

Unit 2: Body Systems, Genetics, Microorganisms and Health

B2.1 Osmosis and Plant Transport

Homework Booklet Name: _____

Content - CCEA Double Award Biology 2 - Fort Hill Integrated College	Got it	Nearly	Haven't a clue
B2.1 Osmosis and Plant Transport			
Osmosis, Plasmolysis and Turgidity			
<i>Investigate the process of osmosis by measuring the change in length or mass of plant tissue or model cells, using Visking tubing (Prescribed Practical B5):</i>			
Can you identify changes in plant cell structure that occur in plasmolysed and turgid cells due to osmosis?			
Can you explain osmosis as diffusion of water molecules from a dilute solution to a more concentrated solution, through a selectively permeable membrane?			
Can you explain how osmosis causes plant cells to become plasmolysed and turgid and demonstrate knowledge and understanding of the role of the cell wall in limiting the entry of water?			
The potometer			
<i>Use a potometer (bubble and weight potometer) to investigate the factors affecting the rate of water uptake by a plant and washing line method to investigate the factors affecting the rate of water loss from leaves (Prescribed Practical B6).</i>			
Transpiration			
Can you define transpiration as evaporation from mesophyll cells followed by diffusion through airspaces and stomata?			
Can you explain how surface area, wind, temperature, humidity and light intensity affect transpiration and the rate of water uptake by a plant?			
Uses of water			
Can you recall that plants use water for support, transport, transpiration and photosynthesis?			

B2.1 Osmosis and Plant Transport

A

- 2 (a) Complete the definition for transpiration by writing in the spaces below.

Transpiration is the _____ of water from leaf cells followed by diffusion through the _____ (pores). [2]

- (b) (i) Several factors affect the rate of transpiration from leaves.

Complete the table to state how a change in each factor affects the rate of transpiration.

Choose your answer from the list for each factor.

- increases
- decreases
- stays the same

Factor	How it affects the rate of transpiration
Higher wind speed	
Higher temperature	
Larger surface area	
Higher humidity	

[4]

- (ii) Name the apparatus used to measure the rate of transpiration from the leaves of a plant.

[1]

- (c) Give **one** use of water in plants, other than in transpiration.

[1]

[Turn over

10145



24GSD4103

F B2 16

B2.1 Osmosis and Plant Transport



- 5 A group of pupils carried out an investigation into osmosis in carrot tissue.

The pupils cut carrot cylinders of similar size and weighed them.

They placed each cylinder into a different percentage concentration of sugar solution.

They left the cylinders for 24 hours, removed them, dried their surfaces and recorded the final masses in the table below.

Percentage concentration of sugar solution	Initial mass of carrot cylinder/g	Final mass of carrot cylinder/g	Change in mass/g	Percentage change in mass
0 (water)	6.5	7.3	+0.8	12.3
2	6.2	6.7	+0.5	8.1
4	6.6	6.8	+0.2	3.0
6	6.6	6.5	-0.1	-1.5
8	6.7	6.3	-0.4	-6.0
10	6.7	6.0		

- (a) (i) Complete the table by calculating the change in mass and the percentage change in mass for the cylinder in 10% concentration of sugar solution.

Show your working.

[3]

- (ii) Suggest why the pupils calculated the **percentage** change in mass rather than just the change in mass in grams.

_____ [1]

Examiner Only	
Marks	Remark

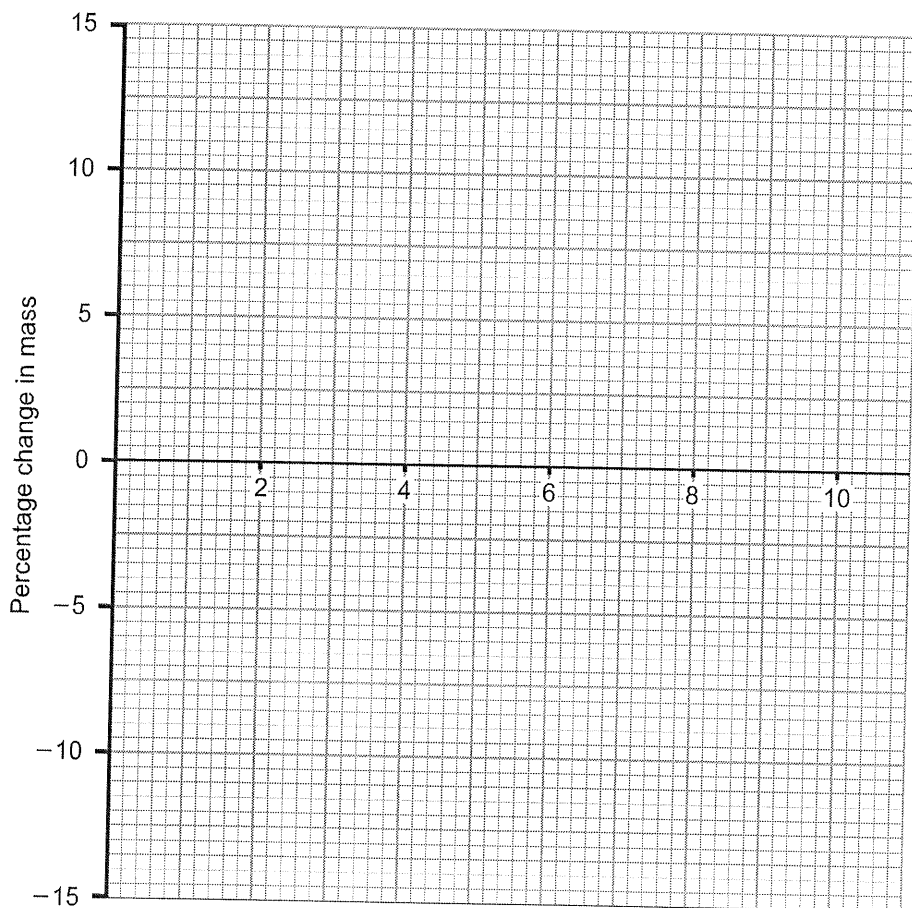
B2.1 Osmosis and Plant Transport

1

(b) (i) Plot a line graph of percentage change in mass against the percentage concentration of sugar solution.

Examiner Only

Marks Remark



Percentage concentration of sugar solution

[3]

(ii) Use your graph to determine the percentage concentration of sugar solution in the cells of the carrot cylinders. Explain your answer.

Concentration _____ %

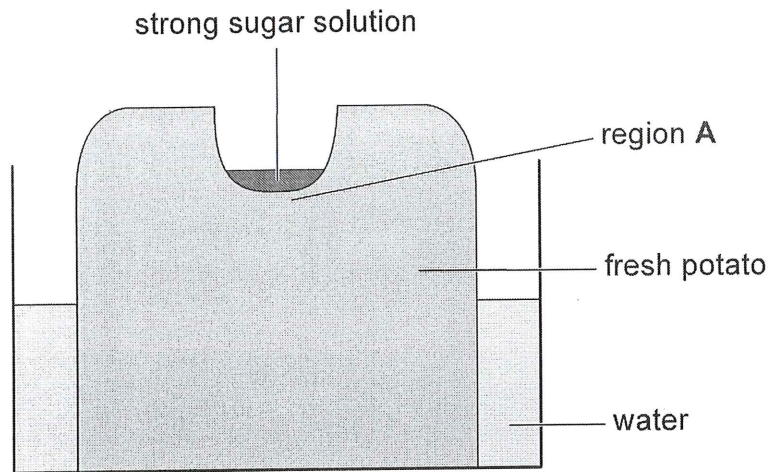
Explanation _____

_____ [2]

B2.1 Osmosis and Plant Transport

丁

- 12 Megan and Paul set up an experiment to investigate osmosis in a potato. The diagram shows the levels of strong sugar solution and water at the start of the experiment.



The experiment was left for 4 hours.

- (a) Describe what happened to the level of the strong solution after 4 hours. Explain your answer.

Description _____

Explanation _____

_____ [3]

- (b) Describe how the vacuole and the cell membrane from a cell in region A will have changed after 4 hours, when the cell has become plasmolysed.

Vacuole _____

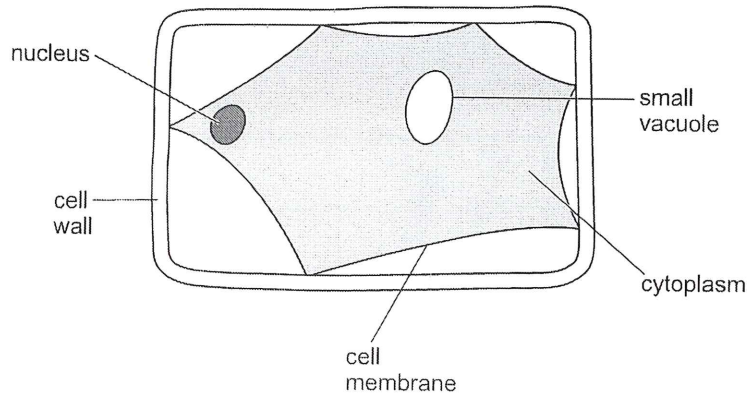
Cell membrane _____ [2]



B2.1 Osmosis and Plant Transport



- 1 The diagram below shows a plant cell as seen under a microscope. The cell had been left in strong sugar solution for 30 minutes.



© CCEA

- (a) What term describes the cell as it appears in the diagram?

[1]

- (b) Redraw the cell, **to the same scale**, as it would appear after being left in water for 30 minutes. Label the **cell wall**, **cell membrane** and **vacuole** on your drawing.

[4]

Examiner Only	
Marks	Remark

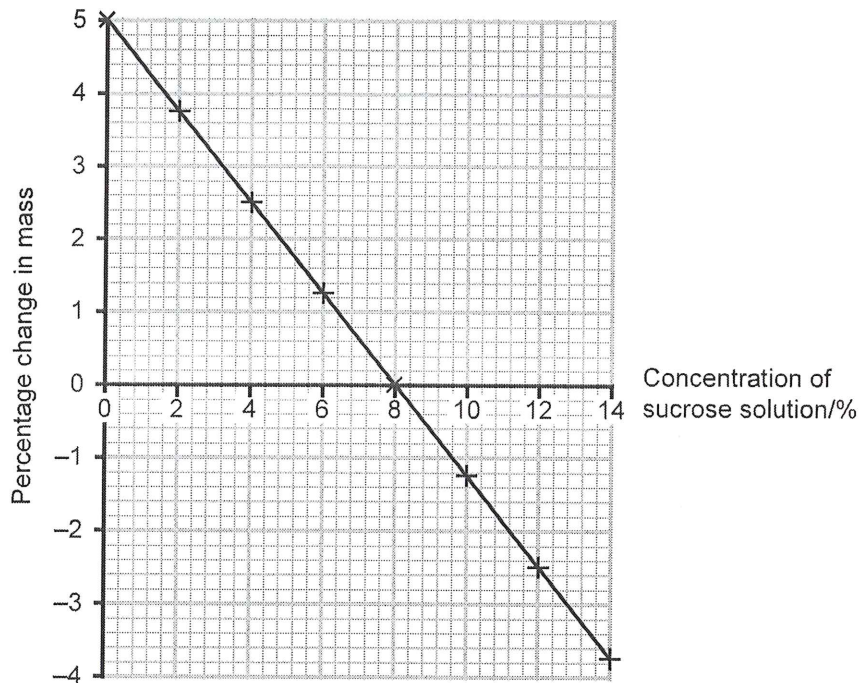
MARKING FOR IMPROVEMENT

B2.1 Osmosis and Plant Transport

(L)

- 3 A student recorded the mass of eight potato cylinders. She placed one cylinder in each of eight concentrations of sucrose solution and left them for two hours. She then reweighed the cylinders and calculated the percentage change in mass.

The graph shows her results.



- (a) (i) Use the graph to find the percentage concentration of sucrose solution which gives zero percentage change in the mass of the potato cylinder.

_____ % [1]

- (ii) Explain your answer.

[1]



B2.1 Osmosis and Plant Transport

M

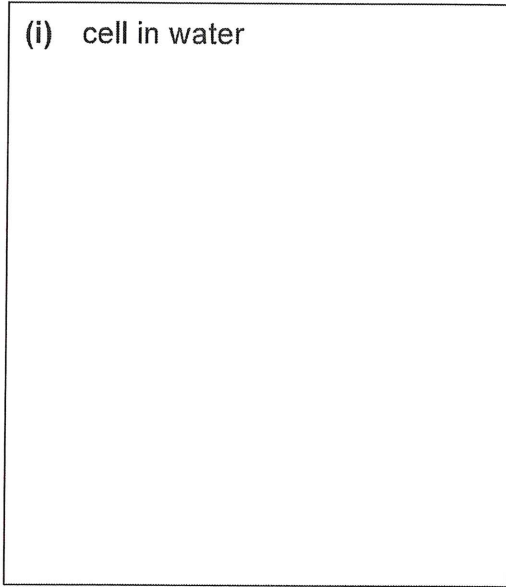
(b) Draw a plant cell in each box as it would appear after it had been left for 2 hours in

(i) water (0% sucrose solution).

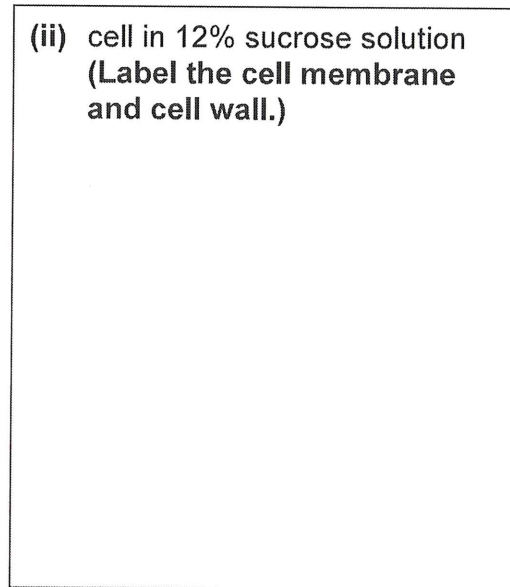
(ii) 12% sucrose solution.

Label the cell wall and cell membrane.

(i) cell in water



(ii) cell in 12% sucrose solution
(Label the cell membrane
and cell wall.)



[4]

(c) What is the function of the plant cell wall in osmosis?

[1]

[Turn over

9583



32GSD4207

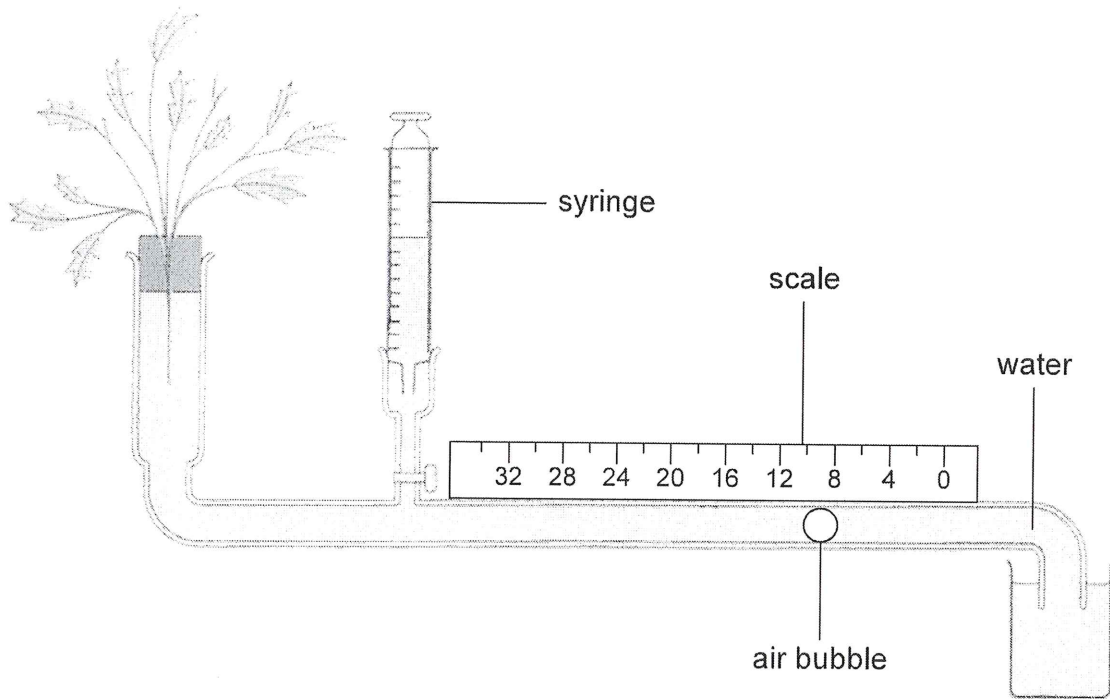
H 15 B2

B2.1 Osmosis and Plant Transport

R

N.B. Q, N, O, P all removed

- 6 (a) The diagram shows apparatus used to investigate the rate of transpiration in a plant shoot in different environmental conditions.



© GCSE Biology for CCEA, 2nd Edition by James Napier, Hodder Education (2011).
ISBN: 9780340983805. Reproduced by permission of Hodder Education.

- (i) Name the apparatus.

[1]

- (ii) How is the bubble reset to zero between experiments?

[1]



B2.1 Osmosis and Plant Transport

5

(b) The table shows the distance moved by the air bubble under different environmental conditions over **30 minutes**.

Experiment	Environmental condition			Position of bubble at the start	Position of bubble at the end	Distance moved by bubble/mm
	Fan speed on/off	Temperature /°C	Humidity low/high			
1	off	20	low			4
2	on	20	low			6
3	off	30	low			
4	on	30	low			9

Complete the table by

(i) drawing in the position of the air bubble at the end of Experiment 2. [1]

(ii) calculating the distance moved by the air bubble in Experiment 3. [1]

(c) What is the rate of transpiration in Experiment 1 in mm per hour?

_____ mm per hour [1]

(d) (i) The distance moved by the air bubble in Experiment 1 was 4 mm.
The distance moved by the air bubble in Experiment 2 was 6 mm.

Give the environmental condition that caused this increase.

_____ [1]

(ii) Experiment 1 was repeated with high humidity. What would you expect to happen to the distance moved by the bubble?

_____ [1]

9583



32GSD4216

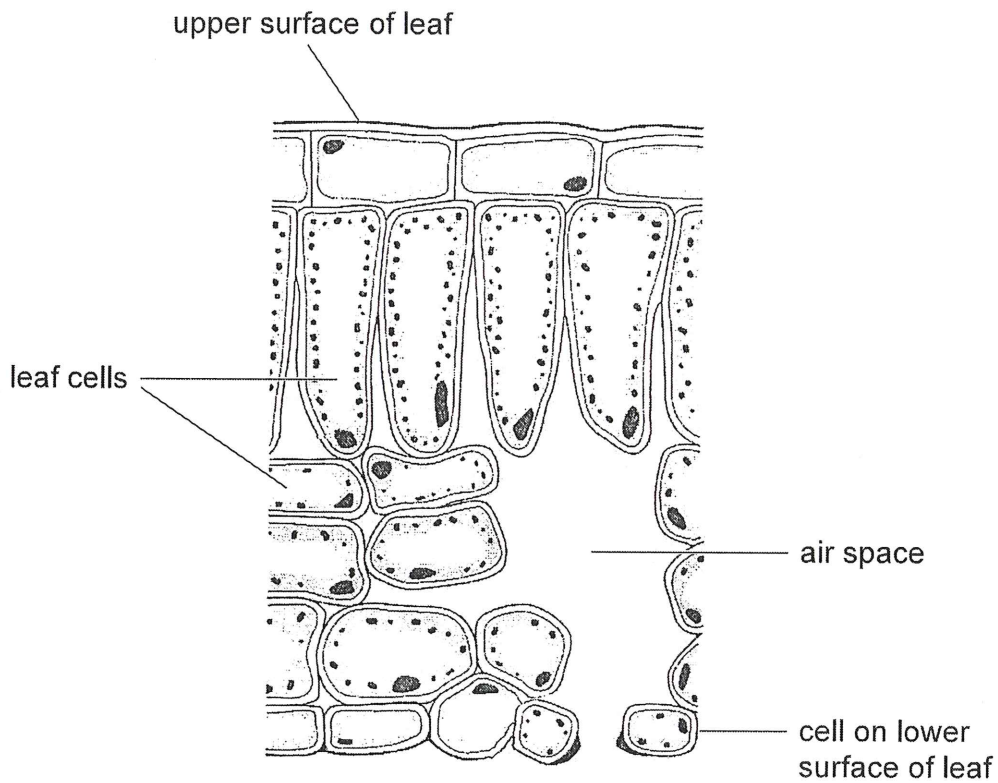
H 15 B2

10 (a) Plants lose water from their leaves.
The water evaporates from the leaf cells and then diffuses out through stomata.
Most plants have more stomata on the lower surface of their leaves.

(i) Name the process described above.

[1]

The diagram shows a section through a leaf.



© GCSE Biology for CCEA by Rose McIlwaine and James Napier. ISBN: 9780340858257.
"Reproduced by permission of Hodder Education".

(ii) Use the information above and your knowledge to draw arrows on the diagram to show the pathway of water out of the leaf.

[2]



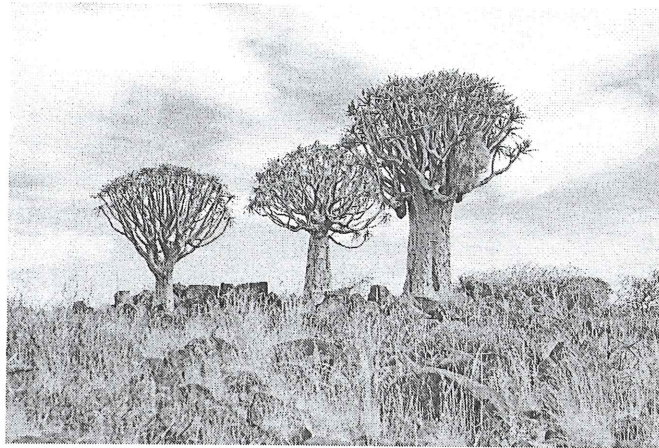
B2.1 Osmosis and Plant Transport

V

- (b) Water that is lost from leaves is usually replaced by water from the soil. In drought conditions water may not be available in the soil to replace the water lost.

Plants in desert regions have become adapted to survive long periods of drought.

The photograph shows quiver trees from the Namib desert in Africa.



© Iaranik / iStock / Thinkstock

During long periods of drought these trees can drop all of their leaves. Suggest how dropping all of their leaves can help quiver trees to survive long periods of drought.

[2]

10147

[Turn over



28GSD4221

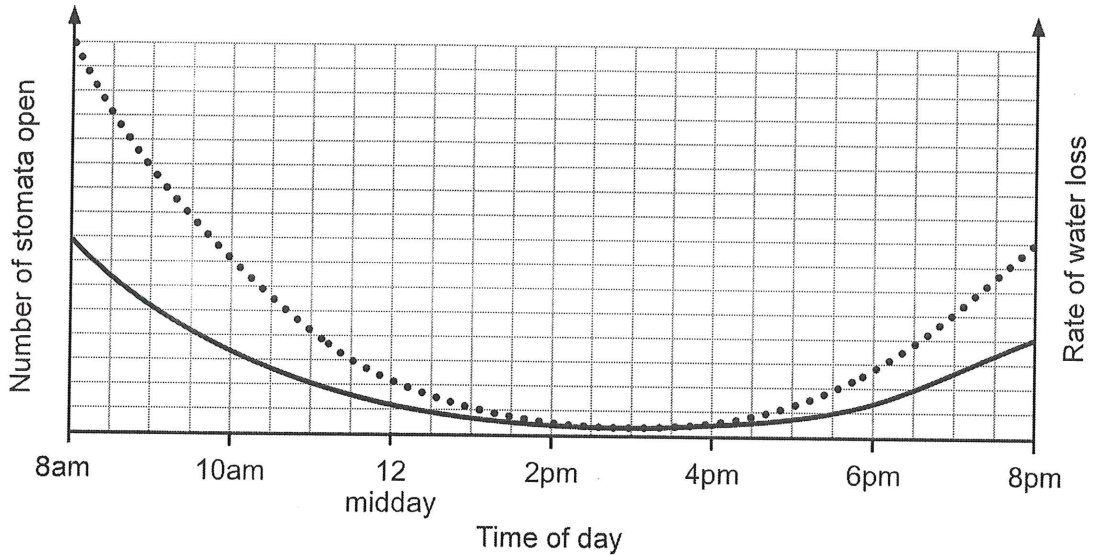
H B2 June '16

B2.1 Osmosis and Plant Transport

(W)

(c) Another desert plant, called the unarmed saltwort, closes its stomata to prevent water loss.

The graph gives information about the number of stomata open and the rate of water loss in the unarmed saltwort over a 12 hour period.



Key:

..... number of stomata open

———— rate of water loss

Source: Principal Examiner

Use the graph and your knowledge to answer the following questions.

(i) During which **four** hour period is the least number of stomata open?

_____ to _____ [1]

(ii) Use the graph to describe the relationship between the number of stomata open and the rate of water loss in the plant.

 _____ [1]

(iii) Draw a line on the graph to show the rate of water loss that would be expected if the stomata did **not** close over the 12 hour period.

[2]

10147



28GSD4222

H B2 June '16

