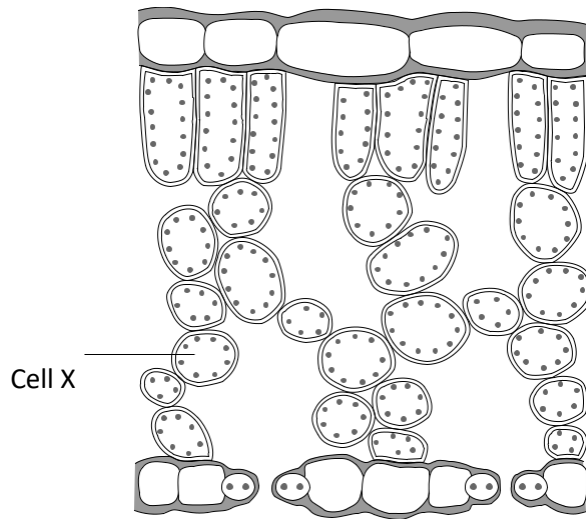


Transpiration

Q:1 (a) The diagram shows a section through a plant leaf. Water evaporates from cell X.



(i) On the diagram, draw an arrow to show how water vapour from cell X gets out of the leaf.

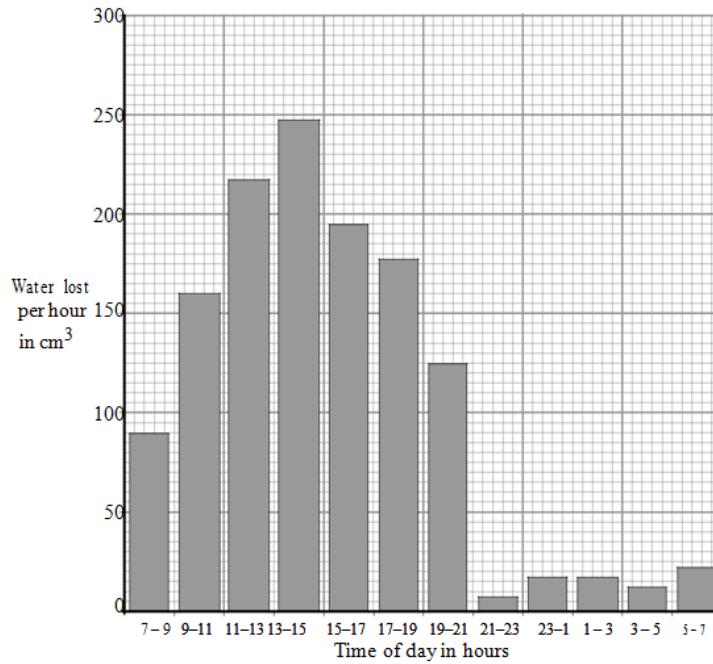
(1 mark)

(ii) Name the process by which water vapour is lost from a leaf. Draw a circle around one answer.

osmosis transpiration wilting

(1 mark)

(b) The graph shows how much water was lost from a plant at different times of the day.



(i) During which 2-hour period was water lost most quickly?

(1 mark)

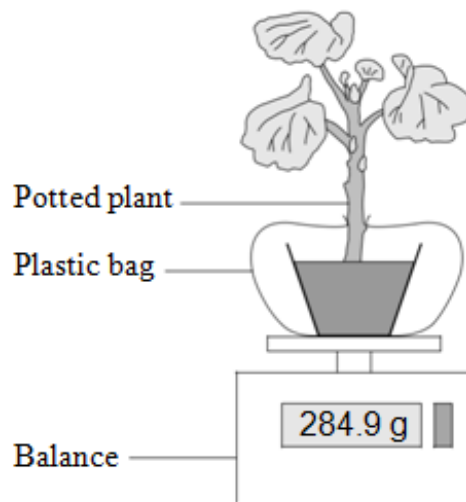
(ii) Give one possible explanation why water was lost most quickly at this time.

(2 marks)

Q:2 (a) Name the process by which water is lost from plant leaves.

(1 mark)

(b) Some students set up the apparatus shown in the diagram to measure the water loss from a potted plant.



The apparatus was placed in different environmental conditions:

- A in still air at 20 °C.
- B in still air at 25 °C.
- C in a wind at 20 °C.
- D in a wind at 25 °C.

Readings from the balance were recorded by a datalogger at 10-minute intervals.

The results are given in the table.

Time in minutes	Balance reading in grams			
	A	B	C	D
0	285.6	284.6	282.9	280.9
10	285.3	284.2	282.4	280.2
20	284.9	283.8	281.9	279.4
30	284.7	283.4	281.4	278.8

(b)(i) Under which conditions, A, B, C or D, was water lost most rapidly?

(1 mark)

(b)(ii) Explain, as fully as you can, why water was lost most rapidly under these conditions.

(2 marks)

Q:3 A student removed three similar leaves from a plant. The student spread petroleum jelly (a waterproofing substance) on some of the leaves, as follows:

Leaf A: on the lower surface

Leaf B: on the upper surface

Leaf C: none.

The student placed each leaf in a separate beaker. He weighed each beaker at intervals.

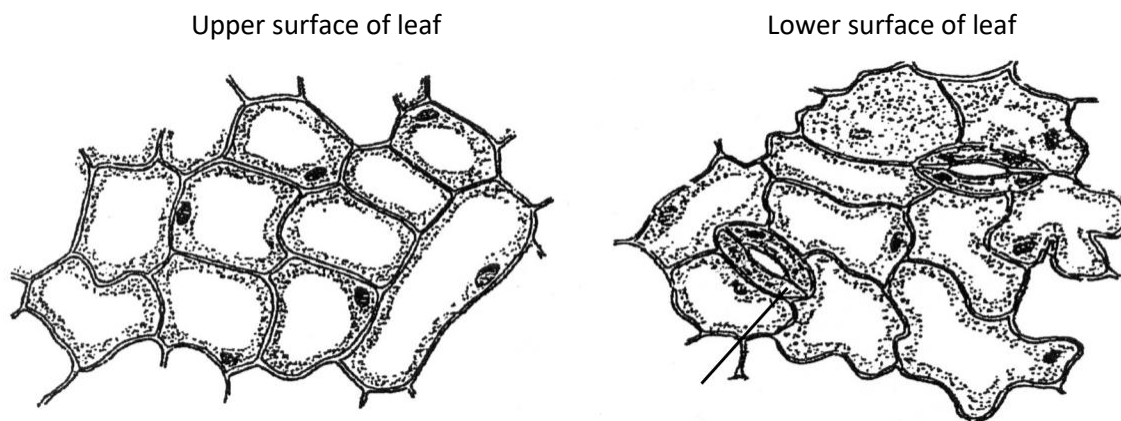
The results are shown in the table.

Time in hours	Mass of leaf + beaker in grams		
	Leaf A	Leaf B	Leaf C
0	50.00	55.01	51.99
1	49.99	54.95	51.90
3	49.97	54.90	51.85
5	49.95	54.86	51.80

(a) Which leaf, A, B or C, lost most water?

(1 mark)

(b) The diagram shows the appearance of the upper and lower surfaces of one of the leaves under a microscope.



(b)(i) Name cell X

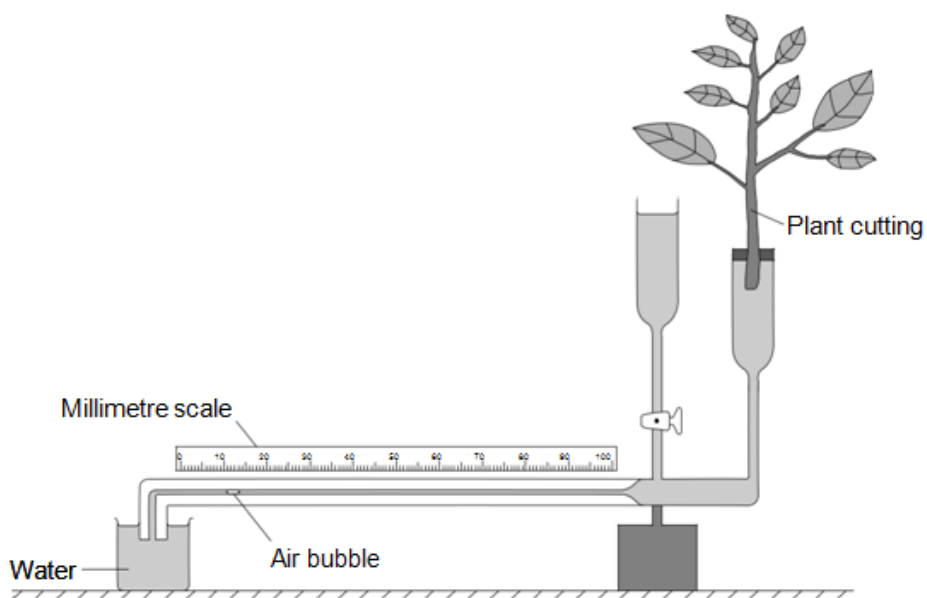
(1 mark)

(b) (ii) The petroleum jelly had a greater effect when it was spread on the lower surface than when it was spread on the upper surface.

Use information from the diagram to explain why.

(2 marks)

Q:4 Some students used the apparatus shown in the diagram to measure the rate of water uptake by a plant cutting.



The students set up the apparatus in three different conditions:

☐☐no wind at 15 °C

☐☐no wind at 25 °C

☐☐wind at 25 °C

For each experiment, the students recorded the movement of the air bubble along the scale.

(a) (i) Name the two variables that the students chose to change in these experiments.

1 _____

2 _____

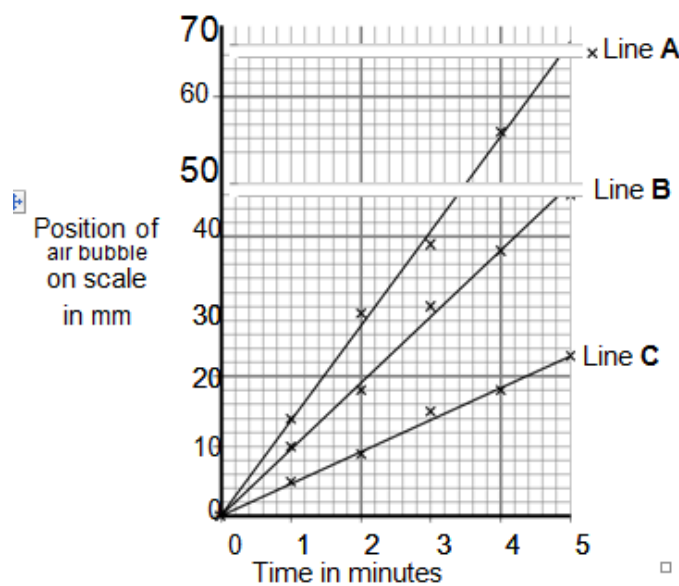
(2 marks)

(a) (ii) It was important to use the same plant cutting each time to make these experiments fair.

Explain why.

(1 mark)

(b) The graph shows the students' results.



Which line on the graph, A, B or C, shows the results for each of the three different experiments?

Write each of the letters A, B or C in the correct boxes in the table.

Condition	Letter
No wind at 15 °C	
No wind at 25 °C	
Wind at 25 °C	

(2 marks)

(c) Water is lost from the leaves of the plant cutting. Name this process.

Draw a ring around one answer.

distillation respiration transpiration

(1 mark)

Q:5 A group of students looked at stomata on four different species of plants, A, B, C and D. They estimated the number of stomata per cm² on the upper and lower surfaces of the leaves of the four species.

Their results are shown in the table.

Plant species	Estimated number of stomata per cm ² of leaf surface	
	Upper surface of leaf	Lower surface of leaf
A	4000	28 000
B	0	800
C	8500	15 000
D	8000	26 000

(a) Which plant species probably lives in a dry region?

Explain the reason for your answer.

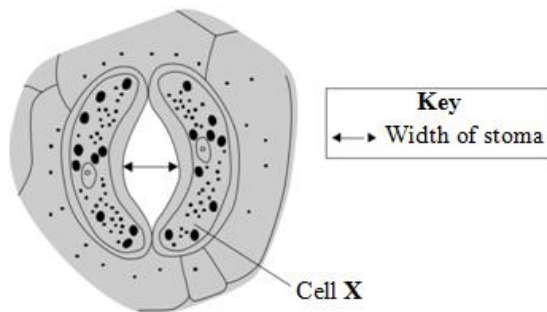
(3 marks)

(b) All four species have more stomata on the lower surface of their leaves than on the upper surface.

Suggest how this could help the plants to survive better.

(2 marks)

Q:5 Plant leaves have many stomata. The diagram shows a stoma.



(a) Name cell X _____

(1 mark)

(b) The table shows the mean widths of the stomata at different times of the day for two different species of plant.

Species A normally grows in hot, dry deserts. Species B grows in the UK.

	Time of day in hours	Mean width of stomata as a percentage of their maximum width	
		Species A	Species B
Dark	0	95	5
	2	86	5
	4	52	6
Light	6	6	40
	8	4	92
	10	2	98
	12	1	100
	14	0	100
	16	1	96
	18	5	54
Dark	20	86	6
	22	93	5
	24	95	5

The data in the table show that species A is better adapted than species B to living in hot, dry deserts.

Explain how.

(4 marks)

TOTAL MARKS=29