

1.3 Cells: Membrane Structure & Transport

Question Paper

Course	DP IB Biology
Section	1. Cell Biology
Topic	1.3 Cells: Membrane Structure & Transport
Difficulty	Medium

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

Question 1

The sentence below describes a cellular process and an associated eukaryotic cellular structure.

Cells which have a high rate of ...I... will have many ...II....

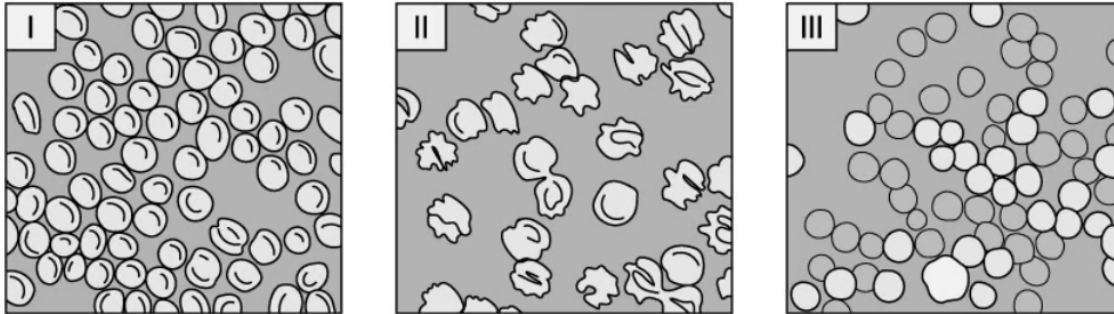
Select the terms that best fit the gaps in this sentence.

	I	II
A	Facilitated diffusion	Mitochondria
B	DNA replication	Lysosomes
C	Exocytosis	Vesicles
D	Phospholipid production	Ribosomes

[1 mark]

Question 2

The diagram below shows red blood cells that have been bathed in solutions of different solute concentration.



Which row of the table correctly describes the three solutions that these red blood cells have been bathed in?

	I	II	III
A	Same osmolarity (isotonic)	Higher osmolarity (hypotonic)	Lower osmolarity (hypertonic)
B	Same osmolarity (isotonic)	Higher osmolarity (hypertonic)	Lower osmolarity (hypotonic)
C	Same osmolarity (isotonic)	Lower osmolarity (hypotonic)	Higher osmolarity (hypertonic)
D	Higher osmolarity (hypertonic)	Lower osmolarity (hypotonic)	Same osmolarity (isotonic)

[1 mark]

Question 3

Which row correctly matches the molecules found in the cell surface membrane with their function?

	Influences membrane fluidity	Act as receptor sites for hormones	Bind to antibodies
A	Glycolipids and glycoproteins	Cholesterol	Proteins and glycolipids
B	Glycoproteins	Glycolipids and glycoproteins	Cholesterol
C	Cholesterol	Proteins and glycoproteins	Glycoproteins
D	Phospholipids and cholesterol	Proteins and glycolipids	Phospholipids and cholesterol

[1 mark]

Question 4

Cystic fibrosis causes a defect in the cell surface membrane of epithelial cells, disrupting the transport of chloride ions out of affected cells.

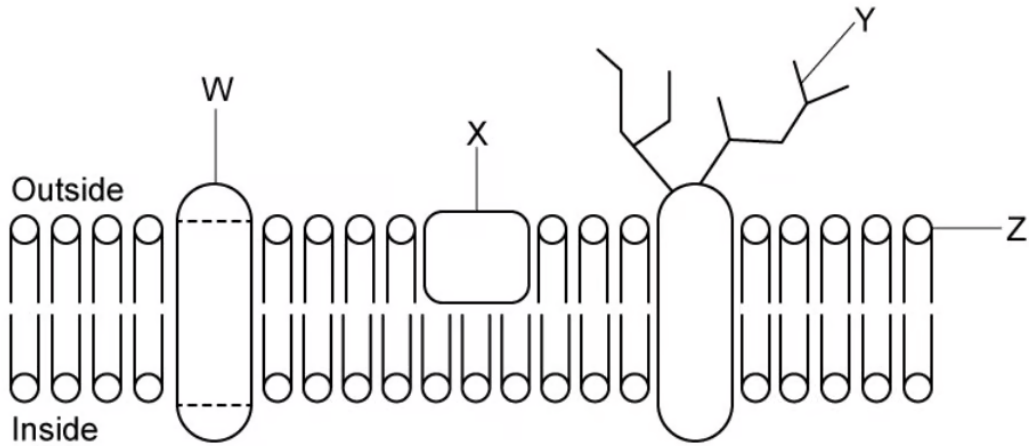
Which membrane component is affected?

- A** Cholesterol
- B** Proteins
- C** Glycolipids
- D** Phospholipids

[1 mark]

Question 5

A student sketches a section of a cell surface membrane to show the fluid mosaic model.



How would they correctly label their sketch?

	W	X	Y	Z
A	Integral protein	Peripheral protein	Phospholipid	Glycoprotein
B	Peripheral protein	Integral protein	Glycoprotein	Phospholipid
C	Glycoprotein	Peripheral protein	Integral protein	Phospholipid
D	Integral protein	Peripheral protein	Glycoprotein	Phospholipid

[1 mark]

Question 6

Select the table row that correctly completes the following sentence:

Cholesterol is a component of animal cell membranes. Most of a cholesterol molecule is ...I... . This means that cholesterol ...II... .

	I	II
A	...hydrophobic, so it is attracted to the hydrocarbon tails at the centre of the membrane.	...reduces the fluidity of the membrane and reduces its permeability to particles such as sodium ions and hydrogen ions.
B	...hydrophilic, so it is attracted to the hydrocarbon tails at the centre of the membrane.	...increases the fluidity of the membrane and reduces its permeability to particles such as sodium ions and hydrogen ions.
C	...hydrophobic, so it is attracted to the hydrocarbon tails at the centre of the membrane.	...reduces the fluidity of the membrane and increases its permeability to particles such as sodium ions and hydrogen ions.
D	...hydrophilic, so it is attracted to the phosphate heads on the periphery of the membrane.	...increases the fluidity of the membrane and increases its permeability to particles such as sodium ions and hydrogen ions.

[1 mark]

Question 7

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

Animal cell: swells and 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 8

Halophytes are plants that are able to survive in regions where they are regularly covered by salty seawater.

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

- A** Root hair cells with a low osmolarity.
- B** Cells with a high number of chloroplasts.
- C** Root hair cells which accumulate salts and other solutes.
- D** Cells with a low number of mitochondria.

[1 mark]

Question 9

The Davson-Danielli model of cell membrane structure stated that cell membranes consisted of a phospholipid bilayer sandwiched between two layers of protein.

Which piece of evidence contributed to the falsification of the Davson-Danielli model and the acceptance of the Singer-Nicolson fluid mosaic model?

- A** The presence and positioning of globular peripheral and integral proteins.
- B** The amphipathic properties of phospholipids.
- C** The presence of a hydrophobic region on the surface of the membrane.
- D** The orientation of the hydrophobic phospholipid tails away from the proteins.

[1 mark]

Question 10

What is the difference between simple diffusion and facilitated diffusion?

	Simple diffusion	Facilitated diffusion
A	Diffusion rate inversely proportional to concentration gradient	Diffusion rate proportional to concentration gradient
B	Never involves a membrane	Always involves a membrane
C	Occurs across any part of the membrane	Occurs via channels in the membrane
D	A passive process that does not require energy from ATP	An active process that requires energy from ATP

[1 mark]