 25

Photomicrograph X shows a transverse section through a typical stem. Photomicrograph Y shows a longitudinal section through one type of cell shown in photomicrograph X.

Which letter represents the cells from photomicrograph Y?



969. 9700_m17_qp_12 Q: 28

Which combination of features is characteristic of a phloem sieve tube element as it unloads into a sink?

	water potential	lignification of the cell wall
A	higher than sink	absent
B	higher than sink	present
C	lower than sink	absent
D	lower than sink	present

970. 9700_m17_qp_12 Q: 29

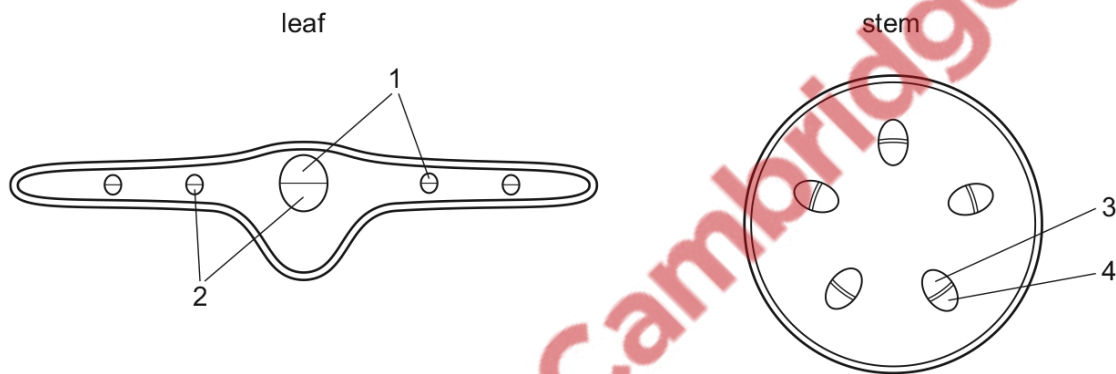
Which statements correctly describe transport pathways in dicotyledonous plants?

- 1 In the symplast pathway, water may move through intercellular spaces.
- 2 The symplast pathway may be blocked by the tonoplast.
- 3 In the apoplast pathway, water does not move through plasmodesmata.
- 4 The apoplast pathway may be blocked by the Casparian strip.

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

971. 9700_m17_qp_12 Q: 30

The diagrams show transverse sections of parts of a plant.



Which labelled structures transport mineral ions?

	1	2	3	4	
A	✓	x	✓	x	key ✓ = yes x = no
B	✓	x	x	✓	
C	x	✓	✓	x	
D	x	✓	x	✓	

972. 9700_m17_qp_12 Q: 31

Which feature of transport in plants is correct for **both** xylem and phloem?

- A** It is passive.
- B** It occurs by mass flow.
- C** It occurs from source to sink.
- D** It occurs only in one direction.

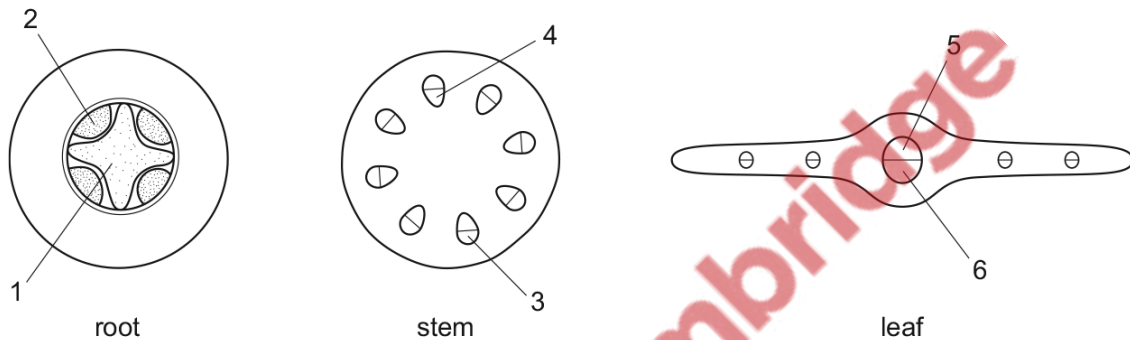
973. 9700_m17_qp_12 Q: 32

What is the main function of a companion cell in phloem tissue?

- A providing cytoplasmic contact with the sieve tube element for loading
- B providing structural support for the sieve tube element
- C providing the nucleus for cell division in the phloem
- D providing the source of assimilates for storage

974. 9700_s17_qp_11 Q: 28

The diagrams represent transverse sections of three plant organs.



Which row is correct for phloem?

	root	stem	leaf
A	1	3	5
B	1	4	6
C	2	3	6
D	2	4	5

975. 9700_s17_qp_11 Q: 29

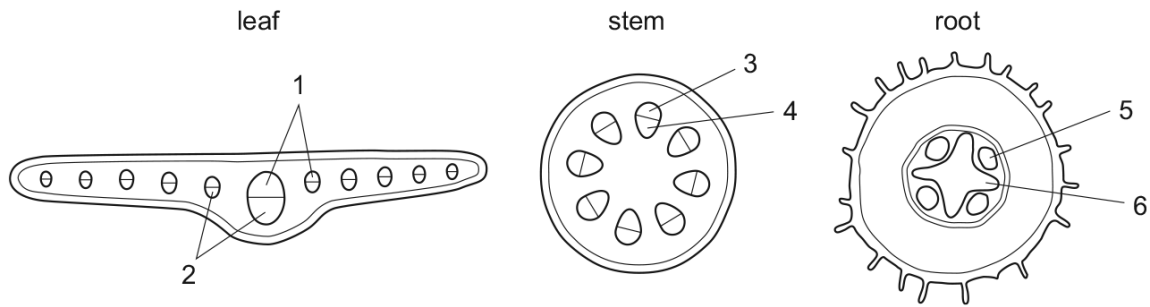
Sucrose moves from a phloem sieve tube element into a root cell.

Which changes to the water potential and the volume of liquid in the phloem sieve tube element are correct?

	water potential	volume of liquid
A	becomes higher	decreases
B	becomes higher	increases
C	becomes lower	decreases
D	becomes lower	increases

976. 9700_s17_qp_13 Q: 22

The diagrams show transverse sections of parts of a plant.



In the transverse sections, which tissues transport most amino acids?

	1	2	3	4	5	6
A	✓	x	✓	x	x	✓
B	✓	x	x	✓	x	✓
C	x	✓	✓	x	✓	x
D	x	✓	x	✓	✓	x

key

✓ = transports most amino acids

x = does not transport most amino acids

977. 9700_s17_qp_13 Q: 23

The statements are descriptions of how water moves across the root to the xylem vessel elements in plants.

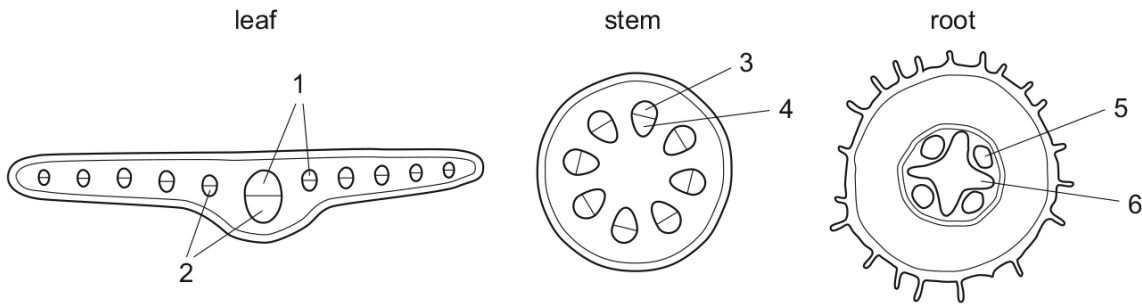
- 1 Water enters the intercellular spaces.
- 2 Water enters the cytoplasm by osmosis.
- 3 Water moves from cell to cell through plasmodesmata.
- 4 Water moves through the cell wall.

Which statements are correct for both the apoplast pathway and the symplast pathway?

- A 1, 2, 3 and 4
- B 1, 2 and 3 only
- C 2 and 4 only
- D 4 only

978. 9700_w17_qp_11 Q: 22

The diagrams show transverse sections of parts of a plant with some transport tissues labelled 1–6.



Which tissues mainly transport water and which tissues mainly transport sucrose?

- A**
- B**
- C**
- D**

979. 9700_w17_qp_11 Q: 24

Mass flow is the bulk movement of materials from one place to another.

How many of the vessels listed carry fluids by mass flow?

- artery
- phloem sieve tube
- vein
- xylem vessel

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

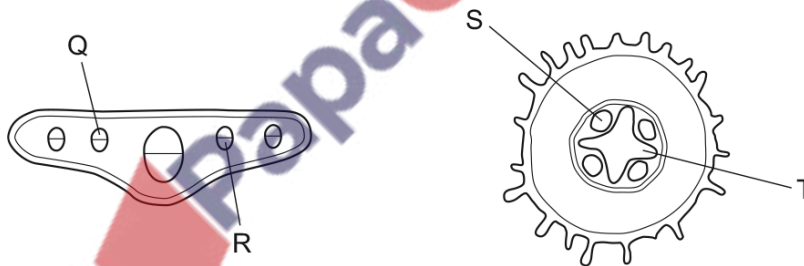
980. 9700_w17_qp_12 Q: 26

What contributes to the movement of water through the xylem vessel elements?

- A** cohesion of water molecules through hydrogen bonding
- B** ion movement followed by passive osmosis
- C** negative water potential in the xylem
- D** surface tension at the top of the plant

981. 9700_w17_qp_12 Q: 29

The transverse sections of two plant organs are shown.



Which pair of tissues contains proton pumps?

- A** Q and S
- B** Q and T
- C** R and S
- D** R and T

982. 9700_w17_qp_12 Q: 30

Measurements of the stem of a young tree showed that the diameter varied slightly. It decreased during the day and increased during the night.

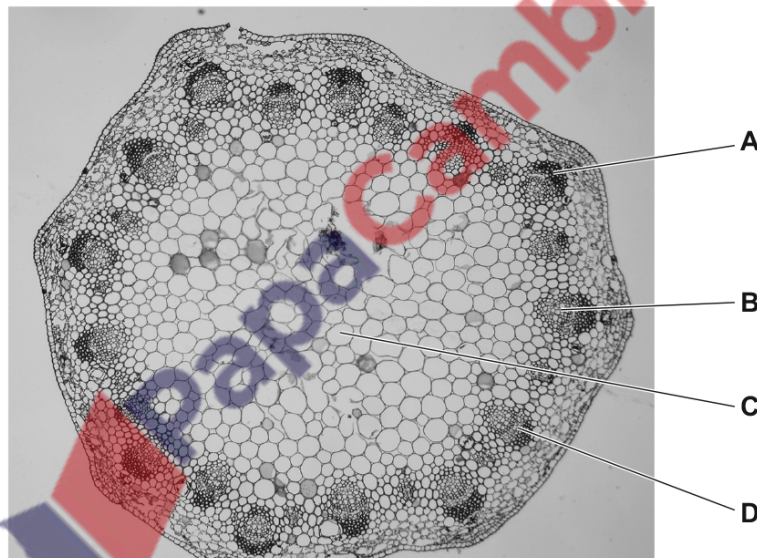
Which statement explains these observations?

- A During the day, cohesion between water molecules and lignin in the walls of the xylem vessels pulls the walls of the vessels inwards.
- B During the day, the tension developed in a moving column of water molecules reduces the pressure inside the xylem vessels, so that their walls move inwards.
- C During the night, the adhesion of water molecules to the lignin in the walls of the xylem vessels pushes the walls of the vessels outwards.
- D During the night, the pressure of the column of water molecules adhering to one another increases and pushes the walls of the xylem vessels outwards.

983. 9700_w17_qp_13 Q: 27

The photomicrograph is a section through a plant organ.

Which label identifies the xylem vessels?



984. 9700_w17_qp_13 Q: 28

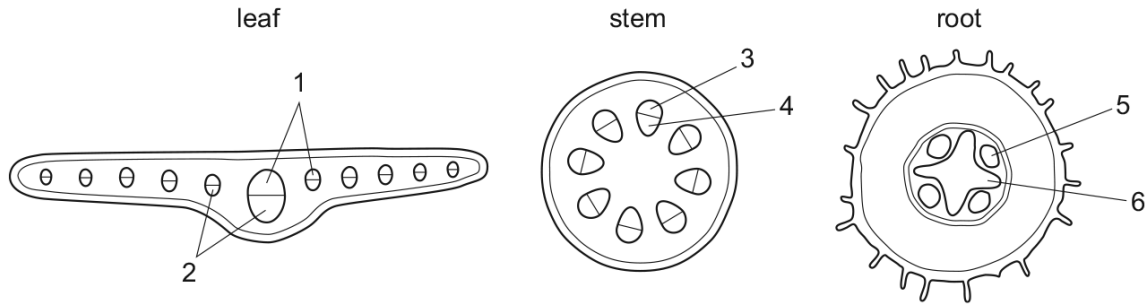
Which of these statements correctly describe transport pathways in dicotyledonous plants?

- 1 In the apoplast pathway, water may move through plasmodesmata.
- 2 In the symplast pathway, water may move through intercellular spaces.
- 3 The apoplast pathway may be blocked by the Casparian strip.

- A 1 and 2
- B 1 and 3
- C 2 and 3
- D 3 only

985. 9700_m16_qp_12 Q: 23

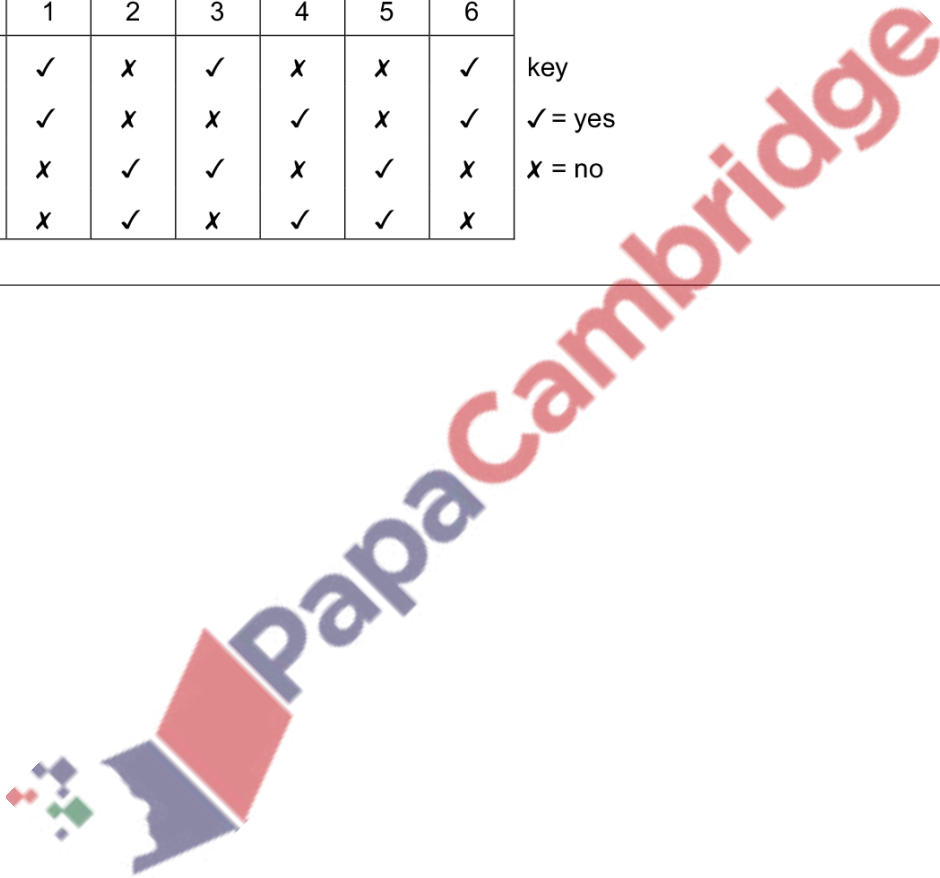
The diagrams show transverse sections of parts of a plant.



In the transverse sections, which tissues transport sucrose?

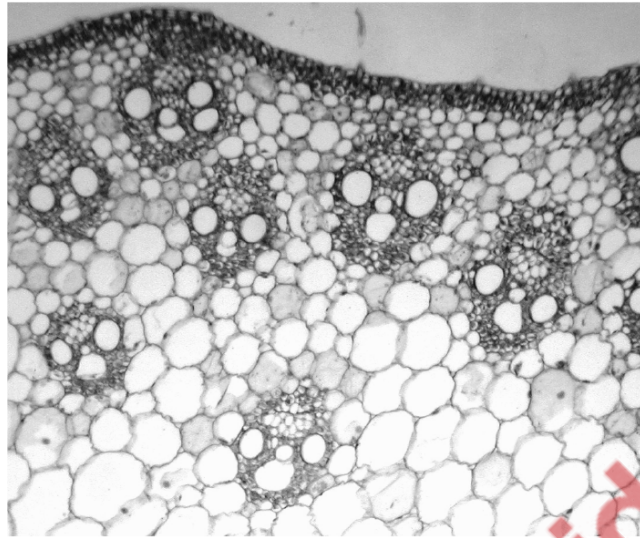
	1	2	3	4	5	6
A	✓	x	✓	x	x	✓
B	✓	x	x	✓	x	✓
C	x	✓	✓	x	✓	x
D	x	✓	x	✓	✓	x

key
✓ = yes
x = no



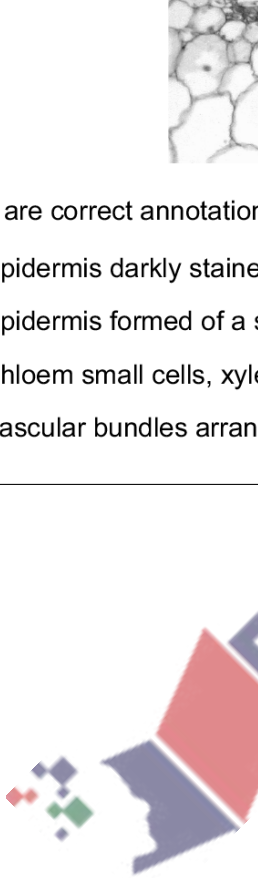
986. 9700_s16_qp_11 Q: 23

A student was asked to draw a plan diagram of the plant tissue shown in the photomicrograph and to annotate two observable features.



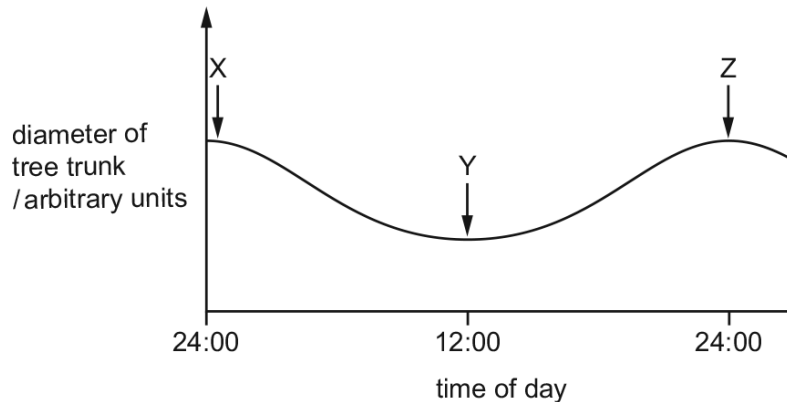
What are correct annotations?

- A epidermis darkly stained layer of cells, xylem hollow vessels
- B epidermis formed of a single layer of cells, xylem strengthened by lignin
- C phloem small cells, xylem empty cells to transport water
- D vascular bundles arranged in a regular pattern, xylem large dead cells

 PapaCambridge

987. 9700_s16_qp_12 Q: 23

The graph shows the diameter of a tree trunk at different times.



Which statement is correct?

- A** X shows the expansion of the trunk as water fills the xylem during transpiration.
- B** Y shows a reduction in diameter of trunk as water is lost from the xylem due to transpiration.
- C** Y shows a reduction in diameter of trunk due to water held in tension in the xylem.
- D** Z shows the expansion of the trunk as the phloem tissue acts as a sink at night.

988. 9700_s16_qp_12 Q: 24

Some plant species can take up toxic heavy metal ions that are dissolved in water in the soil. These ions accumulate in the aerial parts of the plant, which can be harvested and disposed of safely.

An investigation was carried out into the ability of a plant species to remove a heavy metal ion from soil. This produced the following observations:

- some heavy metal ions accumulated in the cells of the root cortex
- within these cells, most of these ions were in the vacuole
- in the roots and leaves, the ions were transported dissolved in water.

Which suggestions about the transport and accumulation of heavy metals are valid?

- 1 After initial entry into the root, some of the ions can pass through the tonoplast.
- 2 In the roots and leaves, the ions pass through a symplastic or apoplastic pathway but at the endodermis they must take a symplastic pathway.
- 3 In xylem vessels, the ions pass through an apoplastic pathway only.

- A** 1 and 2 **B** 2 and 3 **C** 1 only **D** 3 only

989. 9700_w16_qp_11 Q: 23

Which changes to the water potential and the volume of liquid in the phloem occur when carbohydrate is taken out of a sink into a phloem sieve tube element?

	water potential in phloem sieve tube element	volume of liquid in phloem sieve tube element
A	higher	decreases
B	higher	increases
C	lower	decreases
D	lower	increases

990. 9700_w16_qp_12 Q: 24

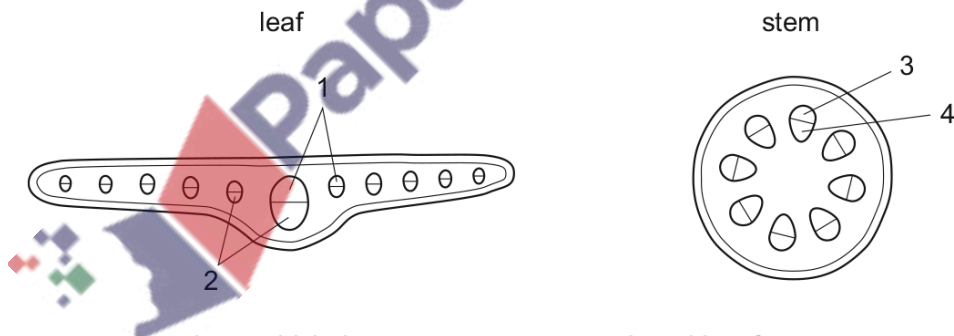
Which processes are involved in the mass movement of water through xylem vessels?

- 1 hydrogen bonding between water molecules
- 2 cohesion between water molecules
- 3 adhesion between water molecules and lignin

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

991. 9700_w16_qp_12 Q: 25

The diagrams show transverse sections of parts of a plant.



In the transverse sections, which tissues transport most mineral ions?

	1	2	3	4	
A	✓	x	✓	x	key ✓ = yes x = no
B	✓	x	x	✓	
C	x	✓	✓	x	
D	x	✓	x	✓	

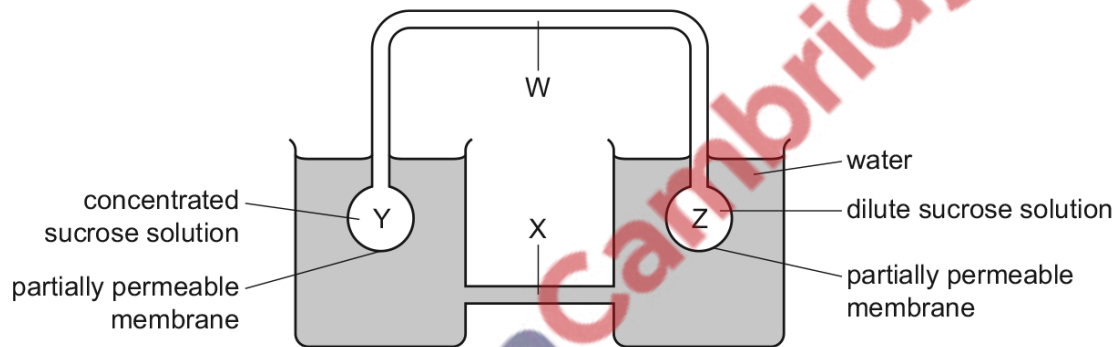
992. 9700_w16_qp_12 Q: 26

Which changes to the water potential and the volume of liquid in the phloem occur when amino acids are transferred from leaves to be transported to a sink in the phloem sieve tube element?

	water potential in phloem sieve tube element	volume of liquid in phloem sieve tube element
A	higher	decreases
B	higher	increases
C	lower	decreases
D	lower	increases

993. 9700_w16_qp_12 Q: 28

The diagram shows a model to demonstrate mass flow.

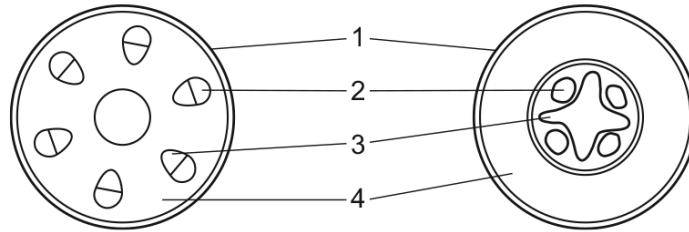


In a plant, what are the structures W, X, Y and Z and what is the direction of flow of solution along W?

	phloem	xylem	roots	leaves	direction of flow along W
A	W	X	Y	Z	from Z to Y
B	W	X	Z	Y	from Y to Z
C	X	W	Y	Z	from Y to Z
D	X	W	Z	Y	from Z to Y

994. 9700_s15_qp_11 Q: 23

The diagram shows transverse sections of two plant structures.

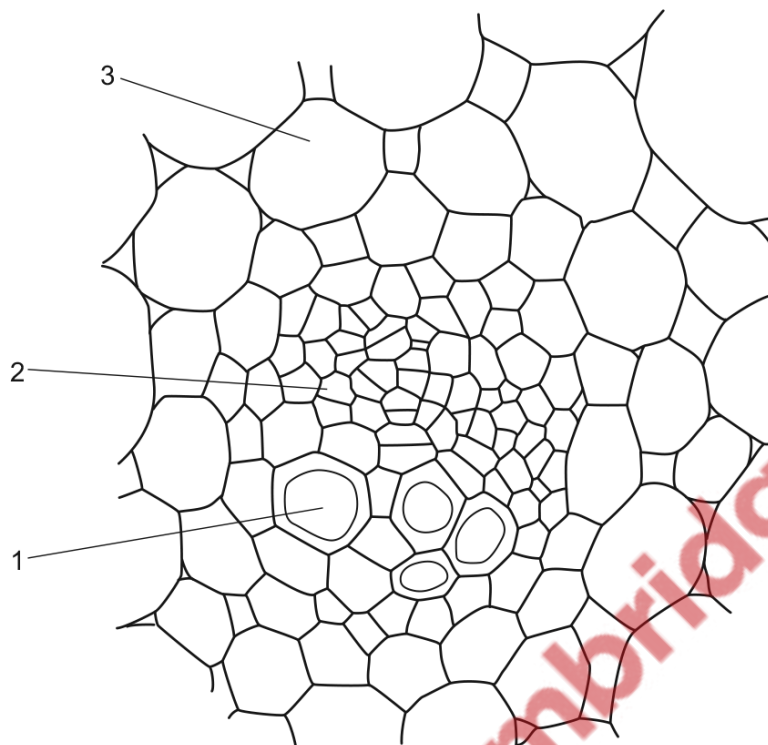


Which row shows the correct labels?

	1	2	3	4
A	cuticle	phloem	xylem	pith
B	cuticle	xylem	phloem	cortex
C	epidermis	phloem	xylem	cortex
D	epidermis	xylem	phloem	pith

995. 9700_s15_qp_11 Q: 25

The diagram shows a vascular bundle from the stem of a plant.



Which row describes the functions of the labelled cells?

	transports sucrose	transports ions	stores starch
A	1	2	3
B	2	1	3
C	2	3	1
D	3	1	2

996. 9700_s15_qp_12 Q: 23

Which features of these cells make them suitable for their function?

	companion cells	xylem vessel elements
A	circulating contents allow transport in both directions	lignified walls provide support
B	cellulose walls provide support	nuclei allow cell division
C	nuclei allow cell division	gaps between cells allow rapid transport
D	numerous mitochondria supply energy	absence of cytoplasm allows mass flow

997. 9700_w15_qp_11 Q: 5

Which features of microvilli and root hairs are correct?

	increase cell surface area	cannot be resolved with the light microscope	contain vacuoles	more than one present on a cell
A	microvilli	microvilli	root hairs	microvilli
B	microvilli	root hairs	microvilli	microvilli
C	root hairs	microvilli	root hairs	root hairs
D	root hairs	root hairs	microvilli	root hairs

998. 9700_w15_qp_11 Q: 23

By which process does sucrose move through phloem sieve tube elements?

- A** active transport
- B** diffusion
- C** facilitated diffusion
- D** mass flow

999. 9700_w15_qp_11 Q: 26

Which changes to the water potential and the volume of liquid in the phloem occur when carbohydrate is taken out of a root into phloem sieve tubes?

	water potential in a phloem sieve tube becomes	volume of liquid in phloem sieve tubes
A	less negative	decreased
B	less negative	increased
C	more negative	decreased
D	more negative	increased

1000. 9700_w15_qp_12 Q: 23

What is the role of the Casparian strip?

- A** to act as a site for active transport of ions into the xylem
- B** to increase root pressure, increasing transpiration
- C** to lower the water potential in the xylem
- D** to prevent water moving back into the cortex from the xylem

1001. 9700_w15_qp_12 Q: 24

Sucrose is loaded into companion cells and phloem sieve tube elements by active transport and diffusion using transport proteins and plasmodesmata.

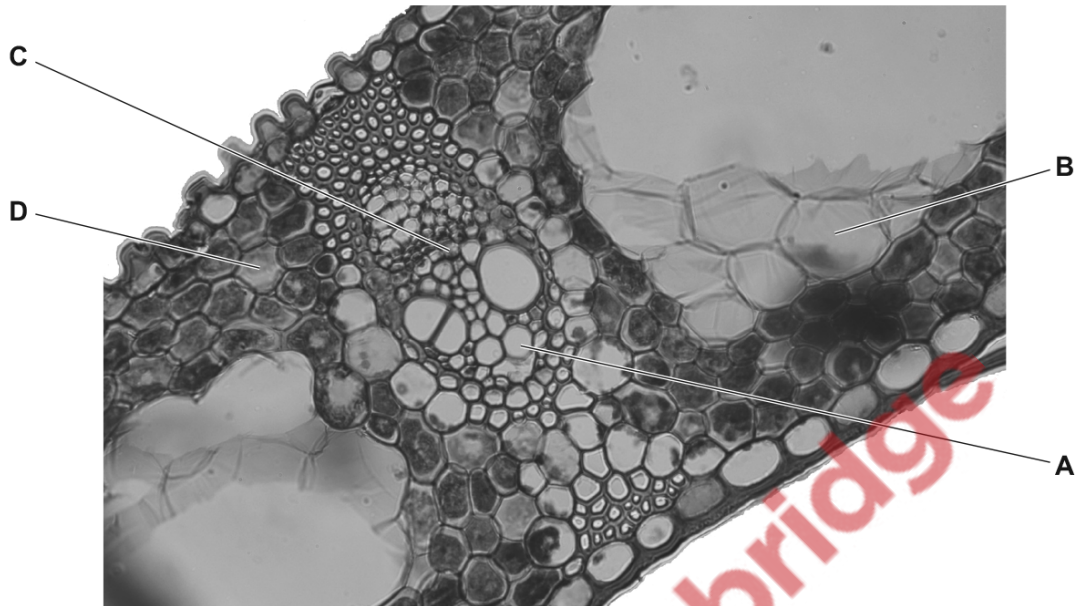
Which row shows how sucrose is loaded?

	active transport	diffusion	transport proteins	plasmodesmata
A	into companion cell	into phloem sieve tube element	into companion cell	into phloem sieve tube element
B	into companion cell	into phloem sieve tube element	into phloem sieve tube element	into companion cell
C	into phloem sieve tube element	into companion cell	into companion cell	into phloem sieve tube element
D	into phloem sieve tube element	into companion cell	into phloem sieve tube element	into companion cell

1002. 9700_w15_qp_13 Q: 23

The photomicrograph shows a transverse section of a leaf.

Which cell has the least negative water potential?



7.2 Transport mechanisms

1003. 9700_m20_qp_12 Q: 26

What is correct about the apoplastic pathway and symplastic pathway in a root?

	apoplastic pathway	symplastic pathway
A	Casparian strip blocks the movement of water	water moves across the root through cell walls
B	water moves across the root through cell walls	water moves from cell to cell via the plasmodesmata
C	water moves from cell to cell via the plasmodesmata	water passes through the cytoplasm
D	water passes through the cytoplasm	Casparian strip blocks the movement of water

1004. 9700_m20_qp_12 Q: 27

Sucrose moves into a phloem sieve tube element from a leaf mesophyll cell.

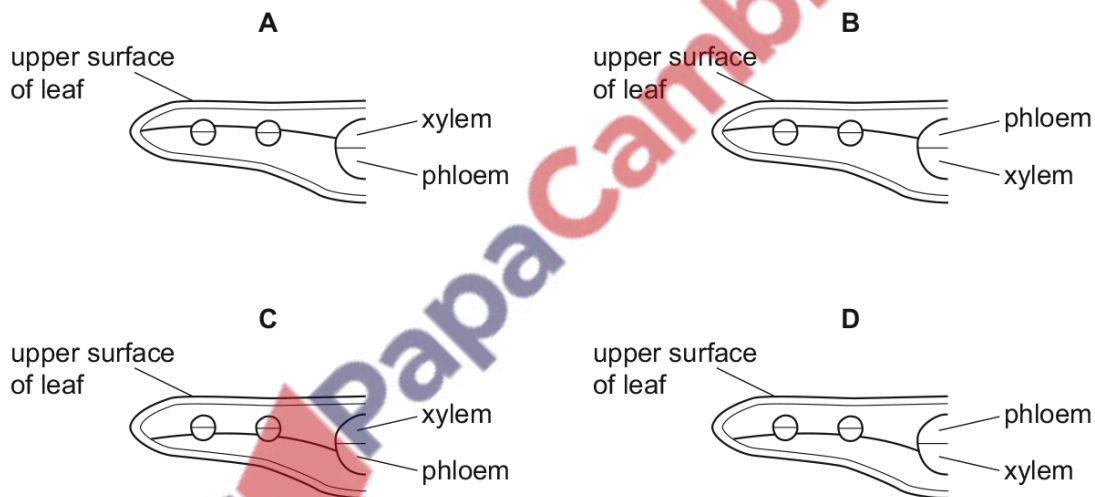
Which changes to the water potential and the volume of solution in the phloem sieve tube element are correct?

	water potential becomes	volume of solution
A	higher	decreases
B	higher	increases
C	lower	decreases
D	lower	increases

1005. 9700_s20_qp_11 Q: 24

A dicotyledonous leaf has a palisade mesophyll layer that is approximately twice as thick as the spongy mesophyll layer.

Which plan diagram is correct?



1006. 9700_s20_qp_11 Q: 25

A number of processes contribute to maintaining a water potential gradient in plants allowing water to reach the highest parts of a plant.

Which processes are responsible for maintaining this water potential gradient?

- 1 capillarity
- 2 osmosis
- 3 transpiration

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

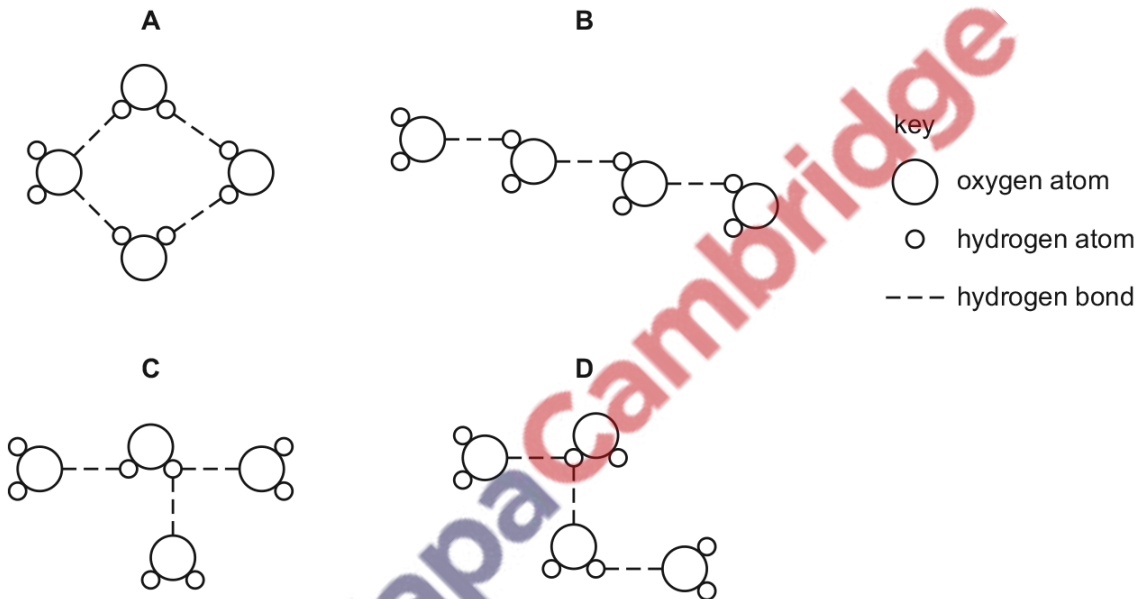
1007. 9700_s20_qp_11 Q: 26

What is a correct statement about the movement of substances absorbed by roots?

- A Ions have to pass through cell walls to cross the endodermis.
- B Ions move through the symplastic pathway only until they reach the Casparian strip.
- C Soil water has a more negative water potential than the xylem sap.
- D Water passes through the symplastic pathway along a water potential gradient.

1008. 9700_s20_qp_11 Q: 27

Which arrangement of four molecules of water shows how water may cohere when moving up a xylem vessel?



1009. 9700_s20_qp_11 Q: 28

Which statement about sucrose loading into companion cells and then into the phloem sieve tube element is **not** correct?

- A Hydrogen ions and sucrose molecules move into the companion cells using a carrier protein.
- B Hydrogen ions are pumped out of the companion cells by active transport.
- C Sucrose molecules are carried into the companion cells down the concentration gradient for sucrose.
- D Sucrose molecules move from a companion cell into the sieve tubes of the phloem through plasmodesmata.

1010. 9700_s20_qp_12 Q: 25

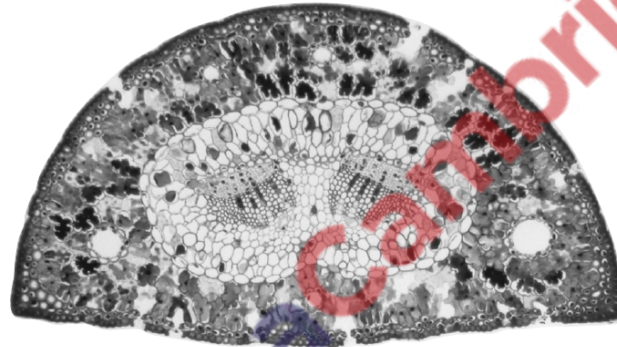
External factors change the rate of transpiration, which also affects the water potential gradient of cells in the leaf.

Which combination is correct?

	external factor changing the rate of transpiration	water potential gradient in the leaf
A	decreasing temperature	increases
B	decreasing wind speed	increases
C	increasing relative humidity	decreases
D	increasing sunlight	decreases

1011. 9700_s20_qp_12 Q: 26

The photomicrograph shows a transverse section through a leaf.



x50

Which features of a xerophytic leaf are visible in this section?

- 1 sunken stomata
- 2 two layers of epithelium
- 3 thick cuticle
- 4 small surface area to volume

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

1012. 9700_s20_qp_12 Q: 27

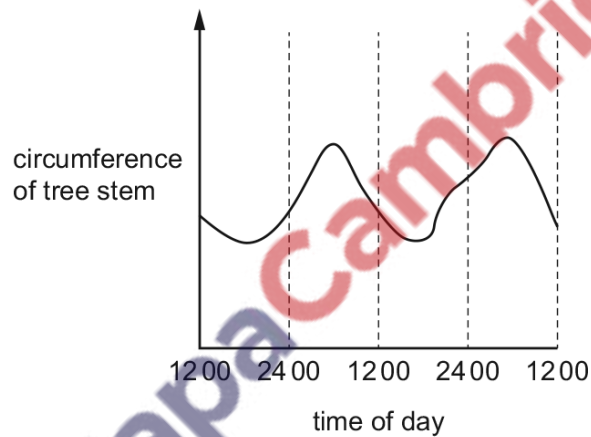
Which changes occur as carbohydrates move out of a root cell into a phloem sieve tube?

	water potential in a phloem sieve tube becomes	volume of liquid in phloem sieve tube
A	less negative	decreases
B	less negative	increases
C	more negative	decreases
D	more negative	increases

1013. 9700_s20_qp_13 Q: 26

The circumference of a tree stem was measured continually for 48 hours.

The results are shown on the chart recording.



What explains the changes in circumference recorded during the 48 hours?

- A** Adhesion forces decrease during the night.
- B** Cohesive tension forces increase during the day.
- C** Mass flow of sucrose increases during the night.
- D** Root pressure decreases during the day.

1014. 9700_s20_qp_13 Q: 27

Which description of movement in phloem is correct?

- A** Adding sucrose to a sieve tube element increases its water potential so that water enters and increases the hydrostatic pressure.
- B** At a sink, such as a storage organ, sucrose is removed from a sieve tube element and polymerised into starch.
- C** At a source, such as a photosynthesising leaf, sucrose enters a sieve tube element by facilitated diffusion.
- D** At a source, sucrose is loaded into a companion cell using a protein that carries both hydrogen ions and sucrose molecules.

1015. 9700_w20_qp_11 Q: 25

Which features have a role in the transport of water in xylem vessel elements?

- 1 capillary action
- 2 adhesion
- 3 hydrogen bonding

- A** 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

1016. 9700_w20_qp_11 Q: 26

The loading of sucrose into companion cells involves a number of processes.

Which process is active?

- A** the movement of hydrogen ions into the cytoplasm of companion cells
- B** the movement of hydrogen ions out of the cytoplasm of companion cells
- C** the movement of sucrose into companion cells
- D** the movement of sucrose out of companion cells

1017. 9700_w20_qp_11 Q: 27

The statements describe events that occur during the movement of sucrose.

- 1 Hydrostatic pressure is decreased.
- 2 Hydrostatic pressure is increased.
- 3 Sucrose is loaded into the phloem vessel.
- 4 Sucrose is unloaded from the phloem vessel.
- 5 Water moves by osmosis into the phloem.
- 6 Water moves by osmosis out of the phloem.
- 7 Water potential decreases in the phloem.
- 8 Water potential increases in the phloem.

Which sequence correctly describes what happens in a plant at a source during the movement of sucrose?

- A** 3 → 7 → 5 → 2
B 3 → 8 → 6 → 1
C 4 → 7 → 5 → 2
D 4 → 8 → 6 → 1

1018. 9700_w20_qp_12 Q: 24

Mass flow is the bulk movement of materials from one place to another.

Which vessels carry fluids by mass flow?

- 1 artery
 - 2 phloem sieve tube
 - 3 vein
 - 4 xylem vessel
- A** 1, 2, 3 and 4
B 1, 2 and 3 only
C 1 and 3 only
D 2 and 4 only

1019. 9700_w20_qp_12 Q: 25

Which two rows are correct for the movement of water from the soil into a root?

	soil	root
1	lower solute concentration	higher solute concentration
2	higher water potential	lower water potential
3	higher solute concentration	lower solute concentration
4	lower water potential	higher water potential

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

1020. 9700_w20_qp_12 Q: 26

ATP is used in companion cells to provide the energy for loading a sieve tube element with sucrose.

How does the co-transporter mechanism use this energy?

- A** to pump hydrogen ions into the sieve tube element
B to pump hydrogen ions out of the companion cell
C to pump sucrose into the sieve tube element
D to pump sucrose out of the companion cell

1021. 9700_w20_qp_13 Q: 26

The diameter of a tree trunk usually decreases slightly during the day and increases slightly at night.

Which three environmental factors, if increased, could cause the largest decrease in diameter?

- A** humidity, temperature, wind speed
B humidity, light intensity, temperature
C humidity, light intensity, wind speed
D light intensity, temperature, wind speed

1022. 9700_w20_qp_13 Q: 27

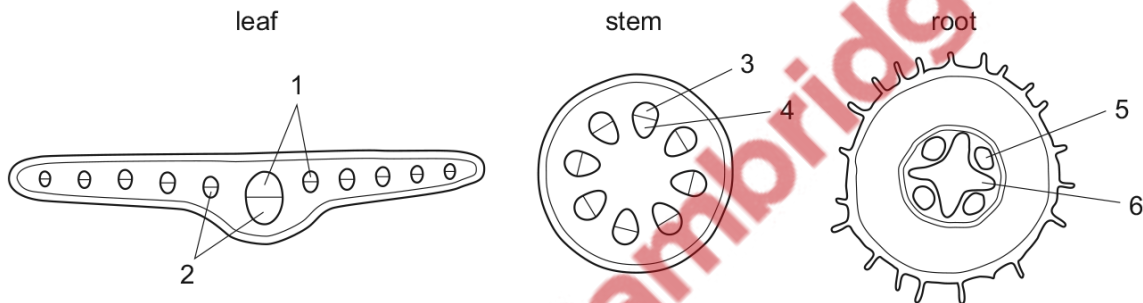
Sucrose moves within a phloem sieve tube from a source to a sink by mass flow.

Which type of gradient within the phloem sieve tube between the source and sink causes the movement of sucrose?

- A diffusion gradient
- B hydrostatic gradient
- C concentration gradient
- D water potential gradient

1023. 9700_m19_qp_12 Q: 25

The diagrams show transverse sections of parts of a plant with some transport tissues labelled from 1 to 6.



Which row shows tissues that mainly transport water and tissues that mainly transport sucrose?

	mainly transport water	mainly transport sucrose
A	1 and 3	4 and 6
B	1 and 6	3 and 5
C	2 and 3	4 and 5
D	3 and 5	2 and 6

1024. 9700_m19_qp_12 Q: 26

Which properties of lignin are important for the function of xylem vessels in the stem of a tall plant, such as a tree?

- 1 It is inflexible so does not bend easily.
- 2 It is not permeable to water.
- 3 It is strong to resist collapse under pressure.
- 4 It has weaker adhesion to water molecules than cellulose.

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

1025. 9700_m19_qp_12 Q: 27

A heating sleeve was placed around the trunk of a small tree at a height of 1 m above the ground. This allowed a narrow region of the tree trunk to be heated to 60 °C.

How will heating this region to 60 °C affect the transport of phloem sap and xylem sap between the roots and leaves?

	movement of phloem sap	movement of xylem sap
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = transport continues

✗ = transport stops

1026. 9700_s19_qp_11 Q: 29

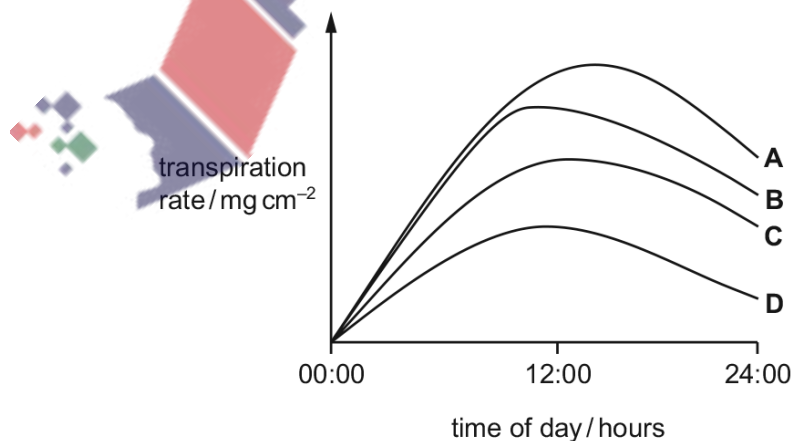
Which statement correctly describes a transport pathway in plants?

- A** In the apoplast pathway, water may move through plasmodesmata.
- B** In the symplast pathway, water may move through intercellular spaces.
- C** The apoplast pathway may be blocked by the Casparian strip.
- D** The symplast pathway may be blocked by the tonoplast.

1027. 9700_s19_qp_12 Q: 25

Four plants, **A**, **B**, **C** and **D**, were grown in the same conditions and their transpiration rates measured.

Which plant is most likely to be a xerophyte?



1028. 9700_s19_qp_12 Q: 26

Sucrose moves from a mesophyll cell in a leaf into a phloem sieve tube element.

Which changes to the water potential and the volume of liquid in the phloem sieve tube element are correct?

	water potential becomes	volume of liquid
A	less negative	decreases
B	less negative	increases
C	more negative	decreases
D	more negative	increases

1029. 9700_s19_qp_13 Q: 30

Irrigating crop plants with water containing low concentrations of salt causes an increase in the concentration of salt in the soil.

What explains why the increase in salt concentration eventually kills the crop?

	water potential in roots	water potential in soil	direction of water movement
A	↓		into the roots
B	↑		into the soil solution
C		↓	out of the roots
D		↑	into the roots

key

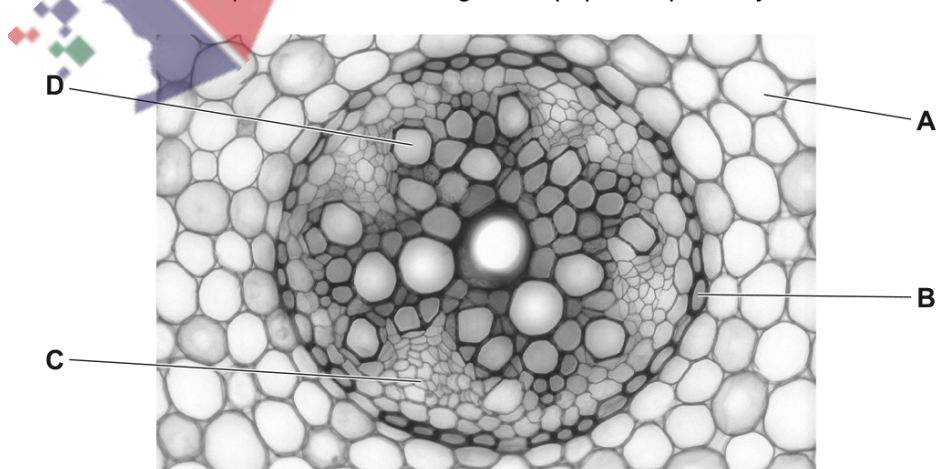
↑ = water potential increases

↓ = water potential decreases

1030. 9700_s19_qp_13 Q: 31

The photomicrograph shows a transverse section through part of a plant root.

Which tissue inhibits the path of water through the apoplastic pathway?



1031. 9700_w19_qp_11 Q: 26

Irrigating crop plants with water containing low concentrations of salt causes an increase in the concentration of salt in the soil.

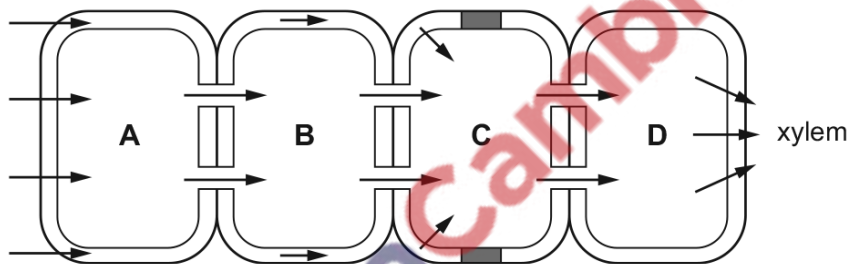
What explains why the increase in salt concentration could eventually kill the crop?

	water potential in roots	water potential in soil	direction of water movement
A	decreases		out of the roots
B	increases		into the roots
C		decreases	out of the roots
D		increases	into the roots

1032. 9700_w19_qp_11 Q: 27

The diagram shows the pathway of water across root cells to the xylem.

Which cell is in the endodermis?



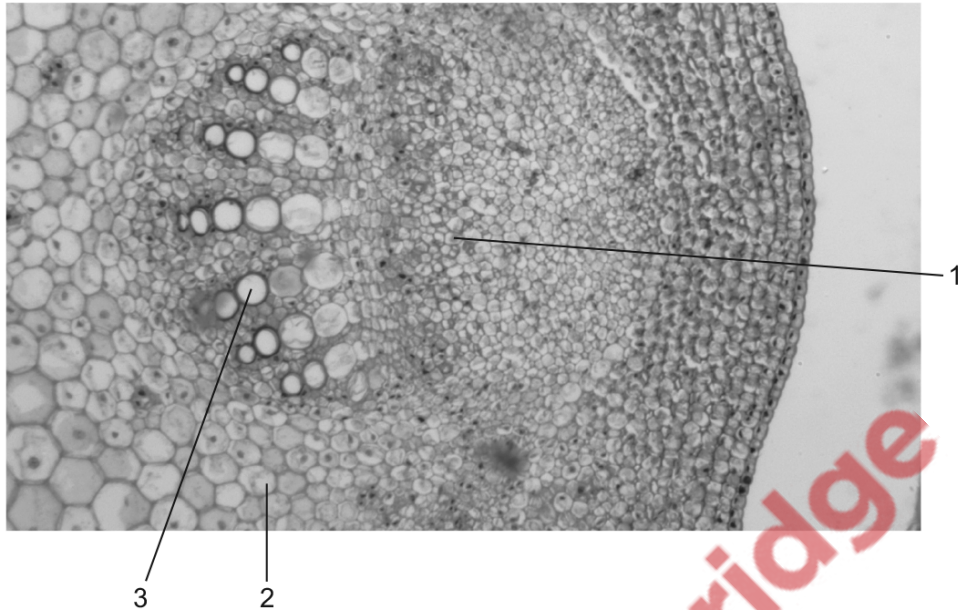
1033. 9700_w19_qp_11 Q: 28

Which row shows the cause of mass flow in the phloem and the direction of movement of phloem sap by mass flow?

	cause of mass flow in the phloem	direction of movement of phloem sap by mass flow
A	hydrostatic pressure gradient	sink to source
B	hydrostatic pressure gradient	source to sink
C	water potential gradient	sink to source
D	water potential gradient	source to sink

1034. 9700_w19_qp_12 Q: 24

The photomicrograph shows a vascular bundle.



Which describes the relationship of water potential in the labelled cells?

- A Cell 3 is less negative than cell 1.
- B Cell 2 is less negative than cell 3.
- C Cell 3 is more negative than cells 1 and 2.
- D Cells 1, 2 and 3 have the same water potential.

1035. 9700_w19_qp_12 Q: 26

What is a definition of transpiration?

- A the evaporation of water vapour from a leaf due to the diffusion of water from an area of low water potential to high water potential
- B the loss of water vapour from a plant to its environment by diffusion down a water potential gradient
- C the movement of water from root to leaf due to the adhesion of water molecules to one another
- D the uptake of water by plant roots by movement of water down a continuous water potential gradient from air to soil

1036. 9700_w19_qp_13 Q: 25

What causes water to move from the root hair cells to the endodermis?

- A diffusion through cell walls, osmosis down a water potential gradient in the cytoplasm
- B diffusion through the symplast, osmosis and root pressure through the apoplast
- C osmosis from cell vacuole to cell vacuole, active transport into the endodermis
- D osmosis through the intercellular spaces, diffusion in cell walls and cytoplasm

1037. 9700_w19_qp_13 Q: 26

What is true about a Casparian strip?

	location	formed from	effect
A	cell wall of cortical cell	lignin	closes symplastic pathway
B	cell wall of endodermis cell	suberin	closes apoplastic pathway
C	cytoplasm of cortical cell	lignin	closes apoplastic pathway
D	cytoplasm of endodermis cell	suberin	closes symplastic pathway

1038. 9700_w19_qp_13 Q: 27

Which xerophytic adaptations reduce the water potential gradient between leaf surface and atmosphere?

- 1 rolled leaves
 - 2 hairy leaves
 - 3 sunken stomata
 - 4 fewer stomata
 - 5 fleshy leaves
- A 1, 2, 3, 4 and 5
 - B 1, 2 and 3 only
 - C 1, 3 and 4 only
 - D 2 and 5 only

1039. 9700_w19_qp_13 Q: 28

When sucrose is loaded into the phloem it has to travel from mesophyll cells to a companion cell and then into the phloem.

In many plants, proton pumps and co-transporter molecules are involved in this process.

Which row shows the relative concentrations of sucrose in each type of cell?

	relative concentration of sucrose / arbitrary units		
	mesophyll cell	companion cell	phloem sieve tube element
A	5	10	15
B	5	15	10
C	15	10	5
D	15	5	10

1040. 9700_m18_qp_12 Q: 28

What will increase the rate of transpiration?

- 1 increasing the humidity
- 2 increasing the light intensity
- 3 decreasing the temperature
- 4 decreasing the wind speed

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

1041. 9700_m18_qp_12 Q: 29

Which properties of water are important for transport in xylem?

- 1 cohesion
- 2 adhesion
- 3 high energy requirement for evaporation
- 4 good solvent properties

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

1042. 9700_s18_qp_11 Q: 25

What is a function of the hairs (trichomes) on xerophytic leaves?

- A** adding a waterproof layer
- B** protecting the stomata
- C** reducing the surface area
- D** trapping a layer of moist air

1043. 9700_s18_qp_11 Q: 26

Which features of companion cells are essential to their function?

- 1 They are connected by plasmadesmata to the sieve tube elements.
- 2 They have a thinner cell wall than a sieve tube element.
- 3 They contain a nucleus and mitochondria.

- A** 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

1044. 9700_s18_qp_12 Q: 27

A potometer was used to measure the transpiration rate of a leafy shoot.

What could be the correct units?

- A** cm min **B** cm² min⁻¹ **C** cm³ g⁻¹ min **D** cm³ min⁻¹

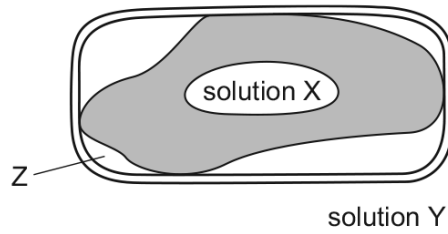
1045. 9700_s18_qp_12 Q: 28

Which combination of features is characteristic of a phloem sieve tube element as it is loaded from a source?

	water potential of the phloem sieve tube element	lignification of the cell wall
A	higher than source	absent
B	higher than source	present
C	lower than source	absent
D	lower than source	present

1046. 9700_s18_qp_13 Q: 18

The diagram shows a partially plasmolysed plant cell.

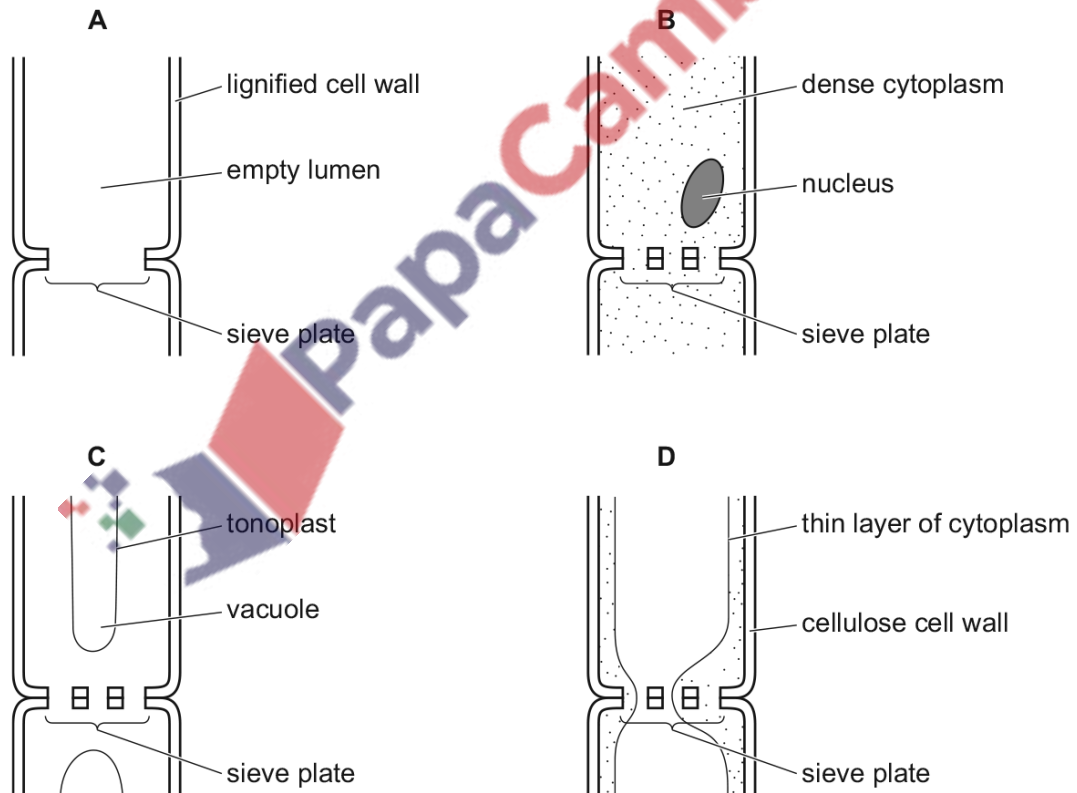


What is found at Z?

- A air
- B solution X
- C solution Y
- D water

1047. 9700_s18_qp_13 Q: 27

Which diagram correctly represents part of a sieve tube element?



1048. 9700_s18_qp_13 Q: 29

Which statements about water movement in plants are correct?

- 1 Water can pass through cellulose.
- 2 Water cannot pass through lignin.
- 3 Water can pass through suberin.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

1049. 9700_w18_qp_11 Q: 24

Which statements correctly describe transport pathways in dicotyledonous plants?

- 1 In the apoplast pathway, water does not move through plasmodesmata.
- 2 In the symplast pathway, water does not move through intercellular spaces.
- 3 The apoplast pathway may be blocked by the Casparian strip.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

1050. 9700_w18_qp_11 Q: 28

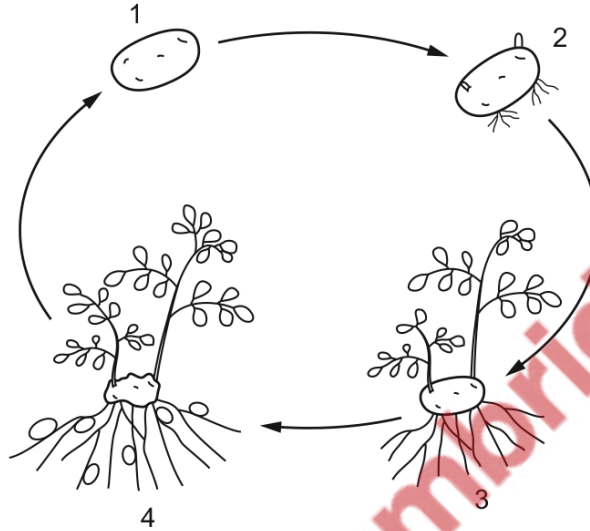
Which statement concerning transpiration is correct?

- A** On a humid day, the water potential gradient between the intercellular air space and the external atmosphere increases to stimulate water loss by evaporation.
 - B** Water arriving at the spongy mesophyll cells via the symplast pathway must move by osmosis through the cell surface membrane before evaporation from the surface of the cells.
 - C** Water diffuses down the water potential gradient from the saturated air space through the guard cells before evaporating from the surface of the cells into the atmosphere.
 - D** Water moves up the xylem in the apoplast pathway and can continue on this pathway by osmosis to reach the spongy mesophyll cells before evaporating into the intercellular air space.
-

1051. 9700_w18_qp_12 Q: 28

The diagram shows a potato tuber at different stages.

- 1 dormant tuber (not growing)
- 2 sprouting roots and shoots
- 3 growing roots and shoots
- 4 making new potato tubers



Which row identifies a stage where a potato tuber acts as a source and a stage where it acts as a sink?

	source	sink
A	1	3
B	2	4
C	3	2
D	4	1

1052. 9700_w18_qp_13 Q: 26

By which process would water rise up through xylem vessels in a plant root when the shoot has been removed?

- A** capillarity, root pressure and transpiration pull
- B** capillarity and root pressure only
- C** capillarity and transpiration pull only
- D** root pressure only

1053. 9700_w18_qp_13 Q: 27

Which changes occur to the water potential and the volume of liquid in the phloem sieve tube element when carbohydrate is moved into a sink?

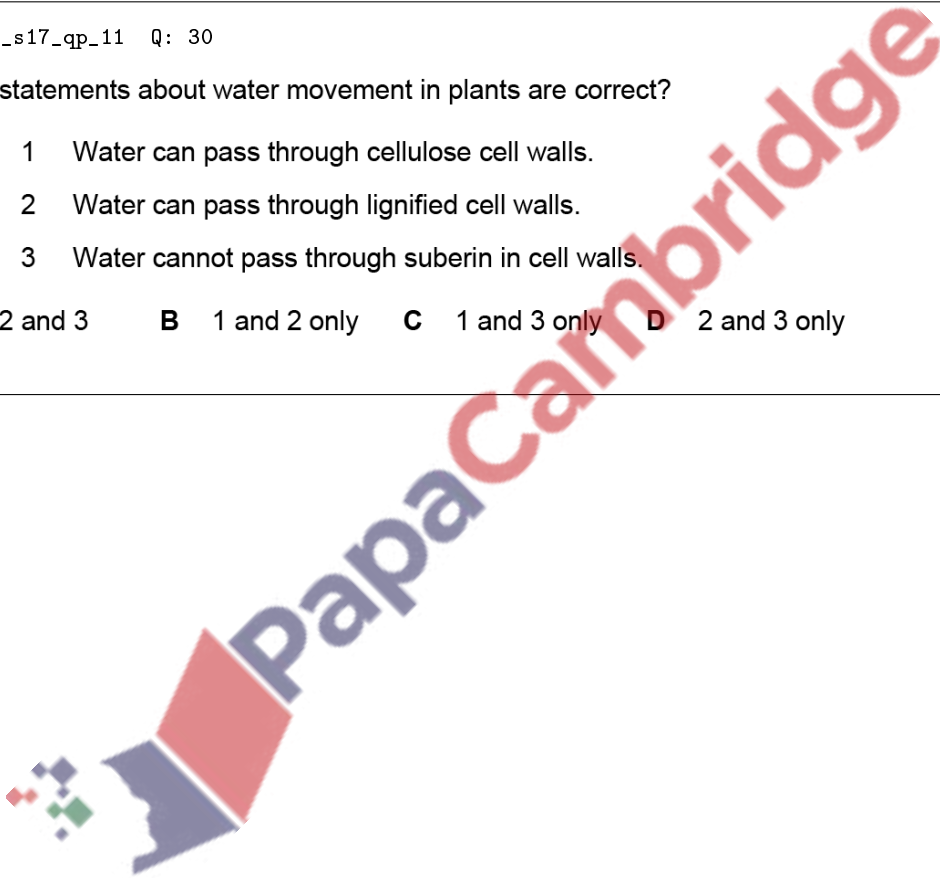
	water potential of the sieve tube element	volume of liquid of the sieve tube element
A	lowers	decreases
B	lowers	increases
C	raises	decreases
D	raises	increases

1054. 9700_s17_qp_11 Q: 30

Which statements about water movement in plants are correct?

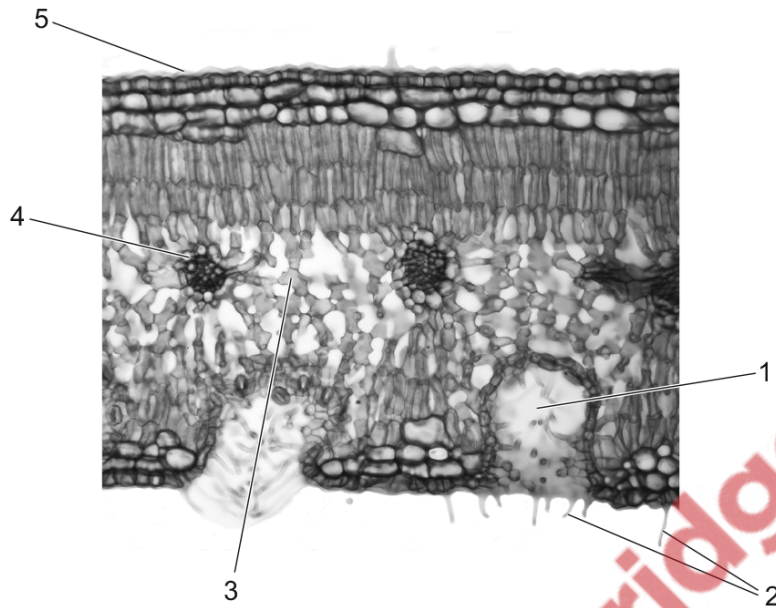
- 1 Water can pass through cellulose cell walls.
- 2 Water can pass through lignified cell walls.
- 3 Water cannot pass through suberin in cell walls.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only



1055. 9700_s17_qp_11 Q: 31

The photomicrograph is a transverse section of a leaf.



Which features are characteristic of xerophytes?

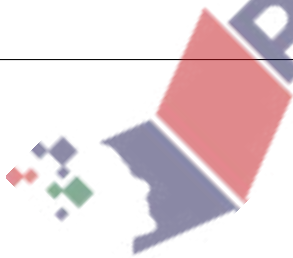
- A** 1, 3, 4 and 5 **B** 1, 2 and 3 **C** 1, 2 and 5 **D** 2, 3, 4 and 5

1056. 9700_s17_qp_11 Q: 32

A maize crop is successfully growing in a field in which the water potential of the soil is -40 KPa.

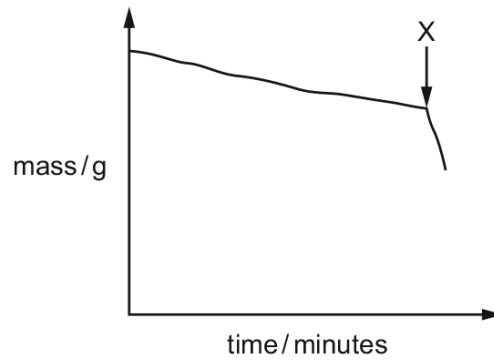
What is the most likely water potential of the cell sap in the root hair cell?

- A** -60 KPa **B** -40 KPa **C** -20 KPa **D** 0 KPa



1057. 9700_s17_qp_12 Q: 22

The graph shows the loss of mass in a potted plant due to transpiration.



What could have occurred at point X on the graph?

- A A plastic bag was placed around the plant.
- B The lower epidermis was sealed with petroleum jelly.
- C The plant was placed into a dark cupboard.
- D Warm moving air was blown over the plant.

1058. 9700_s17_qp_12 Q: 23

Which row is correct for a phloem sieve tube element?

	cell surface membrane	cytoplasm	nucleus	80S ribosomes
A	✓	✓	✓	✓
B	✓	✓	✓	x
C	✓	✓	x	x
D	x	x	x	x

key

✓ = present

x = absent

1059. 9700_s17_qp_12 Q: 24

An aphid, such as a greenfly, uses a tubular mouthpart called a stylet to feed on nutrients in the plant.

It inserts the stylet through the surface of a stem or leaf.

When a stylet is cut near the aphid's head, leaving the stylet in the plant, a liquid with a low water potential continues to flow out of the plant.

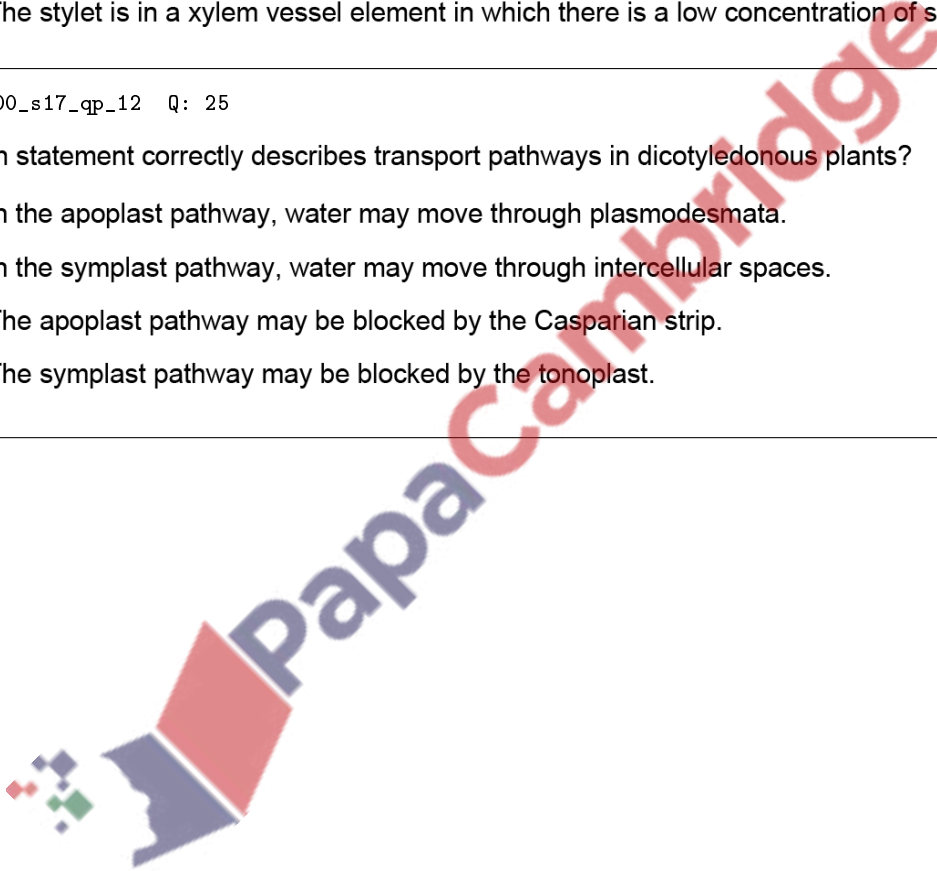
Which statement explains this?

- A The stylet is in a phloem sieve tube element in which there is a high concentration of solutes.
 - B The stylet is in a phloem sieve tube element in which there is a low concentration of solutes.
 - C The stylet is in a xylem vessel element in which there is a high concentration of solutes.
 - D The stylet is in a xylem vessel element in which there is a low concentration of solutes.
-

1060. 9700_s17_qp_12 Q: 25

Which statement correctly describes transport pathways in dicotyledonous plants?

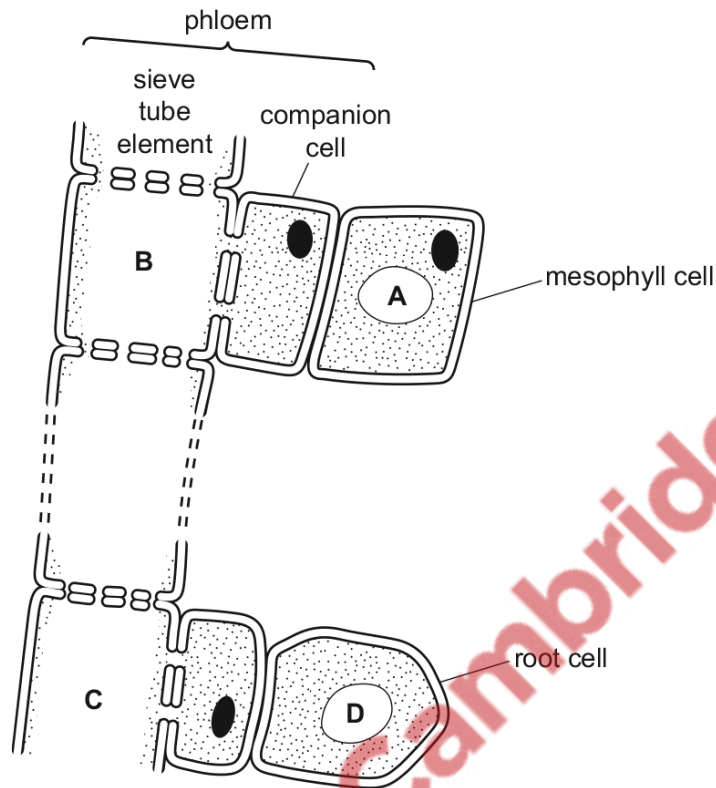
- A In the apoplast pathway, water may move through plasmodesmata.
 - B In the symplast pathway, water may move through intercellular spaces.
 - C The apoplast pathway may be blocked by the Casparian strip.
 - D The symplast pathway may be blocked by the tonoplast.
-



1061. 9700_s17_qp_13 Q: 24

The diagram shows the tissues involved in the transport of sucrose in a plant.

Where is the highest concentration of sucrose?



1062. 9700_s17_qp_13 Q: 25

Which features adapt root hair cells for efficient absorption of water?

- 1 a large number of mitochondria
- 2 a large number of protein carriers in the cell surface membrane
- 3 a large surface area to volume ratio

A 1, 2 and 3 **B** 1 and 2 only **C** 2 and 3 only **D** 3 only

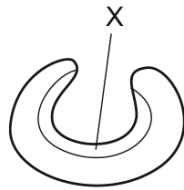
1063. 9700_w17_qp_11 Q: 23

Transpiration is the consequence of which feature of plants?

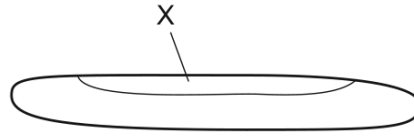
- A** the presence of symplast and apoplast pathways
- B** the requirement for a transport system in plants
- C** the requirement for leaves to exchange gases
- D** the thin waxy cuticle on the lower epidermis of leaves

1064. 9700_w17_qp_11 Q: 25

The diagram shows a xerophytic leaf in different conditions, P and Q.



P



Q

Which statements describe the difference between the cells in layer X in conditions P and Q?

- 1 more negative water potential in P than Q
- 2 more cells plasmolysed in P
- 3 cells less turgid in Q
- 4 water potential becomes zero in Q

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

1065. 9700_w17_qp_11 Q: 26

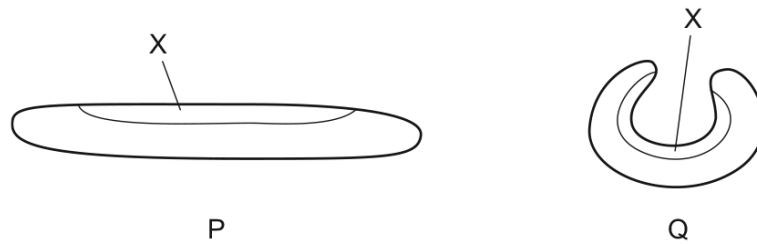
What could increase the rate of transpiration?

- A** increasing the humidity
- B** increasing the light intensity
- C** decreasing the temperature
- D** decreasing the wind speed



1066. 9700_w17_qp_12 Q: 27

The diagram shows a xerophytic leaf in different conditions, P and Q.



Which statements about the cells in layer X of the leaf in each of the conditions P and Q are correct?

- 1 less negative water potential in P than Q
- 2 cells may be turgid in P and plasmolysed in Q
- 3 cells less turgid in P than Q
- 4 no net diffusion of water into X in either P or Q

- A** 1, 2, 3 and 4
B 1, 2 and 4 only
C 1 and 4 only
D 2 and 3 only

1067. 9700_w17_qp_12 Q: 28

What are features that adapt root hair cells for efficient uptake of mineral ions?

- 1 a large number of mitochondria
- 2 a large number of protein carriers in the cell surface membrane
- 3 a large surface area to volume ratio

- A** 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

1068. 9700_w17_qp_13 Q: 29

Mass flow is the bulk movement of materials from one place to another.

Which vessels carry fluids by mass flow?

- 1 artery
- 2 phloem sieve tube
- 3 vein
- 4 xylem vessel

- A** 1, 2, 3 and 4
B 1, 2 and 3 only
C 1 and 3 only
D 2 and 4 only

1069. 9700_w17_qp_13 Q: 30

Amino acids move from a phloem sieve tube element into a root cell.

Which changes to the water potential and the volume of liquid in the phloem sieve tube element are correct?

	water potential	volume of liquid
A	becomes higher	decreases
B	becomes higher	increases
C	becomes lower	decreases
D	becomes lower	increases

1070. 9700_w17_qp_13 Q: 31

The table shows the volume of water taken up over a 10 minute period for two species of plant, X and Y.

time / minutes	water uptake / mm ³	
	X	Y
2	4.2	1.2
4	7.8	2.3
6	10.9	3.7
8	13.3	4.4
10	16.9	4.9

Both plants were tested at the same time, in the same room and using identical potometers. A student concluded that Y was a xerophyte so lost less water.

What feature of the experiment could bring this conclusion into doubt?

- A The student did not control air flow or temperature surrounding the plants.
- B The student did not leave the plants to acclimatise to their surroundings.
- C The student did not take measurements at 0 minutes.
- D The student did not take account of the area of leaves.

1071. 9700_m16_qp_12 Q: 24

Which statement describes movement through a plant in the apoplast pathway?

- A Water moves through the cell walls.
- B Water moves through the cytoplasm.
- C Water moves through the plasmodesmata.
- D Water moves through the vacuoles.

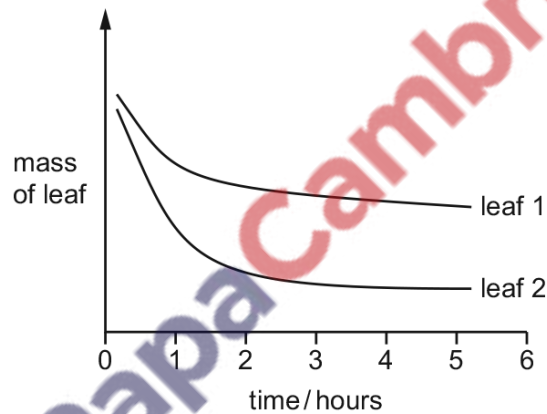
1072. 9700_m16_qp_12 Q: 25

Which changes to the water potential and the volume of liquid in the phloem occur when sucrose is moved from the phloem sieve tube to an actively dividing root tip?

	water potential in phloem sieve tube becomes	volume of liquid in phloem sieve tubes
A	less negative	decreases
B	less negative	increases
C	more negative	decreases
D	more negative	increases

1073. 9700_m16_qp_12 Q: 26

The diagram shows the results of an experiment using leaves with the same surface area from two different species of plant. Each leaf was left on a balance in daylight in a closed room and its mass recorded at 1 hour intervals.



Which features of leaf 2 could explain these results?

- 1 more stomata per unit area of leaf
- 2 fewer trichomes (hairs) on the leaf
- 3 sunken stomata
- 4 thinner cuticle

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

1074. 9700_m16_qp_12 Q: 27

Which evidence supports the cohesion-tension theory for the movement of water in flowering plants?

- 1 When the rate of transpiration of a tree is at its maximum, the diameter of the trunk is at its minimum.
- 2 When a plant shoot is removed close to the base of the stem, sap leaks out from the cut.
- 3 Evaporation of water from a porous pot can exert a force that draws water up a glass tube attached underneath the pot.
- 4 Droplets of water form at the edge of leaves of plants growing in conditions of soil with high water content and air with high humidity.

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

1075. 9700_s16_qp_11 Q: 24

Water that is present inside a root hair cell may leave the cell and pass to the vascular tissue.

Through which route **must** the water travel?

- A** apoplast
 - B** plasmodesmata
 - C** symplast
 - D** vacuoles
-

1076. 9700_s16_qp_11 Q: 25

What is a correct definition of the term transpiration?

- A** diffusion of water from intercellular air spaces to the atmosphere where it evaporates
 - B** evaporation of water from the leaf surface of a plant via the stomata
 - C** loss of water vapour from the aerial parts of a plant to the atmosphere
 - D** movement of water from the xylem to the atmosphere through the cell walls only
-

1077. 9700_s16_qp_11 Q: 26

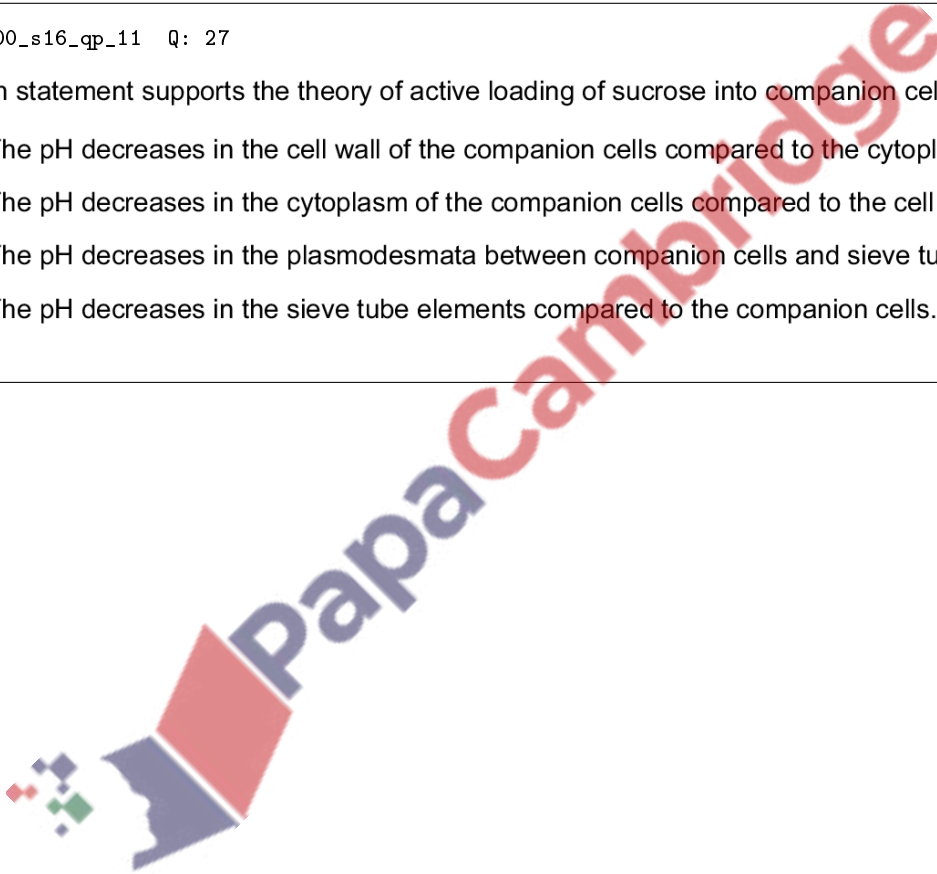
Which changes to the water potential and the volume of liquid in the phloem sieve tube element occur when sucrose is moved from a photosynthesising leaf into the phloem sieve tube element?

	water potential in phloem sieve tube element	volume of liquid in phloem sieve tube element
A	higher	decreases
B	higher	increases
C	lower	decreases
D	lower	increases

1078. 9700_s16_qp_11 Q: 27

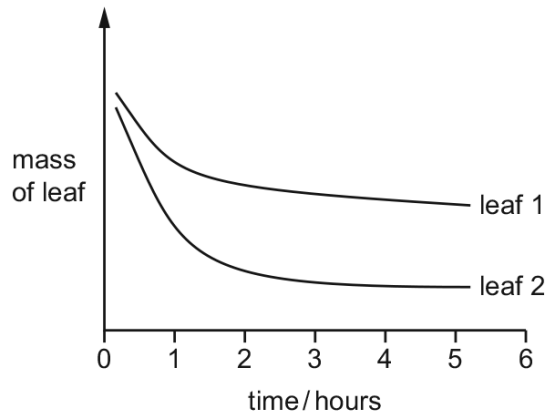
Which statement supports the theory of active loading of sucrose into companion cells?

- A** The pH decreases in the cell wall of the companion cells compared to the cytoplasm.
- B** The pH decreases in the cytoplasm of the companion cells compared to the cell wall.
- C** The pH decreases in the plasmodesmata between companion cells and sieve tube elements.
- D** The pH decreases in the sieve tube elements compared to the companion cells.



1079. 9700_s16_qp_12 Q: 25

The diagram shows the results of an experiment on transpiration using two different leaves. Each leaf was left on a balance in daylight in a closed room and its mass recorded at 1 hour intervals.



Which conclusions could be correct?

- 1 The loss of mass is mainly due to evaporation of water.
- 2 Most stomata close in both leaves after 1 hour.
- 3 Leaf 1 has a larger surface area than leaf 2.
- 4 Leaf 1 has a thicker cuticle than leaf 2.

- A** 1, 2, 3 and 4
B 1, 2 and 4 only
C 2 and 3 only
D 3 and 4 only

1080. 9700_s16_qp_12 Q: 26

Which statement about the transport of sucrose is correct?

- A** ATP synthesised by mitochondria of companion cells provides the energy to move sucrose from phloem sieve tube elements in leaves to sinks.
- B** Sucrose moves through plasmodesmata by passive diffusion from mesophyll cells through companion cells to phloem sieve tube elements.
- C** The water potential in phloem sieve tube elements becomes more negative following the entry of sucrose.
- D** Water enters companion cells and hydrostatic pressure builds up to push sucrose into phloem sieve tube elements by mass flow.

1081. 9700_s16_qp_13 Q: 23

During transpiration, what is the site of evaporation of water in the leaves?

- A air spaces
 - B guard cell walls
 - C mesophyll cell walls
 - D stomata
-

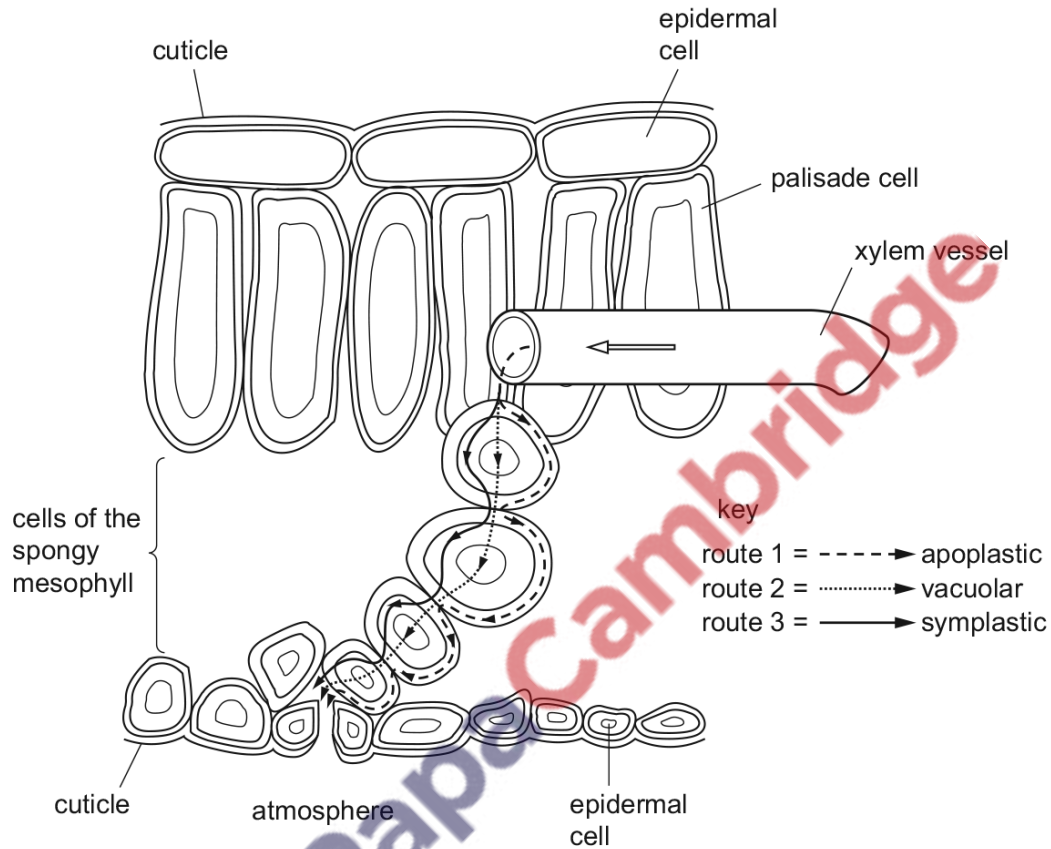
PapaCambridge

1082. 9700_s16_qp_13 Q: 24

Water passes across leaf tissues by different routes as a result of:

- differences in water potential
- the pull transmitted by cohesive forces between water molecules.

The diagram shows three routes by which water can travel.



Which row correctly identifies why water passes across leaf tissues by the different routes?

	differences in water potential	pull transmitted by cohesive forces
A	route 1	routes 2 and 3
B	routes 1 and 3	route 2
C	route 2	routes 1 and 3
D	routes 2 and 3	route 1

1083. 9700_s16_qp_13 Q: 25

Which factors contribute to the increase in transpiration rate when the temperature rises?

- 1 concentration of water molecules increases in air spaces due to evaporation
- 2 increased rate of diffusion as water molecules have more kinetic energy
- 3 increased hydrogen bonding between water molecules in air spaces

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

1084. 9700_s16_qp_13 Q: 26

ATP is used in companion cells to provide the energy for loading a sieve tube element with sucrose.

How does the co-transporter mechanism use this energy?

- A** to pump protons into the sieve tube element
- B** to pump protons out of the companion cell
- C** to pump sucrose into the sieve tube element
- D** to pump sucrose out of the companion cell

1085. 9700_s16_qp_13 Q: 27

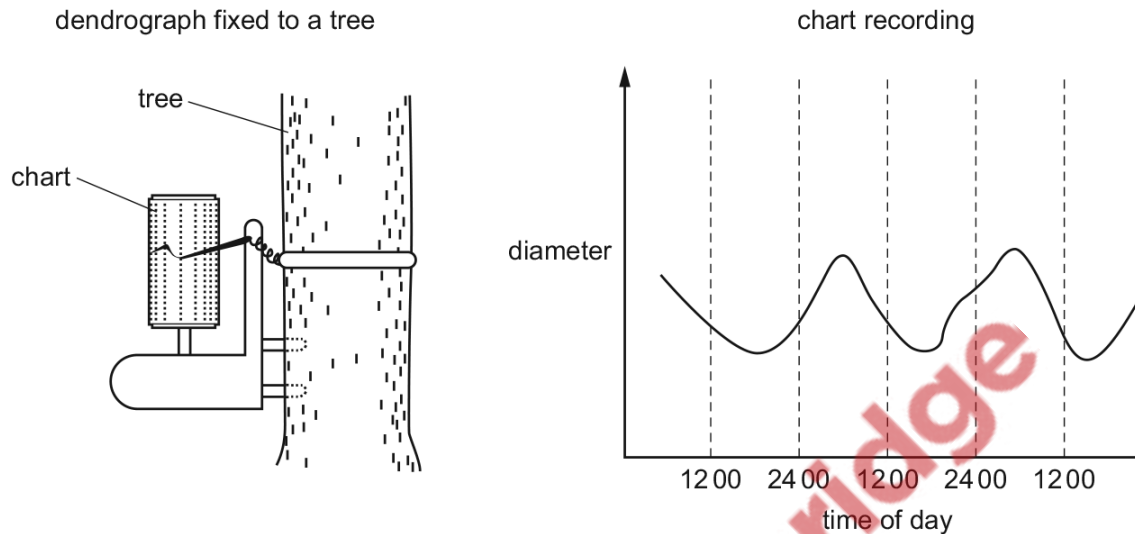
Which changes to the water potential and the volume of liquid in the phloem sieve tube element occur when sucrose is moved from the phloem sieve tube element to an actively dividing shoot tip?

	water potential in phloem sieve tube element	volume of liquid in phloem sieve tube element
A	higher	decreases
B	higher	increases
C	lower	decreases
D	lower	increases

1086. 9700_w16_qp_11 Q: 24

A dendrograph records changes in the diameter of a tree. The diagram shows a dendrograph fixed to a tree.

Some results are shown on the chart recording.



What explains the diameter changes recorded during the day and night?

- A Adhesion forces decrease during the night.
- B Cohesive tension forces increase during the day.
- C Mass flow of sucrose increases during the night.
- D Root pressure decreases during the day.

1087. 9700_w16_qp_11 Q: 25

Which description is correct for xylem vessel elements?

- A cells joined to form a tube, pits at intervals, sieve plates between cells, surrounded by the endodermis in roots
- B contains cells joined end to end, containing cytoplasm, cell walls with lignin, located to the outside of phloem in vascular bundles
- C contains elongated cells with end walls broken down, located in vascular bundles in the stem and centrally in the roots
- D dead elongated cells, lignified cell walls with pits at intervals, associated with companion cells in the roots only

1088. 9700_w16_qp_11 Q: 26

Different substances, such as sucrose and amino acids, can move in different directions in the phloem sieve tube elements.

Which statement explains this?

- A** Active transport occurs in some phloem sieve tube elements and mass flow occurs in other sieve tube elements.
- B** Both active transport and mass flow occur in each individual phloem sieve tube element.
- C** Mass flow occurs in both directions at the same time in each individual phloem sieve tube element.
- D** Mass flow occurs in different directions in different phloem sieve tube elements at the same time.

1089. 9700_w16_qp_11 Q: 27

Which describes possible mechanisms by which sucrose is transferred from a mesophyll cell into a companion cell?

- 1 co-transport with the active transport of hydrogen ions
- 2 co-transport by passive diffusion of hydrogen ions
- 3 facilitated diffusion through plasmodesmata

- A** 1 and 3 **B** 2 and 3 **C** 1 only **D** 2 only

1090. 9700_w16_qp_12 Q: 27

External factors change the rate of transpiration, which also affects the water potential gradient of cells in the leaf.

Which combination of statements is correct?

	external factor changing the rate of transpiration	water potential gradient in the leaf
A	decreasing temperature	increases
B	decreasing wind speed	increases
C	increasing relative humidity	decreases
D	increasing sunlight	decreases

1091. 9700_w16_qp_13 Q: 23

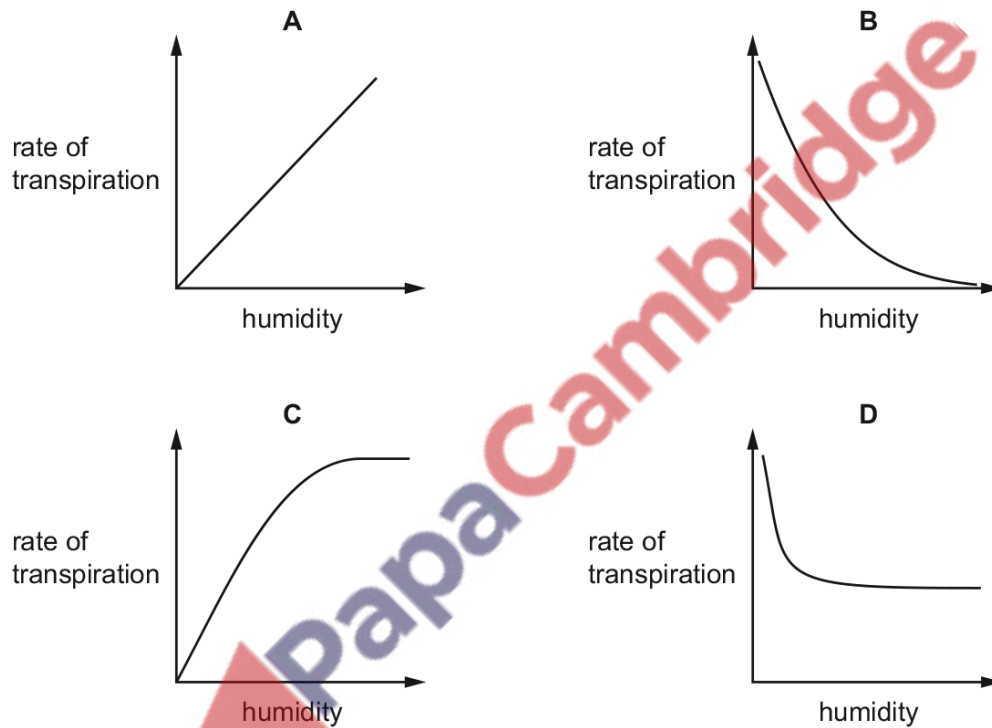
Which statements about water movement in plants are correct?

- 1 Water cannot pass through cellulose.
- 2 Water cannot pass through lignin.
- 3 Water cannot pass through the Casparian strip.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

1092. 9700_w16_qp_13 Q: 25

Which diagram represents the effect of atmospheric humidity on the rate of transpiration?



1093. 9700_w16_qp_13 Q: 26

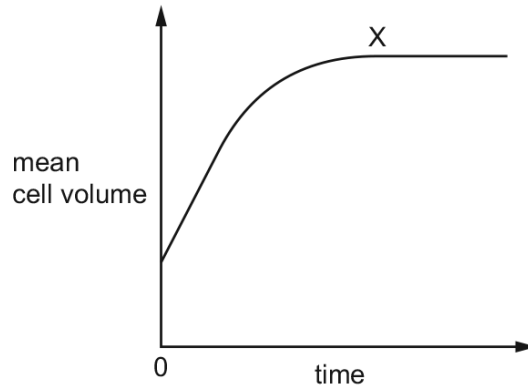
Which parts of a plant have plasmodesmata?

- 1 companion cells
- 2 phloem sieve tube elements
- 3 root hair cell

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

1094. 9700_s15_qp_11 Q: 24

A tissue composed of plasmolysed plant cells was put into distilled water. The graph shows how the mean cell volume changes with time.



What is the cause of the plateau at X?

- 1 water potential in the plant cell has become more negative
- 2 cells have become fully turgid
- 3 no net movement of water into cells

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

1095. 9700_s15_qp_11 Q: 26

Which changes to the water potential and the volume of liquid in the phloem occur when amino acids are moved into a sink from phloem sieve tubes?

	water potential in a phloem sieve tube	volume of liquid in phloem sieve tubes
A	higher	decreased
B	higher	increased
C	lower	decreased
D	lower	increased

1096. 9700_s15_qp_12 Q: 24

What is the sequence of events in the translocation of sucrose?

- A** active loading of sucrose into sieve elements at the source, increased hydrostatic pressure, mass flow, unloading at the sink
- B** hydrolysis of storage compounds in sinks, lowered water potential, unloading of sucrose from sieve elements, mass flow from the source
- C** lowered pressure in sieve elements at the source, movement of sucrose down the pressure gradient, mass flow down a diffusion gradient to the sink
- D** mass flow of dissolved sucrose into the sieve element at the source, lowered hydrostatic pressure, diffusion of sucrose to sink, active unloading

1097. 9700_s15_qp_12 Q: 25

Where does water evaporate from during transpiration?

- A** inside the guard cells
- B** the outer surface of the epidermal cell layer
- C** the sub-stomatal cavity
- D** the surface of spongy mesophyll cell walls

1098. 9700_s15_qp_12 Q: 26

Which changes to the water potential and the volume of liquid in the phloem occur when amino acids are taken out of a sink in a phloem sieve tube?

	water potential in phloem sieve tubes	volume of liquid in phloem sieve tubes
A	higher	decreased
B	higher	increased
C	lower	decreased
D	lower	increased

1099. 9700_s15_qp_12 Q: 39

A farmer grows a different crop in a field each year for three years.

In the fourth year he grows a leguminous crop, such as clover, and then ploughs this into the soil. The next year he starts the rotation again.

How does the fourth year crop add mineral ions to the soil?

	decomposition	nitrification	nitrogen fixation
A	no	yes	yes
B	yes	no	yes
C	yes	yes	no
D	yes	yes	yes

1100. 9700_s15_qp_13 Q: 3

Which comparison of a phloem companion cell with a B-lymphocyte is correct?

- A** Both cell types have proteins embedded in their cell surface membranes.
- B** B-lymphocytes have a spherical nucleus but companion cells do not have a nucleus.
- C** Companion cells always contain chloroplasts, which are not present in B-lymphocytes.
- D** Neither B-lymphocytes nor companion cells possess plasmodesmata.

1101. 9700_s15_qp_13 Q: 5

Which structures in plant cells have a double membrane?

- A** chloroplasts and vacuoles
- B** lysosomes and nuclei
- C** mitochondria and vacuoles
- D** nuclei and mitochondria

1102. 9700_s15_qp_13 Q: 10

Which properties of water are a result of only cohesion?

- 1 The water has a high surface tension.
- 2 Water moves up xylem vessels.
- 3 Water is an excellent solvent.

- A** 1, 2 and 3
- B** 1 and 2 only
- C** 1 only
- D** 3 only

1103. 9700_s15_qp_13 Q: 23

Which force holds water molecules on the surface of cell walls?

- A adhesion
- B capillarity
- C cohesion
- D surface tension

1104. 9700_s15_qp_13 Q: 24

The statements are about the properties of water.

- 1 requires a lot of heat to evaporate
- 2 holds a lot of heat
- 3 is able to form hydrogen bonds with other water molecules
- 4 is able to form hydrogen bonds with other polar molecules

Which properties are important for translocation in phloem?

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

1105. 9700_s15_qp_13 Q: 25

Which changes to the water potential and the volume of liquid in the phloem occur when amino acids are moved into a phloem sieve tube at a source?

	water potential in phloem sieve tubes	volume of liquid in phloem sieve tubes
A	higher	decreased
B	higher	increased
C	lower	decreased
D	lower	increased

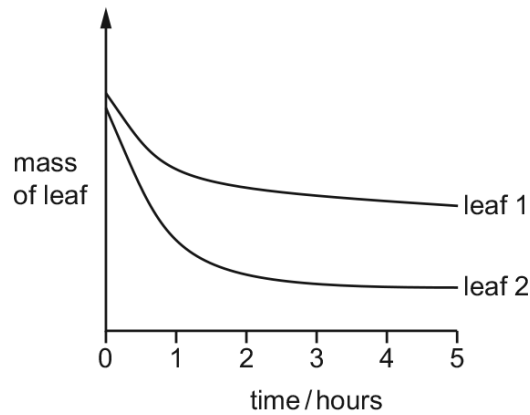
1106. 9700_s15_qp_13 Q: 26

Which feature of transport in xylem depends on the use of energy?

- A mass flow of water to the leaves
- B osmosis of water into xylem
- C uptake of ions into the root
- D transpiration of water from the leaves

1107. 9700_w15_qp_11 Q: 24

The diagram shows the results of an experiment using leaves with the same surface area from two different species. Each leaf was left on a balance in daylight in a closed room and their mass recorded at 1 hour intervals.



What could explain these results?

- A Leaf 1 has a thicker cuticle than leaf 2.
- B Leaf 1 is thinner than leaf 2.
- C Leaf 2 has stomata protected by hairs and leaf 1 does not.
- D Leaf 2 has sunken stomata and leaf 1 does not.

1108. 9700_w15_qp_11 Q: 25

Which description of the movement of water through a leaf is **not** correct?

- A Water evaporates into an air space from the higher water potential in the cell wall of a mesophyll cell.
- B Water moves from the higher water potential of the cytoplasm of a mesophyll cell to the lower water potential in its cell wall.
- C Water moves from the lower water potential of a xylem vessel to the higher water potential of a mesophyll cell.
- D Water vapour diffuses from an air space, through an open stoma, to the lower humidity of the surrounding air.

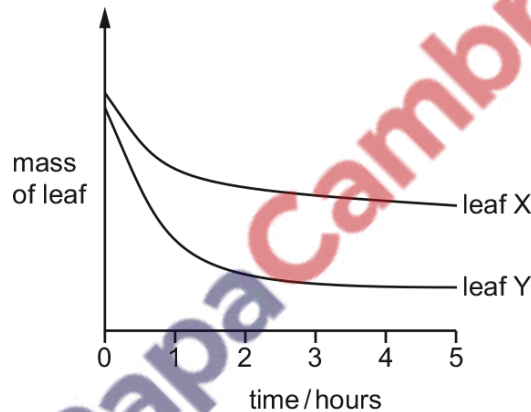
1109. 9700_w15_qp_12 Q: 25

Which changes to the water potential and the volume of liquid in the phloem occur when sucrose is transferred from leaves into phloem sieve tubes to be transported to a sink?

	water potential in phloem sieve tubes becomes	volume of liquid in phloem sieve tubes
A	less negative	decreased
B	less negative	increased
C	more negative	decreased
D	more negative	increased

1110. 9700_w15_qp_12 Q: 26

The diagram shows the results of an experiment using leaves with the same surface area from two different species. Each leaf was left on a balance in daylight in a closed room and their mass recorded at 1 hour intervals.



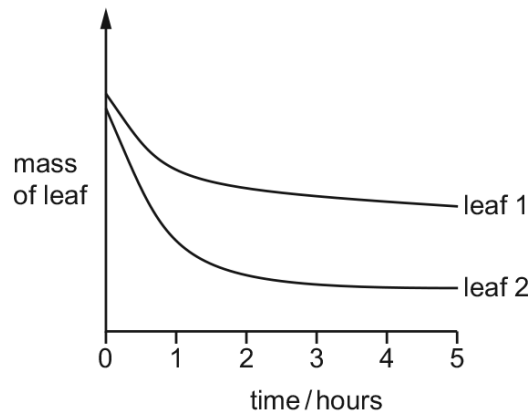
Which features of leaf X could explain these results?

- 1 thinner cuticle
- 2 sunken stomata
- 3 ability to roll the leaf
- 4 no trichomes on the leaf

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

1111. 9700_w15_qp_13 Q: 24

The diagram shows the results of an experiment on transpiration using two different leaves. Each leaf was left on a balance in daylight in a closed room and their mass recorded at 1 hour intervals.



Which conclusions could be correct?

- 1 The loss in mass is mainly due to evaporation of water.
- 2 The stomata in both leaves close after 1 hour.
- 3 Leaf 1 has a larger surface area than leaf 2.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

1112. 9700_w15_qp_13 Q: 25

Which processes are involved in the transport of sucrose in plants?

- 1 active transport
- 2 mass flow
- 3 osmosis

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

1113. 9700_w15_qp_13 Q: 26

Which changes to the water potential and the volume of liquid in the phloem occur when carbohydrate is moved from phloem sieve tubes into a sink?

	water potential in phloem sieve tubes becomes	volume of liquid in phloem sieve tubes
A	less negative	decreased
B	less negative	increased
C	more negative	decreased
D	more negative	increased