

APOLLO

Membranes and membrane transport

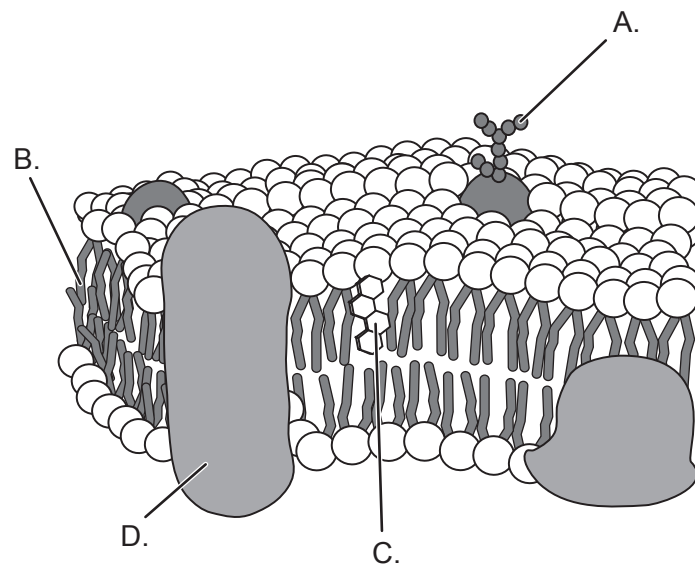
SL

Biology

First assessment 2025

10 questions | questions

9. Which part of the membrane allows cell recognition?



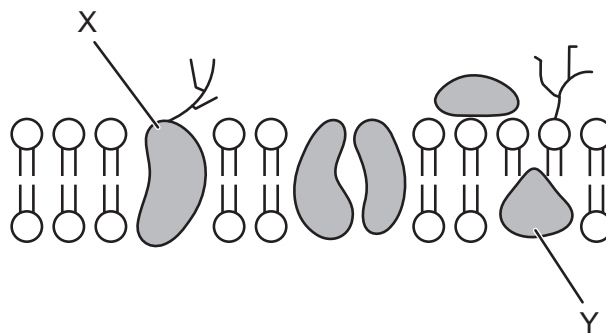
9. The table shows concentrations of potassium ions and sodium ions maintained inside and outside human cells.

Ions	Concentration of ions / $10^{-3} \text{ mol dm}^{-3}$	
	Intracellular	Extracellular
Potassium	135	4
Sodium	10	145

What explains these concentrations?

- A. Active transport using a protein pump
- B. Facilitated diffusion using a vesicle
- C. Simple diffusion using a protein channel
- D. Osmosis using an aquaporin

10. The diagram shows a portion of fluid mosaic membrane.



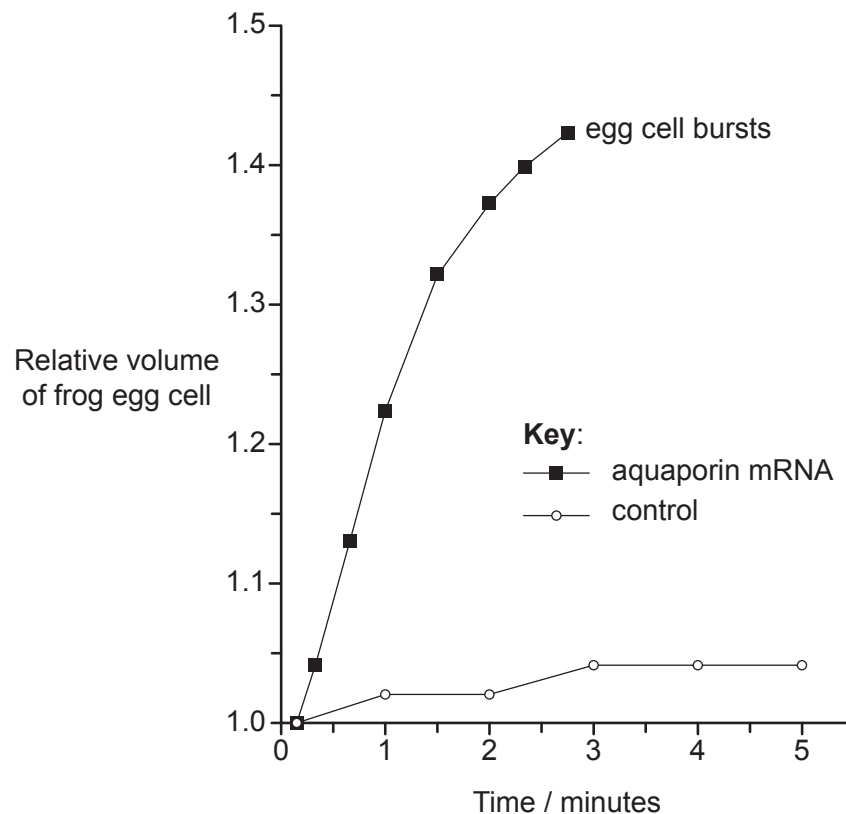
What are the membrane structures X and Y?

	X	Y
A.	glycoprotein	integral protein
B.	integral protein	peripheral protein
C.	channel protein	integral protein
D.	glycoprotein	peripheral protein

2. In the early 1990s, investigations involving egg cells from the African clawed frog (*Xenopus laevis*) led to the discovery of membrane channel proteins called aquaporins.

In one investigation, scientists injected 10 frog egg cells with a solution containing mRNA encoding for an aquaporin, and another 10 frog egg cells with distilled water (control cells). All the frog egg cells were then incubated in a hypotonic solution. The volume of the frog egg cells was then measured during a period of five minutes.

The graph shows the mean results of the investigation.



- (a) State the direction of net movement of water across the plasma membrane of all the frog egg cells between 0 and 3 minutes.

[1]

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- [2]

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- [1]

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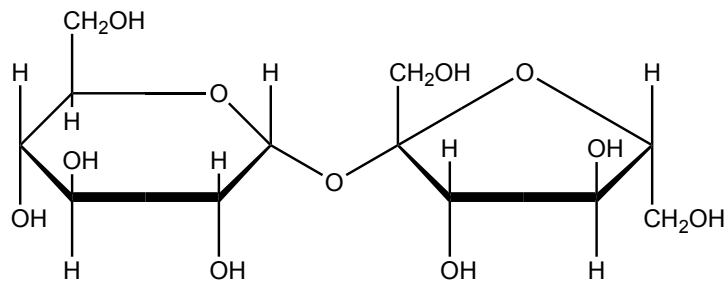


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Section A

Answer **all** questions. Answers must be written within the answer boxes provided.

4. The image shows the molecular structure of sucrose, which the body digests in order to absorb the monosaccharides glucose and fructose.



Sucrose

- (a) State the type of reaction that produces monosaccharides from disaccharides. [1]

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- (b) Describe how capillaries are adapted for exchange of monosaccharides. [2]

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- (c) Outline how fructose could be transported by facilitated diffusion across cell membranes. [2]

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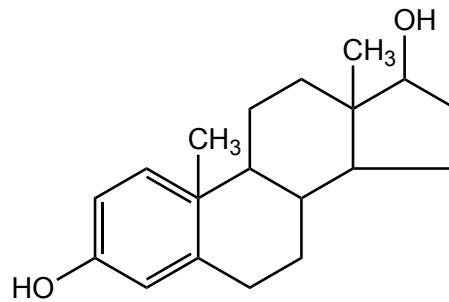


3. Which molecule is paired with the component of the cell membrane that allows it to pass through the membrane?

	Molecule	Component of the cell membrane
A.	insulin	aquaporin
B.	glycogen	channel protein
C.	oestradiol	phospholipid bilayer
D.	carbon dioxide	pump protein

9. Which type of protein uses energy from ATP to transfer particles across membranes against a concentration gradient?
- A. Glycoprotein
 - B. Pump protein
 - C. Aquaporin
 - D. Channel protein

2. Oestradiol is a steroid hormone.



How does oestradiol cross plasma membranes?

- A. It can move between phospholipids because it is non-polar.
- B. It can pass either between phospholipids or through channel proteins because it is amphipathic.
- C. It can only pass through hydrophilic pores as its polar ends can form H bonds.
- D. It must pass through channel proteins due to its large size.

Section A

Answer **all** questions. Answers must be written within the answer boxes provided.

3. Cell membranes have a fluid mosaic structure.

(a) Outline the reason the structure is described as a mosaic. [1]

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(b) Phospholipids are the most common molecules in cell membranes. Draw a diagram of the simplified structure of a phospholipid and label its amphipathic properties. [2]

(c) Explain how the rate of diffusion of oxygen into a cell is affected by the concentration of oxygen outside of the cell. [3]

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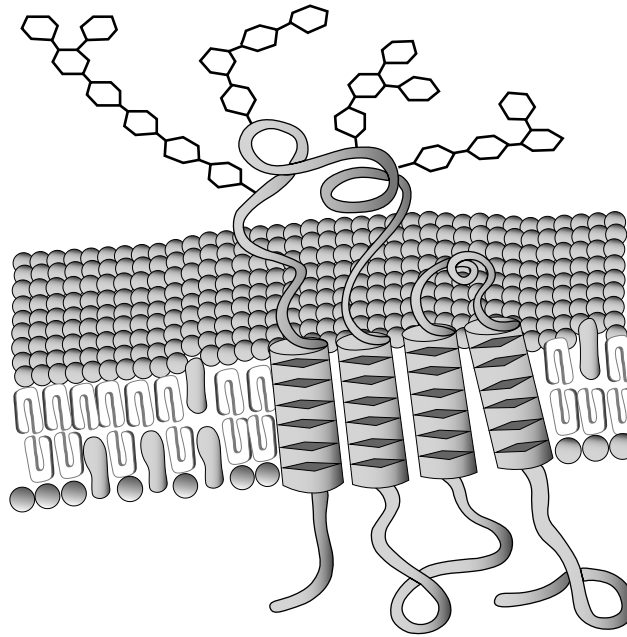
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will not be marked.



12. The image shows a glycoprotein embedded in the phospholipid bilayer of a cell membrane.



Which features of this glycoprotein can be deduced from the image?

- A. It is a peripheral protein that allows attachment to neighbouring cells.
- B. It is a channel protein that provides hydrophilic channels for carbohydrate transport.
- C. It is an integral protein that may be involved in cell recognition.
- D. It is a transport protein that increases the permeability of the membrane to glucose.