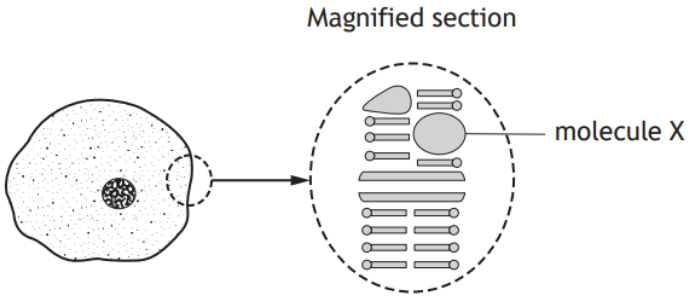
Passive & Active Transport

1. The diagram shows a cell with a section of the cell membrane magnified.



Molecule X is

A phospholipid
B protein
C cellulose
D starch.

2. The following statements relate to the transport of molecules across membranes:

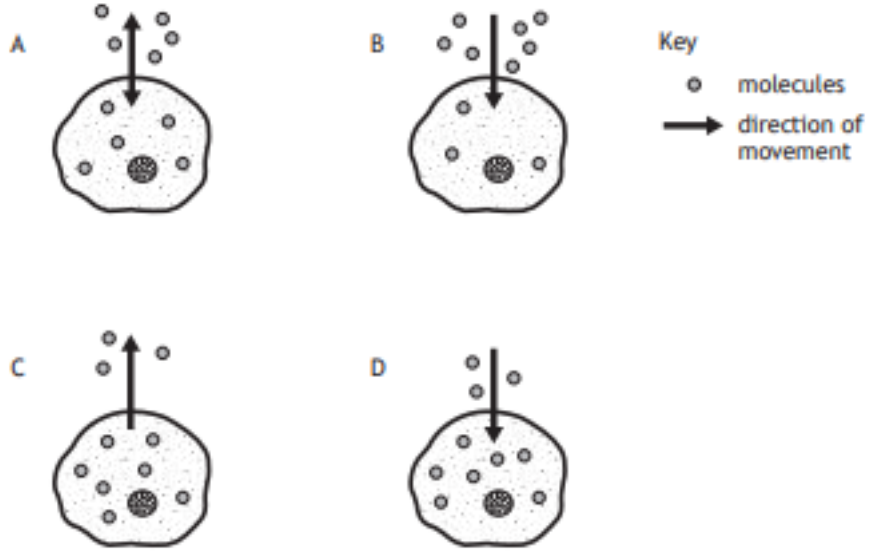
1. Energy is required.
2. Molecules move from an area of high concentration to an area of low concentration.
3. Membrane proteins are involved.

Which of the statements apply to active transport?

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

3. The diagrams represent the movement of molecules across a cell membrane.

Which cell would require the greatest number of mitochondria to allow the movement shown?



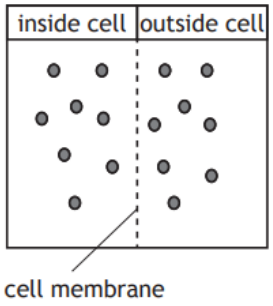
4. Which line in the table below identifies the direction of diffusion of the three substances during muscle contraction?

	Substance		
	Glucose	*Oxygen*	*Carbon dioxide*
A	out	out	in
B	in	out	in
C	out	in	out
D	in	in	out

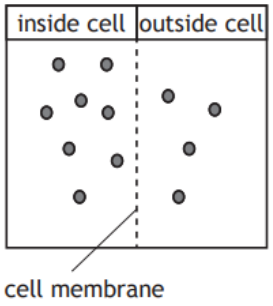
Passive & Active Transport

5. In the diagrams below, the circles represent molecules on either side of a cell membrane. In which of these diagrams would the molecules move into a cell by diffusion?

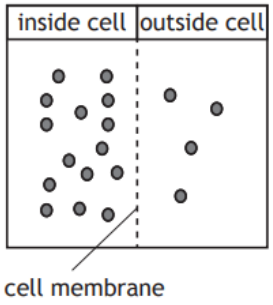
A



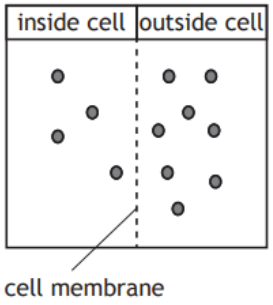
B



C



D

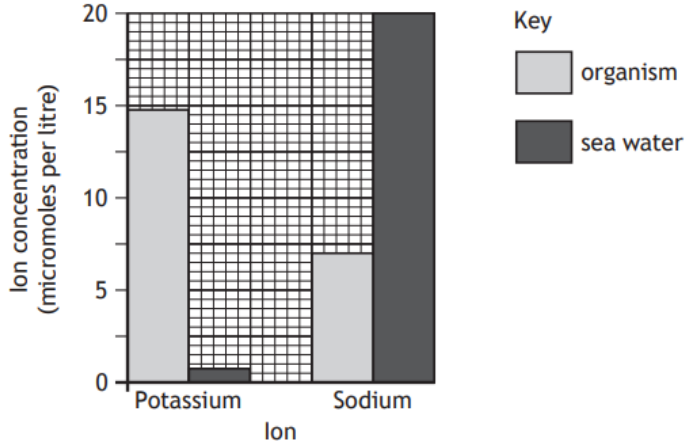


6. Glucose molecules in low concentration in the kidney have to be moved into the bloodstream, where there is a higher concentration of glucose.

The process responsible for this action is

A osmosis
B diffusion
C passive transport
D active transport.

7. The graph shows the concentrations of ions in a single-celled organism and the sea water surrounding it.



Use the graph to identify which of the following statements is correct.

A Sodium ions will move into the organism by active transport.
B Sodium ions will move out of the organism by diffusion.
C Potassium ions will move out of the organism by active transport.
D Potassium ions will move into the organism by active transport.

8. The cells of seaweed which actively absorb iodide ions from sea water would be expected to have large numbers of

A chloroplasts
B mitochondria
C ribosomes
D vacuoles.

Passive & Active Transport

9. The table below shows the concentrations of three ions found in sea water and in the sap of the cells of a seaweed.

	Ion concentrations ($mg\ l^{-1}$)		
	potassium	*sodium*	*chloride*
sea water	0·01	0·55	0·61
cell sap	0·57	0·04	0·60

Which of the following statements is supported by the data in the table?

A Potassium and sodium ions are taken into the cell by active transport.

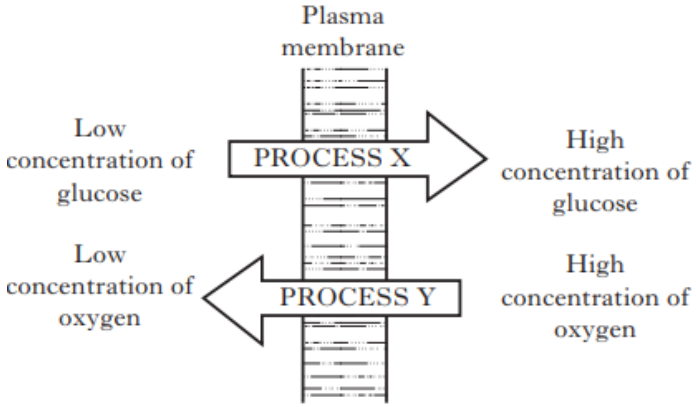
B Potassium and chloride ions are removed from the cell by diffusion.

C Sodium ions are removed from the cell by active transport.

D Chloride and sodium ions are removed from the cell by diffusion.

6 .

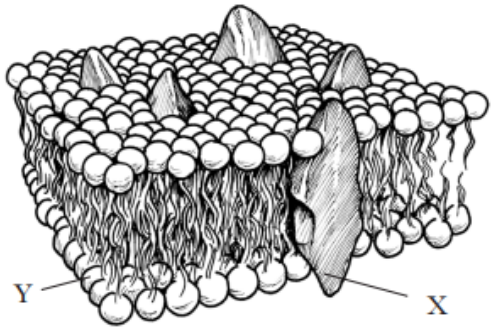
10. The diagram below refers to the plasma membrane of an animal cell.



Identify the two processes X and Y.

	X	*Y*
A	active transport	diffusion
B	diffusion	active transport
C	respiration	diffusion
D	active transport	respiration

11. The diagram below shows the arrangement of molecules in part of a cell membrane.



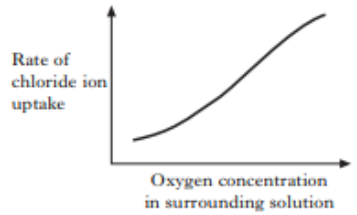
What types of molecule are represented by X and Y?

	X	*Y*
A	Phospholipid	Protein
B	Protein	Phospholipid
C	Protein	Carbohydrate
D	Carbohydrate	Protein

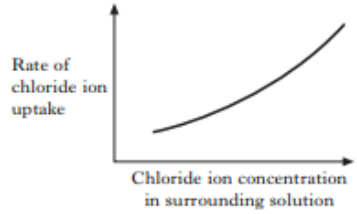
Passive & Active Transport

12. The graphs show the effect of various factors on the rate of active transport of chloride ions by discs of carrot tissue from their surrounding solution.

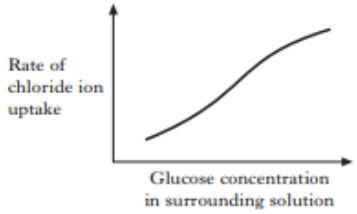
1



2



3



Which graphs support the hypothesis that chloride ion uptake by carrot tissue involves active transport?

A 1 and 2 only

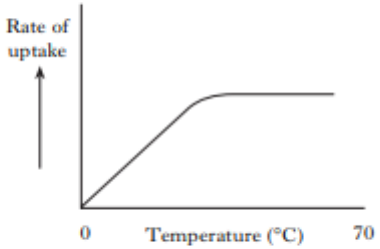
B 1 and 3 only

C 2 and 3 only

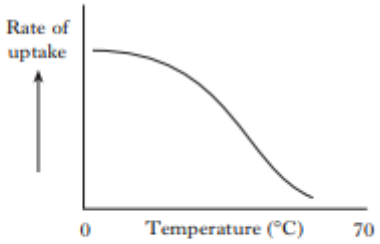
D 1, 2 and 3

13. Which graph best illustrates the effect of increasing temperature on the rate of active uptake of ions by roots?

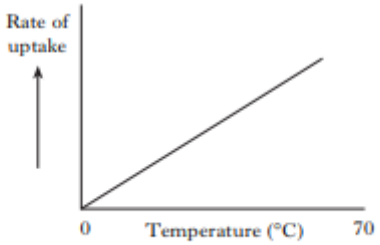
A



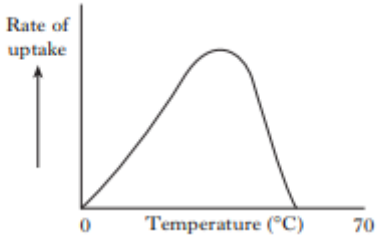
B



C

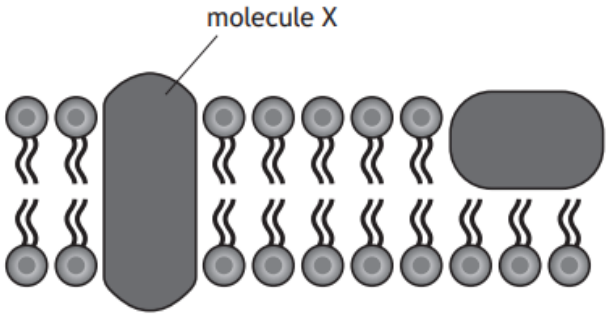


D



Passive & Active Transport

1. The diagram shows a section of a cell membrane.



. Molecule X is involved in active transport.

Name this type of molecule.

_____

2. Plants transport water and mineral ions from their roots to the leaves.

(a) Mineral ions can move from the soil to the root cells by active transport.

Describe the process of active transport.

_____

_____

_____

(b) Water enters a plant by osmosis, which is an example of passive transport.

State what this means in terms of the energy required for osmosis.

_____

3. Ions move in and out of cells by passive and active processes.

The table shows the concentration of three ions outside and inside a human cell.

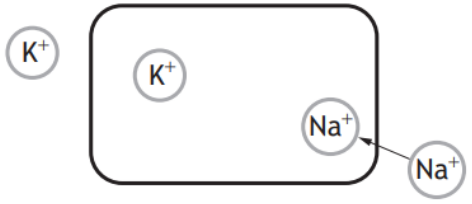
Ions	Outside cell (mM)	Inside cell (mM)
Sodium (Na^+)	145	12
Potassium (K^+)	4	139
Chloride (Cl^-)	116	4

(a) Name the process by which sodium ions move into this cell. **1**

_____

(b) (i) Potassium ions (K^+) move by active transport. **1**

Using the information in the table, complete the diagram, by drawing an arrow, to show the direction in which the potassium ions move.



(ii) Name the type of molecule, found in a cell membrane, which is involved in moving ions by active transport. **1**

_____

5.

Passive & Active Transport

4a). State a feature of the cell membrane which allows the movement of only some substances into the cell. **1**

b) Changes in the cells were due to osmosis.

Explain why osmosis is described as a passive process. **1**

5. 1 Name a process, other than osmosis, which allows molecules to pass through the cell membrane.

2 Give a definition of the process chosen.

6. The movement of molecules in or out of cells can be by passive or active transport.

Describe **one** difference between passive and active transport. **1**

7. The table below shows the rate of potassium ion uptake by active transport in cells growing in culture at different oxygen concentrations .

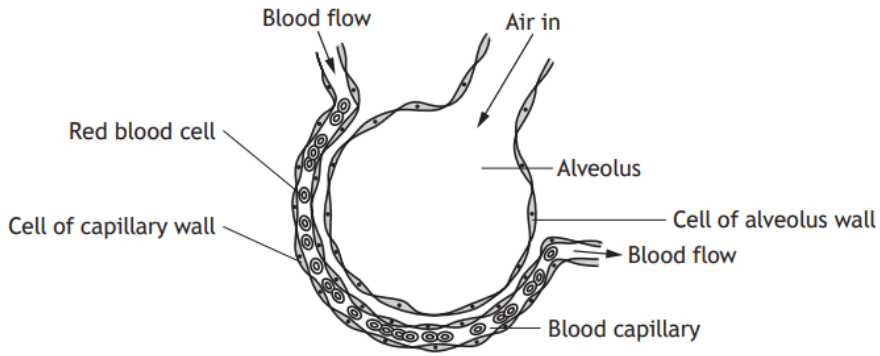
Oxygen concentration (%)	*Rate of potassium ion uptake by animal cells* (units per minute)
0	2
1	24
2	42
3	58
4	65
5	65

Explain the effect of increasing oxygen concentration on the active transport of potassium ions by the cells.

5.

Passive & Active Transport

8 The diagram shows a site of gas exchange in the lungs.



The table shows the relative concentration of oxygen, carbon dioxide and water in three cell types.

	Relative concentration of substances		
Cell Type	*Oxygen*	*Carbon dioxide*	*Water*
Red blood cell	low	high	medium
Cell of capillary wall	medium	medium	medium
Cell of alveolus wall	high	low	medium

(a) (i) Describe the pathway that oxygen would take when moving between these cell types. 1

_____

_____

(ii) Explain why oxygen moves along this pathway. 1

_____

_____

(b) Osmosis would not occur between the cells of the capillary wall and the cells of the alveolus wall. 1

Using the information provided, explain why this is the case.

_____

_____

9 The grid contains information about the plasma membrane and the cell wall.

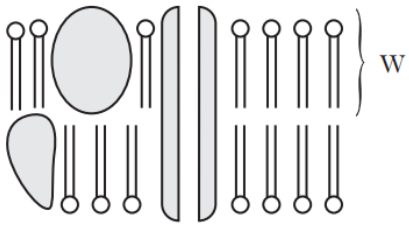
A contains phospholipid	**B** fully permeable	**C** made of fibres
D contains cellulose	**E** selectively permeable	**F** made up of two layers

Two of the boxes contain information about the **structure** of the plasma membrane.

Identify these **two** boxes.

Letters _____ and _____ 1

10. The diagram below shows molecules in the plasma membrane.



Name molecule W.

_____ 1

Passive & Active Transport

11 The following sentences give information about the plasma membrane of beetroot cells.

Underline one alternative in each pair to make the sentences correct.

The plasma membrane contains { cellulose / protein } and { phospholipids / carbohydrate }

As a result, the membrane is { fully / selectively } permeable.

12 Experiments were carried out to investigate the hypothesis that the uptake of ions into mammalian cells takes place by active transport. *MARK*

The concentrations of potassium ions and chloride ions inside and outside a mammalian cell were measured.

The table shows the results obtained at an oxygen concentration of 4·0 units.

Ion	*Ion concentration inside cell* (mM)	*Ion concentration outside cell* (mM)
Potassium	140	5
Chloride	10	110

(i) Describe the information shown in the table that supports the original hypothesis.

_____

_____

_____ **1**

13 (i) Name **two** chemical components of the plasma membrane.

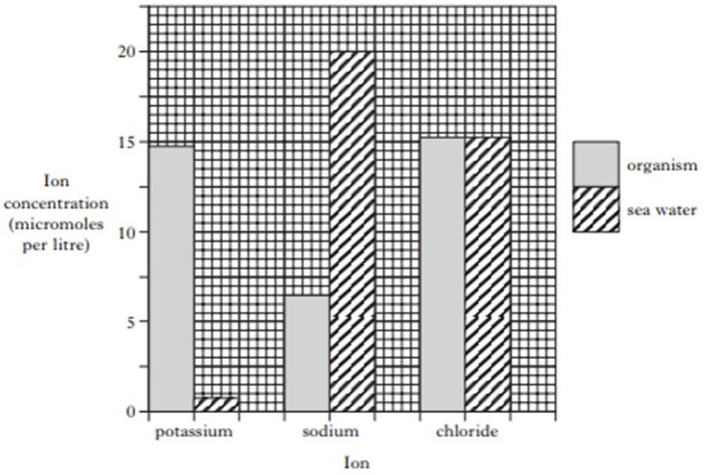
1 _____

2 _____ **1**

(ii) Give a property of the plasma membrane which is related to its role in osmosis.

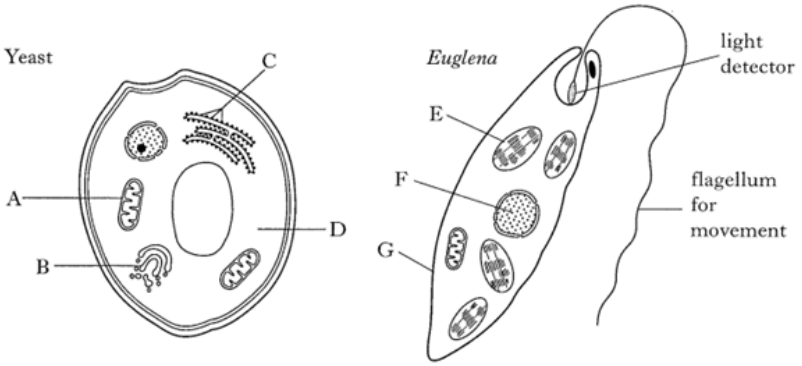
_____ **1**

14. The chart shows the concentration of ions within a unicellular organism and in the sea water surrounding it.



Name the ion(s) that move into the organism by active transport.

Potassium ☐ Sodium ☐ Chlorine ☐

15. 

Name the **two** chemical components of structure G.

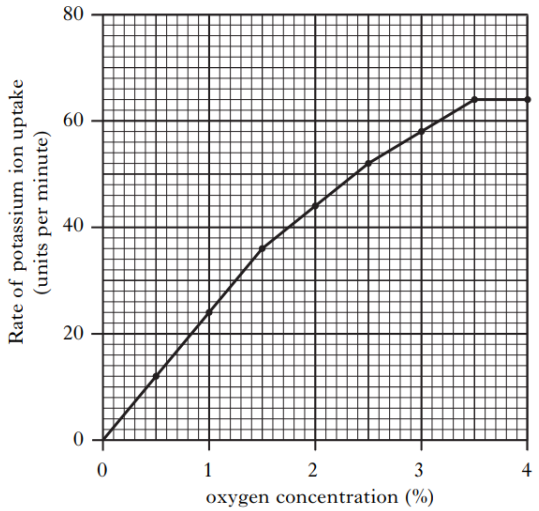
1 _____

2 _____

5.

Passive & Active Transport

16. The graph shows the rate of potassium ion uptake by active transport in human liver cells at different oxygen concentrations at 30 °C.



a) When the experiment was repeated at 20 °C, the potassium ion uptake decreased. Explain this observation.

_____

_____

_____

_____ **2**

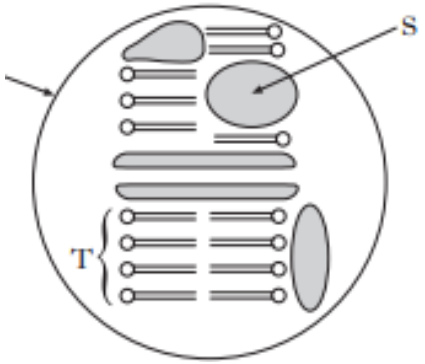
b) Suggest a reason why the graph levels off at oxygen concentrations above 3·5%.

_____

_____ **1**

17

magnified section of plasma membrane



Identify molecules S and T.

S _____ **1**

T _____ **1**

18 Some liver cells take up glucose from the blood by the process of diffusion.

Describe this process.

_____

_____ **1**

5.

Passive & Active Transport Answer

1. B

2. B

3. D

4. D

5. D

6. D

7. D

8. B

9. C

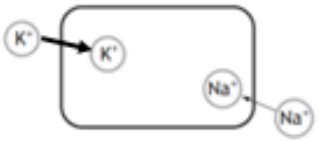
10 A

11. B

12. B

13. D

1. Protein

2.a) movement of molecules/iions 

from low to high concentration /against concentration gradient

b) no ATP required

3. (a) Passive transport b (i) (ii) protein

4a) selectively permeable b) does not require ATP

5 active transport/diffusion

Diffusion : movement of molecules from high concentration to low concentration/ down the concentration gradient

Active Transport: molecule of molecules/ions from low concentration to high concentration/against the concentration gradient

6. Active transport require ATP and passive transport does not require ATP. **OR**

Active transport moves ions from low to high concentration/against the concentration gradient whereas passive transport moves molecules from high to low concentration/down the concentration gradient

5.

Passive & Active Transport Answer

7. More aerobic respiration (1 mark)

   More ATP produced for active transport (1 mark)

8 a (i) From cell of alveolus wall to cell of capillary wall to red blood cell

   (ii) Move molecule from a higher concentration to a lower concentration OR Move molecules down a concentration gradient

   b) There is no concentration gradient/difference in concentration

9 A & F (E is also correct but NOT about structure. E is function)

10. phospholipid

11. protein phospholipid selectively

12. Potassium ions go from 5mM outside cell to 140mM inside cell

13. (ii) protein & phospholipid (ii) selectively

14. sodium only

15. protein & phospholipid

16 a) Less enzymes activity (1 mark)

   Less aerobic respiration OR less ATP produced needed for active transport (1 mark)

b) maximum rate of active transport OR no more molecules to be moved across the membrane OR run out of glucose for respiration

17. S = protein T = phospholipid

18. Movement of (glucose) molecules from high to low concentration/down a concentration gradient