

GCSE Combined Science: Trilogy

Worksheet: Plant organ system

TIME 30 min	TOTAL 30 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Plant organ system

NAME	CLASS	DATE
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- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

The roots, stem and leaves of a plant form an organ system for transporting substances.

0 1 . 1

Name the tissue that transports water and mineral ions from the roots to the leaves.

[1 mark]

0 1 . 2

Name the tissue that transports dissolved sugars around the plant.

[1 mark]

01.3

What is the movement of dissolved food molecules through the phloem called?
Tick (✓) **one** box.

Diffusion

Osmosis

Translocation

Transpiration

☐

☐

☐

☐

[1 mark]

01.4

What is meant by **transpiration**?

[1 mark]

02

A student used a potometer to measure the rate of water uptake by a shoot from a laurel plant. The air bubble in the capillary tube moved 20 mm in 5 minutes.

02.1

Calculate the rate of movement of the air bubble in mm per minute.

Rate = mm per minute

[1 mark]

02.2

Give **two** environmental conditions the student should keep the same while taking readings.

[2 marks]

0 3

Water evaporates from the leaves of plants and diffuses out through the stomata.

0 3 . 1

Which **two** changes would increase the rate of transpiration?

Tick (✓) **two** boxes.

An increase in temperature

☐

An increase in humidity

☐

An increase in air movement

☐

A decrease in light intensity

☐

[2 marks]

0 3 . 2

Name the cells that open and close the stomata.

.....

.....

.....

.....

[1 mark]

0 3 . 3

Other than water vapour, name **one** gas that diffuses out of a leaf through the stomata during the day.

.....

.....

.....

.....

[1 mark]

0 4

The roots, stem and leaves of a plant work together to transport water and mineral ions.

0 4 . 1

Complete the sentences.

Choose words from this list: **active transport**, **diffusion**, **evaporation**, **osmosis**, **phloem**, **xylem**.

Water enters root hair cells by _____.

Mineral ions enter root hair cells by _____.

Water moves up the stem in the _____.

Water is lost from the cells inside a leaf by _____ and then diffuses out through the stomata.

.....

.....

.....

.....

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.....

.....

[4 marks]

0 4 . 2

When are most of the stomata of a plant open?

Tick (✓) **one** box.

At night

☐

In bright light

☐

When the plant is wilting

☐

When the soil is very dry

☐

[1 mark]

0 4 . 3

Give **one** reason why a plant needs water.

.....

.....

[1 mark]

0 5

A student used a potometer to measure the rate of water uptake by a leafy shoot at different humidities.

Table 1 shows the results.

Table 1

Humidity in %	20	40	60	80	90
Rate of water uptake in mm ³ per minute	12.0	9.6	7.0	4.4	3.2

0 5 . 1

Figure 1

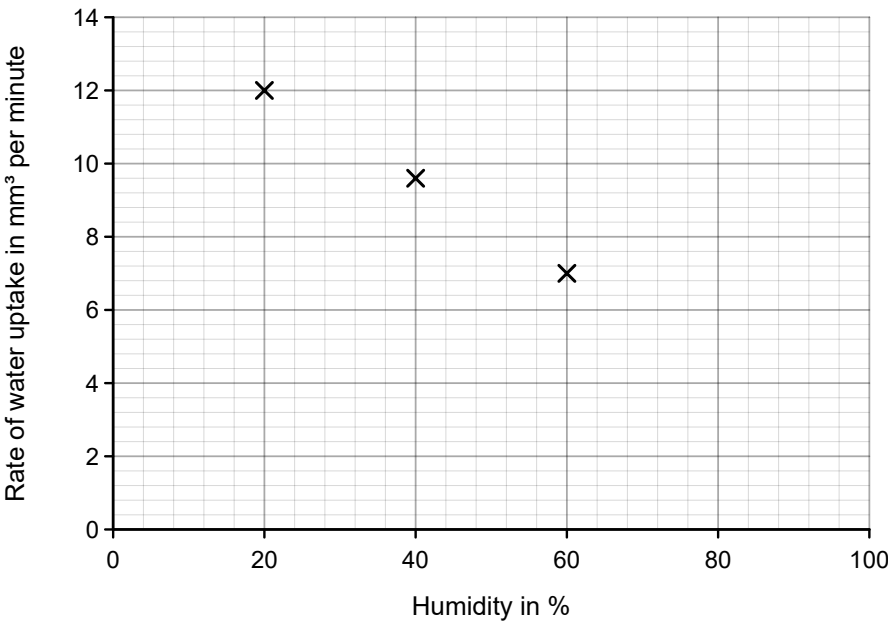


Figure 1 shows some of the results.

Complete Figure 1:

- plot the results for 80% and 90% humidity
- draw a line of best fit.

.....

.....

.....

.....

[2 marks]

0 5 . 2

Use your graph to predict the rate of water uptake at 50% humidity.

.....

.....

.....

Rate = mm³ per minute

[1 mark]

0 5 . 3

Explain why the rate of water uptake measured by the potometer gives an estimate of the rate of transpiration.

.....

.....

.....

.....

[2 marks]

0 5 . 4

Suggest how the student could have increased the humidity around the shoot.

.....

.....

[1 mark]

0 5 . 5

The student waited 5 minutes after changing the humidity before taking each reading.
Suggest why.

.....

.....

[1 mark]

.....

0 6

The rate of transpiration is affected by environmental conditions.

0 6 . 1

Explain why the rate of transpiration increases on a windy day.

.....

.....

.....

.....

[2 marks]

0 6 . 2

Explain why the rate of transpiration decreases when the air is humid.

.....

.....

.....

.....

[2 marks]

0 6 . 3

Explain why the rate of transpiration is higher in bright light than in the dark.

.....

.....

.....

.....

[2 marks]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Combined Science: Trilogy · Worksheet: Plant organ system · 30 marks

Question 1 (4 marks)

01.1 [1 mark]

Answer: xylem

- xylem (1)
-

01.2 [1 mark]

Answer: phloem

- phloem (1)
-

01.3 [1 mark]

Correct: Translocation

01.4 [1 mark]

- the loss of water (vapour) from the leaves (by evaporation through the stomata) (1)
-

Question 2 (3 marks)

02.1 [1 mark]

Answer: 4 mm per minute

- $(20 \div 5 =) 4$ (mm per minute) (1)
-

02.2 [2 marks]

- temperature (1)
- light intensity (1)
- humidity (1)
- air movement / wind speed (1)

Any 2 of the points above.

Question 3 (4 marks)

03.1 [2 marks]

Correct: An increase in temperature; An increase in air movement

03.2 [1 mark]

Answer: guard cells

- guard cells (1)
-

03.3 [1 mark]

Answer: oxygen

- oxygen (1)
-

Question 4 (6 marks)

04.1 [4 marks]

Answer: osmosis; active transport; xylem; evaporation

- osmosis (1)
 - active transport (1)
 - xylem (1)
 - evaporation (1)
-

04.2 [1 mark]

Correct: In bright light

04.3 [1 mark]

- for photosynthesis / to keep cells firm / turgid (for support) / to transport mineral ions / to cool the leaves (1)
-

Question 5 (7 marks)

05.1 [2 marks]

- both points plotted correctly ($\pm\frac{1}{2}$ small square) (1)
- a straight line of best fit through or close to all the points (1)

05.2 [1 mark]

Answer: about 8.3 mm^3 per minute

- 8.0–8.6 (mm^3 per minute) (1)

Notes: Allow a value read correctly from the student's own line.

05.3 [2 marks]

- water lost from the leaves by transpiration is replaced by water drawn up the xylem (1)
- so the shoot takes up water from the potometer at about the same rate as it loses water vapour (1)

05.4 [1 mark]

- put a clear plastic bag over the shoot / spray water into the air around it / use a humidifier (1)

05.5 [1 mark]

- to allow the shoot to adjust / the rate of water uptake to become steady at the new humidity (1)

Question 6 (6 marks)

06.1 [2 marks]

- moving air removes water vapour from around the leaf (1)
- so the concentration gradient is kept steep and water vapour diffuses out faster (1)

06.2 [2 marks]

- there is more water vapour in the air around the leaf (1)
- so the concentration gradient is smaller and water vapour diffuses out more slowly (1)

06.3 [2 marks]

- more stomata are open / stomata open wider in the light (for photosynthesis) (1)
 - so more water vapour can diffuse out of the leaf (1)
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