

4.2 Movement of Substances into & out of Cells

Question Paper

Course	CIEA Level Biology
Section	4. Cell Membranes & Transport
Topic	4.2 Movement of Substances into & out of Cells
Difficulty	Medium

Time allowed: 20
Score: /10
Percentage: /100

Question 1

A student places an animal cell and a plant cell into distilled water and notes down the following observations.

Animal cell: swells then bursts

Plant cell: swells

What is the reason for this difference?

- A. plant cell surface membranes are partially permeable
- B. animal cells have no vacuole
- C. animal cells have no cell wall
- D. plant cell walls are freely permeable

[1 mark]

Question 2

The water potential of sea water is approximately -2500 kPa. Halophytes are plants that are able to survive in regions where they are regularly exposed to sea water.

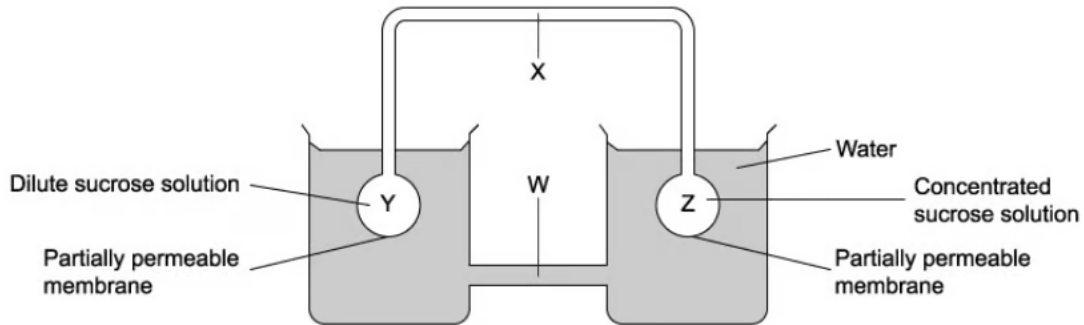
Which adaptation would you expect halophytes to have to enable them to live in this environment?

- A. root hair cells with a very high water potential
- B. leaves that have a large surface area and a thick cuticle
- C. root hair cells which accumulate salts and other solutes
- D. a high density of stomata that are open most of the time

[1 mark]

Question 3

A model to demonstrate the mass flow hypothesis of translocation is illustrated in the diagram.



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

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

[1 mark]

Question 4

An artificial partially permeable membrane called visking tubing can be used to demonstrate diffusion. The pores in the membrane are approximately 2.4 nm in diameter which allows glucose molecules to pass through.

Which of the following could pass through the pores?

- 1 haemoglobin
- 2 bacteria
- 3 glycogen
- 4 ribosomes

A. 1 and 4 only

B. 3 only

C. 2 and 3 only

D. none of these

[1 mark]

Question 5

Some viruses bind to the cell surface membrane before entering the host cell.

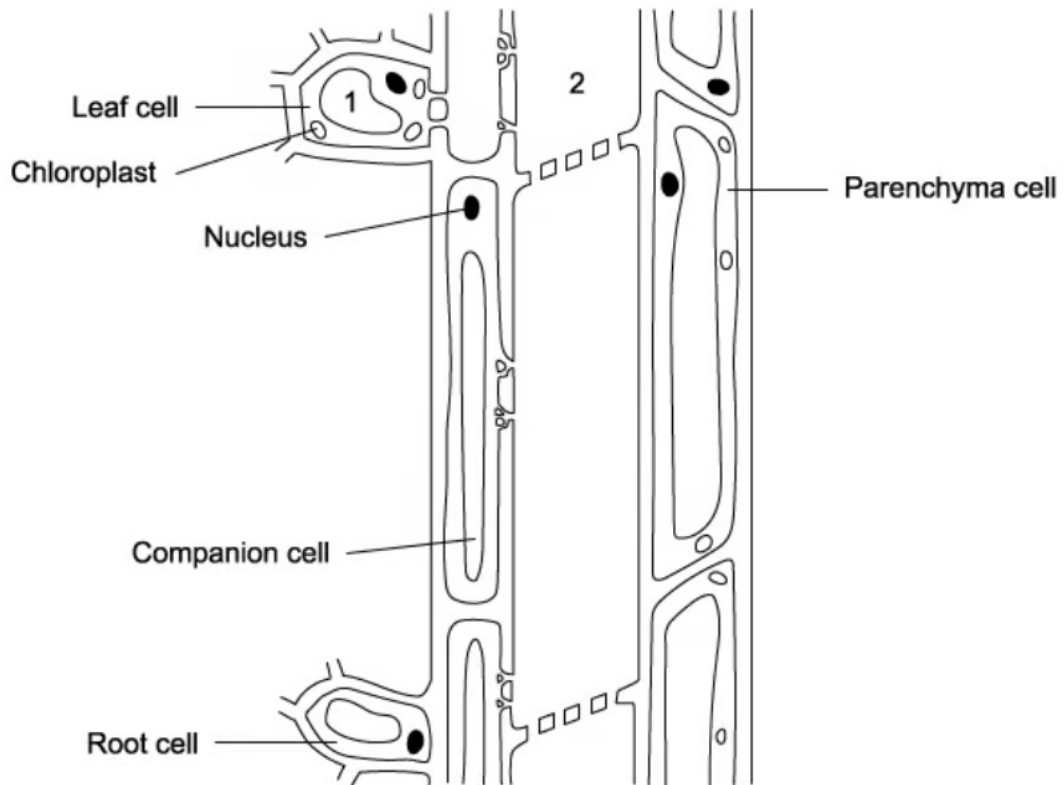
Which sequence of events results in a viral invasion of a cell?

- A. binding to the hydrophilic part of a phospholipid, followed by exocytosis
- B. binding to a glycoprotein receptor, followed by exocytosis
- C. binding to a protein receptor, followed by endocytosis
- D. binding to a cholesterol molecule, followed by endocytosis

[1 mark]

Question 6

The diagram represents the phloem pathway and adjacent cells from leaf to root in a plant.



What process is occurring between 1 to 2 and what is the effect on the water potential at 2?

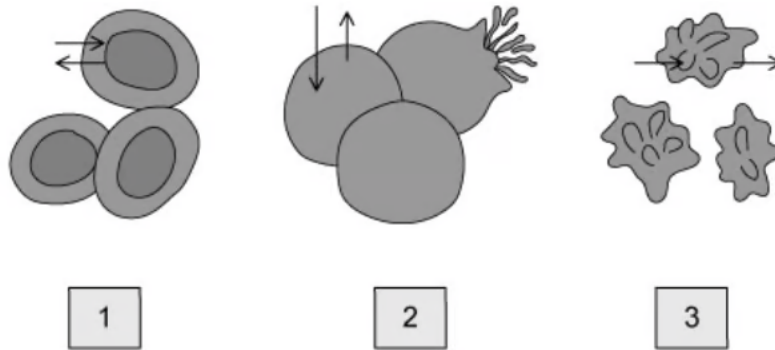
	process from 1 to 2	water potential at 2
A	active transport of sucrose	becomes less negative
B	active transport of sucrose	becomes more negative
C	diffusion of sucrose	becomes less negative
D	diffusion of sucrose	becomes more negative

A.

[1 mark]

Question 7

Diagrams 1, 2 and 3 show red blood cells in different states after each being submerged in a different solution.



What is the correct order of the water potential of each solution from lowest to highest?

- A. $1 < 2 < 3$
- B. $3 < 1 < 2$
- C. $2 < 3 < 1$
- D. $2 < 1 < 3$

[1 mark]

Question 8

Various factors affect the rate of diffusion of molecules.

Which conditions would result in the fastest rate of diffusion?

	difference in concentration (mmol dm^{-3})	temperature ($^{\circ}\text{C}$)	surface area : volumeratio	molecule
A	1	25	4	sodium
B	5	15	2	glucose
C	10	35	0.5	water
D	20	20	3	oxygen

[1 mark]

Question 9

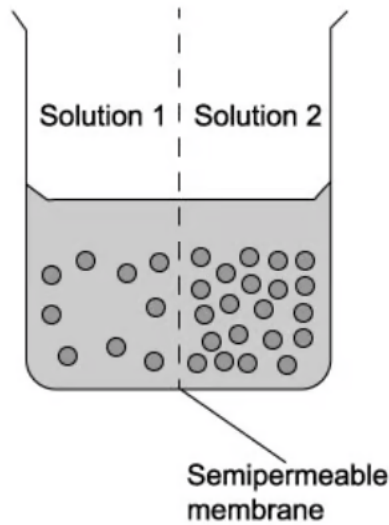
Which of the following membrane proteins does not undergo a conformational change to perform its function?

- A. voltage gated aquaporin
- B. sodium-glucose symporter
- C. ATP-ase proton pump
- D. potassium ion channel

[1 mark]

Question 10

Two solutions are separated by a partially permeable membrane. The two solutions have a different concentration of glucose (black dots).



Which of the following best describes what will happen to the amount of glucose, volume of water and concentration of solution?

	Solution	Amount of glucose	Volume of Water	Concentration
A	1	remains constant	decreases	increases
	2	remains constant	increases	decreases
B	1	increases	remains constant	increases
	2	decreases	remains constant	decreases
C	1	remains constant	increases	decreases
	2	remains constant	decreases	increases
D	1	decreases	increases	remains constant
	2	increases	decreases	remains constant

- A.
- B.

[1 mark]