

Cambridge International AS & A Level

BIOLOGY (9700) P1

TOPIC WISE QUESTIONS + ANSWERS | COMPLETE SYLLABUS



Chapter 4

Cell membranes and transport

4.1 Fluid mosaic membranes

561. 9700_m20_qp_12 Q: 15

Which description of cell surface membrane permeability is correct?

- A** An increase in the concentration of cholesterol molecules in the cell surface membrane can increase its permeability to hydrophilic substances.
- B** Cell surface membrane permeability to large hydrophilic molecules is high and can be increased by membrane transport proteins involved in facilitated diffusion.
- C** The permeability of the cell surface membrane to ions increases as the proportion of saturated fatty acid chains in the phospholipids increases.
- D** Without the presence of carrier and channel membrane proteins, the cell surface membrane has a low permeability to large polar molecules.

562. 9700_s20_qp_11 Q: 14

A decrease in some factors will increase the fluidity of the cell surface membrane.

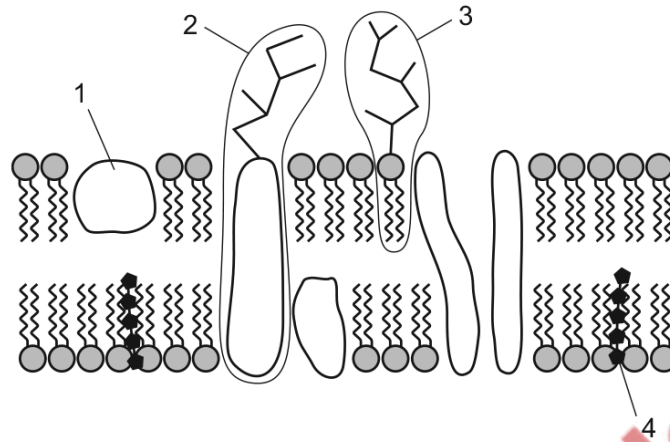
Which pair of factors, when decreased, will increase the fluidity of the cell surface membrane?

	a decrease in
A	<ul style="list-style-type: none">• distance between phospholipid molecules• proportion of short fatty acid chains
B	<ul style="list-style-type: none">• distance between phospholipid molecules• temperature
C	<ul style="list-style-type: none">• proportion of phospholipids with saturated fatty acid chains• proportion of long fatty acid chains
D	<ul style="list-style-type: none">• proportion of phospholipids with unsaturated fatty acid chains• temperature

563. 9700_s20_qp_12 Q: 15

The diagram shows the fluid mosaic model of membrane structure.

Structures 1, 2, 3 and 4 are types of molecule.



Which types of molecules are always identical?

- A** 1, 2 and 3 **B** 1 and 4 **C** 2 and 3 only **D** 4 only

564. 9700_s20_qp_12 Q: 16

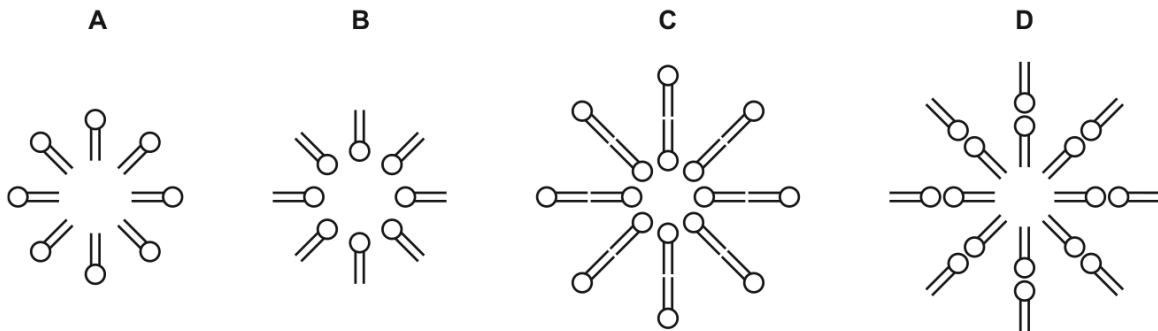
What is the role of G protein in cell signalling?

- A** to act as a membrane-bound enzyme
B to act as a switch releasing a second messenger
C to amplify the original signal
D to change the shape of the protein receptor

565. 9700_s20_qp_12 Q: 17

When a small quantity of phospholipid is added to a test-tube of water and then shaken vigorously, an emulsion is formed by small droplets called liposomes.

Which diagram shows the arrangement of phospholipid molecules in a cross-section of a liposome?



566. 9700_s20_qp_13 Q: 14

What describes the fluid-mosaic model of membrane structure?

- A** Cholesterol makes the membrane more fluid.
 - B** Fluids can cross the membrane by diffusion or osmosis.
 - C** Proteins act as receptors for cell signalling.
 - D** Proteins and phospholipids move and change places.
-

567. 9700_w20_qp_13 Q: 15

The cell surface membrane structure is described as a 'fluid mosaic'.

Which statement describes the 'mosaic' part of the cell surface membrane?

- A** the different patterns that are obtained by the moving phospholipid molecules
 - B** the random distribution of cholesterol molecules within the phospholipid bilayer
 - C** the regular pattern produced by the phospholipid heads and membrane proteins
 - D** the scattering of the different proteins within the phospholipid bilayer
-

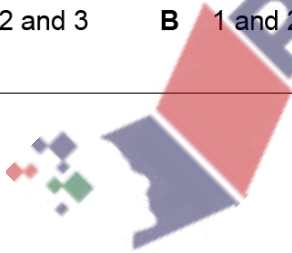
568. 9700_w20_qp_13 Q: 17

Three molecules found in prokaryotes are listed.

- 1 phospholipid
- 2 protein
- 3 peptidoglycan

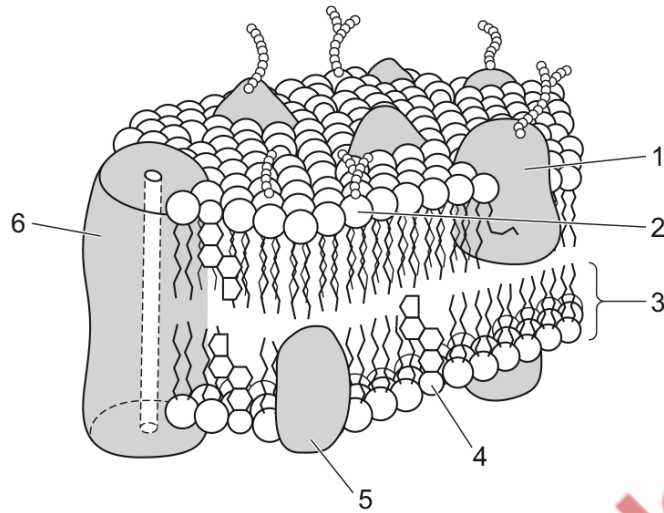
Which molecules are found in prokaryotic cell surface membranes?

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



569. 9700_m19_qp_12 Q: 18

The diagram shows part of a cell surface membrane.



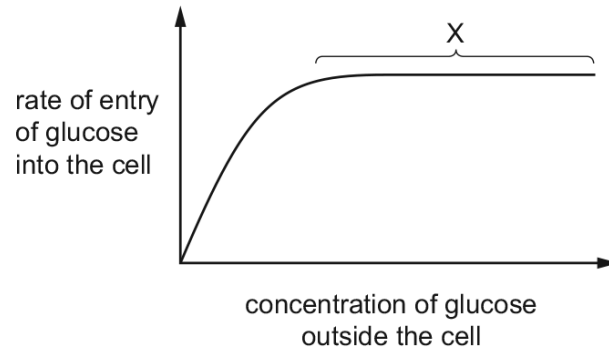
Which row correctly identifies functions of two of the numbered molecules?

	molecule	function	molecule	function
A	1	acts as an antigen	4	stabilises the membrane
B	2	acts as a receptor	5	active transport
C	3	facilitated diffusion	4	regulates the fluidity of the membrane
D	6	active transport	5	acts as an enzyme



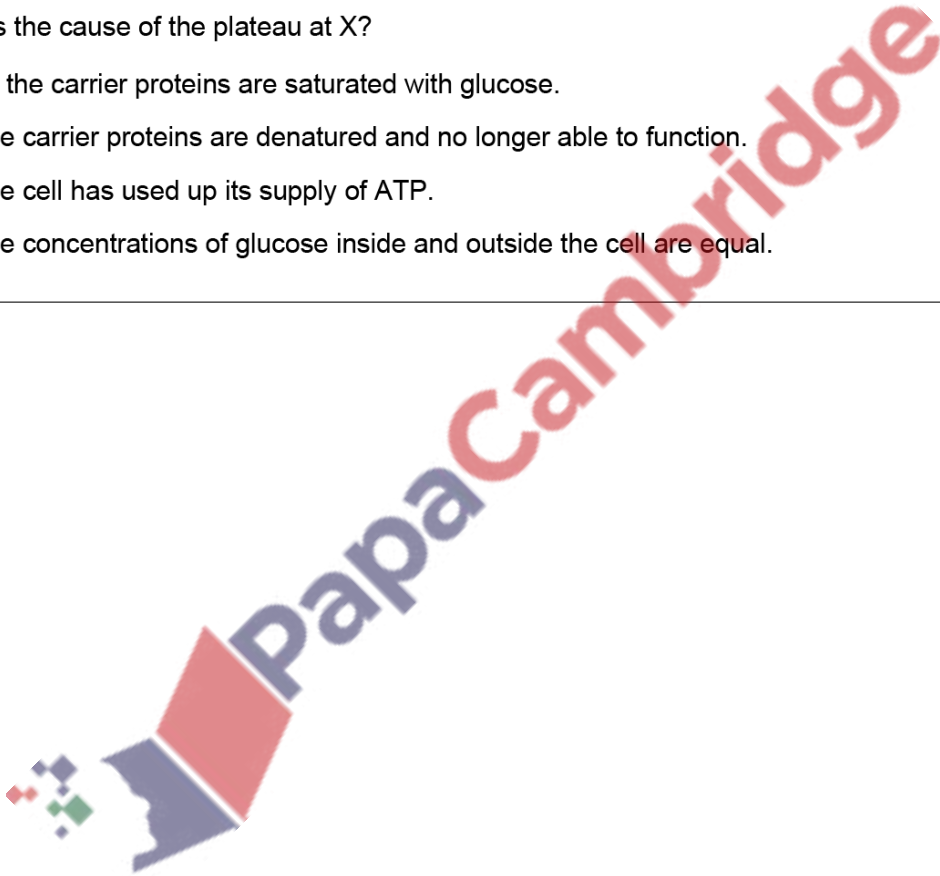
570. 9700_s19_qp_11 Q: 15

The graph shows how the rate of entry of glucose into a cell changes as the concentration of glucose outside the cell changes.



What is the cause of the plateau at X?

- A All the carrier proteins are saturated with glucose.
- B The carrier proteins are denatured and no longer able to function.
- C The cell has used up its supply of ATP.
- D The concentrations of glucose inside and outside the cell are equal.



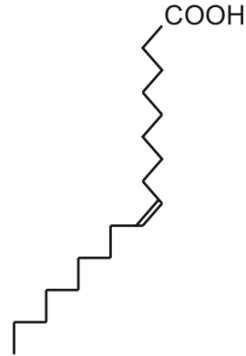
571. 9700_s19_qp_12 Q: 12

The fatty acids elaidic acid and oleic acid have exactly the same structural formulae, with one double bond in the chain. However, the shapes of the chains are different, as shown in the diagram.

elaidic acid



oleic acid

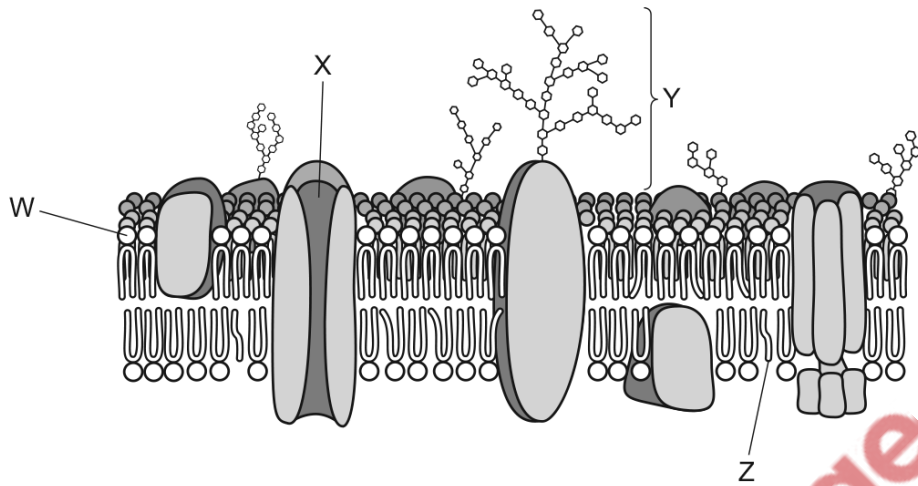


Which row shows the effect of the presence of these fatty acids on the structure and behaviour of a cell surface membrane?

	elaidic acid	oleic acid
A	does not fit closely with other fatty acids so that the membrane is less fluid at high temperatures	fits closely with other fatty acids so that the membrane is less fluid at low temperatures
B	does not fit closely with other fatty acids so that the membrane is more fluid at low temperatures	fits closely with other fatty acids so that the membrane is less fluid at low temperatures
C	fits closely with other fatty acids so that the membrane is less fluid at high temperatures	does not fit closely with other fatty acids so that the membrane is more fluid at low temperatures
D	fits closely with other fatty acids so that the membrane is more fluid at low temperatures	does not fit closely with other fatty acids so that the membrane is more fluid at high temperatures

572. 9700_s19_qp_12 Q: 13

The diagram shows a cell surface membrane.



Which is a correct role for a labelled molecule?

- A W is involved in controlling membrane stability.
- B X is involved in active transport.
- C Y is involved in cell signalling.
- D Z is involved in diffusion of ions.

573. 9700_s19_qp_12 Q: 14

The diagram shows a simple cell signalling pathway in which a signal molecule leads to a response, such as a secretion.

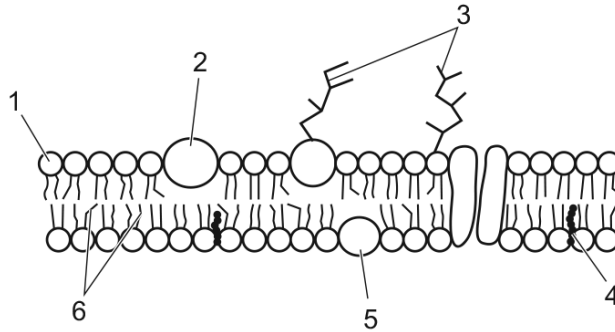


Which row identifies P and Q?

	P	Q
A	activated enzyme in cytoplasm	target in cell surface membrane
B	lipid in cell surface membrane	extracellular enzyme
C	protein in cell surface membrane	activated enzyme in cytoplasm
D	target in cytoplasm	protein in cell surface membrane

574. 9700_s19_qp_13 Q: 17

The diagram represents the fluid mosaic model of membrane structure.



Which two of the numbered components contribute to the fluidity of the membrane?

- A** 1 and 3 **B** 2 and 4 **C** 3 and 5 **D** 4 and 6

575. 9700_s19_qp_13 Q: 19

One of the glycoproteins present in the cell surface membrane of human cells is called ICAM-1.

ICAM-1 is a cell adhesion molecule and it is also used by the common cold virus to attach to human cells.

Which statements are true about ICAM-1?

- 1 A drug binding to ICAM-1 to block the common cold virus could stop cells attaching to each other.
- 2 Part of the ICAM-1 structure must be complementary to proteins in the coat of the common cold virus.
- 3 The ICAM-1 structure must have hydrophobic parts to stabilise it within the cell membrane.

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

576. 9700_w19_qp_11 Q: 16

Cell surface receptors used in cell signalling are usually proteins that extend from one side of the membrane to the other side of the membrane.

What is the role of the extracellular part of the protein?

- A** binding the signalling molecule
- B** functioning as an enzyme
- C** increasing the solubility of the receptor
- D** transmitting the signal from the target cell

577. 9700_w19_qp_11 Q: 17

Which substances can pass directly through cell surface membranes and do **not** use a carrier protein or channel protein?

- 1 K^+ and Cl^-
- 2 CO_2
- 3 $C_6H_{12}O_6$

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

578. 9700_w19_qp_12 Q: 17

High concentrations of ethanol can disrupt cell membrane structure and make the cell surface membrane leaky.

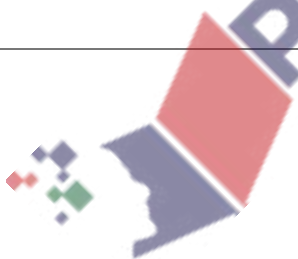
Yeast cells release ethanol as a waste product of metabolism.

Yeast cells can alter the composition of the cell surface membrane to reduce the effect of ethanol.

- A saturated fatty acid, X, is replaced by an unsaturated fatty acid, Y.
- Y has a shorter hydrocarbon chain than X.
- There is an increase in the phospholipid to protein ratio.

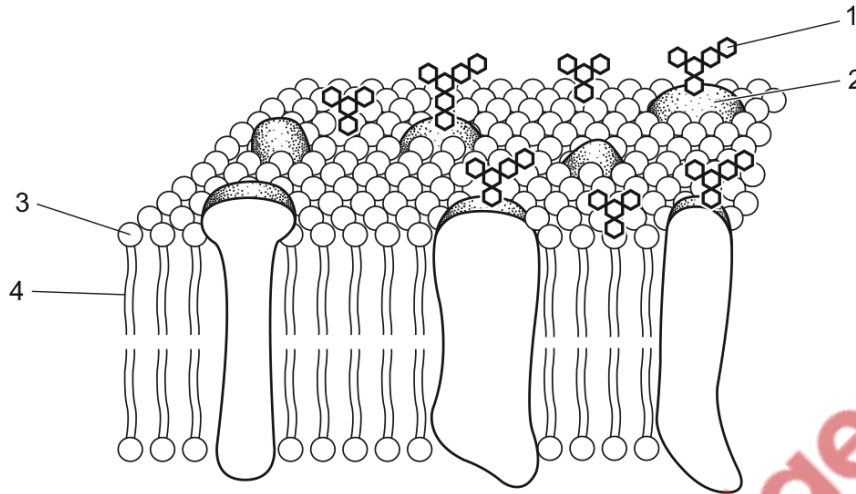
Which statement would explain why the effect of ethanol is reduced?

- A** A greater proportion of phospholipid may increase the entry of ethanol via channel proteins.
- B** An increase in hydrophobic interaction by phospholipid tails improves membrane stability.
- C** An increase in the proportion of fatty acids with double bonds decreases membrane fluidity.
- D** The shorter hydrocarbon chain of Y decreases membrane fluidity.
-



579. 9700_w19_qp_13 Q: 13

The diagram represents part of the fluid mosaic model of a cell surface membrane.



Which parts of the membrane are hydrophilic?

- A** 1, 2 and 3 **B** 2 and 3 only **C** 3 and 4 **D** 4 only

580. 9700_w19_qp_13 Q: 14

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

581. 9700_m18_qp_12 Q: 16

Cholesterol is an integral component of the cell surface membrane.

Which statement about cholesterol is correct?

- A** It allows ions to pass freely through the cell surface membrane.
B It has a hydrophobic head and a hydrophilic tail.
C It helps to regulate the fluidity of the cell surface membrane.
D It reduces the mechanical stability of the phospholipid bilayer.

582. 9700_m18_qp_12 Q: 17

Which type of bond in phospholipids has a role in increasing the fluidity of cell surface membranes?

- A C—C
- B C=C
- C C—O
- D C=O

583. 9700_m18_qp_12 Q: 18

Which of these substances can pass directly through cell surface membranes without using a carrier protein or a channel protein?

- 1 Ca^{2+}
- 2 CO_2
- 3 $\text{C}_6\text{H}_{12}\text{O}_6$

- A 1 and 2 B 1 and 3 C 2 and 3 D 2 only

584. 9700_s18_qp_11 Q: 14

Which statements about the cell surface membrane are correct?

- 1 Channel proteins allow water soluble ions and molecules across the membrane.
- 2 Glucose can pass into the cell via carrier proteins.
- 3 Oxygen passes freely through the membrane as it is soluble in lipids.
- 4 Some glycoproteins act as antigens.

- A 1, 2, 3 and 4
B 1, 3 and 4 only
C 1 and 2 only
D 2, 3 and 4 only

585. 9700_s18_qp_11 Q: 16

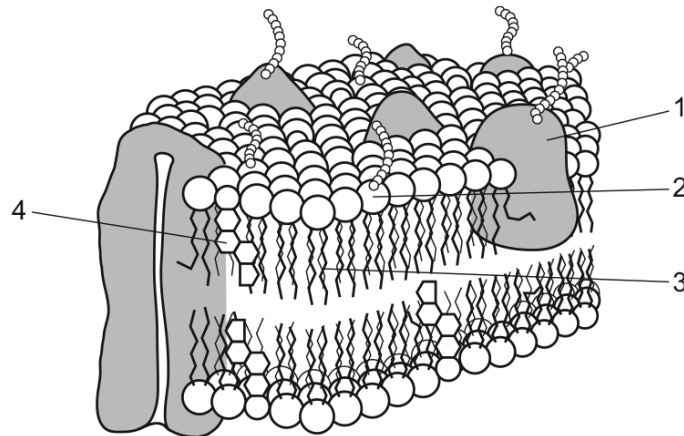
What can increase the fluidity of the cell surface membrane at low temperatures?

- 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

586. 9700_s18_qp_13 Q: 16

The diagram shows part of the cell surface membrane.



Which components act as antigens?

- A** 1 and 2 **B** 1 and 3 **C** 2 and 3 **D** 2 and 4

587. 9700_w18_qp_11 Q: 8

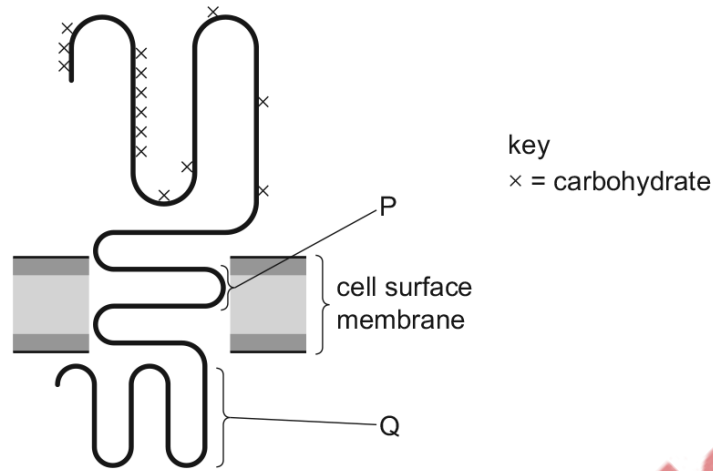
Which pair of statements are correct?

- A** Carbon and oxygen occur in a ratio of 2 : 1 in carbohydrates.
Triglycerides are soluble in water.
- B** Glycolipids are found in all cell surface membranes.
Carbohydrates are stored as starch in plants.
- C** Phospholipids all have two saturated hydrocarbon chains.
Polysaccharides are polymers.
- D** Water is released during the formation of a glycosidic bond.
Phospholipids all have three ester bonds.



588. 9700_w18_qp_11 Q: 15

The diagram shows a glycoprotein embedded in the cell surface membrane of a human red blood cell. This glycoprotein is part of a system of cell surface blood group recognition sites.



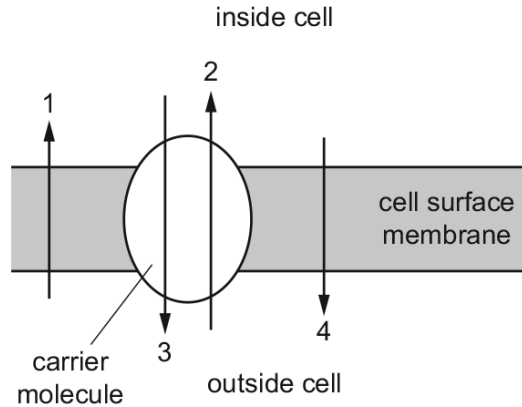
Which row identifies the role of this glycoprotein and regions P and Q of the molecule?

	role of glycoprotein	region P	region Q
A	antigen	amino acids with hydrophobic R groups	amino acids with hydrophilic R groups in the cell's cytoplasm
B	carrier	amino acids with hydrophilic R groups	amino acids with hydrophilic R groups in the cell's cytoplasm
C	channel	amino acids with hydrophilic R groups	amino acids with hydrophobic R groups outside the cell
D	receptor	amino acids with hydrophobic R groups	amino acids with hydrophobic R groups outside the cell

589. 9700_w18_qp_11 Q: 16

The diagram shows the transport of ions across the cell surface membrane. Inside the cell there is a low concentration of sodium ions (Na^+) and a high concentration of potassium ions (K^+). Outside the cell there is a low concentration of K^+ and a high concentration of Na^+ .

The carrier molecule is a pump which exchanges Na^+ for K^+ .



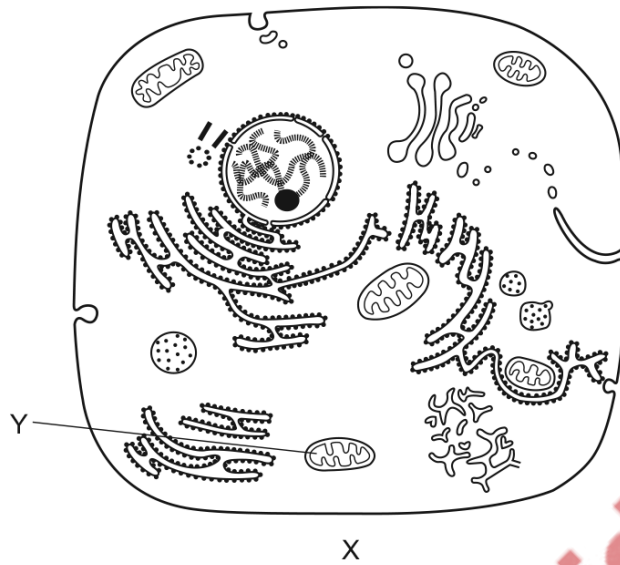
Which ionic movements are represented by the arrows?

	active transport of K^+	active transport of Na^+	diffusion of Na^+	diffusion of K^+
A	2	3	1	4
B	2	3	4	1
C	3	2	1	4
D	3	2	4	1



590. 9700_w18_qp_12 Q: 16

The diagram is a drawing from an electron micrograph of a typical animal cell.



How many layers of phospholipids will a molecule of oxygen cross to travel directly from X, outside the cell, to Y, the matrix of the mitochondrion?

- A** 3 **B** 4 **C** 5 **D** 6

591. 9700_w18_qp_12 Q: 17

How could water molecules cross the cell surface membrane of animal cells?

- 1 carrier proteins
- 2 channel proteins
- 3 cholesterol molecules

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

592. 9700_w18_qp_13 Q: 16

In an experiment the proteins in the cell surface membrane of a living cell were labelled with a fluorescent dye.

A small area of the membrane was observed using a microscope. A laser was then used to permanently destroy the fluorescence of the dye molecules in this field of view.

The fluorescence in this field of view was later seen to return.

What does this experiment show?

- A Proteins are found only on the outer surface of cell surface membranes.
- B Proteins in the outer layer of a bilayer do not penetrate into the inner layer.
- C Proteins move freely in the phospholipids of a bilayer.
- D The cell surface membrane of the cell is a bilayer.

593. 9700_w18_qp_13 Q: 17

In plants adapted to cold conditions, their cell surface membranes change as the weather gets colder, allowing the plants to carry out exocytosis.

Which change occurs in their cell surface membranes?

- A a decrease in the ratio of proteins to saturated phospholipids
- B a decrease in the ratio of unsaturated phospholipids to saturated phospholipids
- C an increase in the ratio of proteins to unsaturated phospholipids
- D an increase in the ratio of unsaturated phospholipids to saturated phospholipids

594. 9700_m17_qp_12 Q: 16

What is the correct range of measurements for the width of the cell surface membrane?

- A 0.5–1.0 nm
- B 5–10 nm
- C 50–100 nm
- D 0.5–1 μ m



595. 9700_m17_qp_12 Q: 17

The cells in the roots of beetroot plants contain a red pigment.

When pieces of root tissue are soaked in cold water, some of the red pigment leaks out of the cells into the water.

An experiment was carried out to investigate the effect of temperature on the loss of red pigment from the root cells. It was found that the higher the temperature of the water, the higher the rate of loss of red pigment from the root cells.

Which of these statements could explain this trend?

- 1 Enzymes in the cells denature as the temperature increases, so the pigment can no longer be used for reactions inside the cells and diffuses out.
- 2 As the temperature increases, the tertiary structure of protein molecules in the cell surface membrane changes, increasing the permeability of the membrane.
- 3 Phospholipid molecules gain kinetic energy as temperature rises, increasing the fluidity of the phospholipid bilayer and allowing pigment molecules to diffuse out more easily.

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

596. 9700_m17_qp_12 Q: 18

The cell surface membrane structure is described as a 'fluid mosaic'.

Which statement describes the 'mosaic' part of the cell surface membrane?

- A the different patterns that are obtained by the moving phospholipid molecules
 - B the random distribution of cholesterol molecules within the phospholipid bilayer
 - C the regular pattern produced by the phospholipid heads and membrane proteins
 - D the scattering of the different proteins within the phospholipid bilayer
-

597. 9700_s17_qp_11 Q: 17

What describes a carrier protein in cell surface membranes?

- A a glycoprotein that is found on the outer surface of the membranes allowing cell recognition
 - B a glycoprotein that is involved in moving substances through the membranes by both active and passive transport
 - C a protein that allows the attachment of signalling molecules which brings about changes within the cell
 - D a protein that is involved in moving substances through the membranes by passive transport through water-filled pores
-

598. 9700_s17_qp_11 Q: 20

In an experiment, fluorescent dyes were used to label proteins on the outer surface of cell surface membranes. Living human cells were labelled with one colour of fluorescent dye and mouse cells with a different colour of fluorescent dye.

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

At first, the different fluorescent labels remain separate, but after 40 minutes they are distributed randomly across the hybrid cell surface membrane.

What does this experiment show?

- A Proteins are found only on the outer surface of cell surface membranes.
- B Proteins in the outer layer of a bilayer do not penetrate into the inner layer.
- C Proteins move freely in the phospholipids of a bilayer.
- D The cell surface membranes of the two cells are bilayers.

599. 9700_s17_qp_12 Q: 13

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.

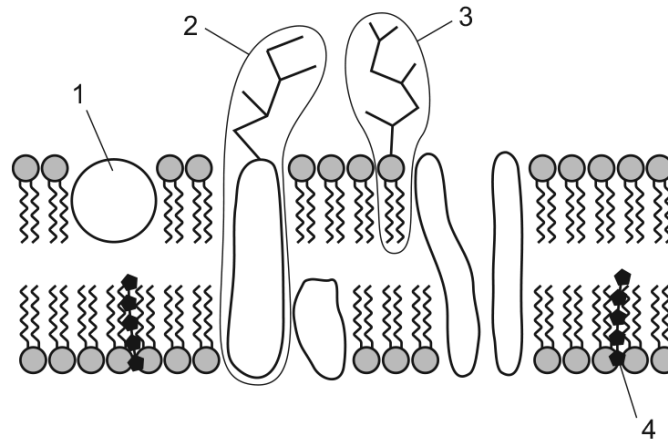
At first the different dyes remained separate. After 40 minutes the two dyes were evenly distributed in the hybrid cell surface membrane.

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.

600. 9700_s17_qp_12 Q: 15

The diagram shows the fluid mosaic model of membrane structure.

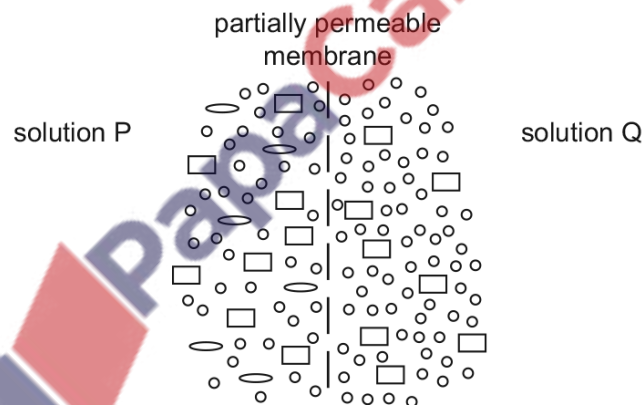


Which molecules in the membrane are identical?

- A** 1, 2 and 3 **B** 1 and 4 **C** 2 and 3 only **D** 4 only

601. 9700_s17_qp_13 Q: 14

The diagram represents an experiment where two solutions, P and Q, were separated by a partially permeable membrane.



What is correct about the initial movement of the molecules \circ , \square and \ominus between the two solutions, P and Q?

	net movement from Q to P	net movement from P to Q	no net movement
A	\circ	\square	\ominus
B	\circ	\ominus	\square
C	\square	\ominus	\circ
D	\ominus	\circ	\square

602. 9700_s17_qp_13 Q: 15

Which functions are correct for components of the cell surface membrane?

	stabilising the hydrophobic layer	allowing osmosis to occur	barrier to dissolved ions
A	cholesterol	phospholipids and proteins	phospholipids
B	glycolipids	phospholipids	proteins
C	phospholipids	proteins	cholesterol
D	proteins	glycoproteins and glycolipids	glycolipids

603. 9700_w17_qp_11 Q: 15

The fluidity of the cell surface membrane can be changed by a number of factors.

 As the fluidity of cell surface membranes decreases, which process would be **least** affected?

- A** active transport
- B** diffusion
- C** endocytosis
- D** osmosis

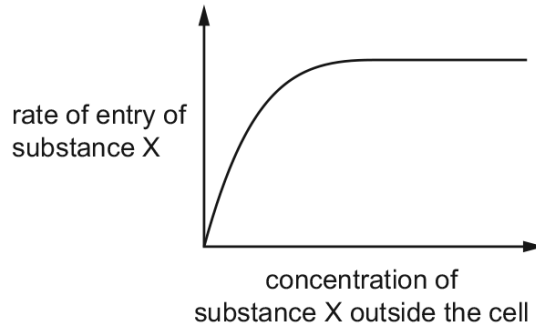
604. 9700_w17_qp_12 Q: 17

Which row shows a correct function of the components of the cell surface membrane?

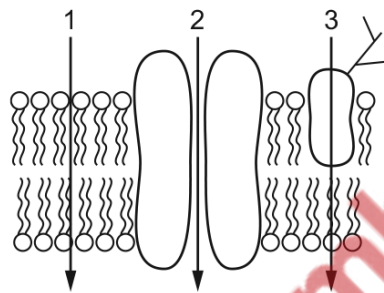
	phospholipids	cholesterol	proteins	glycoproteins
A	prevent the entry of non-polar molecules	regulates permeability of the membrane	allow exchange of ions between the cell and its environment	allow cell-to-cell communication
B	prevent the entry of polar molecules	stabilises the membrane by binding to water molecules	allow cell-to-cell communication	provide sites of attachment for hormones
C	regulate the flexibility of the cell membrane	prevents the entry of protons	allow exchange of gases between the cell and its environment	stabilise the membrane by binding to water molecules
D	regulate the fluidity of the cell membrane	stabilises the membrane over a range of temperatures	form channels for polar molecules	allow cell-to-cell recognition

605. 9700_w17_qp_12 Q: 18

The graph shows how the rate of entry of substance X into a cell changes as the concentration of substance X outside the cell increases.



The diagram shows part of a cell surface membrane.



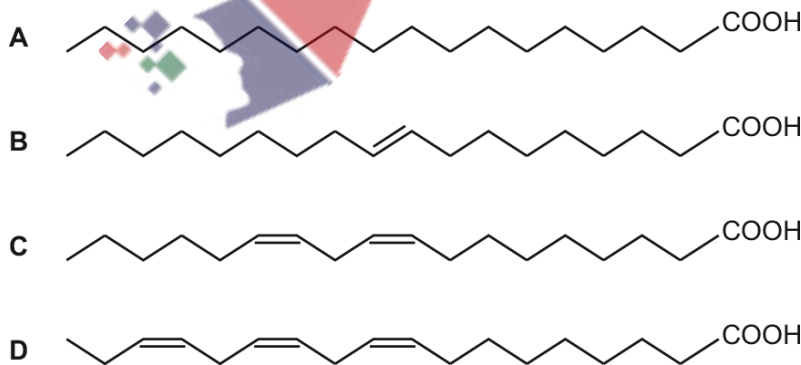
Which pathways could substance X use to enter the cell?

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

606. 9700_w17_qp_13 Q: 11

The diagrams show four fatty acids, each with a chain of 18 carbon atoms.

Which fatty acid, as part of a phospholipid molecule, would contribute most to the fluidity of a cell surface membrane?

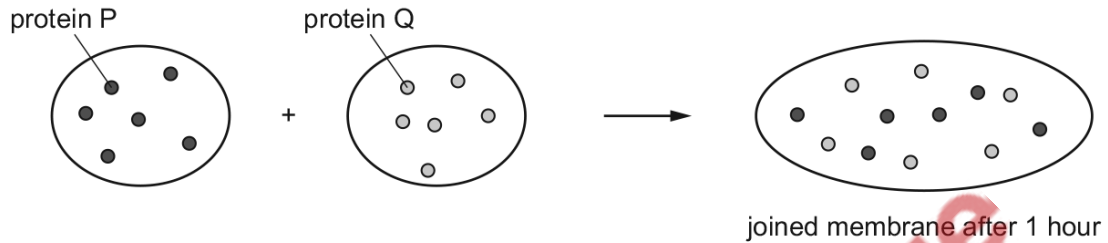


607. 9700_w17_qp_13 Q: 18

The diagram shows an experiment in which two different cell surface membranes were joined to form a single large membrane.

The outer surface of one membrane contained molecules of protein P and the outer surface of the other membrane contained molecules of protein Q.

The positions of the two proteins in each membrane were observed just before they were joined together and 1 hour after they were joined.



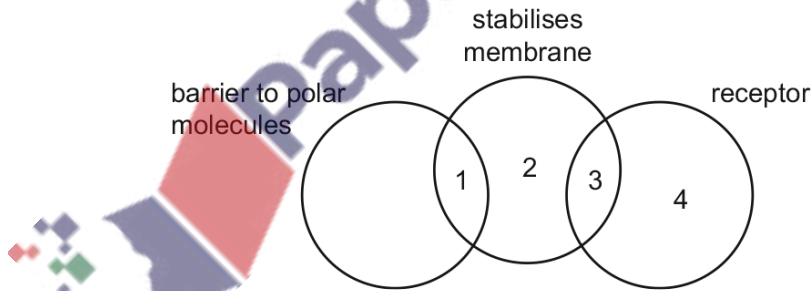
Which statements are correct?

- 1 This provides evidence for the fluid mosaic model of cell membranes.
- 2 This shows that proteins can move freely in cell membranes.
- 3 This shows that the membrane is fluid but the proteins are not.

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

608. 9700_m16_qp_12 Q: 14

Which row correctly links molecules in the cell surface membrane with their roles?



	1	2	3	4
A	glycolipid	cholesterol	glycoprotein	phospholipid
B	glycolipid	glycoprotein	phospholipid	cholesterol
C	glycoprotein	phospholipid	cholesterol	glycolipid
D	phospholipid	cholesterol	glycolipid	glycoprotein

609. 9700_s16_qp_12 Q: 12

What is a function of the cholesterol in a cell surface membrane?

- A** acting as a membrane-bound receptor
 - B** controlling active transport
 - C** helping cells join together
 - D** regulating the flexibility of the membrane
-

610. 9700_s16_qp_12 Q: 13

Which roles of the cell surface membrane are a result of the properties of the phospholipids?

- 1 to allow cytokinesis to occur in mitotic cell division
- 2 to allow entry and exit of oxygen and carbon dioxide
- 3 to allow the phagocytosis of a bacterium into a cell

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

611. 9700_s16_qp_13 Q: 13

The list includes some of the molecules found in a cell surface membrane.

- 1 glycolipid
- 2 surface protein
- 3 glycoprotein
- 4 trans-membrane protein

Which molecules are involved in cell signalling?

- A** 1, 2 and 3 **B** 1 and 3 only **C** 2 and 4 **D** 4 only
-

612. 9700_s16_qp_13 Q: 14

Which statements about fatty acids are correct?

- 1 form part of cell membranes
- 2 form storage droplets
- 3 are synthesised by the Golgi body

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

613. 9700_s16_qp_13 Q: 15

Which substances can pass directly through cell surface membranes **without** using a carrier protein or channel protein?

- 1 Ca^{2+} and Na^+
- 2 O_2
- 3 $\text{C}_6\text{H}_{12}\text{O}_6$

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

614. 9700_w16_qp_11 Q: 14

Which molecules are found at the outer surface of a cell surface membrane?

	cholesterol	glycolipids	phospholipids
A	✓	✓	x
B	✓	x	✓
C	✓	x	x
D	x	✓	✓

key

✓ = present

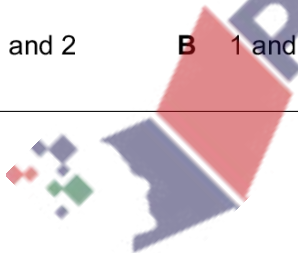
x = absent

615. 9700_w16_qp_11 Q: 15

Which substances can pass directly through cell surface membranes **without** using a carrier protein or channel protein?

- 1 CO_2
- 2 Ca^{2+} and Na^+
- 3 H_2O

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



616. 9700_w16_qp_12 Q: 17

A method called freeze-fracture can be used to study the structure of cell membranes. The membrane is frozen and then split down the middle, separating the two layers of phospholipids from each other. Any proteins contained within one layer remain in that layer. Proteins which span the membrane can be found in either layer after freeze-fracture, depending on the properties of the protein.

Which statement about the results of freeze-fracture studies are correct?

- 1 It provides evidence for the bilayer nature of membranes.
- 2 It provides evidence for the arrangement of proteins.
- 3 It shows that the proteins in the membrane do not contribute to its strength.

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

617. 9700_w16_qp_12 Q: 19

Three of the molecules found in prokaryotes are listed below.

- 1 phospholipid
- 2 protein
- 3 peptidoglycan

Which of these molecules are found in prokaryotic cell surface membranes?

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

618. 9700_s15_qp_11 Q: 15

Which type of cell has a large number of glycoproteins on the cell surface membrane?

- A** ciliated cell
 - B** goblet cell
 - C** lymphocyte
 - D** red blood cell
-

619. 9700_s15_qp_11 Q: 17

 Which set of factors will produce the **most** fluid cell surface membrane?

	a decrease in
A	<ul style="list-style-type: none"> distance between phospholipid molecules proportion of short fatty acid chains
B	<ul style="list-style-type: none"> distance between phospholipid molecules temperature
C	<ul style="list-style-type: none"> proportion of phospholipids with saturated fatty acid chains proportion of long fatty acid chains
D	<ul style="list-style-type: none"> proportion of phospholipids with unsaturated fatty acid chains temperature

620. 9700_s15_qp_12 Q: 14

 Which statements are true about the optimum temperature of **all** enzymes?

- It is the temperature at which the enzymes work best.
- It is the highest temperature at which the enzyme will work.
- It is between 35°C and 40°C.

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

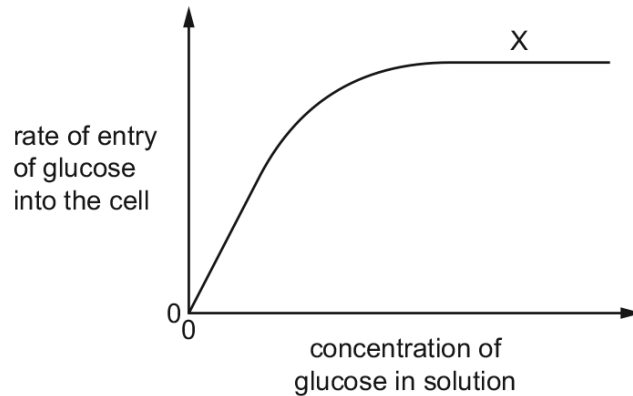
621. 9700_s15_qp_12 Q: 17

 Which set of factors will produce the **most** fluid cell surface membrane?

	an increase in
A	<ul style="list-style-type: none"> proportion of phospholipids with saturated fatty acid chains distance between phospholipid molecules
B	<ul style="list-style-type: none"> proportion of long fatty acid chains proportion of phospholipids with unsaturated fatty acid chains
C	<ul style="list-style-type: none"> proportion of long fatty acid chains temperature
D	<ul style="list-style-type: none"> proportion of phospholipids with unsaturated fatty acid chains temperature

622. 9700_s15_qp_13 Q: 16

The graph shows the effect of increasing the concentration of glucose in a solution on the rate of entry of glucose into a cell.



What are **not** causes of the plateau at X?

- 1 All the carrier proteins are saturated with glucose.
- 2 The carrier proteins are denatured and no longer able to function.
- 3 The cell has used up its supply of ATP.
- 4 The concentrations of glucose inside and outside the cell are equal.

A 1, 2 and 4 **B** 2, 3 and 4 **C** 2 and 3 only **D** 1 only

623. 9700_s15_qp_13 Q: 17

Which set of factors will produce the **least** fluid cell surface membrane?

	an increase in
A	<ul style="list-style-type: none"> • proportion of short fatty acid chains • distance between phospholipid molecules
B	<ul style="list-style-type: none"> • proportion of long fatty acid chains • proportion of phospholipids with saturated fatty acid chains
C	<ul style="list-style-type: none"> • proportion of short fatty acid chains • proportion of phospholipids with unsaturated fatty acid chains
D	<ul style="list-style-type: none"> • proportion of phospholipids with unsaturated fatty acid chains • temperature

624. 9700_w15_qp_13 Q: 16

Which statements about the fluid mosaic model of a membrane are correct?

- 1 Saturated fatty acid tails inhibit the movement of phospholipids in the membrane.
- 2 Glycoproteins in the outer layer of the membrane can move.
- 3 Channel proteins are fixed in position.

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

4.2 Movement of substances into and out of cells

625. 9700_m20_qp_12 Q: 16

Which transport mechanism within a cell can occur in the absence of membranes?

- A** active transport
- B** diffusion
- C** facilitated diffusion
- D** osmosis

626. 9700_m20_qp_12 Q: 17

A student measured the time taken for complete diffusion of a dye into agar blocks of different sizes.

The results are shown in the table.

size of agar block / mm × mm × mm	time for diffusion / s
5 × 5 × 5	6.2
10 × 10 × 10	16.1
15 × 15 × 15	34.5
5 × 10 × 15	

What is the predicted time for complete diffusion of the dye into the agar block measuring 5 mm × 10 mm × 15 mm?

- A** 6.2 s
- B** 16.1 s
- C** 34.5 s
- D** more than 34.5 s

627. 9700_m20_qp_12 Q: 18

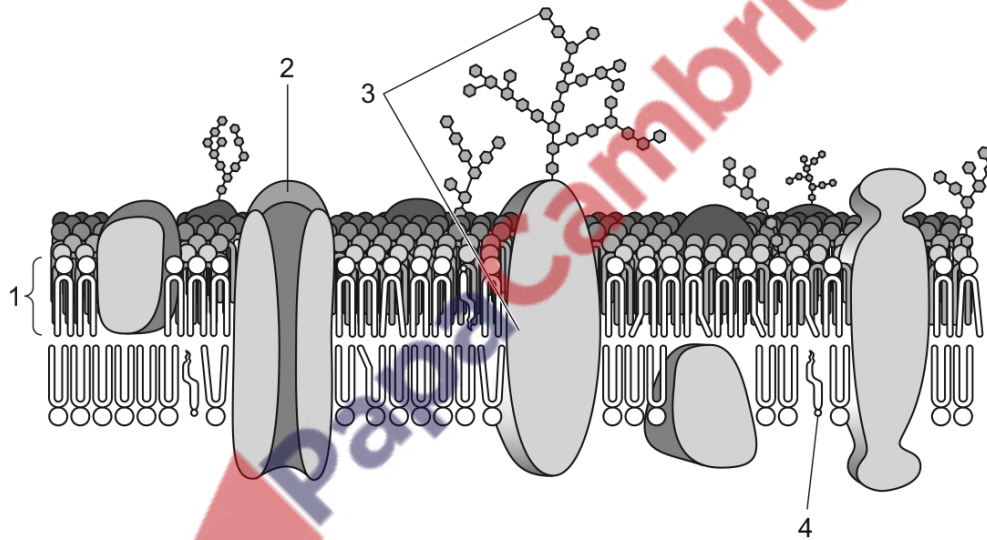
A plant cell with a water potential of -600 kPa was placed in a solution with a water potential of -410 kPa for 10 minutes.

Which row is correct?

	net movement of water	water potential of cell	effect on cell
A	into cell	becomes higher	becomes turgid
B	into cell	becomes lower	bursts
C	out of cell	becomes higher	swells
D	out of cell	becomes lower	becomes plasmolysed

628. 9700_s20_qp_11 Q: 15

The diagram shows a cell surface membrane.



Which statements about the labelled molecules in the membrane are correct?

- 1 is involved in the diffusion of ions.
- 2 is involved in facilitated diffusion.
- 3 is involved in the recognition of antigens.
- 4 is involved in membrane fluidity.

A 1, 2 and 3 **B** 1 and 3 only **C** 1 and 4 **D** 2 and 4 only

629. 9700_s20_qp_11 Q: 16

Equal sized potato pieces were placed into test-tubes containing equal volumes of different concentrations of sucrose solution and left for 30 minutes. All other variables were controlled.

After 30 minutes, the potato piece in one of the concentrations of sucrose solution had not changed in size.

What can be concluded from this result?

- 1 There is no net movement of water into or out of the potato.
- 2 The water potential of the potato is the same as the water potential of the sucrose solution.
- 3 The concentration of sucrose in the potato is the same as the concentration of the sucrose solution.

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

630. 9700_s20_qp_12 Q: 18

What are the features of facilitated diffusion?

- 1 It uses protein channels in the membrane and is driven by the energy from ATP.
- 2 It moves molecules from regions of higher concentration to lower concentration and is driven by the kinetic energy of the molecules which are diffusing.
- 3 It uses protein channels in the membrane, and the maximum rate of diffusion depends on the number of these channels.

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

631. 9700_s20_qp_13 Q: 15

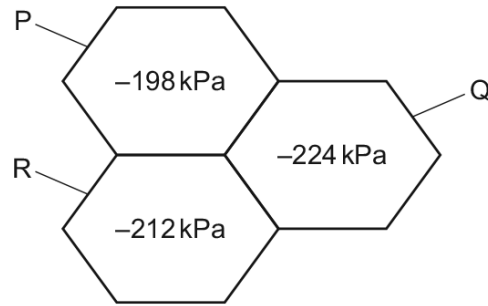
Blocks of agar are stained with a pH indicator and used to investigate the diffusion of an acid solution.

Which block would completely change colour the fastest?

- A** 1mm × 1mm × 1mm
 - B** 1mm × 0.25mm × 0.25mm
 - C** 1mm × 0.5mm × 0.5mm
 - D** 2mm × 0.5mm × 0.5mm
-

632. 9700_s20_qp_13 Q: 16

The diagram shows the water potential of three adjacent plant cells, P, Q and R.



Which shows the net movement of water between cells P, Q and R?

- A $P \rightarrow Q$ and $P \rightarrow R$ and $R \rightarrow Q$
- B $P \rightarrow Q$ and $P \rightarrow R$
- C $Q \rightarrow P$ and $Q \rightarrow R$ and $R \rightarrow P$
- D $Q \rightarrow P$ and $R \rightarrow P$

633. 9700_w20_qp_11 Q: 16

Which processes can allow transport into or out of a cell?

- 1 active transport
- 2 facilitated diffusion
- 3 osmosis

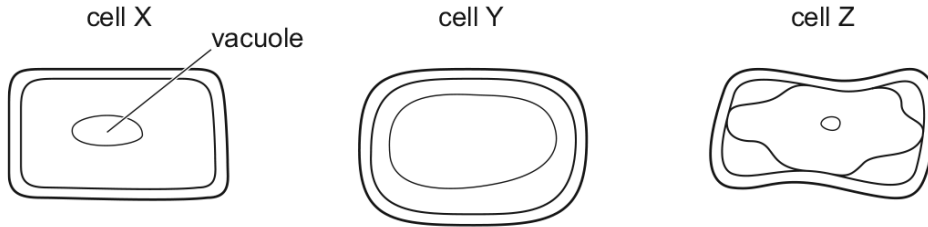
- A 1, 2 and 3
- B 1 and 2 only
- C 1 and 3 only
- D 2 and 3 only



634. 9700_w20_qp_11 Q: 17

Plant cells were put into one of three different concentrations of sugar solution, 10%, 5% and 2.5%.

The cells were left for 50 minutes and then observed using a light microscope.



Which statements are correct?

- 1 Cell Y had a lower water potential than the sugar solution it was put into.
- 2 Cell Z was put into the 10% sugar solution.
- 3 Cell Z had a less negative water potential than the sugar solution it was put into.

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

635. 9700_w20_qp_12 Q: 15

Equal-sized potato pieces were placed into test-tubes containing equal volumes of different concentrations of sucrose solution and left for 30 minutes. All other variables were controlled.

After 30 minutes, the potato piece in one of the concentrations of sucrose solution had **not** changed in size.

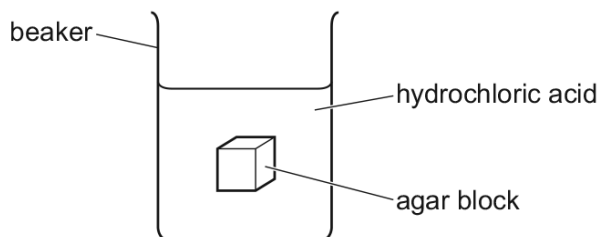
What can be concluded from the result for this potato piece?

- 1 The concentration of sucrose in the potato is the same as the concentration of the sucrose solution.
- 2 The water potential of the potato is the same as the water potential of the sucrose solution.
- 3 There is **no more** movement of water into or out of the potato.

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

636. 9700_w20_qp_12 Q: 16

Four agar blocks are stained green using universal indicator and suspended in 1 mol dm^{-3} hydrochloric acid.



The time taken for the agar blocks to change from green to red was recorded.

Which agar block would be the first to become completely red?

- A $2 \text{ cm} \times 2 \text{ cm} \times 2 \text{ cm}$
- B $2 \text{ cm} \times 1 \text{ cm} \times 4 \text{ cm}$
- C $2 \text{ cm} \times 3 \text{ cm} \times 2 \text{ cm}$
- D $5 \text{ cm} \times 2 \text{ cm} \times 3 \text{ cm}$

637. 9700_w20_qp_13 Q: 16

Solute X is at a higher concentration outside a cell than in the cytoplasm.

Which processes may allow solute X to be moved through the cell surface membrane?

- A active transport, diffusion and facilitated diffusion
- B active transport, diffusion and osmosis
- C diffusion, facilitated diffusion and osmosis
- D exocytosis, facilitated diffusion and osmosis

638. 9700_w20_qp_13 Q: 18

What happens to the surface area to volume ratio of a cube when the length of each side is doubled?

- A The ratio decreases by a quarter.
- B The ratio decreases by half.
- C The ratio doubles.
- D The ratio increases by four times.

639. 9700_m19_qp_12 Q: 17

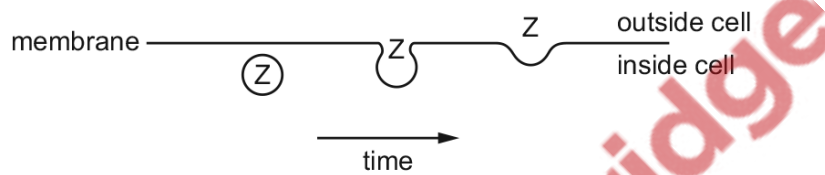
Which statements about the movement of water in and out of cells are correct?

- 1 Water moves from regions of more negative water potential to regions of less negative water potential.
- 2 Water can cross cell membranes by passing through channel proteins.
- 3 Water can pass through cellulose cell walls.

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

640. 9700_s19_qp_11 Q: 16

The diagram shows the movement of substance Z across a cell surface membrane.



Which process is involved in this movement?

- A** endocytosis
- B** exocytosis
- C** phagocytosis
- D** pinocytosis

641. 9700_s19_qp_11 Q: 17

Visking tubing is often used as a model during experiments to investigate osmosis in plants.

What could Visking tubing be used to represent?

	cell surface membrane	cell wall	tonoplast
A	✓	✓	✓
B	✓	x	✓
C	✓	x	x
D	x	✓	✓

key
 ✓ = represents
 x = does not represent

642. 9700_s19_qp_13 Q: 18

The cell surface membranes of some cells are largely made up of phospholipids and cholesterol, with few proteins.

Which transport mechanisms will be reduced across these membranes?

- 1 facilitated diffusion
- 2 active transport
- 3 diffusion

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

643. 9700_s19_qp_13 Q: 20

A student weighed a cylinder of potato and then put it into a test-tube containing a salt solution.

The potato cylinder was removed from the salt solution after one hour. It was blotted dry and then reweighed. The student recorded that the potato had lost mass.

Which row shows the correct explanation for the results the student collected?

	water potential of the potato cells before soaking	condition of the potato cells after soaking
A	higher	plasmolysed
B	higher	turgid
C	lower	plasmolysed
D	lower	turgid

644. 9700_w19_qp_11 Q: 15

Which statement suggests that a membrane protein is involved in active transport?

- A** It allows movement of molecules across a membrane if concentration differences exist.
- B** It can only function if mitochondria are supplied with sufficient oxygen.
- C** It has a tertiary structure with a binding site with a specific shape.
- D** It is found in the cell surface membranes and the mitochondrial membranes.

645. 9700_w19_qp_11 Q: 18

A student put a layer of plant epidermal cells on a microscope slide. The student put a drop of potassium nitrate solution on the layer of cells and observed that:

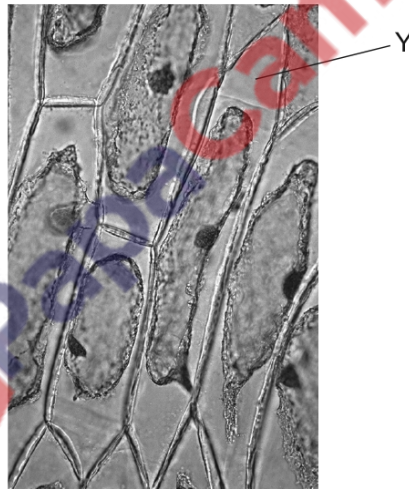
- the cell surface membrane of many of the cells had separated from the cell wall
- the cytoplasm and cell contents had shrunk.

What explains these observations?

	direction of net water movement	water potential of cells at start / kPa	water potential of solution at start / kPa
A	cells to solution	-100	-500
B	cells to solution	-500	-100
C	solution to cells	-100	-500
D	solution to cells	-500	-100

646. 9700_w19_qp_12 Q: 18

The photomicrograph shows the appearance of onion epidermal cells after they have been soaked in solution X for one hour.



What fills the space labelled Y?

- A** air
- B** cytoplasm
- C** solution X
- D** water

647. 9700_w19_qp_12 Q: 19

Equal sized potato pieces were placed into a test-tube and covered with a sucrose solution. The test tube was left for 30 minutes. All other variables were controlled.

After 30 minutes, the potato piece had not changed in size.

What can be concluded from this result?

- A The concentration of sucrose is the same in the potato and in the solution and there is no more movement of water into or out of the potato.
- B The concentration of sucrose is the same in the potato and in the solution and there is no net movement of water into the potato.
- C The water potential is the same in the potato and in the sucrose solution and there is no more movement of water into or out of the potato.
- D The water potential is the same in the potato and in the sucrose solution and there is no net movement of water into or out of the potato.

648. 9700_w19_qp_13 Q: 15

Which pair of factors is inversely proportional to the rate of diffusion?

- A concentration gradient and surface area over which diffusion occurs
- B distance over which diffusion occurs and size of diffusing molecule
- C size of diffusing molecule and concentration gradient
- D surface area over which diffusion occurs and distance over which diffusion occurs

649. 9700_w19_qp_13 Q: 16

Raisins are dried fruit that contain high concentrations of sugar.

Which row is correct when raisins are first put into water?

	water potential in the raisin compared to surrounding water	direction of water movement
A	less negative	into the raisin
B	less negative	out of the raisin
C	more negative	into the raisin
D	more negative	out of the raisin

650. 9700_m18_qp_12 Q: 19

Companion cells use ATP to move hydrogen ions out of the cell and co-transporter proteins to allow hydrogen ions to return with sucrose molecules.

Which two processes are involved in this movement?

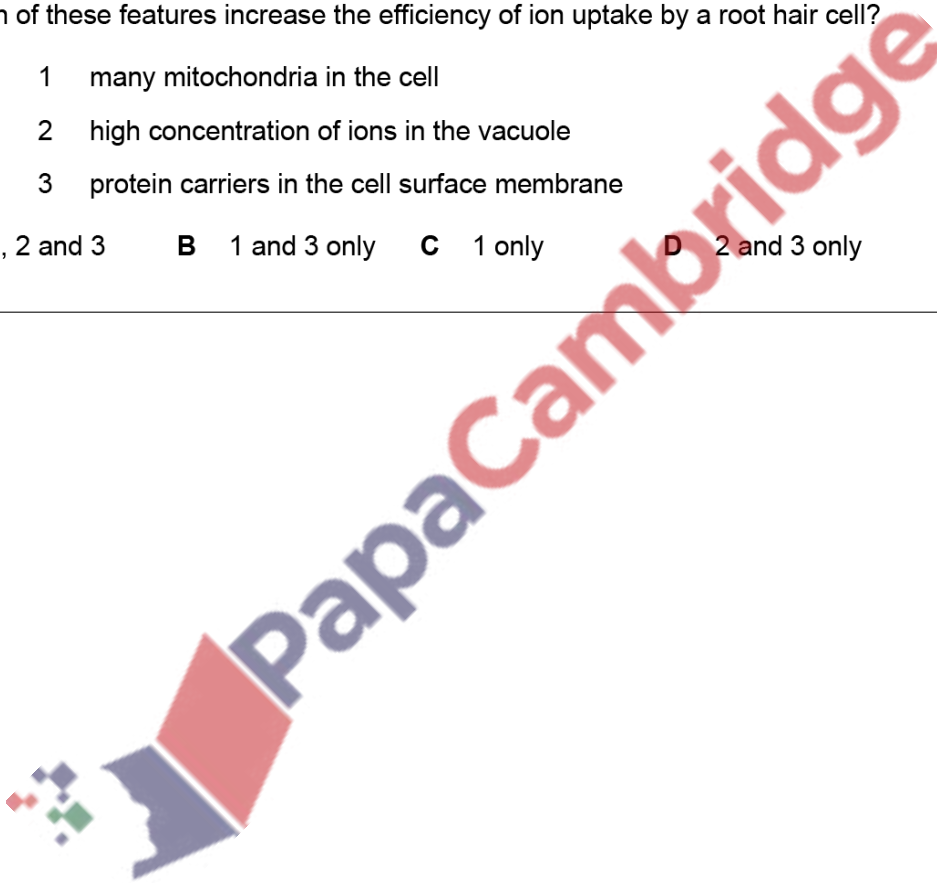
- A active transport and diffusion
 - B active transport and facilitated diffusion
 - C exocytosis and diffusion
 - D exocytosis and facilitated diffusion
-

651. 9700_s18_qp_11 Q: 15

Which of these features increase the efficiency of ion uptake by a root hair cell?

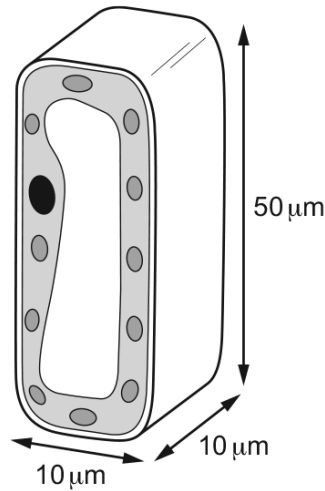
- 1 many mitochondria in the cell
- 2 high concentration of ions in the vacuole
- 3 protein carriers in the cell surface membrane

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

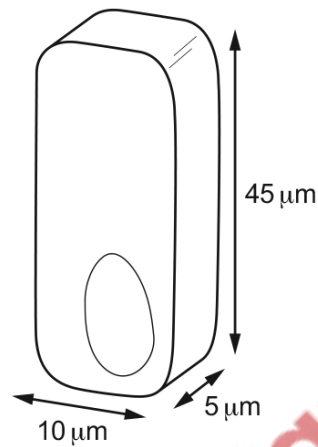


652. 9700_s18_qp_11 Q: 17

The diagrams show the shape and size of two types of cell.



palisade mesophyll cell
surface area = $2200 \mu\text{m}^2$



columnar epithelial cell
volume = $2250 \mu\text{m}^3$

Which statement is correct about the palisade cell and epithelial cell shown in the diagrams?

- A An increase in surface area reduces the distance for gases to reach the centre of the cell.
- B The surface area of the palisade mesophyll cell is $500 \mu\text{m}^2$ greater than the columnar epithelial cell.
- C The surface area to volume ratio is greater in the columnar epithelial cell than the palisade mesophyll cell.
- D The volume of the palisade mesophyll cell is $2500 \mu\text{m}^3$ greater than that of the columnar epithelial cell.

653. 9700_s18_qp_12 Q: 15

The formula shows how the rate of diffusion across a cell surface membrane can be calculated.

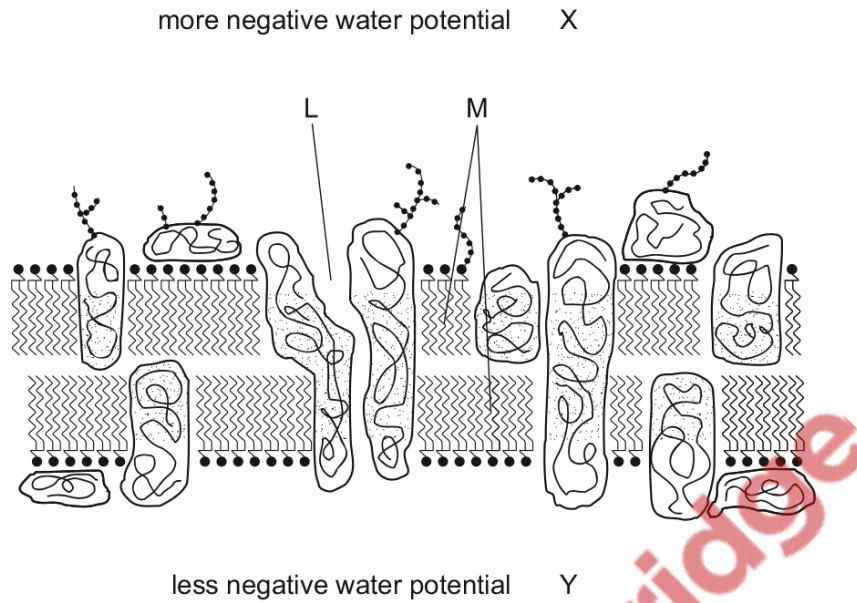
$$\frac{\text{surface area} \times \text{difference in concentration}}{\text{thickness of membrane}}$$

Which row shows how the fastest rate of diffusion can be achieved?

	surface area available	difference in concentration	thickness of membrane
A	high	high	high
B	high	high	low
C	low	high	low
D	low	low	high

654. 9700_s18_qp_12 Q: 16

The diagram shows part of the cell surface membrane of an active animal cell.



Which statements correctly describe the net movement of molecules across this membrane?

- 1 Oxygen diffuses through molecules M from X to Y.
- 2 Carbon dioxide diffuses through molecules M from X to Y.
- 3 Water moves from Y to X through molecule L.

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

655. 9700_s18_qp_12 Q: 17

Some epidermal cells from a well-watered plant are placed in three solutions which have different water potentials.

Which row correctly shows the state of the plant cells in each of the solutions?

	water potential of solution		
	lower than cells	equal to cells	higher than cells
A	plasmolysed	turgid	plasmolysed
B	plasmolysed	turgid	turgid
C	turgid	plasmolysed	plasmolysed
D	turgid	plasmolysed	turgid

656. 9700_s18_qp_13 Q: 4

When mucus is secreted from a goblet cell these events take place.

- 1 addition of carbohydrate to protein
- 2 fusion of the vesicle with the cell surface membrane
- 3 secretion of a glycoprotein
- 4 separation of a vesicle from the Golgi body

What is the sequence in which these events take place?

- A** 1 → 4 → 2 → 3
B 1 → 4 → 3 → 2
C 4 → 1 → 2 → 3
D 4 → 1 → 3 → 2

657. 9700_s18_qp_13 Q: 17

Which processes use energy in the form of ATP?

- 1 endocytosis
- 2 exocytosis
- 3 facilitated diffusion

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

658. 9700_w18_qp_11 Q: 17

The indicator cresol red changes from red to yellow when put into an acid.

Some blocks of agar containing cresol red were cut to different sizes and put in an acid. All other variables were kept constant. The blocks were measured in mm.

Which block became completely yellow most quickly?

- A** $3 \times 30 \times 30$ **B** $6 \times 6 \times 6$ **C** $6 \times 12 \times 12$ **D** $12 \times 12 \times 12$

659. 9700_w18_qp_11 Q: 18

When red blood cells are put into pure water they burst (haemolysis).

Which statements explain this haemolysis?

- 1 The water potential of the surrounding liquid is lower than the water potential of the contents of the red blood cell.
- 2 The cell surface membranes of red blood cells are not supported by cell walls.
- 3 More water moves into the red blood cells by osmosis than leaves the cells.
- 4 Water enters the red blood cells by osmosis but does not leave the cells.

A 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

660. 9700_w18_qp_12 Q: 18

The diagram shows a xylem vessel in a root and four adjacent parenchyma cells.

As water moves up the xylem vessel, it is replaced by water from cell **D**. Water in cell **D** is replaced by water in cell **C**, resulting in a flow of water from cell **A** to the xylem.

Which cell has the least negative water potential?



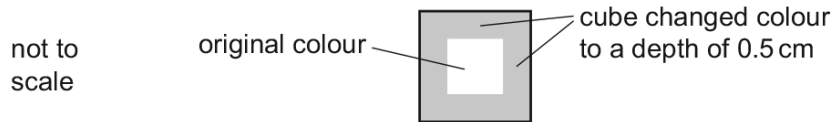
661. 9700_w18_qp_12 Q: 19

Agar cubes can be used to demonstrate the effect of changing surface area to volume ratio on diffusion.

Three different agar cubes made using a dilute acid were placed into an indicator solution that diffused into the cubes. When the indicator came into contact with the acid it changed colour.

The cubes were 1 cm^3 , 2 cm^3 and 3 cm^3 and were left in the indicator solution for 10 minutes. All other variables were kept the same. The results were recorded as diagrams.

The results for the 2 cm^3 cube are shown.



Which diagrams represent the results for the 1 cm^3 and the 3 cm^3 cubes?

not to scale

A cube changed colour completely 1 cm^3

B cube changed colour completely 1 cm^3

C cube changed colour to a depth of 0.25 cm 1 cm^3

D cube changed colour to a depth of 0.25 cm 1 cm^3

A cube changed colour to a depth of 0.5 cm 3 cm^3

B cube changed colour to a depth of 0.5 cm 3 cm^3

C cube changed colour to a depth of 1 cm 3 cm^3

D cube changed colour to a depth of 1 cm 3 cm^3

662. 9700_w18_qp_13 Q: 18

Which statement describes endocytosis?

- A movement across a membrane against the concentration gradient and requiring energy
 - B movement across a membrane down the concentration gradient using a carrier molecule
 - C movement across a membrane into a cell using a vesicle and requiring energy
 - D movement across a membrane using a vesicle and requiring no energy
-

663. 9700_w18_qp_13 Q: 19

An indicator is colourless in acid and pink in alkali.

In an experiment a petri dish of agar was prepared using an acidic solution of this indicator.

A disc of agar 1 cm in diameter was removed from the centre to create a well.

A white card showing circular marker lines 1 cm apart was placed underneath the petri dish.

1 cm³ alkali solution was put into the well in the agar and a stop-watch was started.

A circular disc of pink colour appeared and spread through the agar. It reached the first marker line in a short time but took longer to reach the second marker line and a very long time to reach the third marker line.

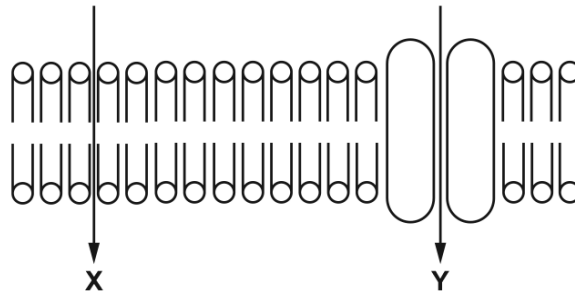
What explains these observations?

- A facilitated diffusion of alkali solution
 - B facilitated diffusion of the indicator
 - C simple diffusion of alkali solution
 - D simple diffusion of the indicator
-



664. 9700_m17_qp_12 Q: 19

The diagram shows two pathways, **X** and **Y**, through which molecules can diffuse across a cell surface membrane.



Which row correctly shows possible pathways for lipids, water and glucose?

	lipids	water	glucose
A	X only	X and Y	Y only
B	X only	Y only	Y only
C	X and Y	X only	X and Y
D	X and Y	X and Y	X only

665. 9700_s17_qp_11 Q: 18

What could happen to a typical bacterium when it is placed in surroundings which have a less negative water potential than that inside the cell?

- A** The bacterium will burst because the cell wall has no structural function.
- B** The bacterium will die since water leaves the cell by osmosis.
- C** There is no change because the cell wall is impermeable to water.
- D** There will be a net movement of water into the bacterium.

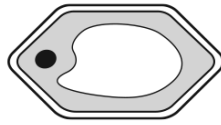
666. 9700_s17_qp_11 Q: 19

By which process do hydrogencarbonate ions leave red blood cells?

- A** active transport
- B** endocytosis
- C** facilitated diffusion
- D** phagocytosis

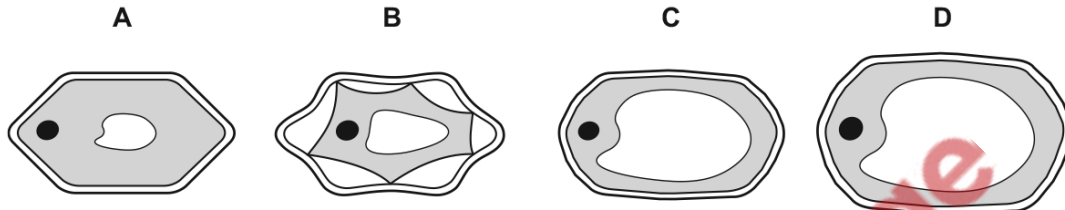
667. 9700_s17_qp_12 Q: 14

The diagram shows a plant cell.



The plant cell is put into a solution with a water potential less negative than the cell contents.

What will happen to the appearance of the cell?



668. 9700_s17_qp_13 Q: 13

Which row is correct for facilitated diffusion of molecules or ions into a cell?

A	ATP required	movement against the concentration gradient	membrane protein required
B	ATP required	movement down the concentration gradient	membrane protein not required
C	ATP not required	movement against the concentration gradient	membrane protein not required
D	ATP not required	movement down the concentration gradient	membrane protein required

669. 9700_w17_qp_13 Q: 17

Which of these processes allow movement in both directions across cell surface membranes?

- 1 active transport
- 2 diffusion
- 3 facilitated diffusion
- 4 osmosis

A 1, 2, 3 and 4 **B** 1 and 4 only **C** 2 and 3 only **D** 2 only

670. 9700_w17_qp_13 Q: 19

Which row describes osmosis across a cell surface membrane?

	molecule moved	uses energy from ATP	moves molecule down a concentration gradient
A	solute	✓	✓
B	solute	✓	✗
C	solvent	✗	✓
D	solvent	✗	✗

key

✓ = correct

✗ = incorrect

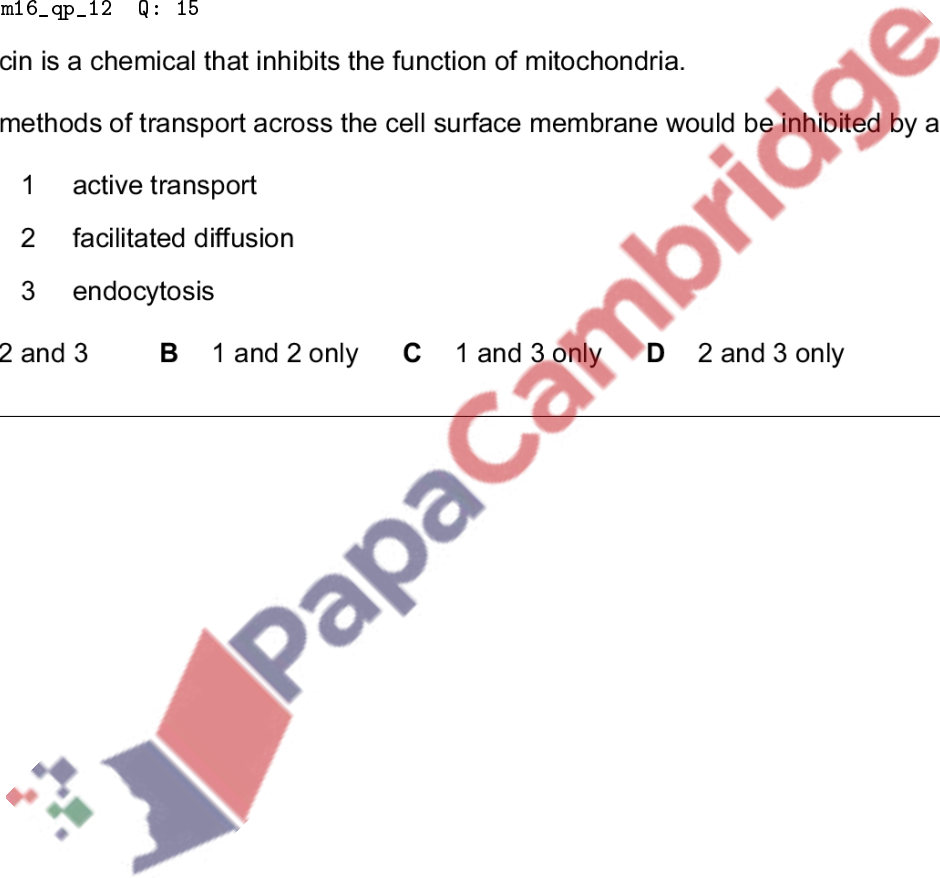
671. 9700_m16_qp_12 Q: 15

Antimycin is a chemical that inhibits the function of mitochondria.

Which methods of transport across the cell surface membrane would be inhibited by antimycin?

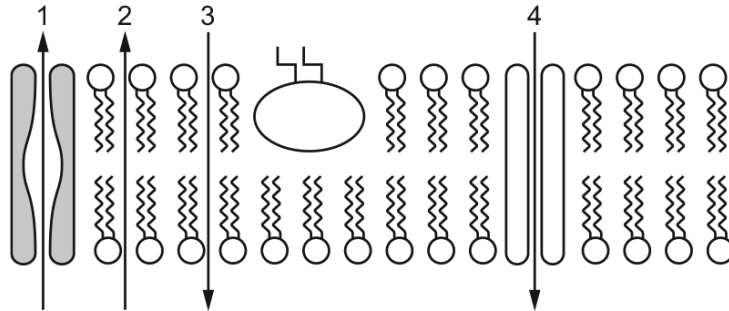
- 1 active transport
- 2 facilitated diffusion
- 3 endocytosis

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



672. 9700_s16_qp_11 Q: 15

The diagram represents a cell surface membrane of a metabolically active cell and the direction of movement of some molecules through the membrane.



Which row shows a process by which the molecules may be moving through the membrane at each of the points 1, 2, 3 and 4?

	1	2	3	4
A	carbon dioxide by diffusion	water by osmosis	glucose by diffusion	sodium ions by active transport
B	fatty acids by diffusion	oxygen by diffusion	carbon dioxide by diffusion	water by osmosis
C	sodium ions by active transport	carbon dioxide by diffusion	water by osmosis	glucose by facilitated diffusion
D	water by osmosis	oxygen by diffusion	fatty acids by diffusion	glucose by active transport

673. 9700_s16_qp_11 Q: 16

Batrachotoxin is a poison found in frogs in the Columbian jungle. The poison is used by Native Indians to produce poison darts.

The poison works by **increasing** the permeability of some cell surface membranes to sodium ions, which move out of the cells.

Which statements are **correct** for cells affected by batrachotoxin?

- 1 The intracellular fluid has a less negative water potential than the extracellular fluid.
- 2 The extracellular fluid has a less negative water potential than the intracellular fluid.
- 3 Water leaves the cells by osmosis, causing the cells to shrink.
- 4 Water enters the cells by osmosis, causing the cells to swell.

A 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

674. 9700_s16_qp_12 Q: 14

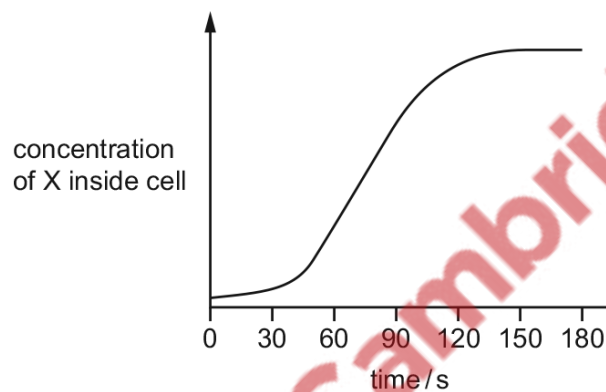
Which statements about active transport are **always** correct?

- 1 It does not require a membrane.
- 2 It occurs against the concentration gradient.
- 3 It moves oxygen molecules.

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

675. 9700_s16_qp_12 Q: 15

There is a high concentration of molecule X outside the cell which enters the cell by facilitated diffusion. The results of measuring the concentration of X inside the cell at 30s intervals are shown by the graph.



Why does the concentration of X inside the cell remain constant after 150s?

- 1 There is no more of X outside the cell.
- 2 The number of carrier proteins is limiting.
- 3 There is no net movement of X.

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

676. 9700_s16_qp_13 Q: 16

Which statements about endocytosis are correct?

- 1 It is a process requiring energy in the form of ATP.
- 2 Phagocytosis is a form of endocytosis.
- 3 Substances brought into a cell by endocytosis are enclosed in a small vacuole.

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

677. 9700_w16_qp_11 Q: 16

Which statements about the proteins in cell surface membranes are correct?

- 1 They can be involved in active transport and facilitated diffusion.
- 2 They can be involved in antigen recognition.
- 3 They have hydrophilic R groups to interact with the inner portion of the membrane.

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

678. 9700_w16_qp_12 Q: 16

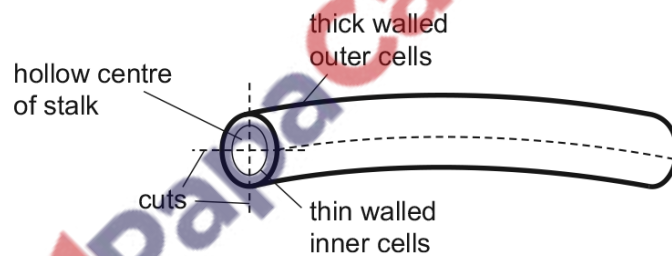
Which observations support a link between active transport and ATP production?

- 1 Active transport occurs only in living cells.
- 2 The rate of active transport decreases in low oxygen concentrations.
- 3 Companion cells have large numbers of mitochondria.

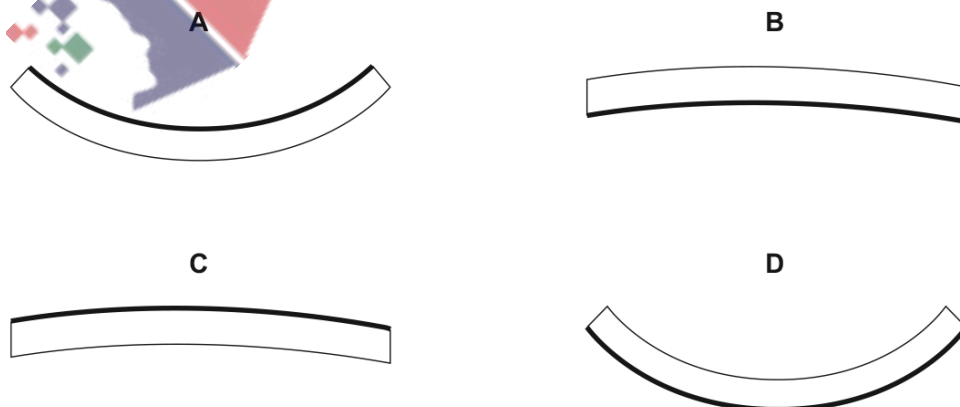
A 1, 2 and 3 **B** 1 and 2 only **C** 2 and 3 only **D** 3 only

679. 9700_w16_qp_12 Q: 18

The stalk of a dandelion flower is a hollow tube. Pieces of the stalk are cut as shown 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?



680. 9700_w16_qp_13 Q: 15

The following are all processes by which substances can enter a cell.

- 1 endocytosis
- 2 facilitated diffusion
- 3 osmosis

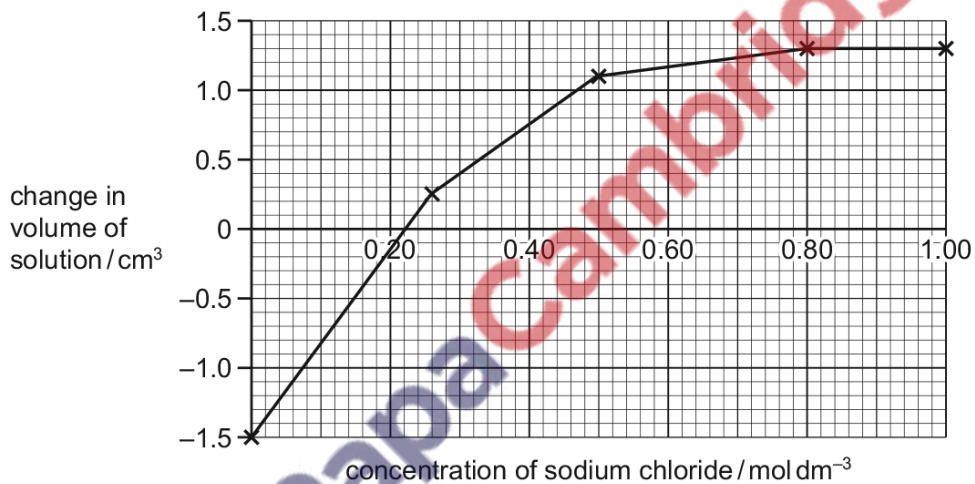
Which processes are passive?

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

681. 9700_w16_qp_13 Q: 16

Equal volumes of five concentrations of sodium chloride solution were placed into five containers. An identical piece of plant tissue was placed into each container and left for 48 hours.

The plant tissues were removed and the volumes of the sodium chloride solution were accurately measured. The results are shown below.



Which statements explain the results from 0.80 to 1.00 mol dm⁻³ sodium chloride?

- 1 There was no net movement of water into or out of the plant tissues.
- 2 The plant root tissues had a water potential of zero.
- 3 The plant tissues were fully plasmolysed.

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

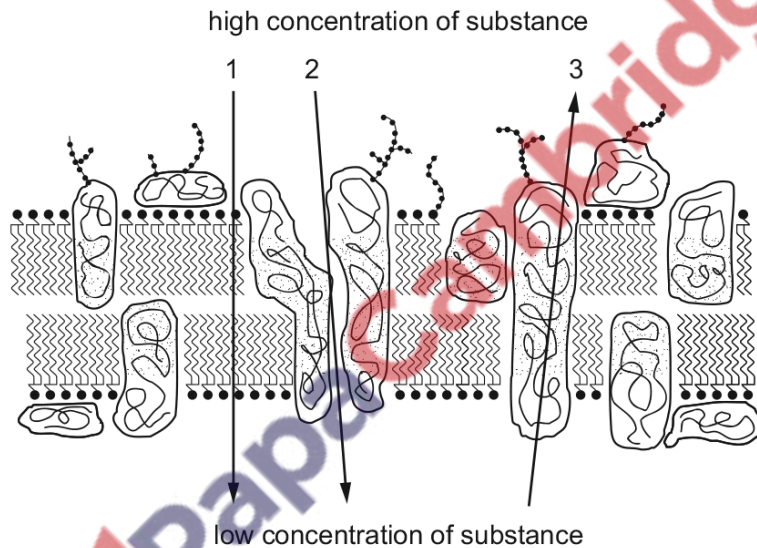
682. 9700_s15_qp_12 Q: 15

Which description of cell surface membrane permeability is correct?

- A** An increase in the concentration of cholesterol molecules in the cell surface membrane can increase its permeability to hydrophilic substances.
- B** Cell surface membrane permeability to large hydrophilic molecules is high and can be increased by membrane transport proteins involved in facilitated diffusion.
- C** The permeability of the cell surface membrane to ions is increased with an increase in the proportion of saturated fatty acids in the phospholipids.
- D** Without the presence of carrier and channel membrane proteins, the cell surface membrane has a low permeability to large polar molecules.

683. 9700_s15_qp_12 Q: 16

The diagram represents a cell surface membrane.



Three pathways through the membrane are shown.

Which process is represented by each arrow?

	1	2	3
A	active transport	diffusion	facilitated diffusion
B	diffusion	active transport	facilitated diffusion
C	diffusion	facilitated diffusion	active transport
D	facilitated diffusion	diffusion	active transport

684. 9700_s15_qp_13 Q: 15

What supports the view that a membrane protein is involved in active transport?

- A It allows movement of molecules across a membrane if concentration differences exist.
- B It can only function if mitochondria are supplied with sufficient oxygen.
- C It has a tertiary structure with a binding site with a specific shape.
- D It is found in the cell surface membranes and the mitochondrial membranes.

685. 9700_w15_qp_11 Q: 3

Which process occurs in a mature red blood cell?

- A active transport
- B cell division
- C transcription
- D translation

686. 9700_w15_qp_11 Q: 16

The statements are comparisons of endocytosis and exocytosis.

- Both are mechanisms that involve vesicles or vacuoles and the transport of materials across the cell surface membrane.
- Both mechanisms occur to allow bulk transport across the cell surface membrane.
- Endocytosis involves taking materials into the cell whereas exocytosis involves the release of materials from the cell.
- Some of the cell surface membrane is lost when endocytosis occurs and there is an increase in the cell surface membrane when exocytosis occurs.

How many of the statements are correct?

- A 1
- B 2
- C 3
- D 4

687. 9700_w15_qp_12 Q: 15

Which descriptions are correct for transport across cell surface membranes?

	active processes	passive processes
A	active transport	exocytosis and osmosis
B	endocytosis and exocytosis	facilitated diffusion and osmosis
C	exocytosis and active transport	osmosis and endocytosis
D	facilitated diffusion and exocytosis	endocytosis and diffusion

688. 9700_w15_qp_12 Q: 16

The stages of an investigation using plant tissue are listed below.

- A freshly cut slice of plant tissue was rinsed in distilled water, dried and weighed.
- This slice was placed in a solution with a water potential of -4 arbitrary units for thirty minutes.
- The slice was removed from the solution, dried and reweighed.
- The mass of the slice was the same as its original mass.

Which conclusions can be drawn from this investigation?

- 1 The water potential of the cells of the plant tissue is -4 arbitrary units.
- 2 The cell sap of the plant tissue has a lower water potential than the surrounding solution.
- 3 There has been no net movement of water.
- 4 The cell wall of the plant tissue will not be in contact with the cell membrane.

- A** 1 and 2 **B** 1 and 3 **C** 2 and 4 **D** 3 and 4

689. 9700_w15_qp_12 Q: 17

What explains the effect on a red blood cell of being placed into pure water?

- A** Less water leaves the cell than enters it, so the cell shrinks.
- B** More water enters the cell than leaves it, so the cell swells and bursts.
- C** Water enters the cell and none leaves it, so the cell swells and bursts.
- D** Water enters the cell and more leaves it, so the cell shrinks.

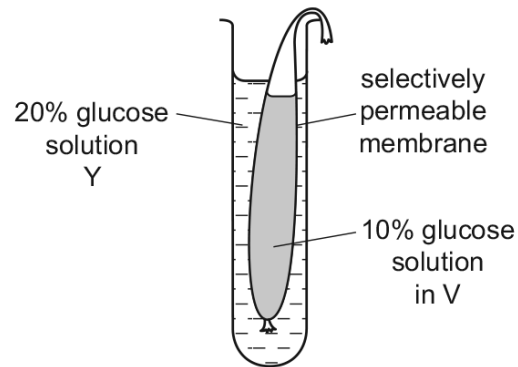
690. 9700_w15_qp_13 Q: 15

Which descriptions are correct about transport across cell surface membranes?

	active processes	passive processes
A	active transport	exocytosis and osmosis
B	active transport and exocytosis	endocytosis and diffusion
C	endocytosis and exocytosis	diffusion and osmosis
D	exocytosis and active transport	osmosis and endocytosis

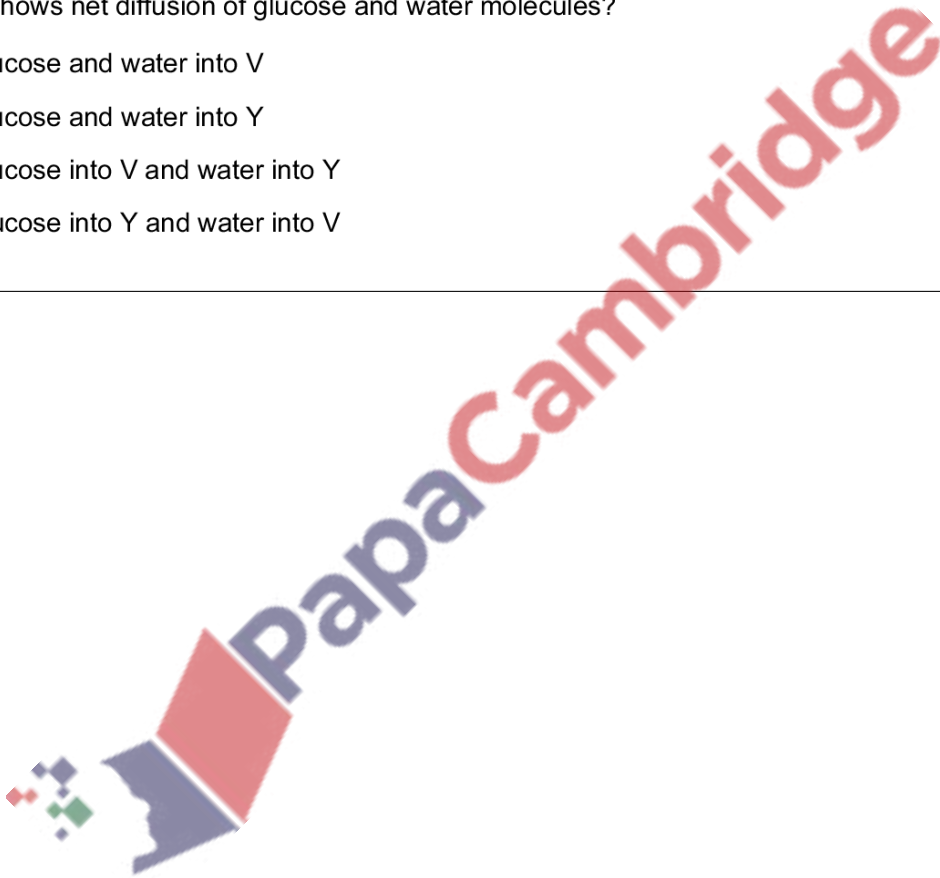
691. 9700_w15_qp_13 Q: 17


The diagram shows apparatus set up to investigate diffusion.



What shows net diffusion of glucose and water molecules?

- A glucose and water into V
- B glucose and water into Y
- C glucose into V and water into Y
- D glucose into Y and water into V



A large, semi-transparent watermark of the PapaCambridge logo is oriented diagonally across the page. The logo consists of a stylized 'P' made of colored squares (red, blue, green) followed by the text 'PapaCambridge' in a bold, sans-serif font.