15 What are the main roles of glycolipids in cell surface membranes?

1 to help cells to attach to each other to form tissues

2 to act as antigens for cell-to-cell recognition

3 to increase fluidity for the cell surface membrane

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

16 A sample of healthy plant cells taken from the same tissue is placed in a beaker containing distilled water.

The cells change in size.

What would explain this change in size?

A Water will leave the cells by active transport.

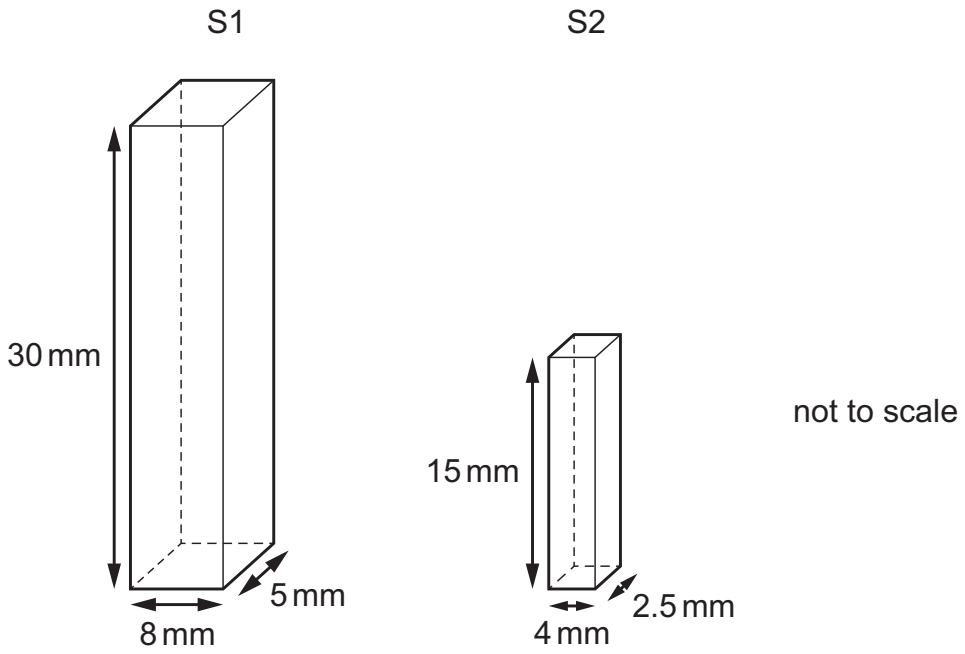
B Water will enter the cells by osmosis.

C Solutes will enter the cells by active transport.

D Solutes will leave the cells by osmosis.

17 A student studying surface area to volume ratio and diffusion made a cuboid, S1, using agar stained blue with a pH indicator. The dimensions of S1 are shown in the diagram.

The student made a second agar cuboid, S2. Each dimension of S2, (the length, the width and the height), was half that of S1.



The student placed each cuboid in a test-tube and covered it in acid. The time taken for each cuboid to completely change colour was recorded. All variables other than the size of the cuboids were standardised.

Which row shows the surface area to volume ratio of S1 and the time taken for S1 to change colour completely in acid compared to the time taken for S2 to change colour completely?

	surface area to volume ratio of S1	time taken for S1 to change colour completely in acid compared to S2
A	0.72 : 1	S1 takes less time than S2
B	0.72 : 1	S1 takes more time than S2
C	1.4 : 1	S1 takes less time than S2
D	1.4 : 1	S1 takes more time than S2

17 What can increase the fluidity of the cell surface membrane at low temperatures?

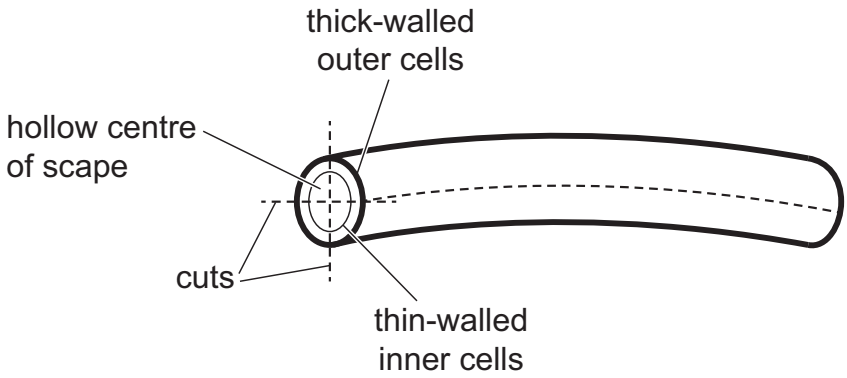
1 double bonds between carbon atoms in the fatty acid chains

2 cholesterol

3 fatty acids having shorter chains

A 1, 2 and 3 **B** 1 and 3 only **C** 1 only **D** 2 and 3 only

20 The stalk of a dandelion flower is a hollow tube called a scape. Pieces of the scape are cut as shown by the dotted lines and placed in sucrose solutions of different water potentials.



Which diagram shows the piece that is placed in the sucrose solution with the highest water potential?

A

B

C

D

1 Fig. 1.1 shows a diagram of the fluid mosaic model of the structure of the cell surface membrane.

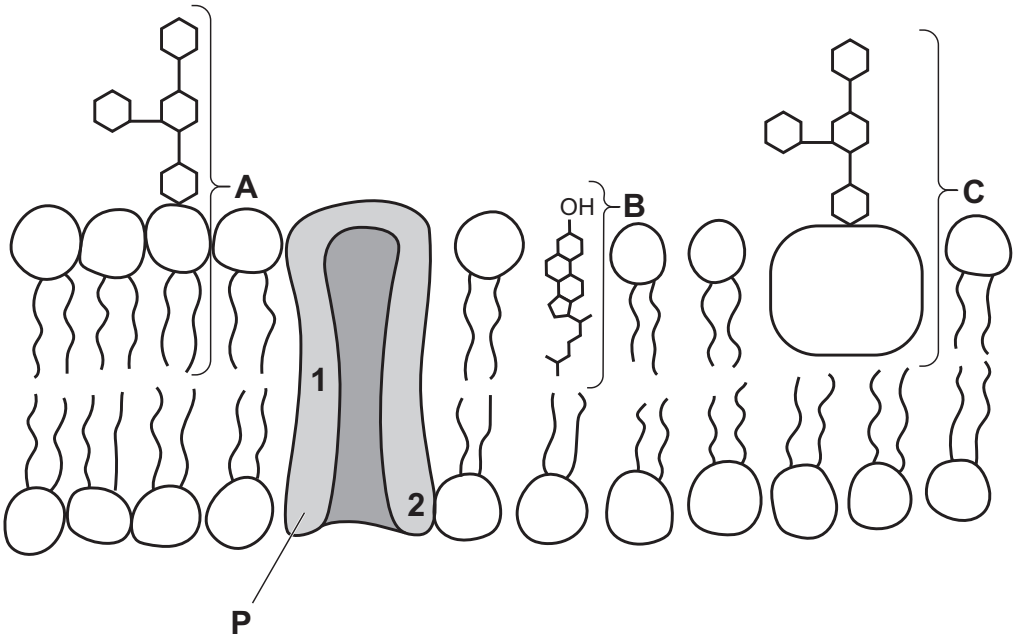


Fig. 1.1

(a) Name the structures labelled **A**, **B** and **C** in Fig. 1.1.

A .....

B .....

C .....

[3]

(b) Draw an arrow on Fig. 1.1 to show the movement of a molecule across the membrane into the cell by facilitated diffusion. [2]

(c) Explain how the fluidity of the membrane would change if the proportion of unsaturated fatty acids in the phospholipid bilayer increased.

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..... [3]

(d) The R-groups of amino acids give them different properties.

Suggest how the properties of the R-groups of the amino acids at position **1** of **P** may differ from the R-groups of the amino acids at position **2**.

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..... [1]

[Total: 9]

1 Dialysis tubing is a partially permeable membrane. Some molecules such as glucose molecules can diffuse through pores in the membrane.

You are required to investigate the diffusion of glucose through the pores in dialysis tubing using two different concentrations of glucose.

You are provided with the materials shown in Table 1.1.

Table 1.1

labelled	contents	hazard	volume / cm^3
R	20.0% glucose solution	low	20
S	10.0% glucose solution	low	20
G	1.0% glucose solution	low	30
W	distilled water	low	100
Benedict's	Benedict's solution	harmful irritant	20
D1	length of dialysis tubing in distilled water	low	–
D2	length of dialysis tubing in distilled water	low	–

If any solution comes into contact with your skin, wash off immediately with cold water. It is recommended that you wear suitable eye protection.

You will need to:

- put two different concentrations of glucose solution into dialysis tubing surrounded by water
- take a sample of the water surrounding the dialysis tubing
- test the sample for the presence of glucose.

Carry out step 1 to step 10.

step 1 Draw a mark 8 cm from the top of a large test-tube, as shown in Fig. 1.1.

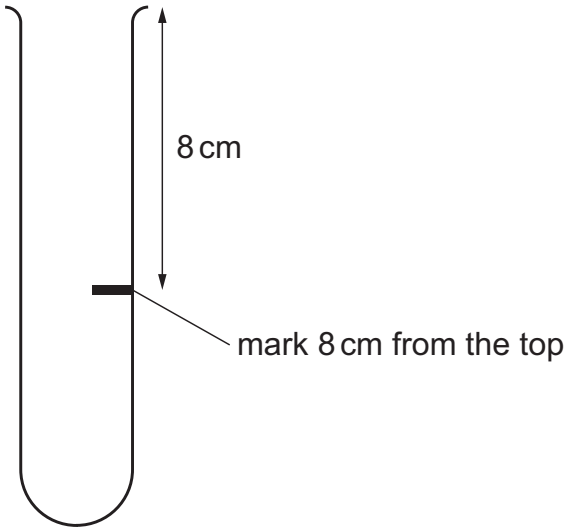

Fig. 1.1

step 2 Remove the dialysis tubing from beaker **D1**. Tie a knot in the dialysis tubing as close as possible to one end, so that the end is sealed.

step 3 The whole length of the dialysis tubing needs to be separated to allow the tubing to be filled with solution. To do this, rub the whole length of the dialysis tubing gently between your finger and thumb.

step 4 Put 10 cm^3 of 20.0% glucose solution, **R**, into the open end of the dialysis tubing.

step 5 Rinse the outside of the dialysis tubing by dipping it in the water in beaker **D1**.

step 6 Put the dialysis tubing containing **R** into the large test-tube and keep it in position using an elastic band as shown in Fig. 1.2.

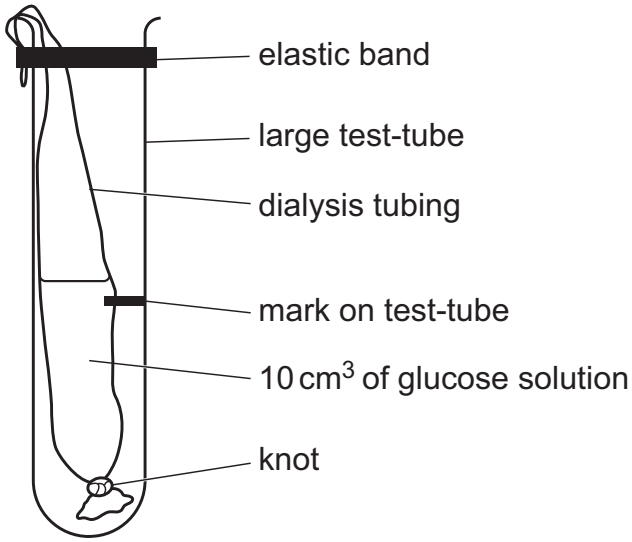

Fig. 1.2

step 7 Put distilled water into the large test-tube so that the top of the water is above the level of the glucose solution in the dialysis tubing.

step 8 Start timing and leave the dialysis tubing in the distilled water for 15 minutes.

step 9 Repeat step 1 to step 7 using the dialysis tubing in the container labelled **D2** and the 10.0% glucose solution, **S**, instead of **R**.

step 10 Start timing and leave the dialysis tubing in the distilled water for 15 minutes.

While you are waiting, continue with preparing the glucose standards.

Preparing glucose standards

You will need to carry out a **serial** dilution of the 1.0% glucose solution, **G**, to reduce the concentration by **half** between each successive dilution.

You will need to prepare **four** concentrations of glucose solution in addition to the 1.0% glucose solution, **G**.

After the serial dilution is completed, you will need to have 10 cm^3 of each concentration available to use.

(a) (i) Complete Fig. 1.3 to show how you will prepare your serial dilution.

Each beaker should have:

- a labelled arrow to show the volume of glucose solution transferred
- a labelled arrow to show the volume of distilled water, **W**, added
- a label under the beaker to show the concentration of glucose solution.

0 cm^3 of **W**