Diffusion & Osmosis

Question Paper

Level	O Level
Subject	Biology
Exam Board	Cambridge International Examinations
Topic	Diffusion & Osmosis
Sub Topic	Diffusion & Osmosis
Booklet	Question Paper

Time Allowed: **52 minutes**

Score: **/43**

Percentage: **/100**

1 Which processes can **only** occur through a membrane?

	active transport	diffusion	osmosis
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✓

key
✓ = yes
✗ = no

2 What shows how the rate of transpiration changes when conditions in the atmosphere change?

	reduced wind	increased humidity
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

3 The cell wall of a plant cell is removed using an enzyme. What

would happen if this cell is then placed in distilled water?

A It would take longer for the cell to become turgid.

B Proteins in the cytoplasm would leave through the cell membrane.

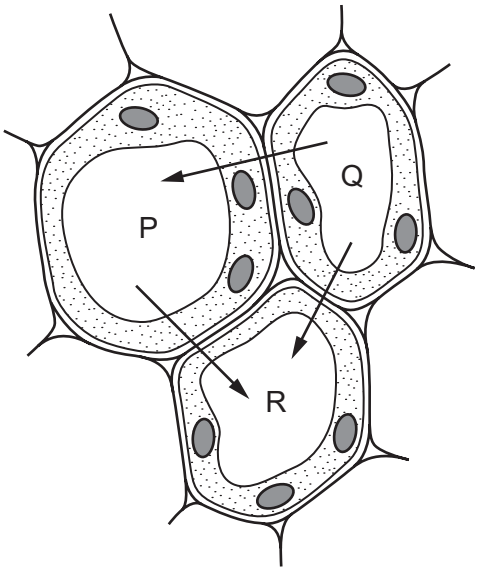
C The cell would become smaller as water passes out.

D The cell would burst as water moves into it.

4 Which processes are responsible for the uptake of ions from the soil by a plant and the uptake of glucose into the villi of a human?

	uptake of ions by a plant	uptake of glucose into the villi
A	active transport	active transport
B	active transport	osmosis
C	diffusion	osmosis
D	osmosis	active transport

5 The diagram shows three plant cells labelled P, Q and R. The arrows show the direction of water movement by osmosis.



What is the correct order of water potential in the cells, from the highest to the lowest?

	highest	middle	lowest
A	P	Q	R
B	P	R	Q
C	Q	P	R
D	R	P	Q

6 What describes the diffusion of molecules?

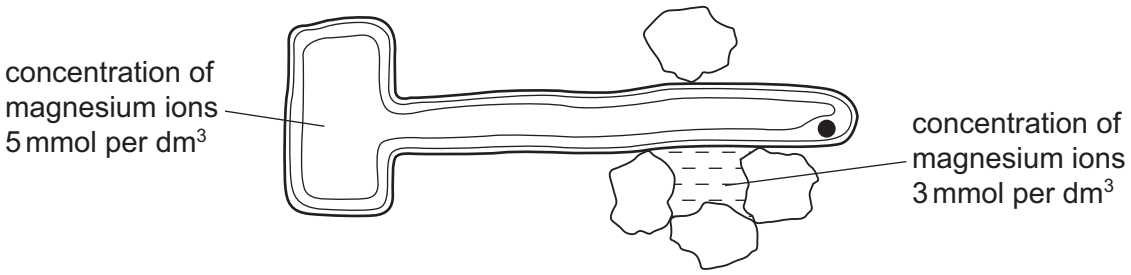
A movement from a region of their higher concentration to a region of their lower concentration down a concentration gradient

B movement from a region of their higher concentration to a region of their lower concentration up a concentration gradient

C movement from a region of their lower concentration to a region of their higher concentration down a concentration gradient

D movement from a region of their lower concentration to a region of their higher concentration up a concentration gradient

7 The diagram shows the concentration of magnesium ions in a healthy root hair cell of a plant and in the soil water surrounding it.



For the plant to remain healthy, how will the magnesium ions move?

A into the cell by active transport

B into the cell by diffusion

C out of the cell by active transport

D out of the cell by diffusion

8 How do plants absorb nitrate ions by active transport?

A against a concentration gradient using energy

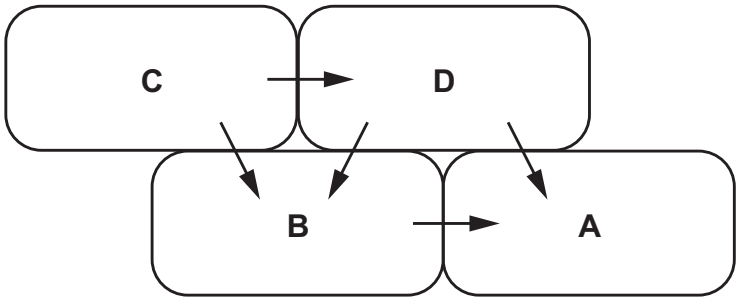
B against a concentration gradient without using energy

C down a concentration gradient using energy

D down a concentration gradient without using energy

9 The diagram shows the net movement of water by osmosis between four adjacent cells.

Which cell has the highest water potential?



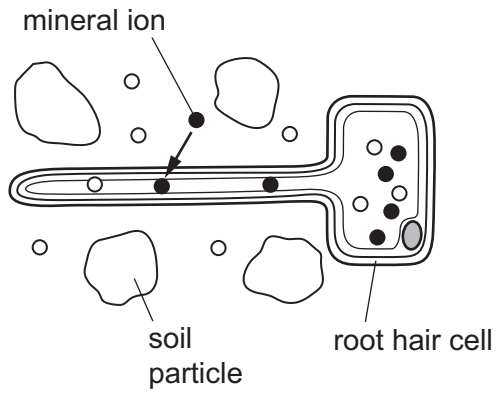
10 Plant cells are placed in a solution with a lower water potential than that of the cells.

Which row is correct?

	movement of water by osmosis	volume of vacuole
A	enters cells	decreases
B	enters cells	increases
C	leaves cells	decreases
D	leaves cells	increases

11 Which diagram illustrates the process of active transport?

A



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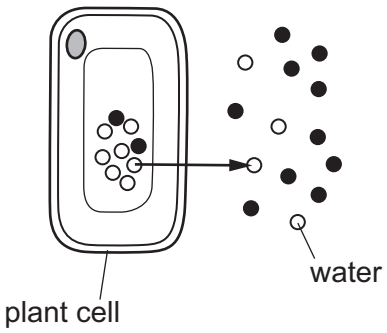

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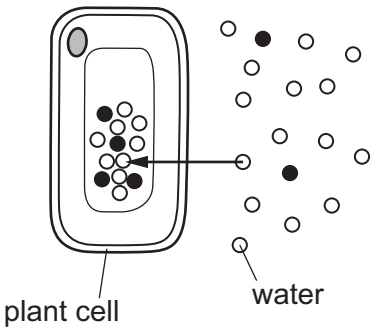

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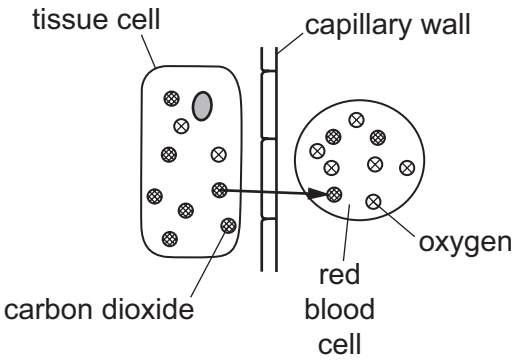


12 Which statement is always correct when oxygen is diffusing out of a plant cell?

A The concentration of carbon dioxide is higher inside the cell than outside.

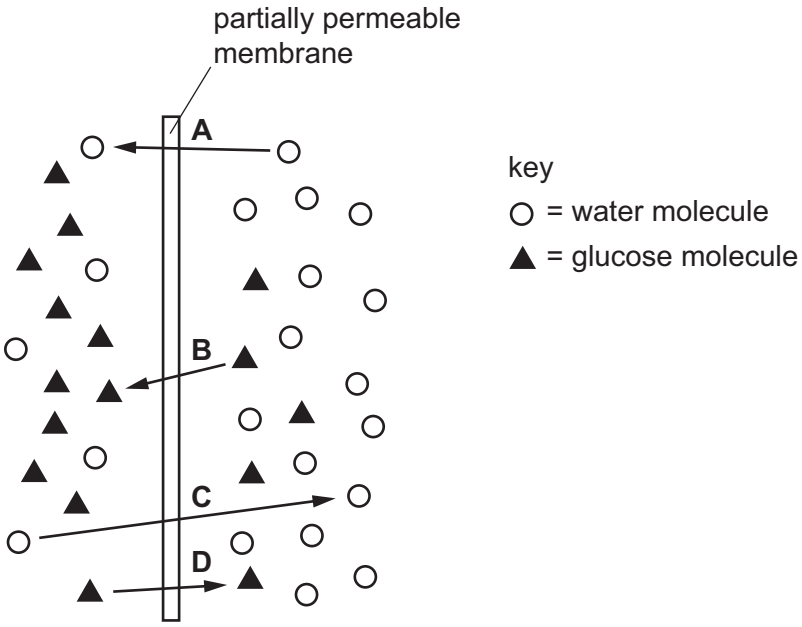
B The concentration of carbon dioxide is higher outside the cell than inside.

C The concentration of oxygen is higher inside the cell than outside.

D The concentration of oxygen is higher outside the cell than inside.

13 The diagram represents the passage of water molecules and glucose molecules across a partially permeable cell surface membrane.

Which arrow indicates osmosis?



14 What is an example of active transport?

A movement of glucose molecules into the cells of the villi

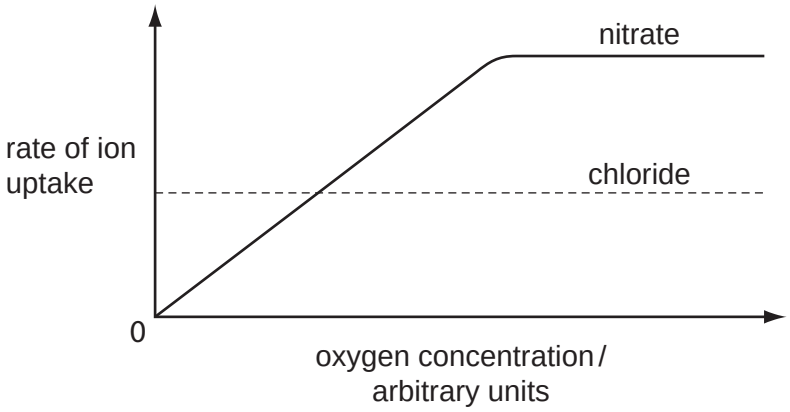
B movement of glucose molecules down a concentration gradient

C movement of ions in blood plasma

D movement of water in the transpiration stream

15 The roots of a plant are placed in a dilute solution containing chloride and nitrate ions.

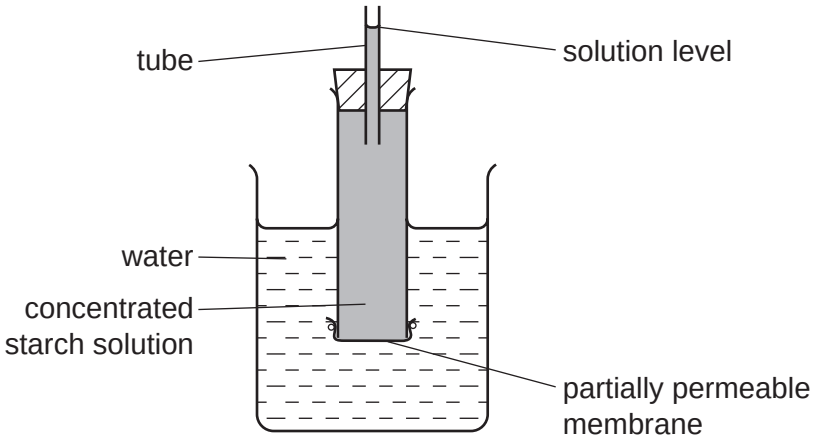
The graph shows how the rate of uptake of chloride and nitrate ions by the roots of the plant varies with oxygen concentration.



What can be concluded about how chloride and nitrate ions enter the roots?

	chloride	nitrate
A	active transport	active transport
B	active transport	diffusion
C	diffusion	active transport
D	diffusion	diffusion

16 The diagram represents apparatus used to investigate osmosis.



Which molecules will move across the partially permeable membrane and which change will occur in the solution level?

	molecules	solution level
A	starch	fall
B	starch	rise
C	water	fall
D	water	rise

17 The small intestine of a person contains a lower concentration of glucose than is present in the blood.

The cells of the villi absorb glucose.

By which process is the glucose absorbed?

A by active transport against the concentration gradient

B by active transport with the concentration gradient

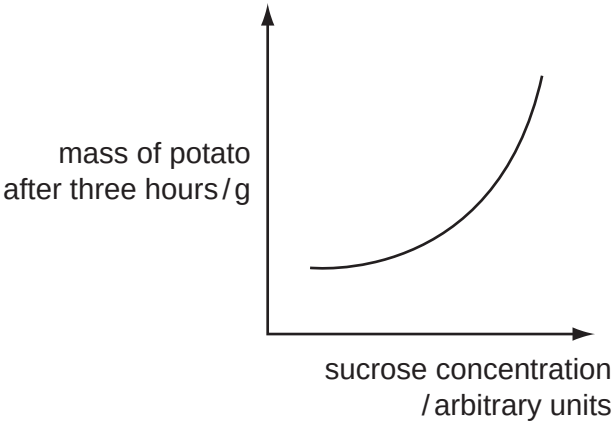
C by diffusion against the concentration gradient

D by diffusion with the concentration gradient

18 Identical pieces of potato are placed in sucrose solutions of different concentrations. After three hours, the mass of each potato piece is measured.

Which graph shows the results of this experiment?

A



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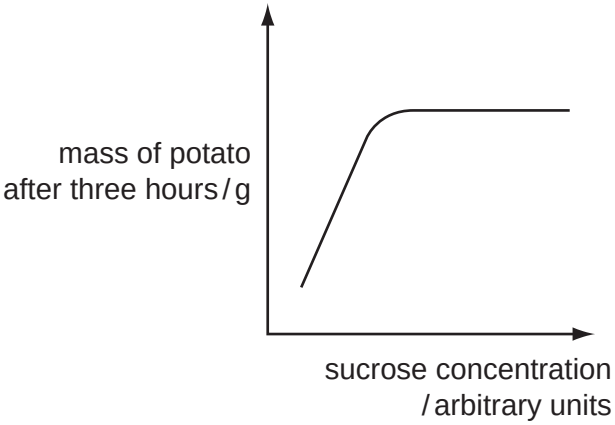

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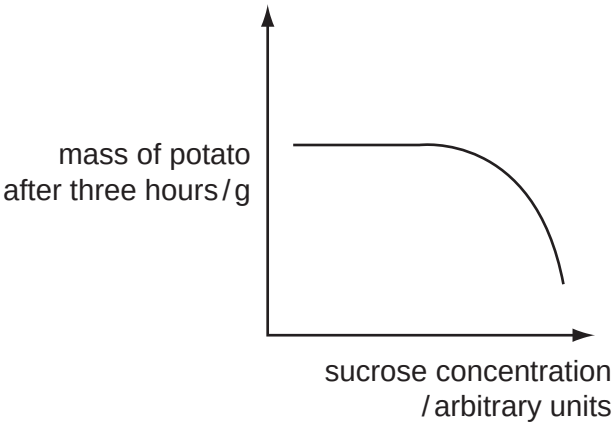
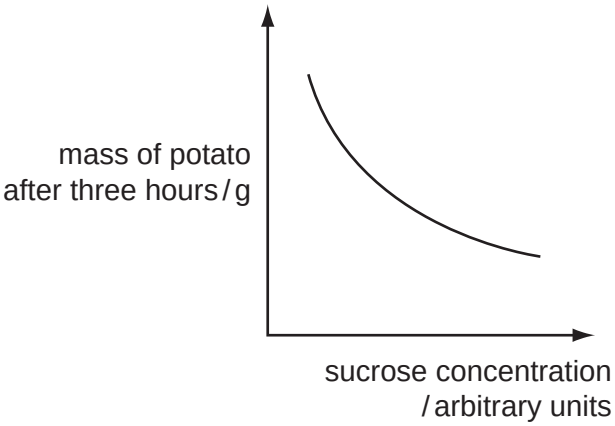
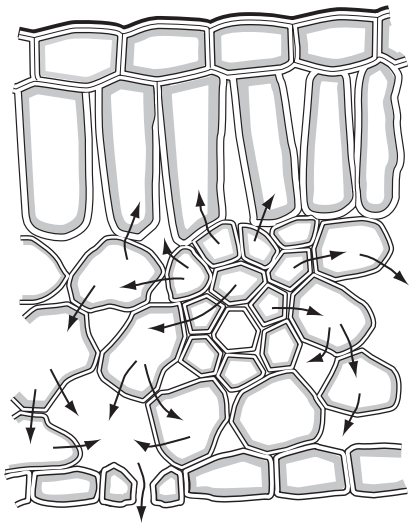


D



19 The diagram shows a section through a green leaf.



The arrows represent the movement of

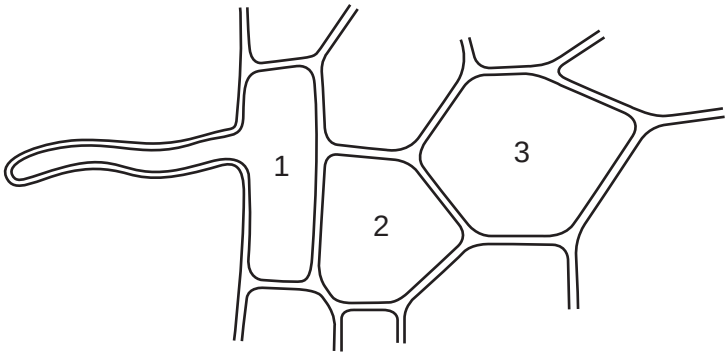
A carbon dioxide during respiration.

B oxygen during photosynthesis.

C sugars during translocation.

D water during transpiration.

20 The diagram shows some cells in the root of a plant that is absorbing water from the soil.



How does the water potential of the cell marked 2 differ from the water potentials of the cells marked 1 and 3?

A higher than cell 1 and cell 3

B higher than cell 1 and lower than cell 3

C lower than cell 1 and higher than cell 3

D lower than cell 1 and lower than cell 3

21 In the human circulatory system, what causes the transfer of materials from the capillaries to the tissue fluid?

A active transport

B blood pressure

C capillarity

D osmosis

22 Below is a series of cell processes.

1 mineral ions entering root hair cells

2 glucose uptake by villus cells

3 water entering root hair cells

Which of these involve active transport?

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

23 Which process does **not** depend on respiration?

A active uptake of ions

B conduction of nervous impulses

C diffusion of glucose

D muscle contraction

24 The sentence describes the uptake of water by a plant.

Water moves into the root hairs of a plant by osmosis through a .....1..... permeable cell membrane, ……2…… a water potential gradient.

Which words correctly complete gaps 1 and 2?

	1	2
A	fully	down
B	fully	up
C	partially	down
D	partially	up

25 Which process needs energy from respiration?

A movement of carbon dioxide into the alveoli

B movement of oxygen into red blood cells

C uptake of glucose by cells in the villi

D uptake of water by root hair cells

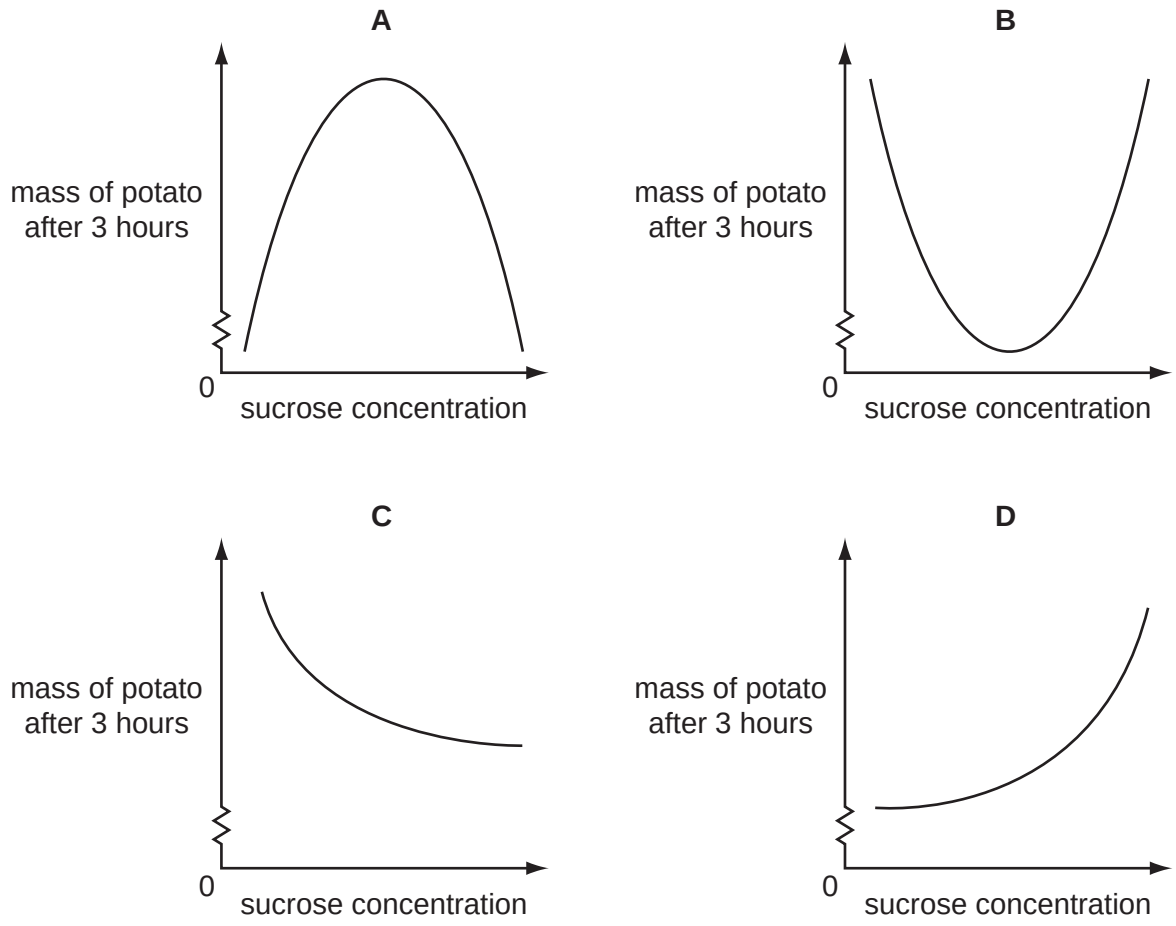
26 The mass of a cube of fresh potato is found. It is then placed in a test-tube containing a dilute solution of sucrose. After an hour, its mass has increased.

Which process has occurred and what has happened to the concentration of the sucrose in the solution in the test-tube?

	process	sucrose concentration
A	active transport	decreased
B	active transport	increased
C	osmosis	decreased
D	osmosis	increased

27 Identical pieces of potato are placed in sucrose solutions of different concentrations. After three hours, the mass of each potato piece is measured.

Which graph shows the results of this experiment?



28 Which of these processes require energy from respiration?

	diffusion	osmosis
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = energy required

✗ = energy not required

29 Four identical pieces of potato are treated in two stages, as shown.

Which piece of potato will be largest after 2 hours?

	stage 1	stage 2
A	boiled in water for 10 minutes	placed in 10 % salt solution for 2 hours
B	boiled in water for 10 minutes	placed in distilled water for 2 hours
C	unboiled	placed in 10 % salt solution for 2 hours
D	unboiled	placed in distilled water for 2 hours

30 The table shows the concentrations of some mineral ions in the root hair of a plant and in the soil around it.

mineral ion	concentration in the root hair (arbitrary units)	concentration in the soil (arbitrary units)
magnesium	75	15
nitrate	126	47

How are these mineral ions absorbed from the soil by the plant?

	magnesium	nitrate
A	active transport	active transport
B	active transport	diffusion
C	diffusion	active transport
D	diffusion	diffusion

31 Where and how does carbon dioxide enter a plant?

	where	how
A	root hair cells	active uptake
B	root hair cells	diffusion
C	stomata	active uptake
D	stomata	diffusion

32 Diagram 1 shows an onion cell that has been placed in pure water.

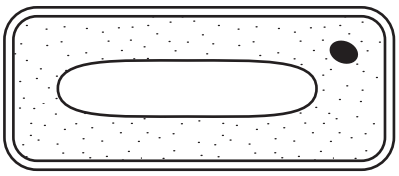


diagram 1

The cell is now placed in a concentrated sugar solution.

It changes to appear as in diagram 2.

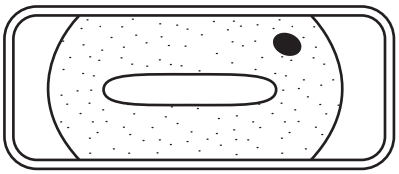


diagram 2

Which statement explains the change?

A Sugar has moved into the cell.

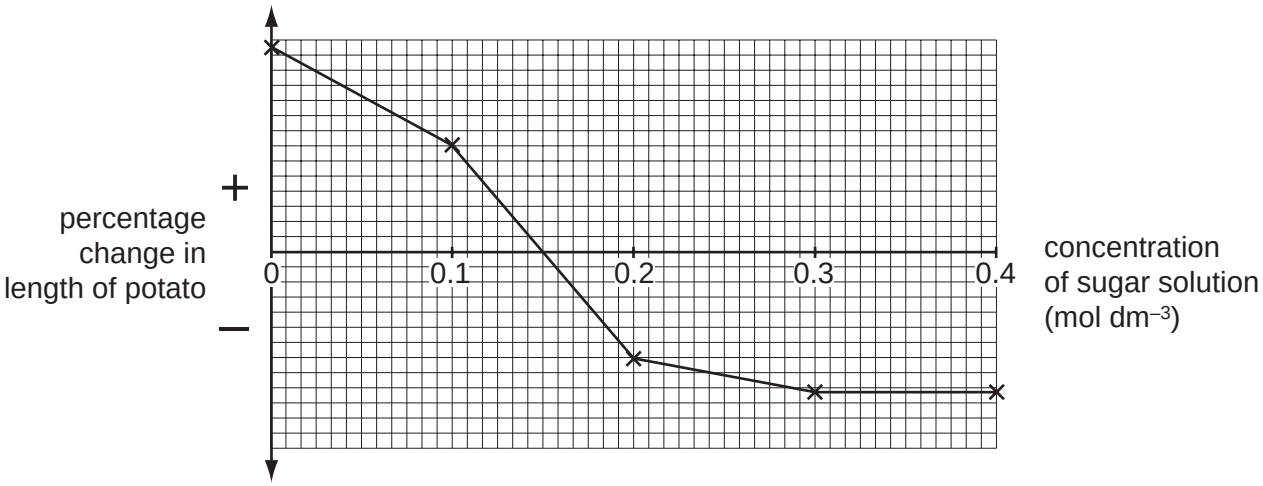
B Sugar has moved out of the cell.

C Water has moved into the cell.

D Water has moved out of the cell.

33 Five pieces are cut from a potato, all of equal size and shape. The pieces are then placed in sugar solutions of different concentrations. After four hours, the change in length of each potato piece is measured.

The results are shown in the graph.



Which concentration of sugar solution has approximately the same water concentration as the potato?

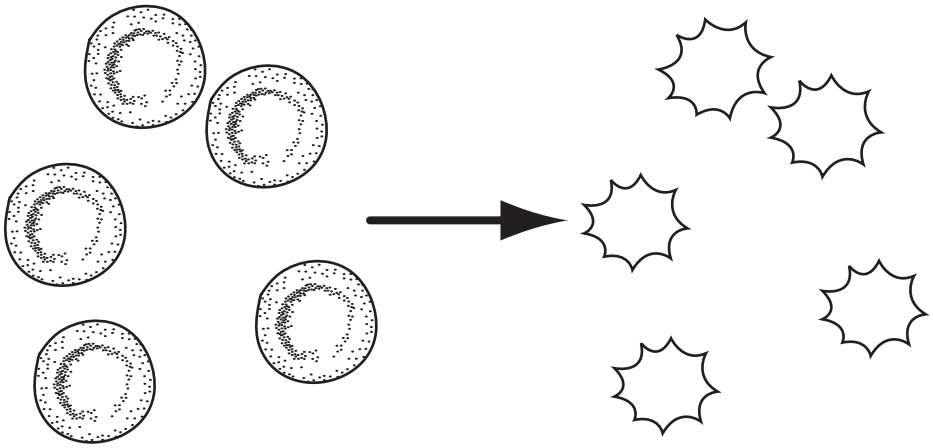
A 0.00 mol dm^{-3}

B 0.15 mol dm^{-3}

C 0.30 mol dm^{-3}

D 0.40 mol dm^{-3}

34 The diagram shows cells in fresh blood and the same cells after the blood has been mixed with liquid **X**.



fresh blood

blood after mixing with liquid **X**

Which statement describes the water potential of liquid **X**?

A It is equal to that of pure water.

B It is equal to that of the cell cytoplasm.

C It is higher than that of the cell cytoplasm.

D It is lower than that of the cell cytoplasm.

35 Which processes can take place in a root hair cell when oxygen is **not** available?

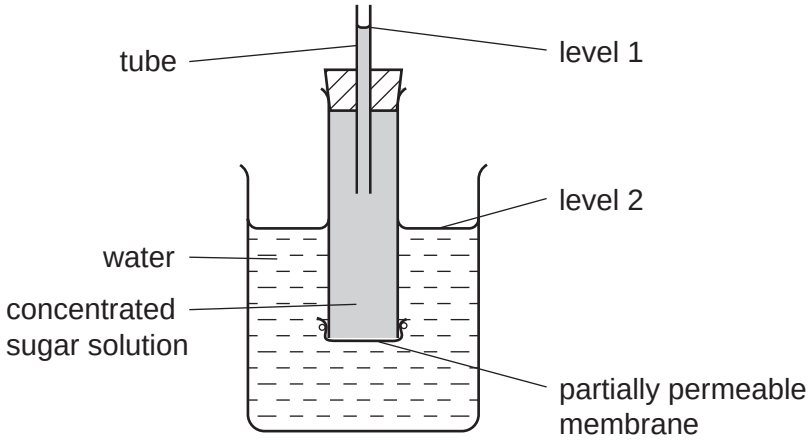
A active transport only

B diffusion only

C active transport and osmosis only

D diffusion and osmosis only

36 The diagram shows apparatus used to investigate osmosis.



Which molecules will move across the partially permeable membrane and which changes in levels will occur?

	molecules	level 1	level 2
A	sugar	fall	rise
B	water	fall	rise
C	sugar	rise	fall
D	water	rise	fall

37 What causes water to enter plant roots from the soil?

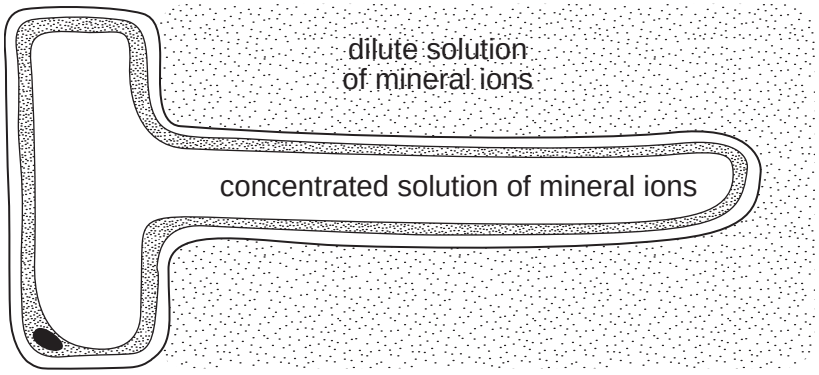
A Water potential in root hairs and the soil is equal.

B Water potential in root hairs and xylem is equal.

C Water potential in root hairs is higher than in the soil.

D Water potential in root hairs is lower than in the soil.

38 The diagram shows a root hair, surrounded by a dilute solution of mineral ions.



Which statement is correct?

A Water molecules move into the root hair because their concentration is lower inside.

B Water molecules move into the root hair because their concentration is lower outside.

C Water molecules move out of the root hair because their concentration is lower inside.

D Water molecules move out of the root hair because their concentration is lower outside.

39 Which process can involve active transport?

A carbon dioxide intake through stomata

B mineral ion intake through root hairs

C mineral ion transport through xylem vessels

D water leaving mesophyll cells

40 Which process, occurring in the human body, does **not** involve energy from respiration?

A contraction of heart muscle

B diffusion of oxygen from the alveoli into the blood

C digestion of bread

D maintaining a constant body temperature

41 A human red blood cell is placed in a strong salt solution.

In which direction does water move and what is the effect on the cell?

	movement of water	effect on cell
A	into the cell	slight increase in size
B	into the cell	cell bursts
C	out of the cell	slight decrease in size
D	out of the cell	no change in cell volume

42 Four strips are cut from a fresh potato. The length of each strip is measured. One strip is placed in water, the others in different concentrations of sugar solution.

After an hour, the strips are measured again. The results are shown in the table.

Which liquid is water?

liquid	original length of strip / mm	final length of strip / mm
A	75	75
B	78	85
C	82	80
D	86	87

43 The table shows the concentration of a substance inside and outside four different cells.

Which cell would need the most energy to absorb the substance by active transport?

cell	concentration (arbitrary units) inside cell	concentration (arbitrary units) outside cell
A	3	6
B	3	9
C	6	3
D	9	3