

# GCSE Biology (9 – 1)

## Plant Tissues, Organs and Organ Systems

Name: .....

Group: .....

### Instructions

- Read each question carefully before you begin to answer it.
- Use black ink or black ball-point pen for your answers.
- Fill in the boxes at the top of this page with your name and group.
- Attempt to answer every question in the booklet.
- Answer the questions in the spaces provided – there may be more space than you need in some answer spaces.
- Calculators may be used for this booklet.
- For any calculations, you **must** show all your working.
- Any and all drawings or graphs should be completed in pencil.



| For markers use |      |
|-----------------|------|
| Question        | Mark |
| 1               | /3   |
| 2               | /5   |
| 3               | /6   |
| 4               | /12  |
| 5               | /13  |
| 6               | /9   |
| 7               | /9   |
| 8               | /13  |
| Total           | /70  |
| %               |      |
| Grade           |      |

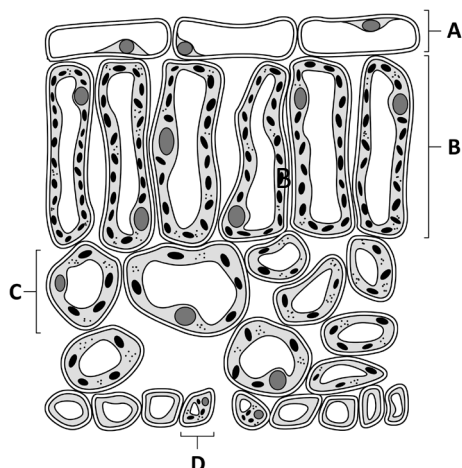
### Information

- The maximum mark for this paper is 70 marks.
- The marks for each question are shown in brackets.
- Please be aware that good English and clear presentation are required in your answers.



1. The following multiple-choice questions will assess your understanding of the different structures found in plants and their specific roles. Circle the letter of the correct answer for each question.

a) The figure below shows a section through the leaf of a sycamore tree.



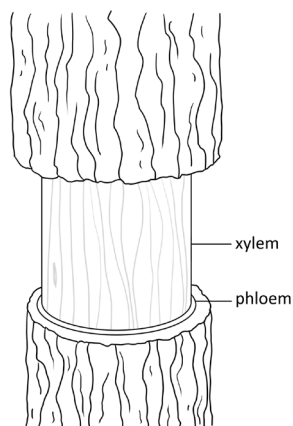
In which region will the most photosynthesis take place?

- A**                      **B**                      **C**                      **D**

(1 mark)

b) The figure below shows part of a the stem of a plant. A strip of the outer bark including the phloem tissue has been removed.

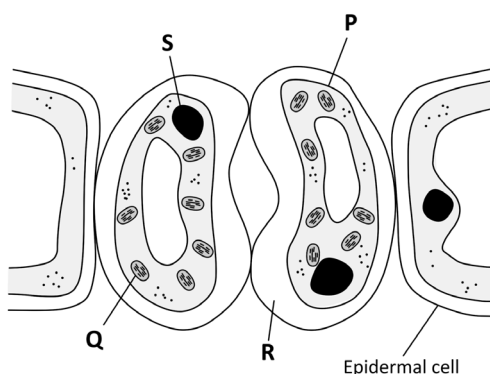
As the phloem tissue has been removed how has the transport of the plant been affected?



- A** Water cannot reach the leaves for photosynthesis.  
**B** Water cannot move from the leaves to the roots.  
**C** Ions cannot pass to the leaves.  
**D** Sucrose cannot move from the leaves to the roots.

(1 mark)

c) The figure below shows a cross section across two guard cells of a leaf.



Which labelled structures would also be present in animal cells?

**A**

S and P

**B**

S and Q

**C**

R and P

**D**

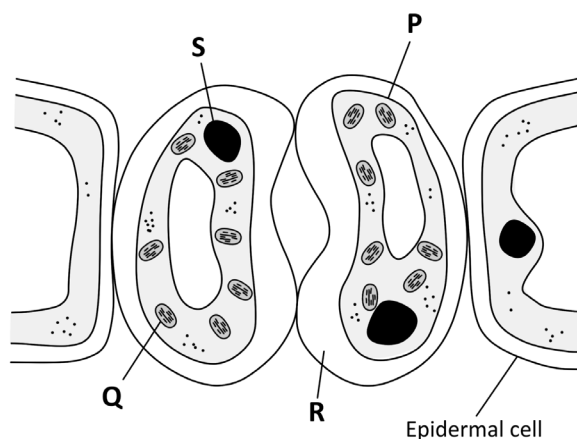
R and Q

(1 mark)

(Total for Question 1 is 3 marks)



3. For gases to pass into and out of a leaf, the stomata need to be open.  
The figure below illustrates a stoma along with two guard cells. When the stomata are open, the guard cells are considered turgid, meaning they are filled with water.



- a) Explain how the guard cells help control the size of the stoma.  
Use information from the figure above.

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(4 marks)

- b) A student describes the structure and function of phloem to another student.  
*"Phloem vessels are made up of dead cells joined together end to end. The vessels are made of a waterproof material and transport water up the plant."*

The student has made two mistakes in their description. Write down the **two** mistakes they have made.

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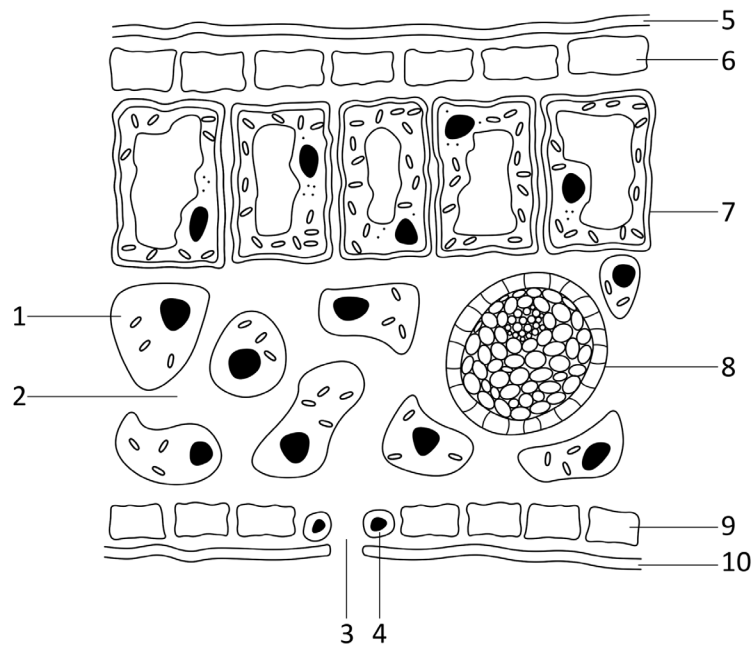
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(2 marks)

(Total for Question 3 is 6 marks)

4. The figure below shows a cross section through a leaf.



a) Identify the structures labelled in the figure above.

1 = .....

2 = .....

3 = .....

4 = .....

5 = .....

6 = .....

7 = .....

8 = .....

9 = .....

10 = .....

(10 marks)

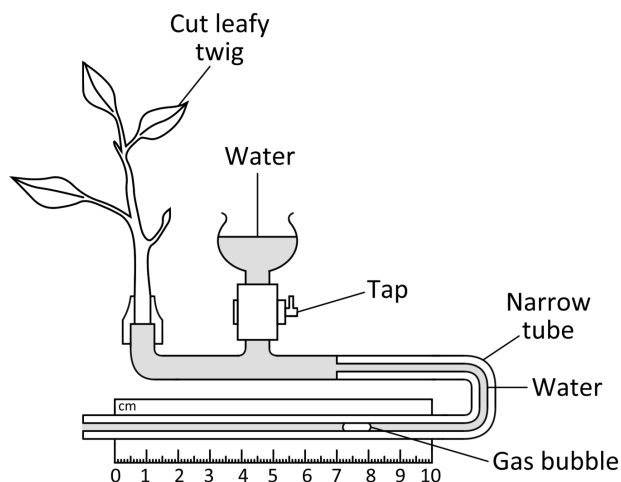
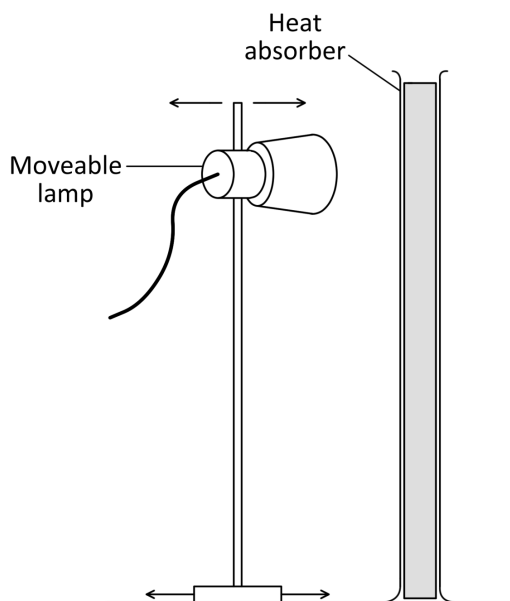
b) Describe **two** factors that can affect the rate of transpiration in a plant.

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(2 marks)

(Total for Question 4 is 12 marks)

5. The figure below shows a simple potometer.
- The photometer can be used to investigate the effect of light intensity on transpiration rate of a plant.



- a) Describe what happens during transpiration.

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**(2 marks)**

- b) Describe how the apparatus can be used to investigate the effect of light on transpiration rates.

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**(2 marks)**

- c) The heat sink is a transparent tube of cold water. Explain why a heat sink is used in this experiment.

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**(2 marks)**

The table shows the results from using the potometer.

| Distance of the photometer from light source (cm) | Distance the gas bubble moved in one minute (mm) |              |              |
|---------------------------------------------------|--------------------------------------------------|--------------|--------------|
|                                                   | Experiment 1                                     | Experiment 2 | Experiment 3 |
| 10                                                | 60                                               | 64           | 62           |
| 20                                                | 63                                               | 64           | 61           |
| 30                                                | 42                                               | 39           | 40           |
| 40                                                | 32                                               | 20           | 21           |
| 50                                                | 2                                                | 6            | 7            |

- d) Calculate the mean distance that the bubble moved along the tube when the light source was 10 cm from the photometer.

Mean distance = .....  
(2 marks)

- e) The diameter of the tube in the photometer was 1 mm.  
Using your answer from part (d), calculate the volume of water taken up by the plant. Use the equation:  $\text{volume} = \pi r^2 l$ . Give your answer to 2 significant figures.

Volume of water = .....  $\text{mm}^3 / \text{minute}$   
(3 marks)

- f) Identify the anomalous reading in their recorded results and suggest a possible reason for this.

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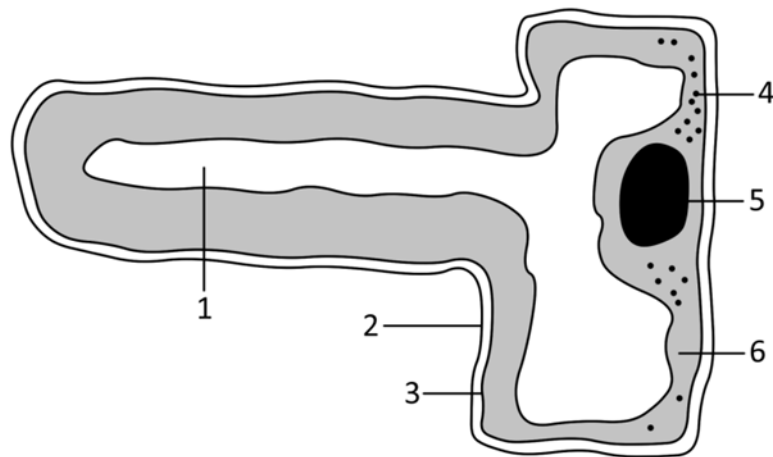
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(2 marks)

(Total for Question 5 is 13 marks)

6. The figure below shows a single root hair cell of a plant.



a) Identify the structures labelled in the figure above.

- 1 = .....  
2 = .....  
3 = .....  
4 = .....  
5 = .....  
6 = .....

**(6 marks)**

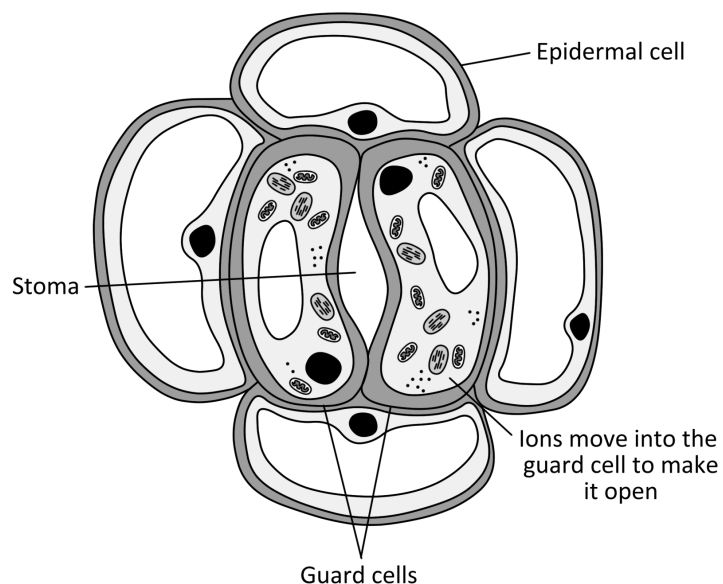
b) Explain how the root hair cell is adapted for its role in absorbing water and minerals.

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**(3 marks)**

(Total for Question 6 is 9 marks)

7. The figure below shows a small section of the lower epidermis of a leaf.



a) Explain how guard cells change shape to open stomata.

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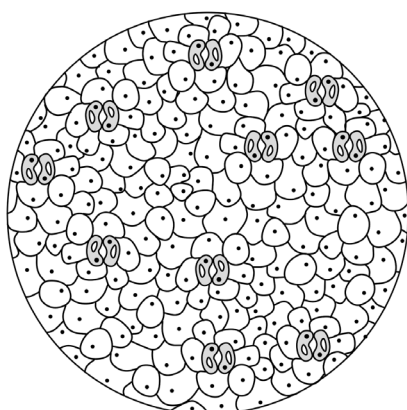
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**(4 marks)**

A student viewed the surface of a leaf using a light microscope.

The figure below shows what the student saw through the microscope.



b) The diameter of the image the student saw is 30 mm.  
Determine the area of the image the student saw.

Area = .....

**(2 marks)**

- c) The student then viewed another five areas of the leaf and recorded the number of stomata that they saw.

The table below shows the students results.

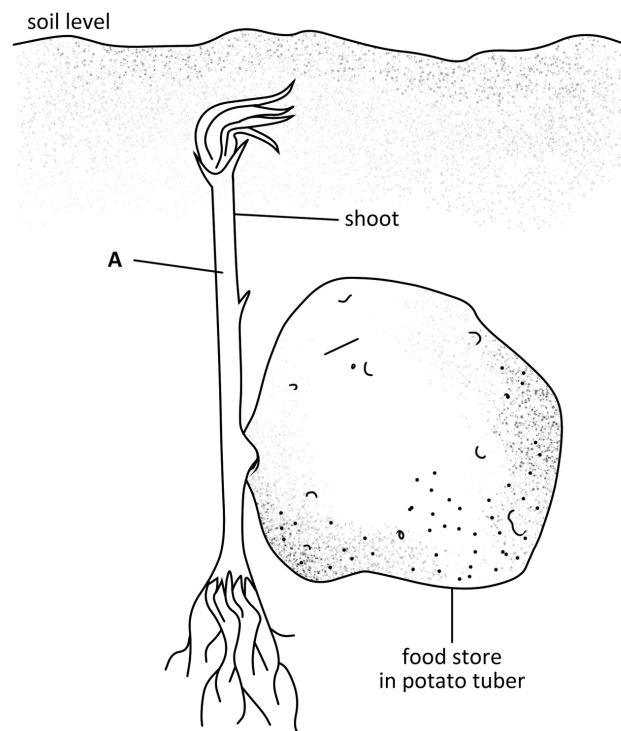
| The number of stomata in the microscope view |        |        |        |        |
|----------------------------------------------|--------|--------|--------|--------|
| View 1                                       | View 2 | View 3 | View 4 | View 5 |
| 10                                           | 18     | 15     | 9      | 13     |

Calculate the mean number of stomata in the microscope view.

Mean = .....

**(2 marks)**

- d) The figure below shows a small shoot produced from a seed potato.



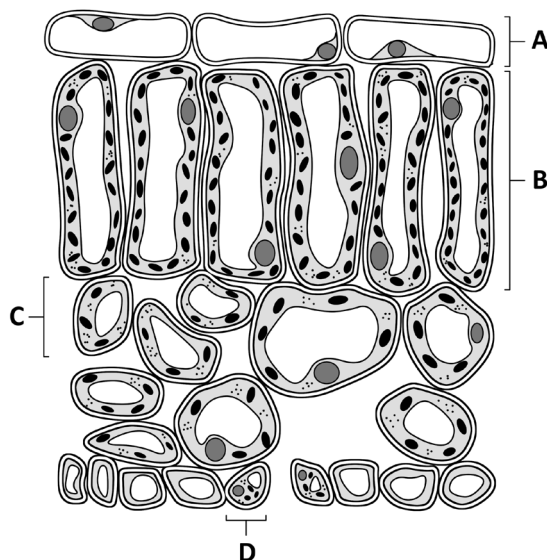
What is being transported at A? Circle the letter of the correct answer.

- A** Glucose is being transported upwards.
- B** Sucrose is being transported upwards.
- C** Glucose is being transported downwards.
- D** Sucrose is being transported downwards.

**(1 mark)**

(Total for Question 7 is 9 marks)

8. The figure below shows a cross section through a leaf.



a) Around which cells is most gas exchange taking place?  
Circle the letter of the correct answer.

A

B

C

D

(1 mark)

b) Identify an organelle that would be present in the cells of the palisade mesophyll cells but that would not be present in a root hair cell.

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(1 mark)

c) State the main process that occurs in the cells found in layer B.

.....  
(1 mark)

d) Plants lose water via the process of transpiration through their leaves.  
Identify the cells present in a leaf that control the rate of transpiration.

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(1 mark)

e) Describe **three** factors that affect the rate of transpiration in plants.

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(3 marks)

[illegible]

(Total for Question 8 is 13 marks)