

Biological Membranes

Question Paper 4

Level	A Level
Subject	Biology
Exam Board	OCR
Module	Foundations in Biology
Topic	Biological Membranes
Booklet	Question Paper 4

Time allowed: 50 minutes

Score: /37

Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E
>69%	56%	50%	42%	34%	26%

Question 1

Cells require vitamins and minerals in order to function correctly. These vitamins and minerals need to cross the plasma membrane.

Vitamins are either fat soluble or water soluble. Vitamins A, D, E and K are fat soluble.

Which of the following combinations enter a cell by facilitated diffusion?

- A** vitamin A and calcium ions
- B** vitamin C and calcium atoms
- C** vitamin C and calcium ions
- D** vitamin A and calcium atoms

[1]



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Question 2

(a) Complete the passage below. [5]

Membranes have a variety of functions in cells. All membranes are permeable. This means that they allow the passage of certain substances by processes such as active transport or through the membrane. The cell surface membrane, also known as the membrane, surrounds the cytoplasm. The cell surface membrane consists of a bilayer of To stabilise the structure of the membrane and keep it fluid, molecules of are also found in this bilayer.

(b) Membranes contain a variety of proteins. Some of these proteins are combined with carbohydrates to form glycoproteins.

Describe the functions of glycoproteins in the cell surface membrane.



your answer you should use appropriate technical terms, spelt correctly.

[5]

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[Total: 10]

Question 3

Fig. 2.1 shows the structure of a plasma (cell surface) membrane.

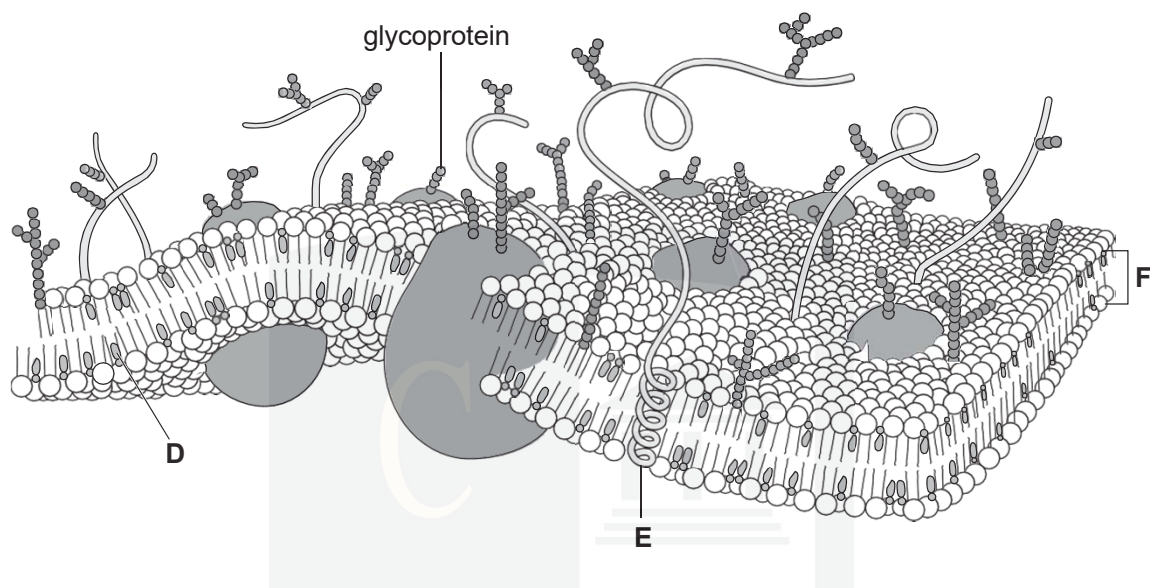


Fig. 2.1

- (a) (i) Name the components of the plasma (cell surface) membrane labelled **D**, **E** and **F**. [3]

D

E

F

- (ii) State **one** function for each of the components **D**, **E** and **F**. [3]

D

E

F

- (b) Glycoprotein molecules are positioned in the plasma (cell surface) membrane with the carbohydrate chain outside the cell.

This is to allow the glycoproteins to act as receptors in the process of cell signalling.

- (i) Explain what is meant by the term *cell signalling*. [2]

- (ii) Explain **how** a glycoprotein can act as a receptor. [2]

- (c) A student investigated the effect of temperature on the release of pigment from pieces of beetroot.

She cut a fresh beetroot into four pieces and placed each piece into water at a different temperature.

After 10 minutes she removed the beetroot and used a colorimeter to test how much pigment had entered the water.

She placed the coloured water into the colorimeter and measured the percentage transmission of light through the water. Her results are shown in Table 2.1.

Table 2.1

temperature of water (°C)	percentage transmission of light
10	85
30	87
50	78
100	0

- (i) The results show that below 50 °C little pigment had entered the water.

Explain why there was no transmission of light after the beetroot had been placed in water at 100 °C.

[2]

- (ii) Suggest **three** ways in which the student could have improved her investigation.

[3]

[Total: 15]

Question 4

Fig. 2.1 shows diagrams of four cells that have been placed in different solutions.

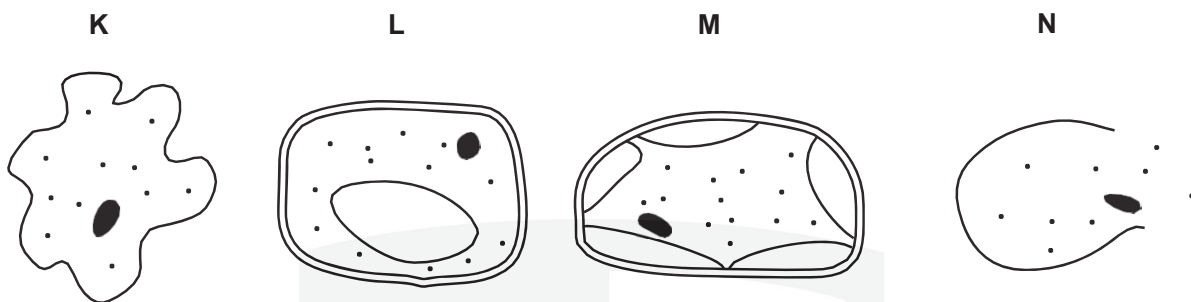


Fig. 2.1

(a) In the table below, write the letter **K**, **L**, **M** or **N** next to the description that best matches the diagram. One has been done for you.

[3]

description	letter
an animal cell that has been placed in distilled water	
an animal cell that has been placed in a concentrated sugar solution	
a plant cell that has been placed in distilled water	
a plant cell that has been placed in a concentrated sugar solution	M

(b) Explain, using the term **water potential**, what has happened to cell **M**.

[3]

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(c) Small non-polar substances enter cells in different ways to large or polar substances.

Outline the ways in which substances, **other than water**, can enter a cell through the plasma (cell surface) membrane. [5]



In your answer, you should use appropriate technical terms, spelt correctly.

small, non-polar substances

large substances

polar substances

[Total: 11]

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