

OCR AS GCE Biology (11 pages)

F211 Cells, Transport and Exchange

Exam questions from January 2009-June 2012

Topics:

1.1.2 Cell Membranes

Outline the roles of membranes within cells and at the surface of cells;
State that plasma (cell surface) membranes are partially permeable barriers;
Describe, with the aid of diagrams, the fluid mosaic model of membrane structure
Describe the roles of the components of the cell membrane; phospholipids, cholesterol, glycolipids, proteins and glycoproteins
Outline the effect of changing temperature on membrane structure and permeability;
Explain the term <i>cell signaling</i> ;
Explain the role of membrane-bound receptors as sites where hormones and drugs can bind;
Explain what is meant by <i>passive transport</i> (diffusion and facilitated diffusion including the role of membrane proteins), <i>active transport</i> , <i>endocytosis</i> and <i>exocytosis</i> ;
Explain what is meant by <i>osmosis</i> , in terms of water potential. (No calculations of waterpotential will be required);
Recognise and explain the effects that solutions of different water potentials can have upon plant and animal cells

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

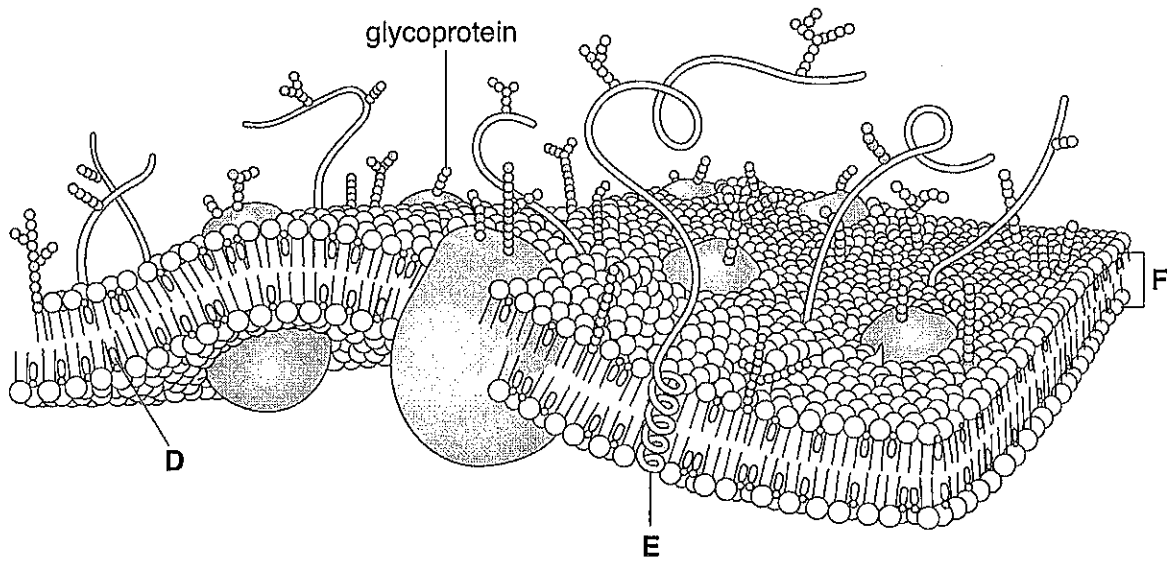


Fig. 2.1

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

- D**
- E**
- F** [3]

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

- D**
-
- E**
-
- F**
- [3]

- (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*.

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..... [2]

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

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..... [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.

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..... [2]

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

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2
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3
..... [3]

[Total: 15]

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

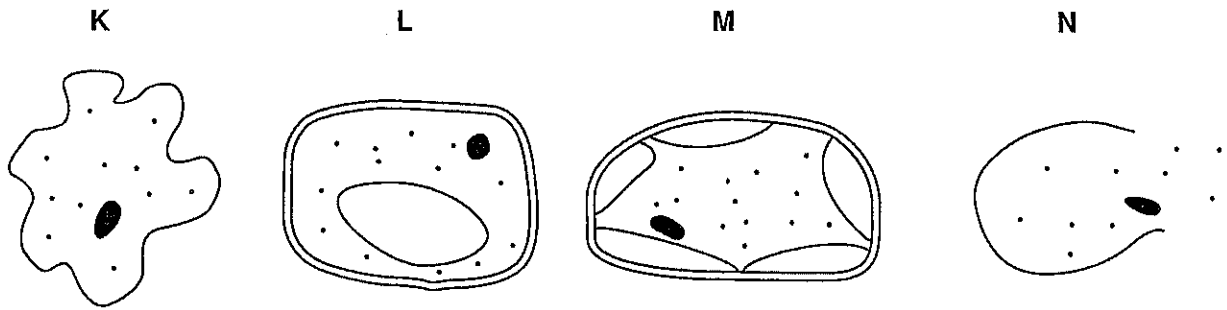


Fig. 2.1

(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.

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

[3]

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

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[3]

(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.



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

small, non-polar substances

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large substances

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polar substances

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[5]

[Total: 11]

2 The cell surface membrane allows different substances to enter and leave the cell.

(a) List **three** components of a cell surface membrane.

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..... [3]

(b) (i) Explain what is meant by the term *active transport*.

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..... [2]

(ii) State **two** examples of active transport in cells.

For each example, you should name the substance that is transported **and** the cell involved.

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..... [2]

(c) In addition to active transport, substances can pass through cell surface membranes by:

- diffusion
- facilitated diffusion
- osmosis
- bulk transport (endocytosis / exocytosis)

For each example described in Table 2.1 below, state how the substance crosses the cell surface membrane. The first one has been done for you.

Table 2.1

example	mechanism of movement across cell surface membrane
release of enzymes into the gut	bulk transport
a plant cell taking up water	
calcium ions entering a nerve cell down a concentration gradient	
oxygen entering a red blood cell	

[3]

[Total: 10]

- 4 (a) A student wanted to observe some red blood cells under the microscope. The student placed a small sample of blood onto a microscope slide and added a drop of distilled water. When viewed at high power, the student observed that the red blood cells had burst.

In a similar procedure using plant epidermis, the student observed that the plant cells did not burst.

- (i) Explain these observations.



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

..... [5]

- (ii) Suggest how the student could modify the procedure to observe red blood cells without them bursting.

..... [1]

(b) Oxygen enters red blood cells as they pass through the capillaries in the lungs.

Name the mechanism by which oxygen enters the red blood cells.

..... [1]

(c) The cells in the epidermis of a plant root are specialised to absorb minerals from the surrounding soil.

State the process by which root epidermal cells absorb minerals from the soil **and** describe how these cells are specialised to achieve absorption.

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..... [3]

[Total: 10]