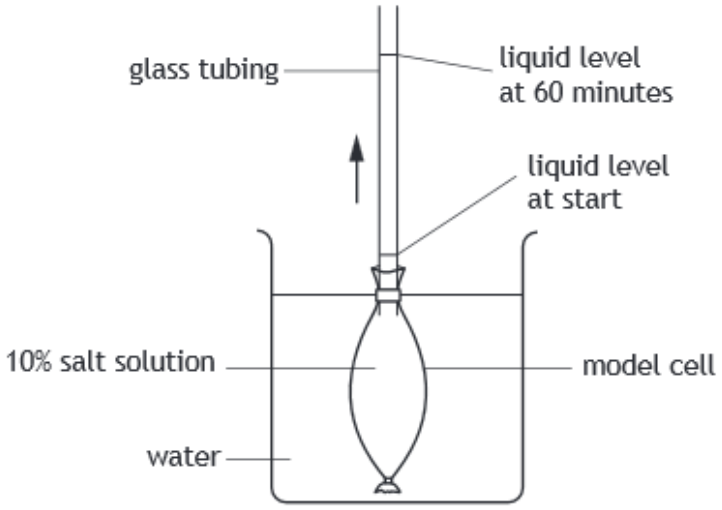
Transport Across Cell Membranes

2. 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

2. The apparatus shown below was used to investigate the movement of water into and out of a model cell. The model cell had a selectively permeable membrane.



The liquid level in the glass tubing was measured every 10 minutes for 60 minutes.

The results are shown in the table below.

Time (minutes)	*Liquid level* (mm)
0	10
10	22
20	32
30	40
40	48
50	56
60	64

(a) Name the process which caused the liquid level to rise. **1**

_____

(b) Explain how this process caused the liquid level to rise. **2**

_____

_____

_____

(c) Calculate the average rate of movement of liquid in the glass tubing. **1**

Space for calculation

_____ mm per minute

(d) When the investigation was repeated, the average rate of movement of liquid was slower.

Suggest **one** difference in the way that the investigation was set up that could have caused this change in results. **1**

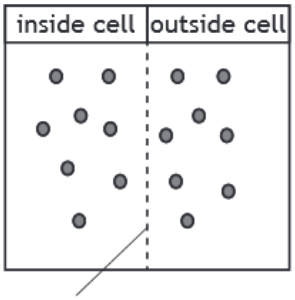
_____

_____

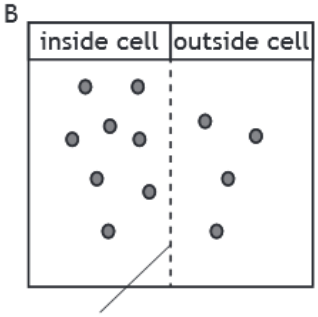
Total marks 5

1. 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?

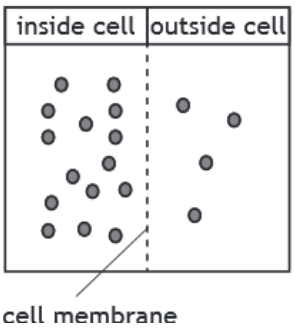
A



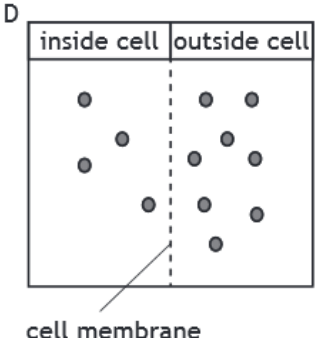
B



C

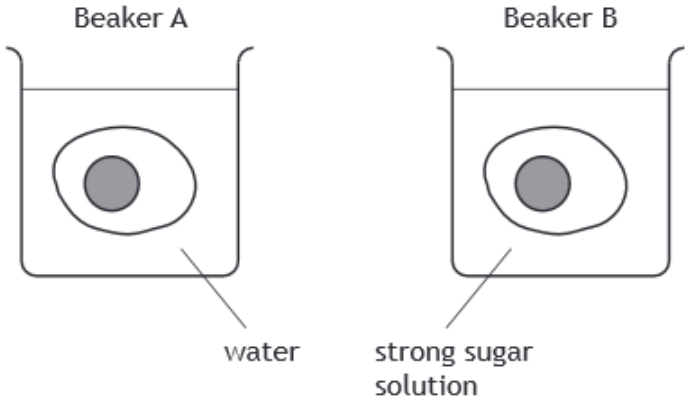


D



2. (a) Shells can be removed from eggs by dissolving them in vinegar for 2–3 days. The egg contents remain inside a thin membrane.

In an investigation the shells from two eggs were removed. The eggs were then weighed and placed in beakers as shown below.



After 2 hours the eggs were removed from the beakers, blotted dry and reweighed. The results are shown in the following table.

Beaker	*Mass at start* (g)	*Mass after 2 hours* (g)	*Percentage change in mass*
A	54·0	67·5	
B	52·1	47·8	−8·2

(i) Complete the table by calculating the percentage change in mass for beaker A. **1**

Space for calculation

(ii) Suggest why the eggs were blotted dry before being reweighed. **1**

(iii) Choose either beaker A or B and explain how osmosis caused the change in mass of the eggs in that beaker. **2**

Beaker _____

Explanation _____

_____

_____

(b) 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**

_____

_____

2. Four cylinders of potato tissue were weighed and each was placed into a salt solution of a different concentration.

The cylinders were reweighed after one hour and the results are shown below.

Salt Solution	*Initial mass of potato cylinder* (g)	*Final mass of potato cylinder* (g)
A	10·0	7·0
B	10·0	9·4
C	10·0	11·2
D	10·0	12·6

In which salt solution would most potato cells be plasmolysed?

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

_____

(b) Osmosis is a process which can occur across the cell membrane.

(i) Choose either the leaf cell or red blood cell by ticking (✓) one of the boxes below.

Describe the effect of osmosis on this type of cell if it was placed in pure water. **1**

Leaf cell ☐ Red blood cell ☐

Effect on the cell _____

_____

(ii) 1 Name a process, other than osmosis, which allows molecules to pass through the cell membrane. **1**

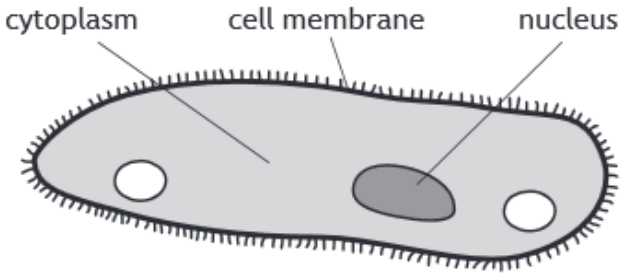
_____

2 Give a definition of the process chosen. **1**

_____

1. *Paramecium* is a single-celled organism which lives in fresh water.

The following diagram shows some of its structures.



(a) (i) Choose one of the following structures by ticking (✓) one of the boxes and describe its function. **1**

Cytoplasm ☐ Cell membrane ☐ Nucleus ☐

Function _____

_____

(ii) The water concentration outside the paramecium is higher than the water concentration of the cytoplasm. This causes the diffusion of water into the cell.

Name this movement of water. **1**

_____

(b) Name the structure present in a plant cell which prevents it from bursting when full of water. **1**

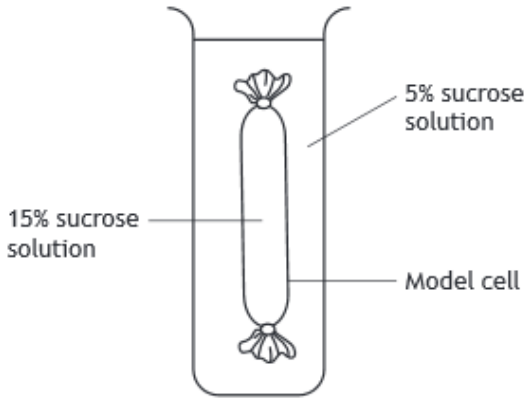
_____

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 diagram shows an experiment in which a model cell was placed in a sucrose solution.



At the start of the experiment the model cell weighed 25 g and at the end it weighed 30 g.
What was the percentage increase in mass?

A 5·0%
B 16·7%
C 20·0%
D 83·3%

3. 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

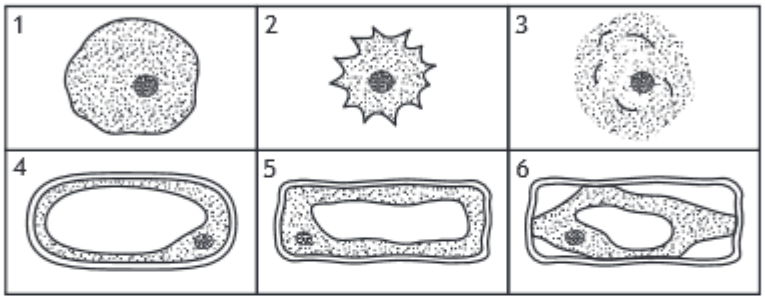
B diffusion

C passive transport

D active transport.

2. A student examined plant and animal cells using a microscope.

The animal and plant cells were placed in solutions of different salt concentrations. After several minutes a sample of cells was taken from each solution and examined. One cell from each solution is shown.



(a) Changes in the cells were due to osmosis.

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

_____

_____

(b) Identify the animal cell shown which had been placed in a solution of higher salt concentration than its cell contents. **1**

Cell number _____

(c) State the term used to describe the condition of cell 6. **1**

_____

(d) Cells 3 and 4 had been placed in solutions which were both of the same concentration.

Explain why the results observed were different. **2**

_____