B4- Organising animals and plants Exam Practice 2

Name:

Marks:

Q1.

This question is about leaves.

(a) Complete the sentences.

Choose answers from the box.

epidermis	**phloem**	**palisade mesophyll**	
	waxy cuticle	**xylem**	

The layer of cells lining the upper surface and lower surface of a leaf is the _____.

The part of the leaf where most photosynthesis occurs is the _____.

Water is transported to the leaf in the _____.

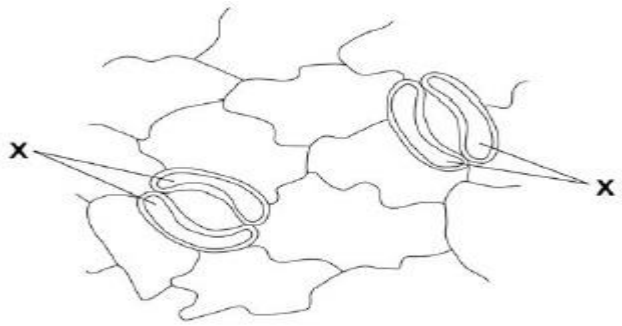
(3)

Water is lost through small openings on the lower surface of plant leaves.

These small openings are called stomata.

Figure 1 shows two stomata on the lower surface of a leaf.

Figure 1



(b) The cells labelled **X** control the width of the stomata.

What are the cells labelled **X**?

Tick (✓) **one** box.

- Guard cells ☐
- Mesophyll cells ☐
- Root hair cells ☐
- Stem cells ☐

(1)

(c) What is the function of the stomata?

Tick (✓) **one** box.

- To allow light into the leaf ☐
- To let carbon dioxide into the leaf ☐
- To let sugars out of the leaf ☐
- To protect the leaf from pathogens ☐

(1)

(d) How is water lost from a leaf?

Tick (✓) **one** box.

- By evaporation ☐
- By respiration ☐
- By translocation ☐

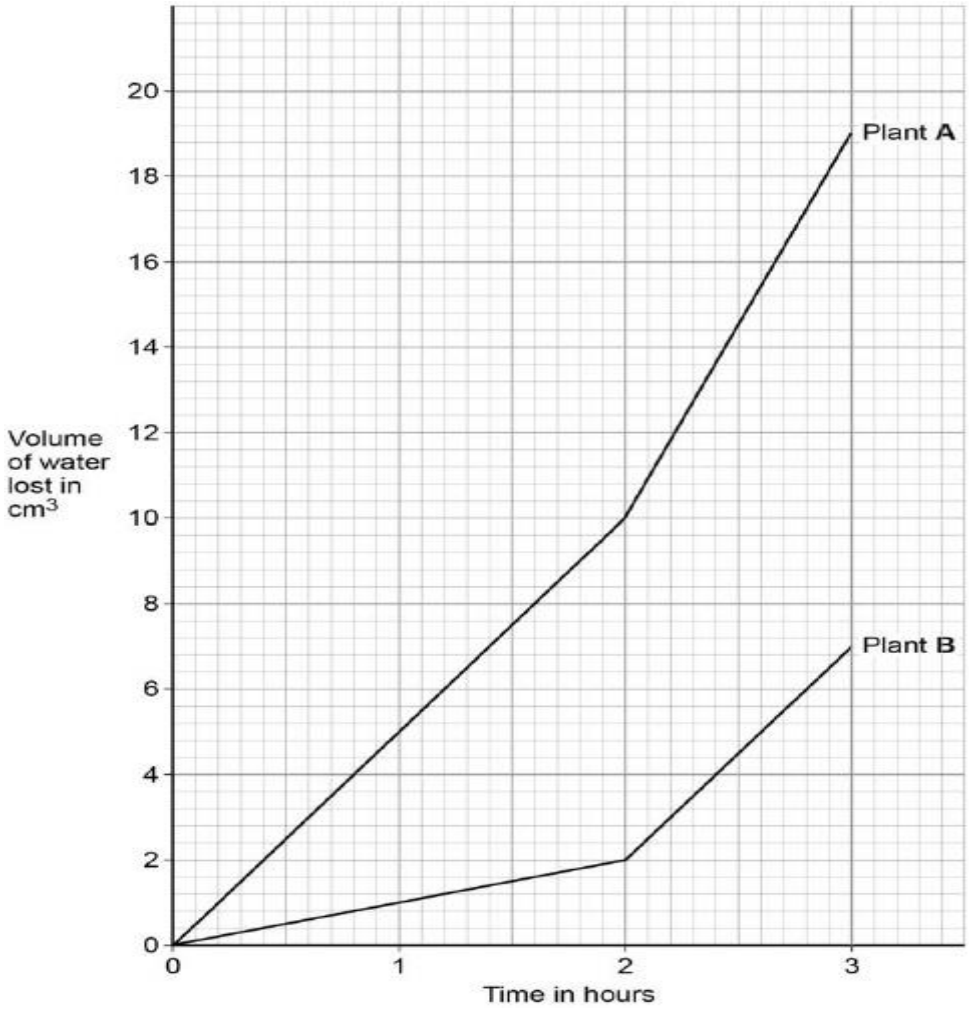
(1)

A student investigated the volume of water lost from two plants.

The plants were different species.

Figure 2 shows the student's results.

Figure 2



(e) Calculate the difference in the volume of water lost by plant **A** compared to plant **B** in the first hour.

_____

_____

Difference in volume = _____ cm^3

(2)

(f) What could cause plant **A** to lose water at a faster rate than plant **B**?

Tick (✓) **one** box.

Plant **A** has fewer stomata per leaf.	☐
Plant **A** is smaller.	☐
Plant **A** has more leaves.	☐
Plant **A** has smaller leaves.	☐

(1)

(g) After the first 2 hours, both plants were moved to a new room.

Suggest **one** reason why both plants lost water at a faster rate in the new room.

_____

_____

(1)

(h) Some plants have adaptations to stop them from being eaten by animals.

Figure 3 shows part of a holly plant.

Figure 3

Describe **one** way the holly plant is adapted to stop it being eaten by animals.

_____

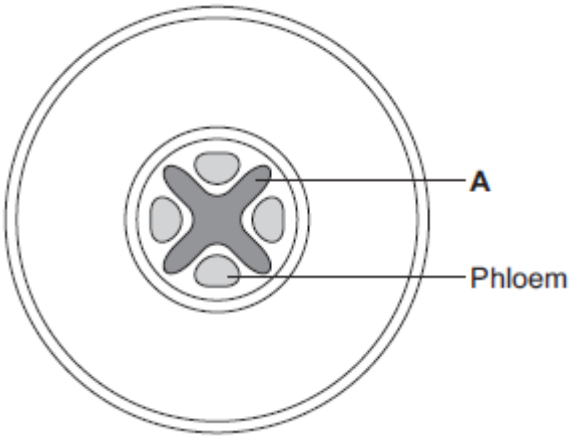
_____

(1)

(Total 11 marks)

Q2.

The diagram below shows a cross-section of a plant root. The transport tissues are labelled.



(a) (i) What is tissue **A**?

Draw a ring around the correct answer.

cuticle **epidermis** **xylem**

(1)

(ii) Name **two** substances transported by tissue **A**.

1. _____

2. _____

(2)

(b) Phloem is involved in a process called translocation.

(i) What is translocation?

_____

_____

_____

(1)

(ii) Explain why translocation is important to plants.

_____

_____

_____

_____

(2)

(c) Plants must use active transport to move some substances from the soil into root hair cells.

(i) Active transport needs energy.

Which part of the cell releases most of this energy?

Tick (✓) **one** box.

mitochondria ☐

nucleus ☐

ribosome ☐

(1)

(ii) Explain why active transport is necessary in root hair cells.

_____

_____

_____

_____

_____

_____

(2)

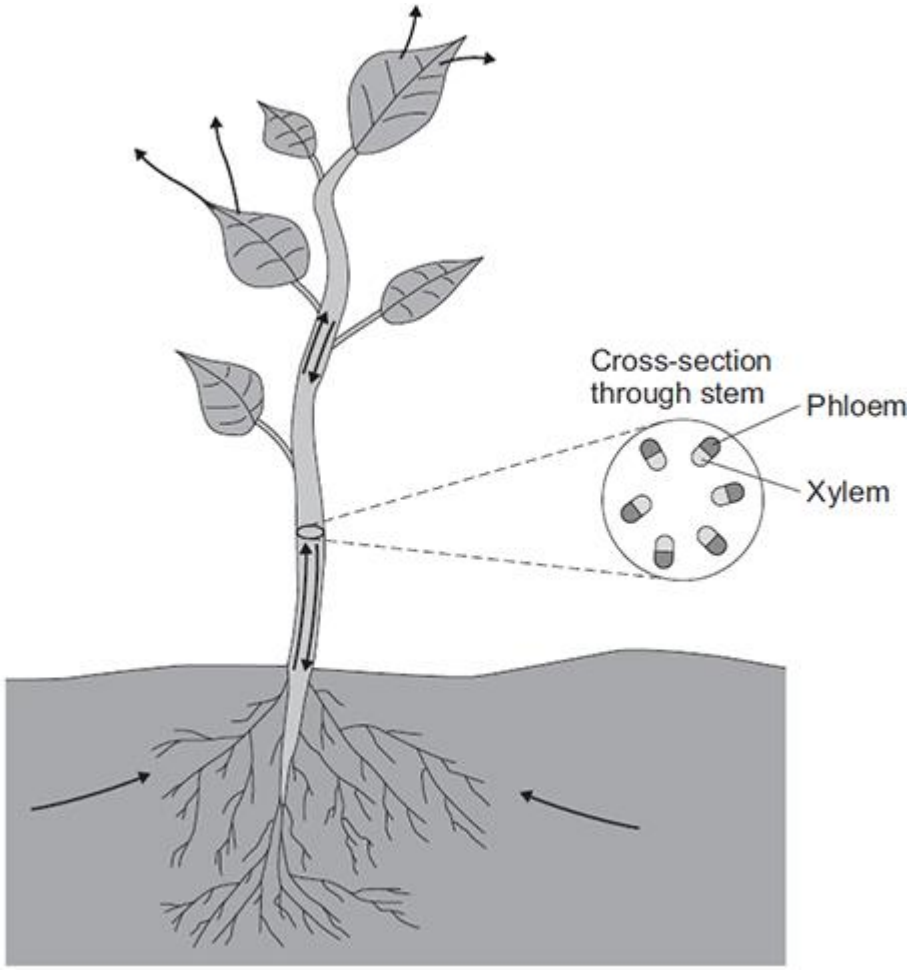
(Total 9 marks)

Q3.

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.

The diagram below shows the direction of movement of substances through a plant.



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

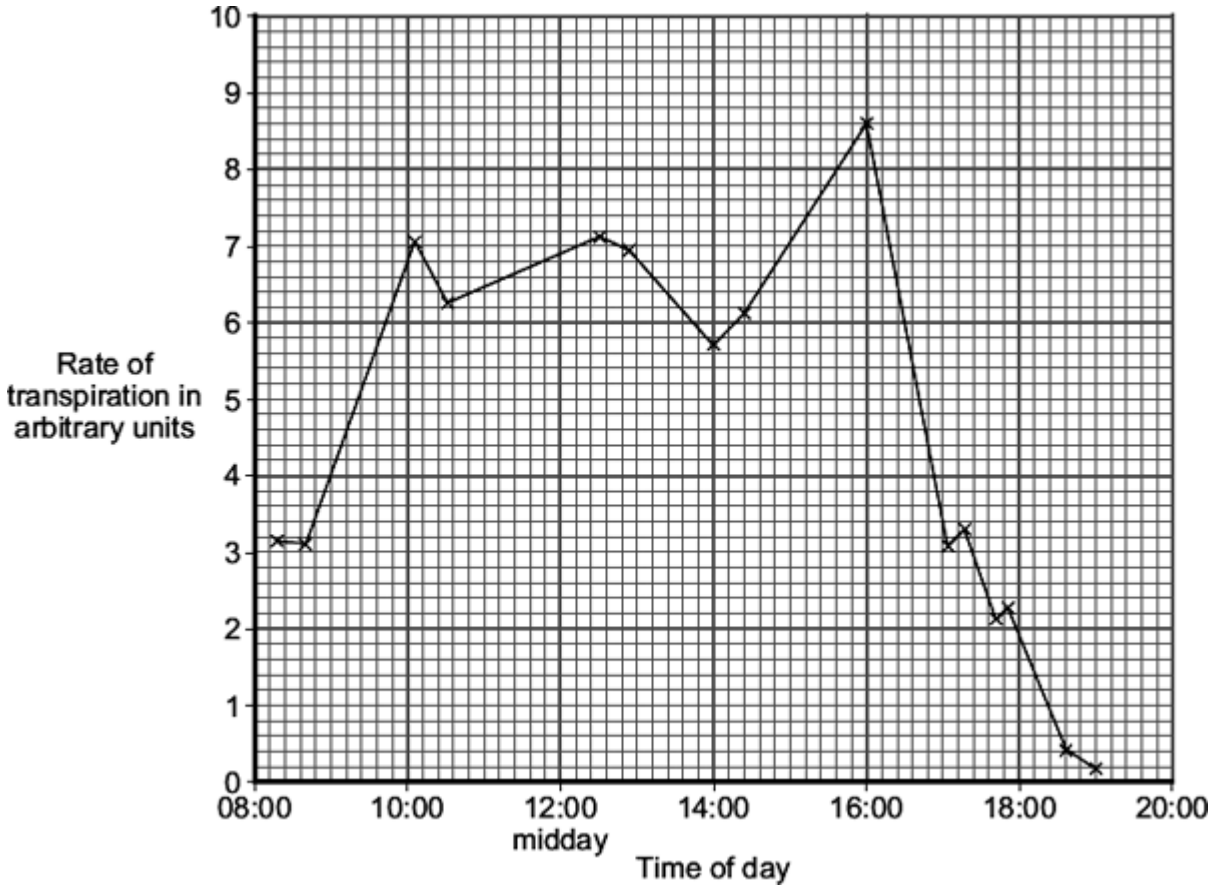
In your answer you should refer to materials moving upwards in a plant and to materials moving downwards in a plant.

(Total 6 marks)

Combined Higher Questions

Q4.

The graph shows the rate of transpiration from a plant at different times of the day.



Transpiration occurs mainly in the leaves of a plant.

(a) (i) What is *transpiration*?

_____

_____

_____

_____

(2)

(ii) Through which part of a leaf does most transpiration occur?

_____

(1)

(b) In this investigation, the rate of transpiration decreases between 16:00 hours and 19:00 hours.

(i) Calculate the average rate of decrease per hour in the rate of transpiration over this time.

Show clearly how you work out your answer.

Rate = _____ arbitrary units per hour

(2)

(ii) Suggest **one** explanation for the decrease in the rate of transpiration between 16:00 hours and 19:00 hours.

(2)

(Total 7 marks)

Q5.

Water moves from a plant to the atmosphere through the leaves.

(a) How is the volume of water lost from the leaves controlled?

(1)

(b) Describe the transport of water through a plant from the roots to the atmosphere.

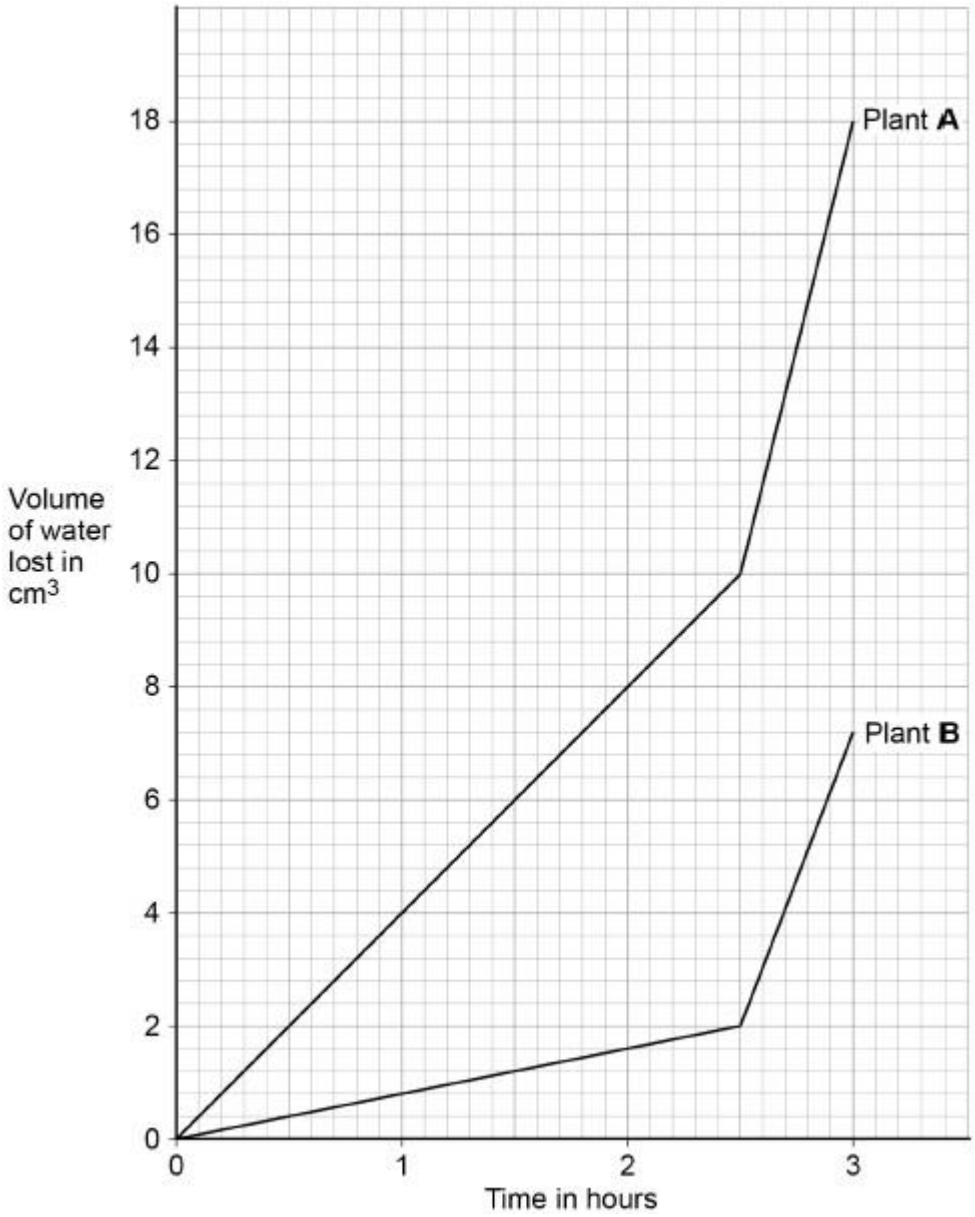
(3)

A student investigated the volume of water lost from two plants of different species.

Both plants were kept together.

Figure 1 shows the student's results.

Figure 1



(c) Suggest **one** reason for the difference in the rate of water loss from the two plants in the first 2.5 hours.

_____

_____

(1)

Both plants were moved to a different place at 2.5 hours.

(d) Calculate the rate of water loss per hour in plant **B** from 2.5 hours to 3 hours.

Give your answer to **2** significant figures.

Rate of water loss = _____ cm^3/hour

(3)

(e) Suggest **two** reasons why the rate of water loss in both plants changed after 2.5 hours.

(2)

(Total 10 marks)

Q1.

(a) epidermis

palisade mesophyll
allow palisade / mesophyll

xylem

3

(b) guard cells

1

(c) to let carbon dioxide into the leaf

1

(d) by evaporation

1

(e)
*an answer of 4 (cm^3) scores **2** marks*

evidence of correct graph readings (5 and 1)
allow in range 4.8 to 5.2 and 0.8 to 1.2

1

4 (cm^3)
allow correct subtraction from their graph readings
allow their calculated value from readings in the range 4.6 to 5.4 and 0.6 to 1.4

1

(f) plant **A** has more leaves

1

(g) any **one** from:
(the new room was)
- windier
- warmer
- drier / less humid
- brighter

answers must be comparative
allow sunnier
ignore more sun

1

(h) any **one** from:
- spikes / points / thorns / sharp
- poisonous / toxic
- brightly coloured berries
- leaves are tough / leathery
  or
  leaves are hard to chew

ignore reference to predators eating holly

allow unpleasant taste

1

[11]

Q2.

(a) (i) xylem

1

(ii) water

1

minerals / ions / named example(s)

ignore nutrients

1

(b) (i) movement of (dissolved) sugar

allow additional substances, eg amino acids / correct named sugar (allow sucrose / glucose)

allow nutrients / substances / food molecules if sufficiently qualified

ignore food alone

1

(ii) sugars are made in the leaves

1

so they need to be moved to other parts of the plant for respiration / growth / storage

1

(c) (i) mitochondria

1

(ii) for movement of minerals / ions

Do not accept 'water'

1

against their concentration gradient

1

[9]

Q3.

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response.

Level 3 (5–6 marks):
Processes used for obtaining specified materials are given.
and
correctly linked to the vessels that the materials are transported in
or
correctly linked to a description of the direction of movement of the materials.
For full credit, in addition to the above descriptors at least **one** of the processes must be linked to the vessel that the material is transported in **and** the direction of the movement of the material.

Level 2 (3–4 marks):

At least **one** process for obtaining a specified material is given
and
is correctly linked to the vessel that the material is transported in
or
correctly linked to a description of the direction of movement of the material

Level 1 (1–2 marks):
At least **one** process (P) for obtaining a material is given
or
at least **one** vessel (V) and the material it carries is given
or
there is a description of the direction of movement (M) for at least **one** material

0 marks:
No relevant points are made

examples of points made in the response Ions:
(P) taken up by diffusion or active transport
- from an area of high to low concentration (diffusion) **or** an area of low to high concentration (active transport)
  (V) travels in the xylem
  (M) to the leaves **or** from the roots / soil

Water:
(P) taken up by osmosis
- from an area of low to high concentration

  allow high concentration of water to low concentration of water

  allow from high water potential to low water potential

  ignore along a concentration gradient

  (V) travels in the xylem
  (M) to the leaves **or** from the roots / soil
  (P) transpiration stream
- movement replaces water as it evaporates from leaves
  (V) in the xylem

Sugar:
(P) made during photosynthesis
(V) travels in the phloem
(M) to other parts of the plant **or** to storage organs **or** travels up and down

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Combined Higher Mark Scheme:

Q4.

(a) (i) water <u>loss</u>

extra substance(s) cancel

*if transpiration stream described max **1** mark*

1

as a vapour / by evaporation

ignore stomata

1

(ii) stomata / stoma / guard cells

ignore epidermis

1

(b) (i) 2.8

*correct answer with or without working gains **2** marks*

if answer incorrect:

*allow **1** mark for (8.6 - 0.2) ÷ 3 **or** 8.4 ÷ 3*

2

(ii) warmer at 16:00 / gets cooler

***or** reverse argument for 19.00*

1

faster diffusion / evaporation

accept sun setting as equivalent to heat or light marking points

or

lighter at 16:00 / gets darker (1)

if no environmental factor still allow reason mark

stomata open / more open (1)

eg 'stomata close later in the day

or

(more) windy at 16:00 / gets less windy (1)

removal of (more) water vapour / steeper gradient (1)

or

air is less humid at 16.00 (1)

allow rain at 19.00

faster diffusion or steeper gradient (1)

1

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Q5.

(a) (by the guard cells) opening **and** closing the stomata

ignore ref to guard cells being plasmolysed / turgid

1

(b) (water is) transported in xylem

ignore mechanism of water entering the roots

*do **not** accept translocation*

1

water evaporates (from leaves)

allow loss of water vapour

1

through the stomata

allow between the guard cells
*if no other marks awarded allow **1** mark for reference to transpiration*

1

(c) any **one** from:

*allow converse for plant **B***

- plant **A** has more stomata
  allow (the plants) have different numbers of stomata
- plant **A** has more leaves
  allow (the plants) have different numbers of leaves
- plant **A** has bigger leaves
  allow (the plants) have different sized leaves
- plant **A** has a greater total surface area of leaves
  allow (the plants) have different total surface area of leaves

*allow plant **A** has less (waxy) cuticle*
or
(the plants) have different amounts of (waxy) cuticle

*allow plant **A** has fewer hairs on leaves*
or
(the plants) have different number of hairs on the leaves

1

(d)

*an answer of 10 scores **3** marks*

5.2

allow in range 4.8 to 5.6

1

(5.2 × 2 =) 10.4

or

$\left(\frac{5.2}{0.5} =\right) 10.4$

allow their calculated value in the range 8.8 to 12.0

1

10 (cm^3/hour)

allow their calculated value in the range 8.8 to 12.0 correct to 2 significant figures

1

(e) (rate increased because)

any **two** from:

answers must be comparative

- (it was) warmer
- light intensity was higher
- (it was) less humid

allow greater water vapour gradient between leaves and environment

- (it was) windier

2

[10]