3. Movement into and out of cells

3.2 Osmosis

Paper 1 and 2

Question Paper

Paper 1

Questions are applicable for both core and extended candidates

1 Some molecules move through a membrane during osmosis.

Which row shows the molecule that moves and the type of membrane?

	molecule moving	type of membrane
A	oxygen	partially permeable
B	oxygen	permeable
C	water	partially permeable
D	water	permeable

2 Which statement about plant support is correct?

A The pressure of water inside the cells presses inwards on the cell walls.

B The pressure of water inside the cells presses outwards on the cell walls.

C The pressure of water outside the cells presses inwards on the cell walls.

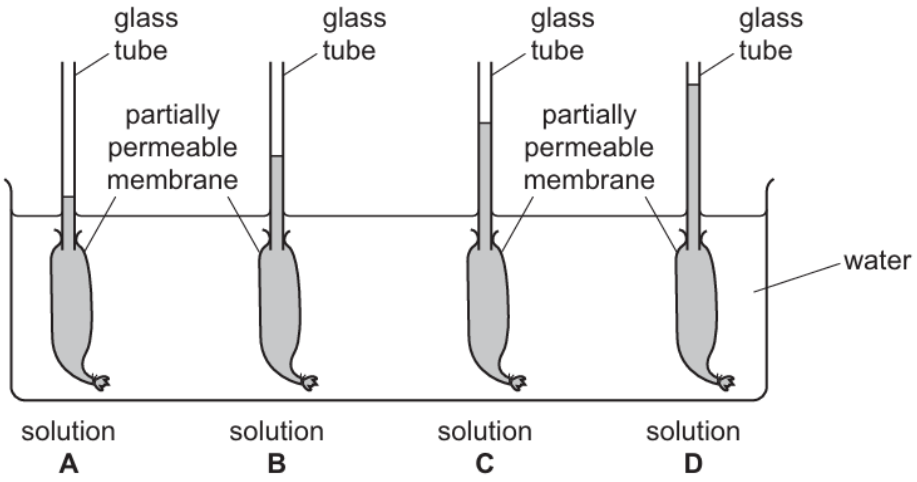
D The pressure of water outside the cells presses outwards on the cell walls.

3 The diagram shows apparatus used to investigate osmosis.

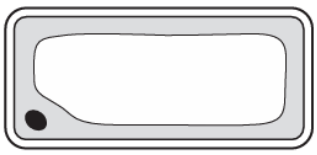
The volumes of solutions **A**, **B**, **C** and **D** were the same at the start of the investigation.

After one hour, the solutions had moved up the glass tubes.

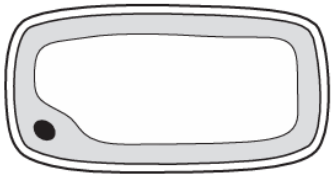
Which solution was the most concentrated at the start of the investigation?



4 The diagrams show how a cell appears under the microscope at the start of an experiment and after it has been placed in a dilute solution of salts for 5 minutes.



start of the experiment



after placing in a dilute solution of salts

Which statement explains what happens?

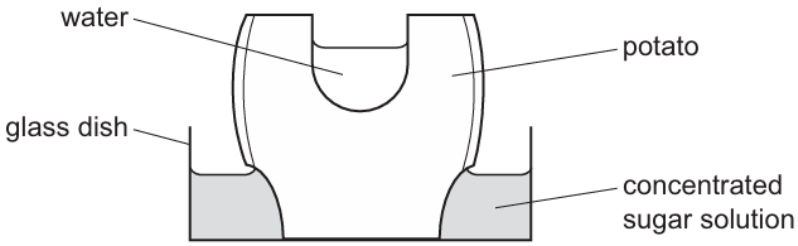
A Dissolved salts enter the cell by diffusion.

B Dissolved salts leave the cell by diffusion.

C Water enters the cell by osmosis.

D Water leaves the cell by osmosis.

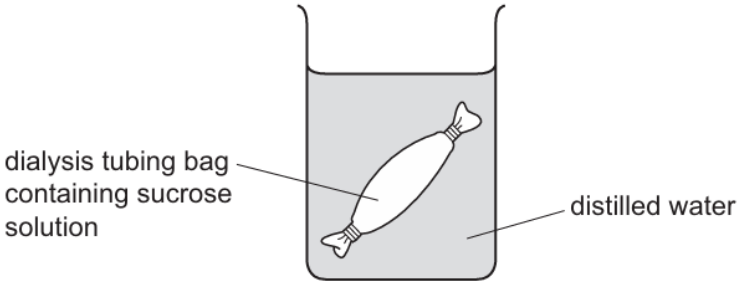
5 The diagram shows an experiment to investigate osmosis in living cells.



What happens to the volumes of water and sugar solution after 12 hours?

	volume of water	volume of sugar solution
A	decreases	increases
B	increases	increases
C	increases	remains the same
D	remains the same	decreases

6 The diagram shows some of the apparatus used in an osmosis investigation.



In this investigation a dialysis tubing bag was filled with sucrose solution, sealed and weighed.

The dialysis tubing bag was then immersed in distilled water for one hour.

After one hour the dialysis tubing bag was removed from the beaker, the surface was dried and the bag was reweighed.

Which row explains what will happen during the investigation?

	mass of the dialysis tubing bag at the end of the investigation	net movement of sucrose molecules	net movement of water molecules
A	decreased	none	out of the bag
B	decreased	into the bag	out of the bag
C	increased	none	into the bag
D	increased	out of the bag	into the bag

7 What is a role of water in digestion?

A It is an enzyme.

B It is a solvent.

C It is soluble.

D It is a mineral.

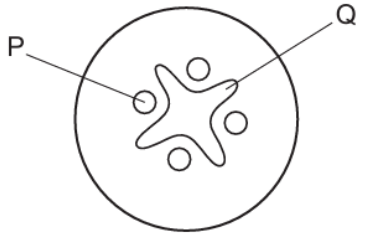
8 Potato cylinders were put into different concentrations of sucrose solution for the same amount of time. The masses of the potato cylinders were measured before and after being immersed in the solutions.

The results are recorded in the table.

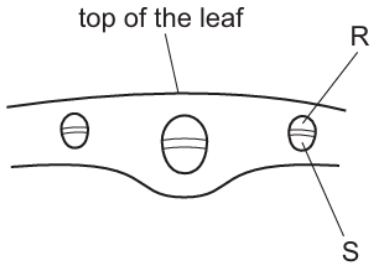
Which potato cylinder was put into the solution with the highest sucrose concentration?

	mass before immersion / g	mass after immersion / g	percentage change in mass
A	1.95	1.92	–1.5
B	2.05	1.95	–4.9
C	2.10	2.13	+1.4
D	2.25	2.20	–2.2

9 The roots of a plant were placed in a solution of red dye. After 24 hours, a section of root and a section of leaf were cut from the plant.



root



leaf

In which tissues will the red dye be visible?

A P and R **B** P and S **C** Q and R **D** Q and S

10 Which row shows features of osmosis in cells?

	requires a cell membrane	requires a cell wall	water can move into the cell	water can move out of the cell
A	✓	✓	✓	✓
B	✓	✗	✓	✓
C	✓	✓	✗	✓
D	✗	✓	✓	✗

key
✓ = yes
✗ = no

11 Which process could continue without energy from respiration?

A active transport

B growth

C osmosis

D protein synthesis

12 A cylinder of potato tissue was placed in a beaker of very salty water. After one hour the mass of the potato cylinder had decreased.

Why did this happen?

A Salt entered the plant tissue by active transport.

B Salt left the plant tissue by osmosis.

C Water entered the plant tissue by active transport.

D Water left the plant tissue by osmosis.

13 A cylinder of potato tissue was placed in a concentrated salt solution. After soaking for one hour the potato tissue was observed.

How will the potato tissue have changed after soaking for one hour?

A longer and firmer

B no change

C shorter and softer

D shorter and firmer

14 What are features of osmosis?

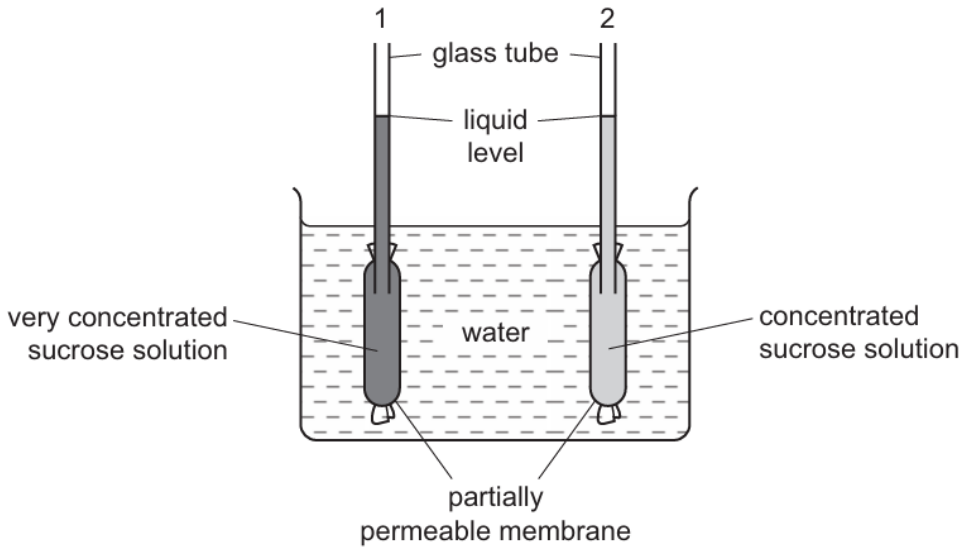
	diffusion is involved	requires cell walls	requires a partially permeable membrane
A	✓	✗	✓
B	✓	✗	✗
C	✗	✓	✓
D	✗	✓	✗

key

✓ = yes

✗ = no

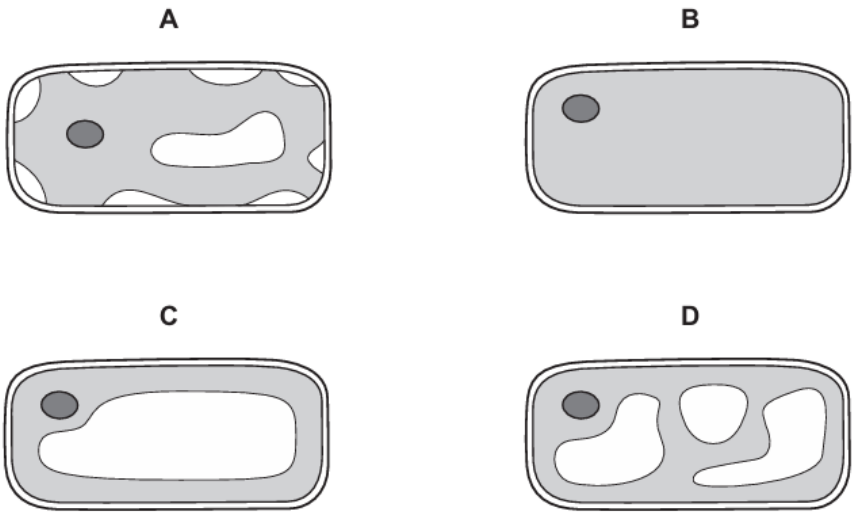
15 The diagram shows apparatus which can be used to demonstrate osmosis.



After one hour, what would happen to the liquid levels in the glass tubes?

	liquid level in tube 1	liquid level in tube 2
A	falls	falls
B	falls	rises
C	rises	falls
D	rises	rises

16 Which diagram shows the appearance of a plant cell several minutes after it has been placed in a concentrated solution of sugar?



17 Uncooked pieces of potato of identical size were placed in different liquids for one hour and then measured.

Which liquid will cause a decrease in the size of the piece of potato?

A pure water

B sugar solution less concentrated than the potato cell contents

C sugar solution more concentrated than the potato cell contents

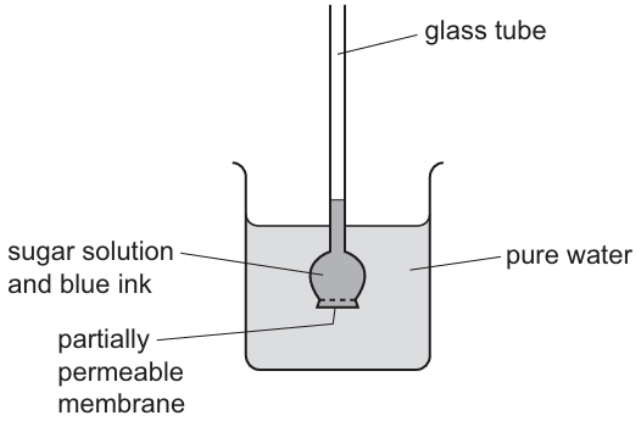
D sugar solution with the same concentration as the potato cell contents

18 Some pieces of potato were placed in a very concentrated sugar solution. Other pieces of potato were placed in distilled water.

What happened to the mass of the potato pieces in the two liquids?

	mass of the potato pieces in a very concentrated sugar solution	mass of the potato pieces in distilled water
A	decreased	decreased
B	decreased	increased
C	increased	decreased
D	increased	increased

19 The apparatus shown was set up.



Some hours later, the water in the beaker had turned blue, and the liquid in the glass tube had moved upwards.

Which processes caused these changes?

	water turned blue	liquid in glass tube moved upwards
A	osmosis	diffusion
B	active transport	osmosis
C	diffusion	active transport
D	diffusion	osmosis

20 Which process describes osmosis?

A diffusion of water through a cell wall

B diffusion of water through a partially permeable membrane

C diffusion of water through the cell sap

D diffusion of water through the cytoplasm

Paper 2

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

21 Samples of plant cells from the same species are immersed in three different liquids. The low concentration sucrose solution has a higher water potential than the plant cell cytoplasm. The high concentration sucrose solution has a lower water potential than the plant cell cytoplasm.

What is the state of the cells in the different liquids? **(extended only)**

	distilled water	low concentration sucrose solution	high concentration sucrose solution
A	turgid	plasmolysed	flaccid
B	flaccid	turgid	plasmolysed
C	flaccid	plasmolysed	flaccid
D	turgid	turgid	plasmolysed

22 Some plant cells are placed in distilled water for 1 hour.

Which description of the condition of the plant cells after 1 hour is correct? **(extended only)**

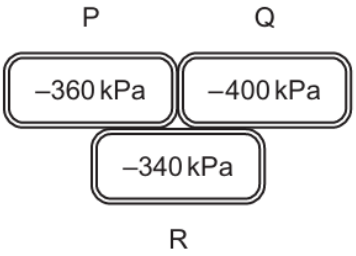
A burst

B flaccid

C plasmolysed

D turgid

23 The diagram shows the water potential of three plant cells. The more negative the value, the higher the solute concentration.



What is the immediate movement of water that will occur between the three cells? **(extended only)**

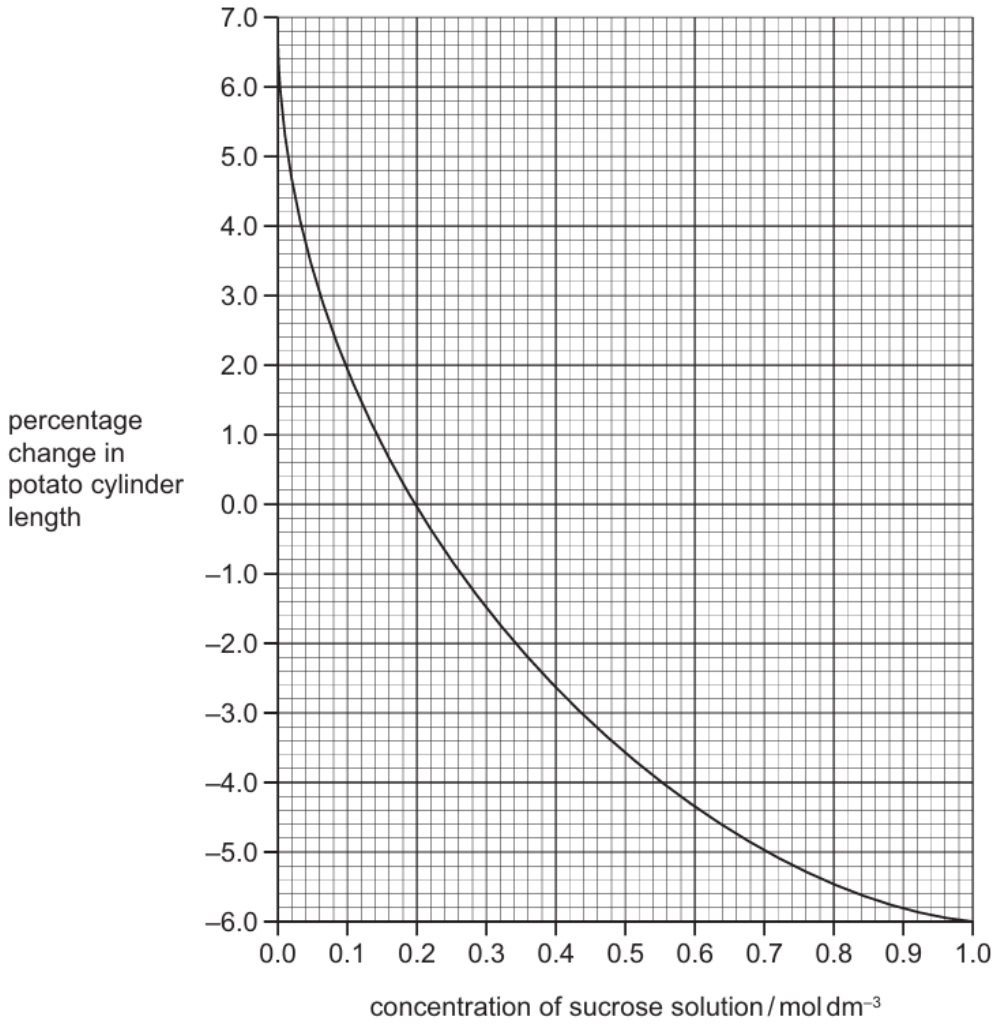
A from P to Q, and from R to P and Q

B from Q to P and R only

C from Q to P and R, and from P to R

D from R to Q only

24 Cylinders of potato tissue were left in different concentrations of sucrose solution for one hour. The graph shows the percentage change in the length of the potato cylinders after one hour.



What can be concluded about the cells of the potato cylinders that were left in 0.2 mol dm^{-3} sucrose solution? **(extended only)**

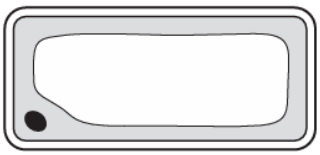
A The cells in the potato cylinders became flaccid.

B The cells in the potato cylinders became plasmolysed.

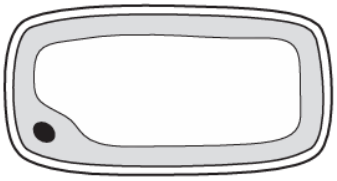
C The net movement of water into the potato cells was equal to the net movement of water out of the potato cells.

D The water potential of the potato cells was zero.

25 The diagrams show how a cell appears under the microscope at the start of an experiment and after it has been placed in a dilute solution of salts for 5 minutes.



start of the experiment



after placing in a dilute solution of salts

Which statement explains what happens?

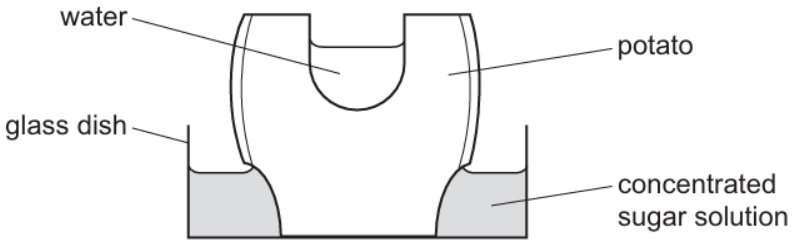
A Dissolved salts enter the cell by diffusion.

B Dissolved salts leave the cell by diffusion.

C Water enters the cell by osmosis.

D Water leaves the cell by osmosis.

26 The diagram shows an experiment to investigate osmosis in living cells.



What happens to the volumes of water and sugar solution after 12 hours?

	volume of water	volume of sugar solution
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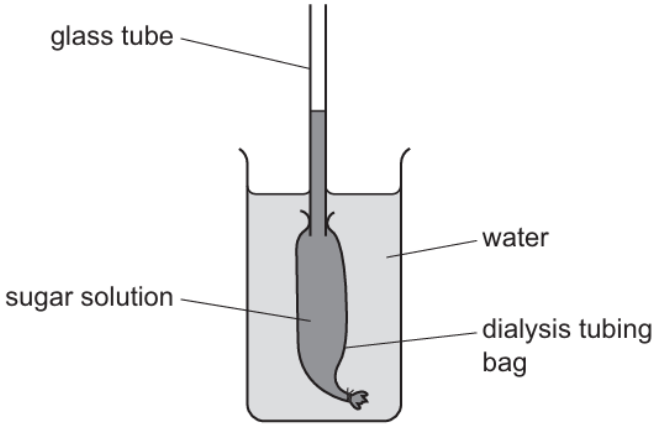
27 The diagram shows an experiment demonstrating osmosis using a dialysis tubing bag.

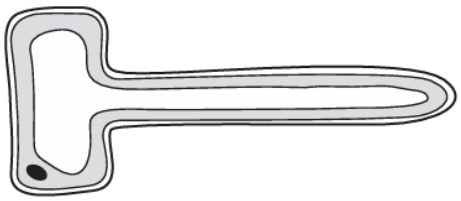


After 30 minutes, the level of the liquid in the glass tube goes .....1..... because the water had a .....2..... water potential than the sugar solution.

Which words correctly complete the statement? **(extended only)**

	1	2
A	down	lower
B	down	higher
C	up	lower
D	up	higher

28 The diagram shows a root hair cell.



When does water enter the cell by osmosis? **(extended only)**

A when the concentration of solutes outside the cell is greater than inside the cell

B when the concentration of solutes inside and outside the cell are equal

C when the water potential inside the cell is higher than outside the cell

D when the water potential outside the cell is higher than inside the cell

29 Which statement about turgor pressure is correct? **(extended only)**

A It creates a pull in the xylem which allows water to move upwards.

B It allows sucrose and amino acids to travel upwards and downwards in the phloem.

C It is a pressure that is only found in cells containing chloroplasts.

D It is pressure that helps to provide support for plants.

30 What are features of osmosis?

	diffusion is involved	requires cell walls	requires a partially permeable membrane
A	✓	✗	✓
B	✓	✗	✗
C	✗	✓	✓
D	✗	✓	✗

key

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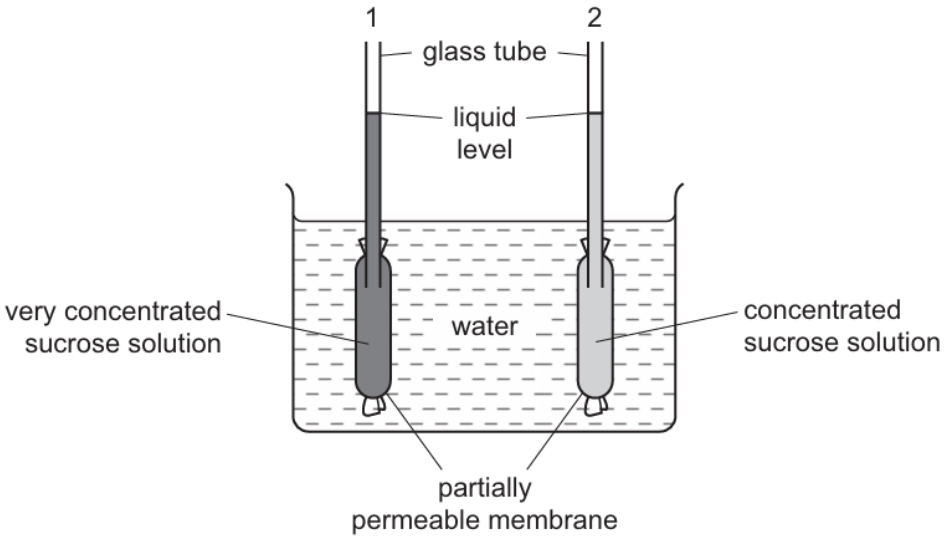

After one hour, what would happen to the liquid levels in the glass tubes?

	liquid level in tube 1	liquid level in tube 2
A	falls	falls
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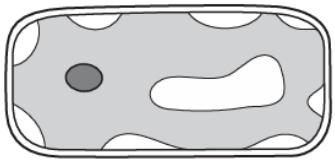
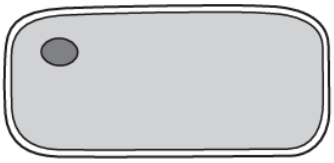
32 Which diagram shows the appearance of a plant cell several minutes after it has been placed in a concentrated solution of sugar?

A



B



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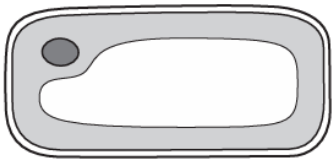
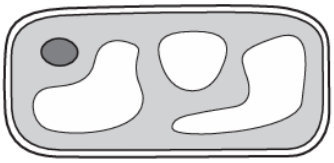


D



33 An uncooked piece of potato was placed in a solution. After two hours the size of the piece of potato had decreased.

Which row explains why this has happened and how the potato cells have changed? **(extended only)**

	water potential		potato cells become
	potato cells	external solution	
A	higher	lower	flaccid
B	higher	lower	turgid
C	lower	higher	flaccid
D	lower	higher	turgid

34 Which process describes osmosis?

A diffusion of water through a cell wall

B diffusion of water through a partially permeable membrane

C diffusion of water through the cell sap

D diffusion of water through the cytoplasm