

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.

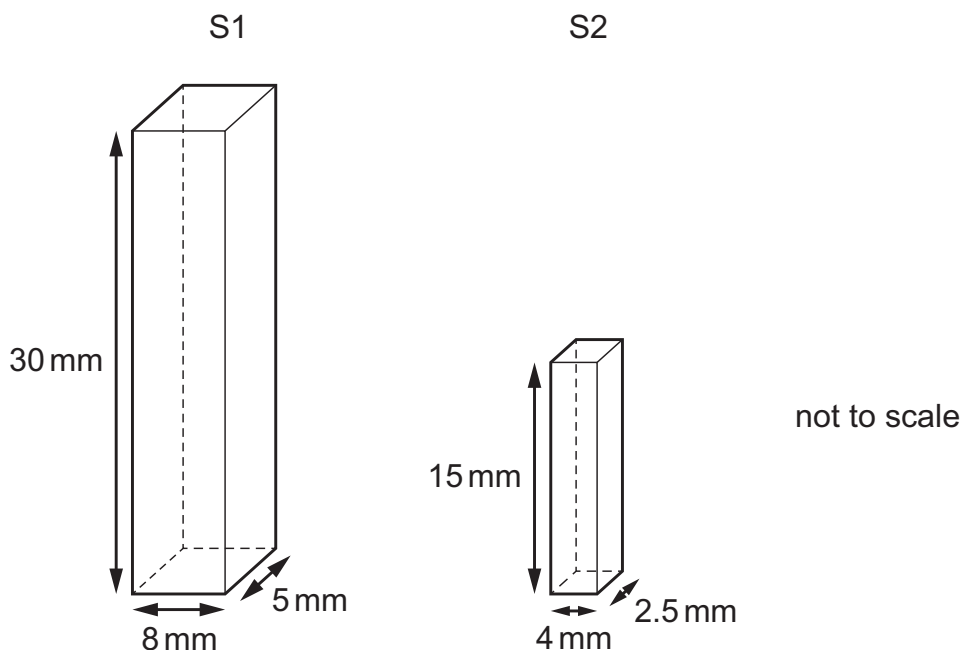
The cells change in size.

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

- 18** Two test-tubes, labelled X and Y, were set up containing equal volumes of solution X or solution Y respectively.

A large number of type P cells and a large number of type Q cells were added into test-tube X and also into test-tube Y.

After a few minutes, samples of the solutions were taken and the cells were observed with a microscope.

- In solution X, all of cell type P had burst and cell type Q had **not** burst.
- In solution Y, **no** cells had burst.

Which row correctly identifies cell type Q and solutions X and Y?

	cell type Q	solution X	solution Y
A	red blood cells	5% NaCl solution	distilled water
B	goblet cells	5% glucose solution	distilled water
C	liver cells	distilled water	5% glucose solution
D	root hair cells	distilled water	5% NaCl solution

- 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

- 18** Which statements about the proteins and glycoproteins in cell surface membranes are correct?

- 1 They can allow cells to bond together to form tissues.
- 2 They can recognise messenger molecules like hormones.
- 3 They can be antigens and allow cell-to-cell recognition.

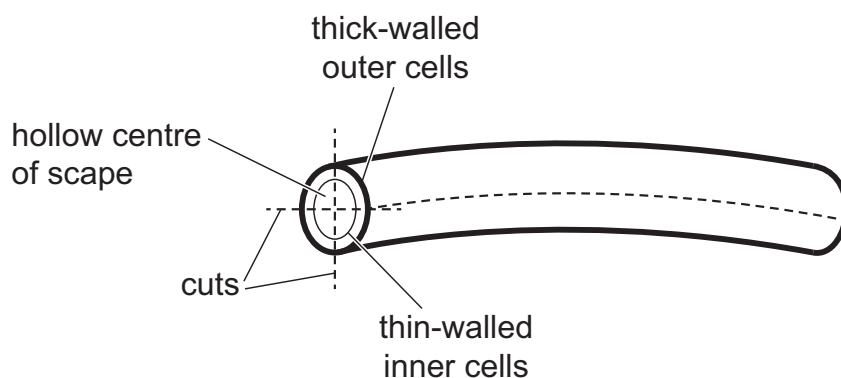
A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

- 19** In an experiment, four different-sized cubes of colourless agar were placed into a blue dye. The time taken for each cube to turn blue was recorded.

Which row shows the surface area and volume of the cube that took the longest time to turn completely blue?

	surface area /cm ²	volume /cm ³
A	6.0	1
B	9.5	2
C	12.5	3
D	38.0	16

- 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?



14 Which statement about phospholipids in the bilayer of a cell surface membrane is correct?

- A** The non-polar phosphate heads face outwards and the polar fatty acid tails face inwards.
- B** The polar phosphate heads face outwards and the non-polar fatty acid tails face inwards.
- C** The non-polar fatty acid tails face outwards and the polar phosphate heads face inwards.
- D** The polar fatty acid tails face outwards and the non-polar phosphate heads face inwards.

18 Proteins in the cell surface membranes of human cells and mouse cells were labelled with fluorescent dyes. The human cells were labelled with a red dye and the mouse cells were labelled with a green dye.

A human cell and a mouse cell were then fused to form a hybrid cell.

At first, the different dyes remained separate. After 40 minutes, the two dyes were evenly distributed in the hybrid cell surface membrane.

What explains this observation?

- A** All protein molecules in the cell surface membrane are fixed to structures within the cell, but phospholipid molecules move freely between them.
- B** Groups of protein and phospholipid molecules in the cell surface membrane are attached to each other and move together.
- C** Only protein molecules in the outer layer of the cell surface membrane can move freely between phospholipid molecules.
- D** Protein molecules in the outer layer of the cell surface membrane and those which span the bilayer can move freely between phospholipid molecules.