1 A student wants to investigate osmosis using potato tissue.

(a) What is meant by the term **osmosis**?

(3)

(b) The student puts 90 cm^3 of glucose solution of different concentrations into six different plastic cups. He then puts one raw potato chip into each cup. The diagram shows one of the plastic cups.

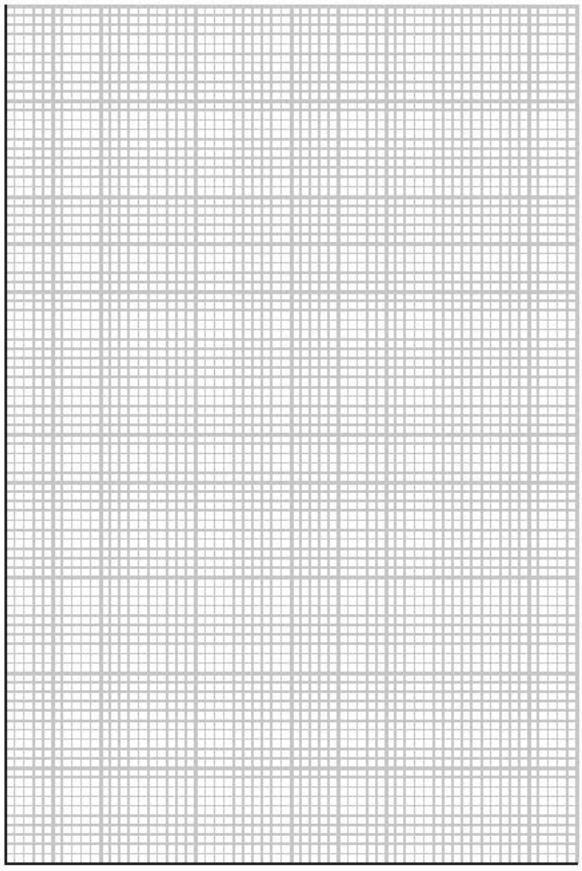


The potato chips were all the same mass and shape at the start of the investigation. After 12 hours the chips are removed and the volume of solution in the plastic cups is measured. The table shows the results.

Cup	Concentration of glucose solution in plastic cup in mol/dm^3	Volume of solution at start in cm^3	Volume of solution in cup after 12 hours in cm^3
1	0.0	90	84
2	0.2	90	88
3	0.4	90	93
4	0.6	90	95
5	0.8	90	95
6	1.0	90	95

(i) Use the information in the table to plot a graph on the grid to show the volume of solution remaining in the cup after 12 hours in each concentration of glucose. Use a ruler to join your points with straight lines.

(5)



(ii) Use your graph to estimate the concentration of the cytoplasm in the potato cells.

(1)

concentration ..... mol/dm^3

(iii) Complete the table by ticking the boxes to show the cups in which the potato chips lost water.

(1)

Cup	1	2	3	4	5	6
Tick						

(c) (i) Name the independent variable in this investigation.

(1)

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(ii) Name a controlled variable in this investigation.

(1)

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(iii) Suggest two reasons why the volume of solution measured by the student may not be accurate.

(2)

1 .....

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2 .....

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(iv) Suggest a piece of apparatus that could be used to give a precise measurement of the volume of the solution left in each cup.

(1)

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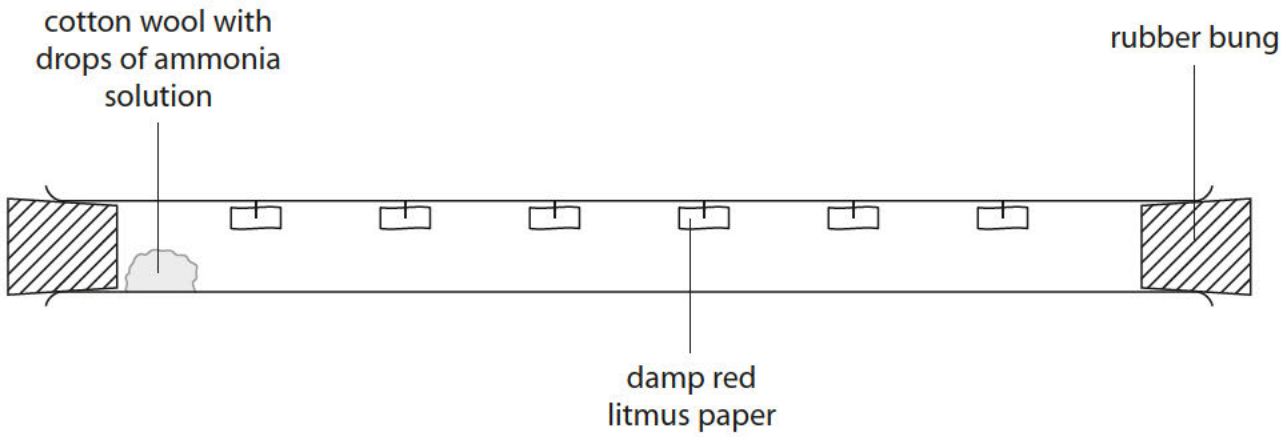
(Total for Question = 15 marks)

2 Lily investigated the effect of concentration of a substance on the rate of diffusion.

In a fume cupboard she set up a glass tube with small squares of damp red litmus paper spaced at 4 cm intervals along its length.

She added 1 drop of ammonia solution to some cotton wool and used tweezers to place the cotton wool at one end of the tube. She closed the tube with a bung. She timed how long it took for each square of litmus paper to change colour.

She then set up an identical tube and repeated the experiment, but this time she used 3 drops of ammonia solution.



Her results are shown in the table.

Number of drops of ammonia solution	Time taken for litmus paper to change colour in seconds					
	4 cm	8 cm	12 cm	16 cm	20 cm	24 cm
1	7	13	19	26	32	37
3	3	7	10	13	16	20

(a) Describe what is meant by the term **diffusion**.

(2)

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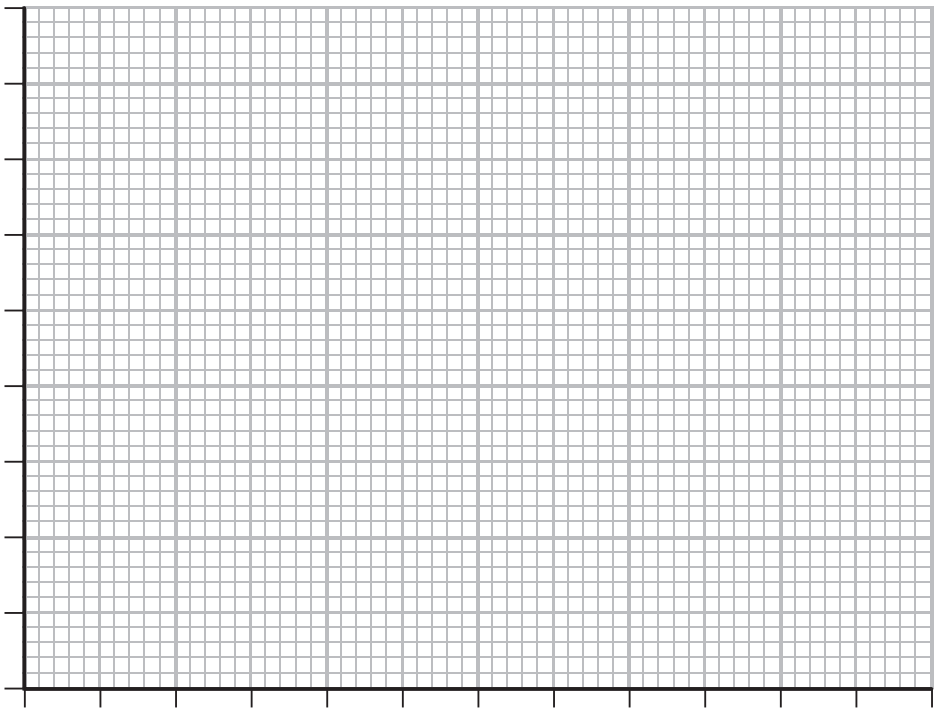
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(b) Plot these results on the grid. Use straight lines to join the points.

(6)



(c) Describe the results shown by the graph.

(2)

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(d) Calculate the average rate of diffusion, in centimetres per second of ammonia, from the 3 drops of ammonia solution between the litmus papers at 4 cm and 24 cm. Show your working.

(2)

Answer ..... cm/s

(e) Explain the difference in the rate of diffusion between the experiment using 1 drop of ammonia and the experiment using 3 drops of ammonia.

(1)

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(f) Suggest how Lily could modify her experiment to investigate the effect of temperature on the rate of diffusion.

(2)

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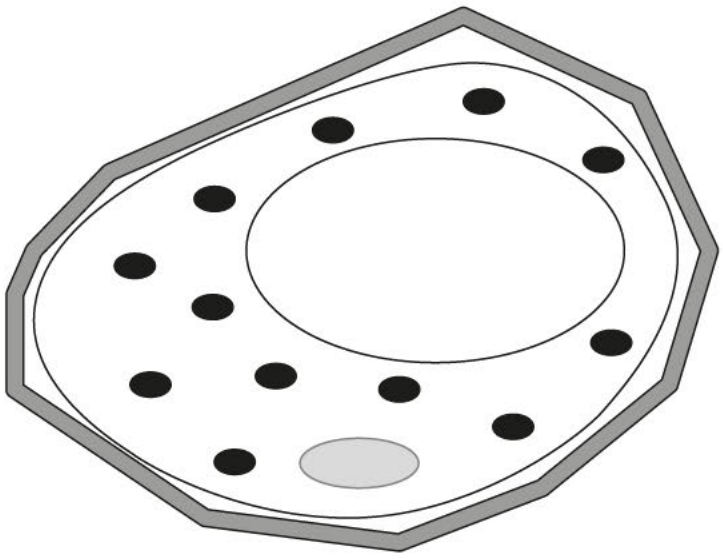
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(Total for Question = 15 marks)

3 (a) The diagram shows a plant cell drawn by a student.

(i) Label the diagram to show the selectively permeable membrane.

(1)



(ii) Name three parts of a typical plant cell that are not found in an animal cell.

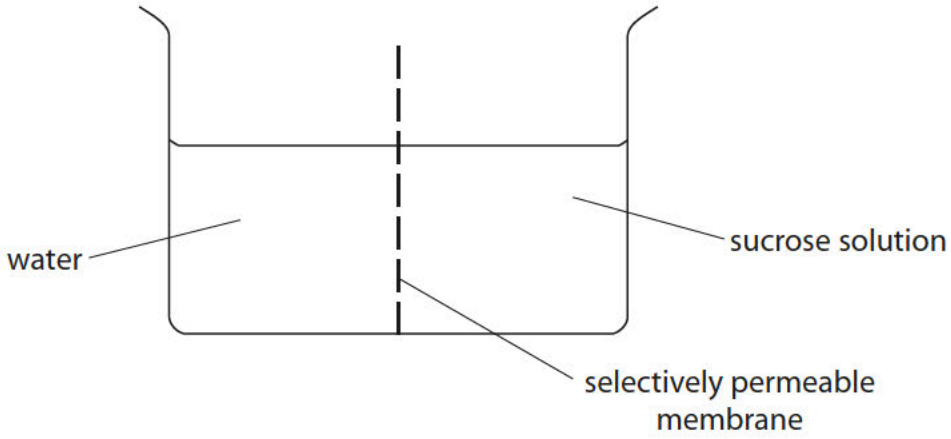
(3)

1 .....

2 .....

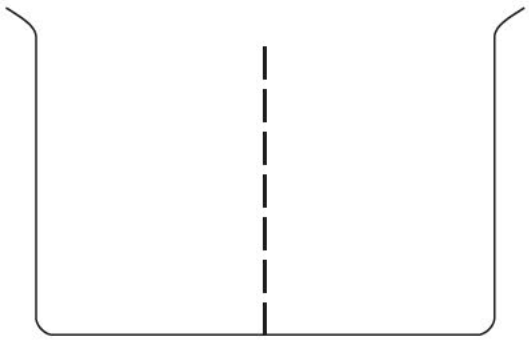
3 .....

(b) The diagram shows a glass container divided in half by a selectively permeable membrane. One half contains water and the other half contains sucrose solution.



(i) Complete the diagram below to show the change to the level of the water and the level of the sucrose solution after one hour.

(1)



(ii) Name the process that causes the change in the level of the water and the level of the sucrose solution.

(1)

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(Total for Question = 6 marks)

4 (a) The table lists some structures that provide a large surface area for the diffusion of substances.

Complete the table by naming the organ in which each structure is found.
The first one has been done for you.

(3)

Structure	Organ
spongy mesophyll	leaf
alveolus	
nephron	
villus	

(b) What is meant by the term **diffusion**?

(2)

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(c) The nephron is involved in the removal of substances from the blood.

Describe how substances are removed from the blood into the nephron.

(2)

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(Total for Question = 7 marks)