TUTOR ZONE

Name

Percentage	
Grade	

GCSE Biology

Plants

Duration: 50 min

Total Marks: 49

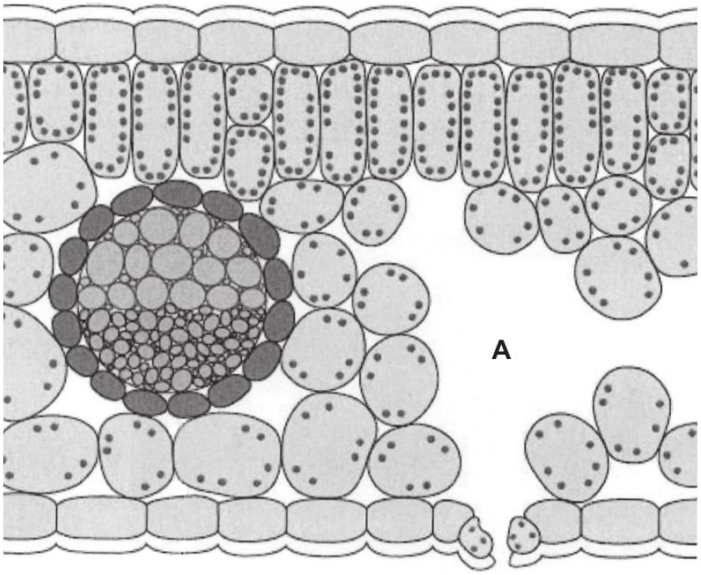
Information for Candidates:

- Use black or blue ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. If additional paper is used, the question number(s) must be clearly shown
- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.

Do not write in this table	
Question	Mark
TOTAL	

Answer **all** questions in the spaces provided.

1 The diagram shows a section through a plant leaf.



1 (a) Use words from the box to name **two** tissues in the leaf that transport substances around the plant.

epidermis	**mesophyll**	**phloem**	**xylem**

..... and .....

(1 mark)

1 (b) Gases *diffuse* between the leaf and the surrounding air.

1 (b) (i) What is *diffusion*?

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(2 marks)

1 (b) (ii) Name **one** gas that will diffuse from point **A** to point **B** on the diagram on a sunny day.

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(1 mark)

4

Turn over ▶

4 Plants exchange substances with the environment.

4 (a) Plant roots absorb water mainly by osmosis.
Plant roots absorb ions mainly by active transport.

Explain why roots need to use the two different methods to absorb water and ions.

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(4 marks)

4 (b) What is meant by the *transpiration stream*?

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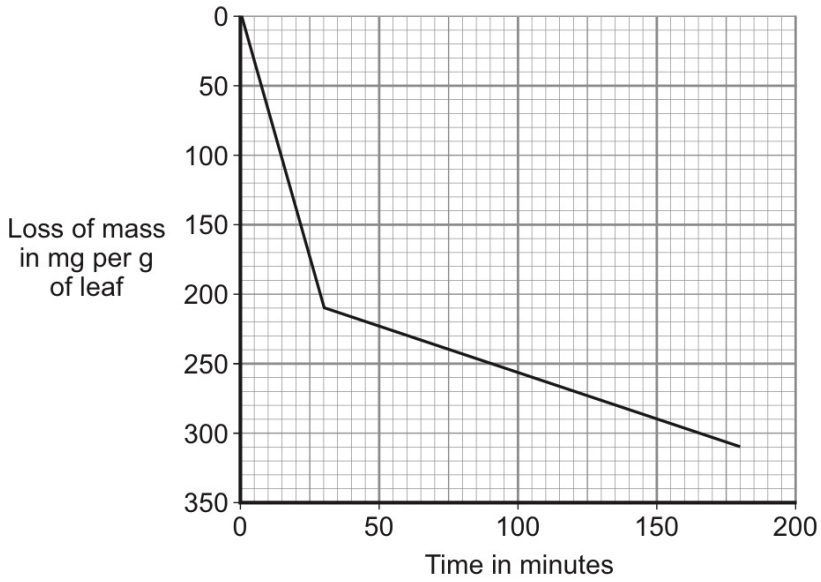
(3 marks)

4 (c) Students investigated the loss of water vapour from leaves.

The students:
- cut some leaves off a plant
- measured the mass of these leaves every 30 minutes for 180 minutes.

The graph shows the students' results.



4 (c) (i) The rate of mass loss in the first 30 minutes was 7 milligrams per gram of leaf per minute.

Calculate the rate of mass loss between 30 minutes and 180 minutes.

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Rate of mass loss = ... milligrams per gram of leaf per minute
(2 marks)

4 (c) (ii) The rate of mass loss between 0 and 30 minutes was very different from the rate of mass loss between 30 and 180 minutes.

Suggest an explanation for the difference between the two rates.

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(2 marks)

11

5 The leaves of most plants have stomata.

5 (a) (i) Name the cells which control the size of the stomata.

[1 mark]

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5 (a) (ii) Give **one** function of stomata.

[1 mark]

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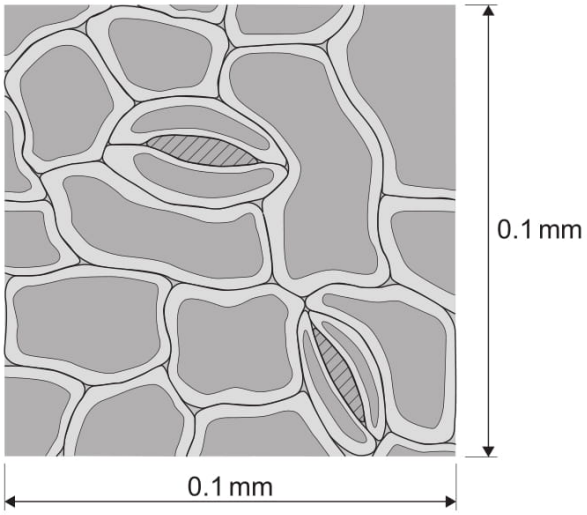
5 (b) **Figure 5** shows part of the surface of a leaf.

Figure 5



The length and width of this piece of leaf surface are both 0.1 mm.

5 (b) (i) Calculate the number of stomata per mm^2 of this leaf surface.

[2 marks]

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..... per mm^2

Turn over ▶

5 (b) (ii) A different plant species has 400 stomata per mm^2 of leaf surface.

Having a large number of stomata per mm^2 of leaf surface can be a disadvantage to a plant.

Give **one** disadvantage.

[1 mark]

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5 (c) A student investigated the loss of water from plant leaves.

The student did the following:

- Step 1: took ten leaves from a plant
- Step 2: weighed all ten leaves
- Step 3: hung the leaves up in a classroom for 4 days
- Step 4: weighed all ten leaves again
- Step 5: calculated the mass of water lost by the leaves
- Step 6: repeated steps **1** to **5** with grease spread on the upper surfaces of the leaves
- Step 7: repeated steps **1** to **5** with grease spread on both the upper and lower surfaces of the leaves.

All the leaves were taken from the same type of plant.

Table 2 shows the student's results.

Table 2

Treatment of leaves	**Mass of water the leaves lost in g**
No grease was used on the leaves	0.98
Grease on upper surfaces of the leaves	0.86
Grease on upper and lower surfaces of the leaves	0.01

5 (c) (i) What mass of water was lost in 4 days through the upper surfaces of the leaves?

[1 mark]

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Mass = ... g

5 (c) (ii) Very little water was lost when the lower surfaces of the leaves were covered in grease.

Explain why.

[3 marks]

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9

Turn over for the next question

2 (a) Carbon dioxide enters a plant through stomata on the leaves.

Name the cells that control the size of the stomata.

[1 mark]

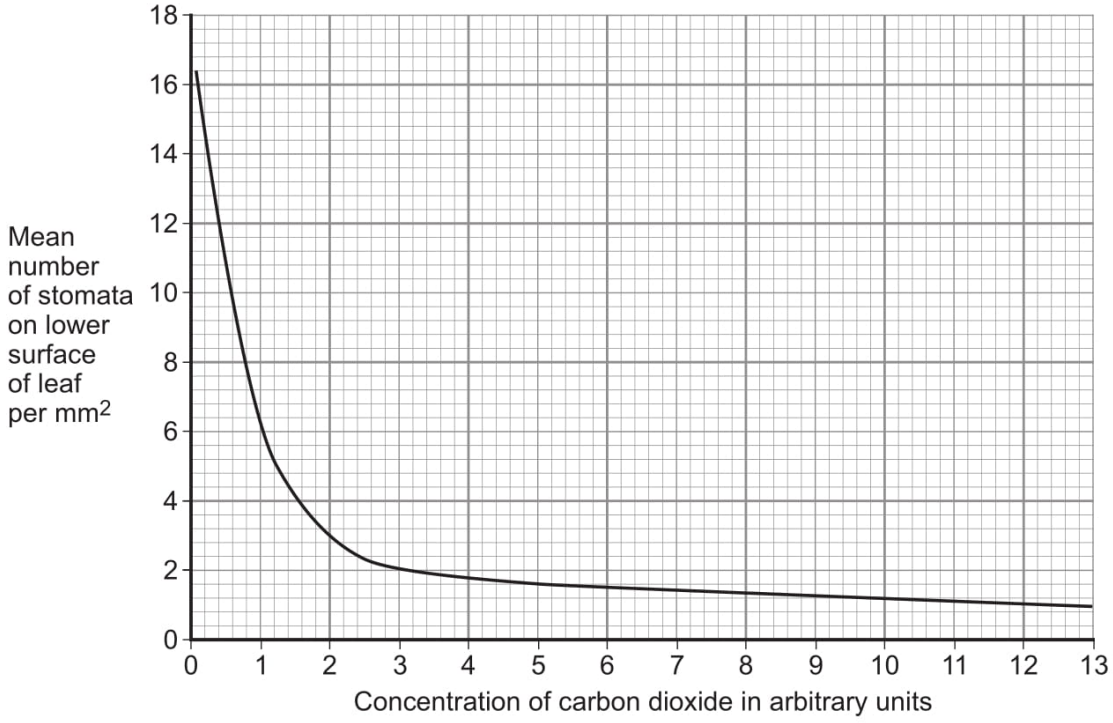
_____

2 (b) Scientists grew tomato plants in air containing different concentrations of carbon dioxide.

The scientists recorded the number of stomata found on the lower surface of the leaves of plants grown at each carbon dioxide concentration.

Figure 2 shows the results.

Figure 2



2 (b) (i) Describe the relationship between the mean number of stomata per mm^2 and carbon dioxide concentration.

[2 marks]

2 (b) (ii) Suggest a reason for the relationship you described in part **(b)(i)**.

[1 mark]

2 (c) (i) Suggest **one** disadvantage to a plant of having a large number of stomata per mm^2 on each leaf.

[1 mark]

2 (c) (ii) Suggest **one** environmental condition where a large number of stomata per mm^2 on each leaf would be a disadvantage.

[1 mark]

6

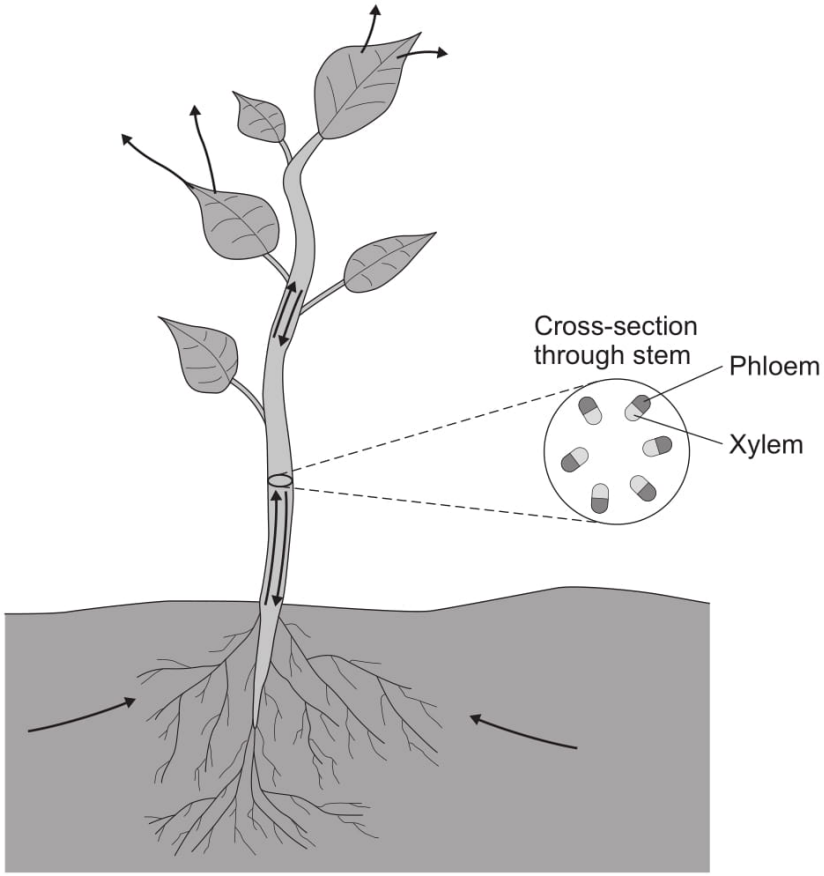
Turn over for the next question

3 **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

Plants transport many substances between their leaves and roots.

Figure 3 shows the direction of movement of substances through a plant.

Figure 3



Describe how **ions**, **water** and **sugar** are obtained and transported through plants.

In your answer you should refer to materials moving upwards in a plant and to materials moving downwards in a plant.

[6 marks]

Extra space

6

5 Plants have transport systems.

5 (a) In **Table 2**, name **two** tissues that transport substances through a plant. For each tissue, name **one** substance that it transports.

[2 marks]

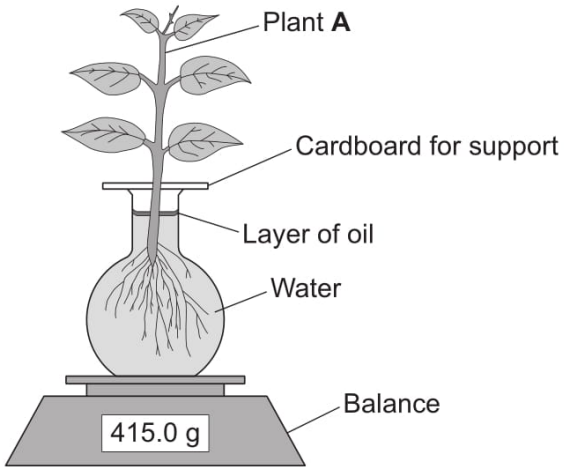
Table 2

Tissue	Substance transported
1 _____	_____
2 _____	_____

5 (b) A student investigated the rate of transpiration in four different plant species, **A**, **B**, **C** and **D**.

He set up the apparatus for plant **A** as shown in **Figure 4**.

Figure 4



In each experiment he:

- recorded the mass of the apparatus at the start of the experiment
- recorded the mass every 5 minutes for 30 minutes
- repeated the experiment with plants **B**, **C** and **D**.

Figure 5 shows his results.

Figure 5

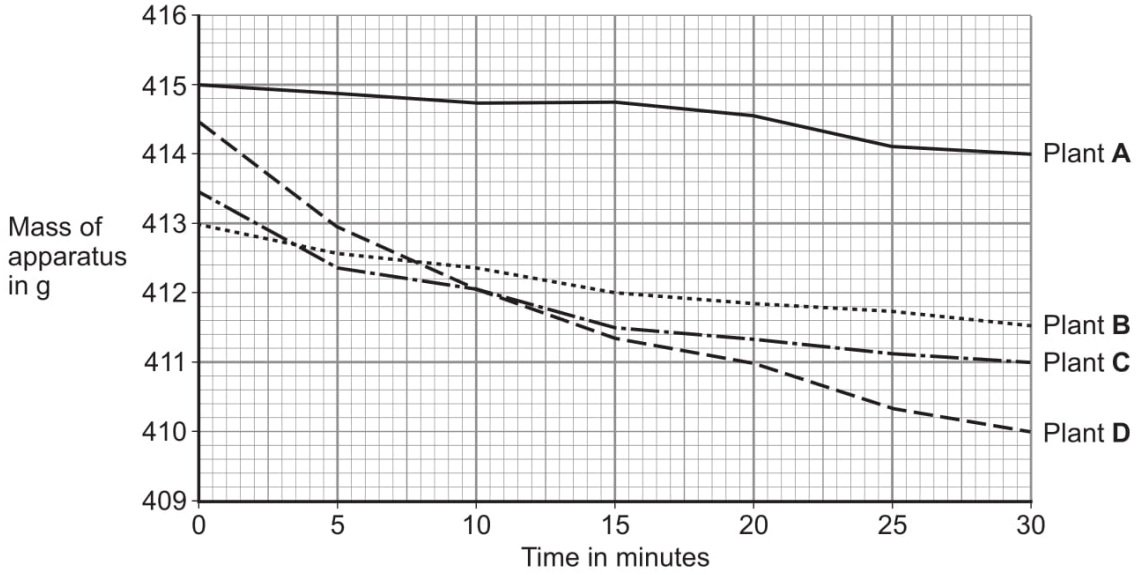


Table 3 shows information about the four plant species.

Table 3

Plant species	Mean number of stomata per mm^2 of leaf
Bellflower	42.74
Caraway	117.50
Goosegrass	6.94
Clover	387.33

5 (b) (i) The student concluded that plant **D** was clover.

Use information from **Figure 5** and **Table 3** to suggest an explanation for the student's conclusion.

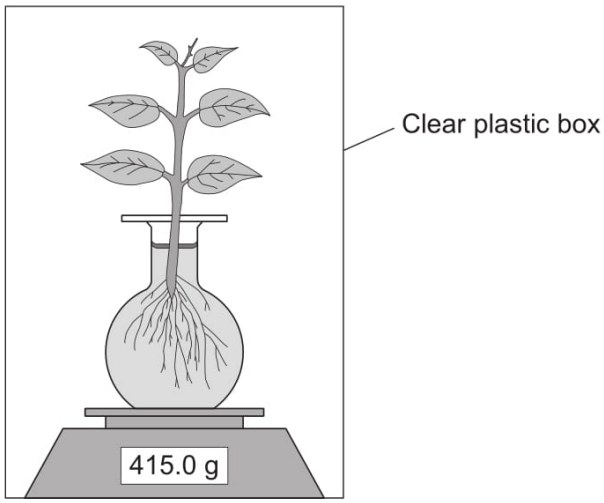
[3 marks]

5 (b) (ii) The student carried out another experiment using plant **A**.

The student used the same apparatus and method.

In this experiment the apparatus was placed in a clear plastic box for the 30 minutes, as shown in **Figure 6**.

Figure 6



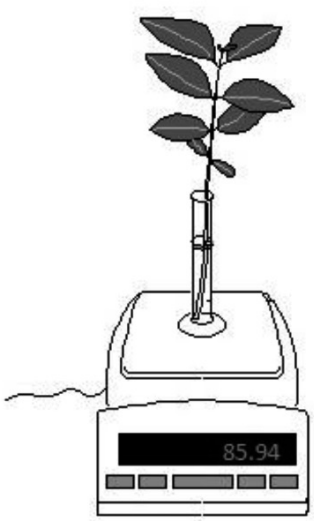
Explain what would happen to the rate of water loss due to transpiration in this experiment compared to the first investigation.

[3 marks]

8

18 A student wants to investigate the effect of air movement on transpiration.

The diagram shows how she sets up her experiment.



1. She measures the rate of transpiration by measuring the loss in mass over 3 hours.
2. She does this first with the fan switched off.
3. She repeats this but with the fan switched on.
4. She keeps all other environmental conditions the same.

These are her results.

	Fan switched off	Fan switched on
Mass loss in 3 hour (g)	37	144

(a) Explain the difference in her results.

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..... **[2]**

(b) The student kept environmental conditions like light intensity and temperature the same.

(i) Why was it important to keep the light intensity the same?

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..... **[2]**

(ii) Why was it important to keep the temperature the same?

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..... **[1]**