AQA – Photosynthesis – GCSE Combine Science Biology

1. May/2020/Paper_1F/No.3

0 3 Water is lost from the leaves of plants through pores called stomata.

0 3 . 1 What is the loss of water from a leaf called?

[1 mark]

Tick (✓) **one** box.

Osmosis ☐

Respiration ☐

Transpiration ☐

0 3 . 2 Which cells control the size of stomata?

[1 mark]

Tick (✓) **one** box.

Guard cells ☐

Phloem cells ☐

Xylem cells ☐

A student investigated the water loss when different surfaces of leaves were covered in grease.

The grease blocks the stomata.

This is the method used.

1. Remove four similar leaves from one plant.

2. Put grease on different surfaces of the leaves as shown in **Figure 4**.

3. Record the mass of each leaf and attach the four leaves to a string.

4. After 24 hours record the mass of each leaf again.

Figure 4

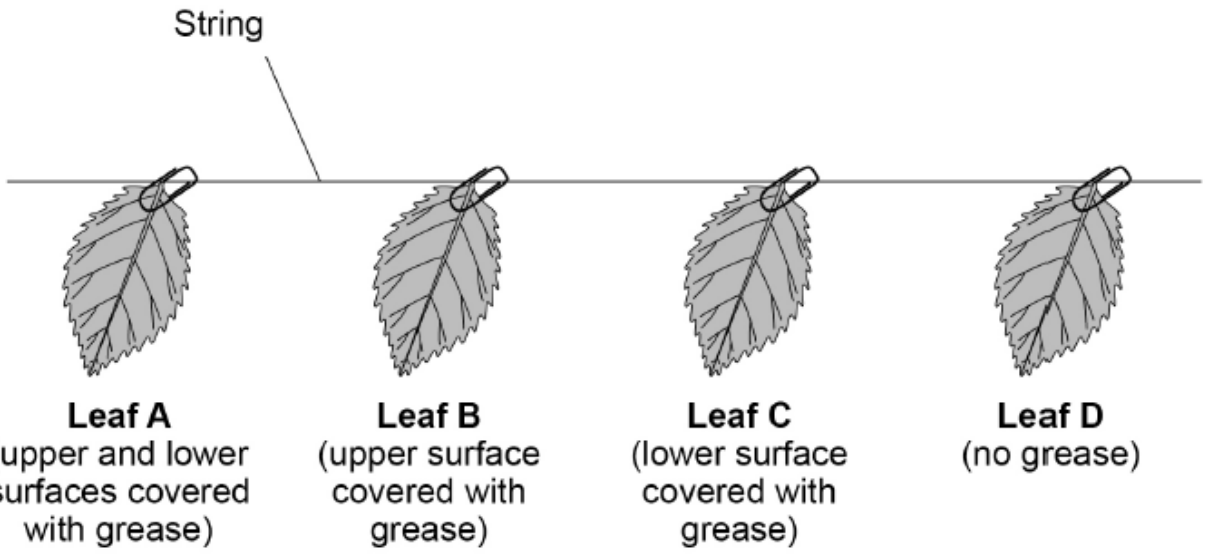


Table 2 shows the results.

Table 2

Leaf	Surfaces covered with grease	Mass of leaf at start in grams	Mass of leaf after 24 hours in grams	Loss in mass after 24 hours in grams
A	Upper and lower	2.01	1.97	**X**
B	Only upper	2.00	1.87	0.13
C	Only lower	2.01	1.96	0.05
D	None	1.98	1.83	0.15

0 3 . 3 Calculate value **X** in **Table 2**.

[1 mark]

Value **X** = _____ g

0 3 . 4 The loss in mass of water was measured after 24 hours.

Calculate the mass of water lost in grams per hour for leaf **D**.

[2 marks]

Mass of water lost per hour = _____ g

The student concluded:

'More water is lost from the lower surface of a leaf than from the upper surface.'

0 3 . 5 What evidence is there in **Table 2** to support the student's conclusion?

[1 mark]

0 3 . 6 What do the results in **Table 2** show about the number of stomata on the surfaces of a leaf?

[1 mark]

Tick (✓) **one** box.

There are more stomata on the lower surface. ☐

There are more stomata on the upper surface. ☐

There are the same number of stomata on both surfaces. ☐

0 3 . 7 The investigation was done at 20 °C

How would the mass of water lost be different if the investigation was done at 25 °C?

Give a reason for your answer.

[2 marks]

Difference _____

_____

Reason _____

_____

2. May/2020/Paper_1H/No.5

0 5 This question is about photosynthesis and food production.

0 5 . 1 How can oxygen production be used to show the **rate** of photosynthesis?

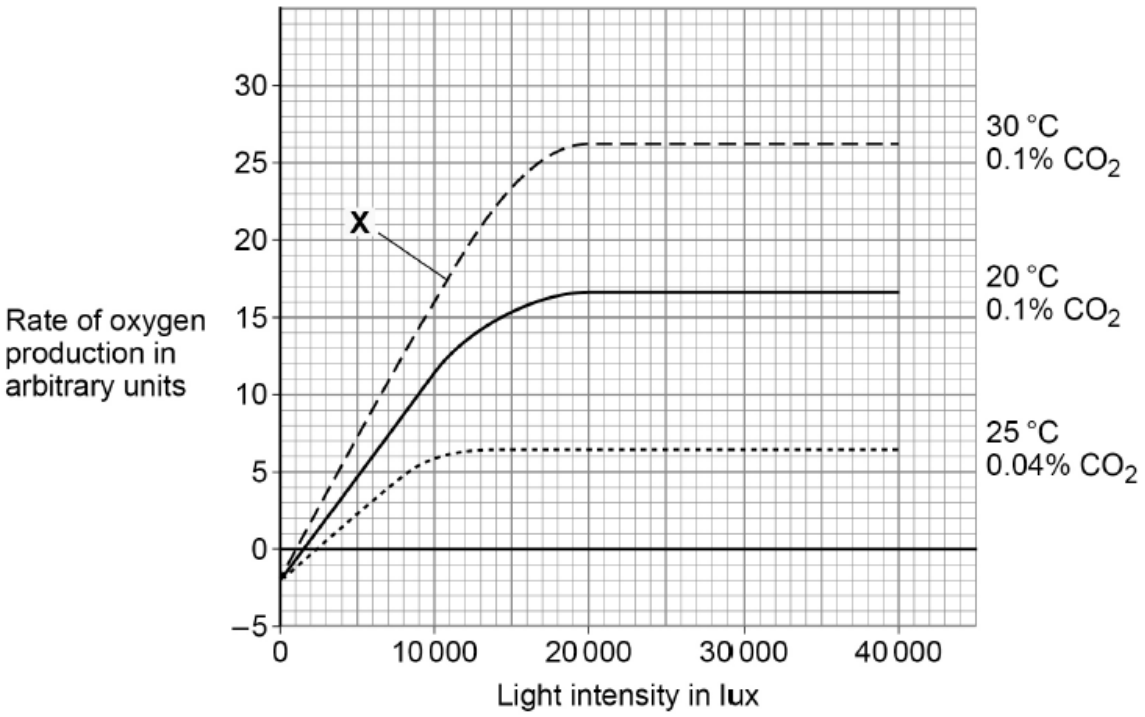
[1 mark]

Scientists investigated factors affecting the rate of photosynthesis in tomato plants.

The tomato plants were growing in a commercial greenhouse in the UK during winter.

Figure 5 shows the results.

Figure 5



The percentage of carbon dioxide in the Earth's atmosphere is 0.04%

0 5 . 2 Name the factor that is limiting the rate of photosynthesis at point **X**.

[1 mark]

_____

Farmers growing tomatoes commercially try to control the rate of photosynthesis and make maximum profit.

A farmer can control the temperature and carbon dioxide concentration in a greenhouse.

0 5 . 3 What is the **minimum** light intensity a farmer should use to get the maximum rate of photosynthesis shown in **Figure 5**?

[1 mark]

Light intensity = _____ lux

0 5 . 4 The light intensity you gave in Question **05.3** may **not** give the farmer maximum profit.

Explain why.

[3 marks]

_____

_____

_____

_____

_____

_____

0 5 . 5 Explain the results when the light intensity was 0 lux.

Use **Figure 5**.

[4 marks]

3. May/June/2019/Paper_1F/No.3

0 3 This question is about organisation in living organisms.

0 3 . 1 Write the biological structures from the box in the correct size order.

[3 marks]

cell	nucleus	organ	tissue

Smallest

↓

Largest

_____

_____

_____

_____

0 3 . 2 Name **one** animal organ.

[1 mark]

_____

0 3 . 3 Which is a plant tissue?

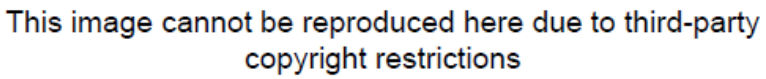
[1 mark]

Tick (✓) **one** box.

- Flower ☐
- Leaf ☐
- Phloem ☐
- Root ☐

Figure 5 shows part of a root viewed using a microscope.

Figure 5

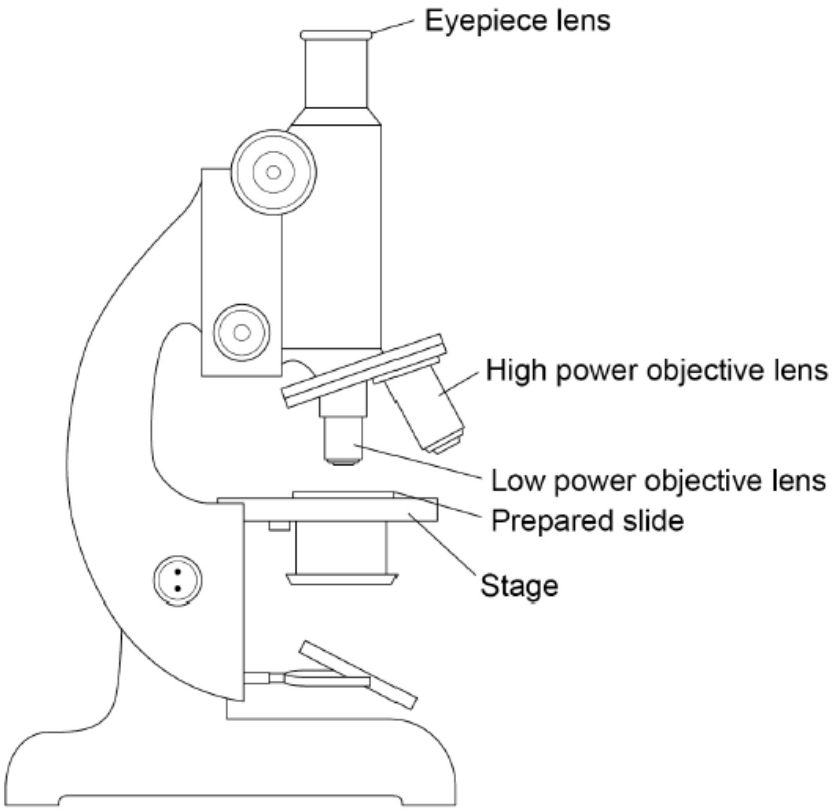


0 3 . 4 Explain how a root hair cell is specialised for its function.

[2 marks]

Figure 6 shows a microscope.

Figure 6



0 3 . 5 It is easier to view the cells using the low power objective lens first.

Give **one** reason why.

[1 mark]

0 3 . 6 To focus the image the objective lens should be moved away from the stage.

Give **one** reason why the objective lens should **not** be moved towards the stage.

[1 mark]

0 3 . 7 The image of the prepared slide in **Figure 6** is viewed with the ×10 objective lens.

The total magnification is ×50

What was the power of the eyepiece lens used?

[1 mark]

Power of eyepiece lens = × _____

0 3 . 8 Root hair cells do **not** contain chloroplasts.

Suggest **one** reason why.

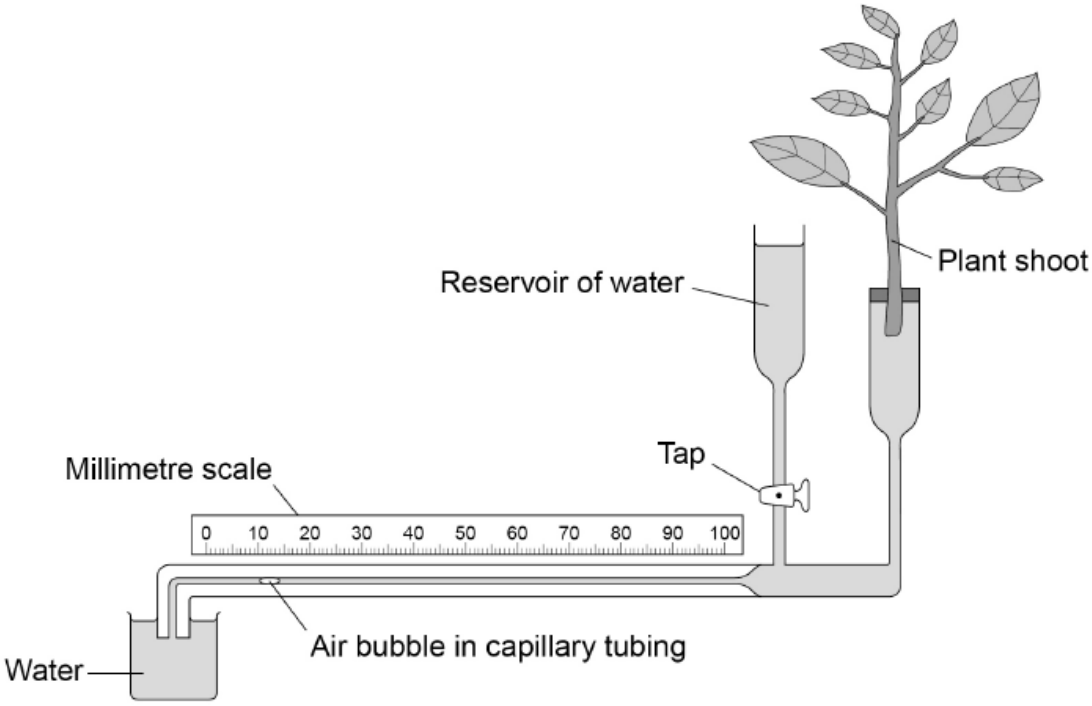
[1 mark]

4. May/June/2019/Paper_1H/No.3

0 3 A student used a potometer to investigate the rate of water uptake in a plant shoot.

Figure 3 shows a potometer.

Figure 3



As the shoot takes in water the air bubble moves.

The rate of water uptake is the distance the air bubble moves in a given time.

This is the method used.

1. Place the potometer in moist air at 25 °C
2. Position the air bubble at 0 mm in the capillary tube.
3. Record the position of the air bubble in the capillary tube every minute for 5 minutes.
4. Repeat steps 2 and 3 with the potometer in different conditions.

Table 3 shows the conditions used.

Table 3

Investigation	Conditions
A	Moist air at 25 °C
B	Dry air at 15 °C
C	Dry air at 25 °C

0 3 . 1 After investigation **A** the air bubble had moved part way along the capillary tube.

Suggest how the student moved the air bubble back to 0 mm for the start of investigation **B**.

[1 mark]

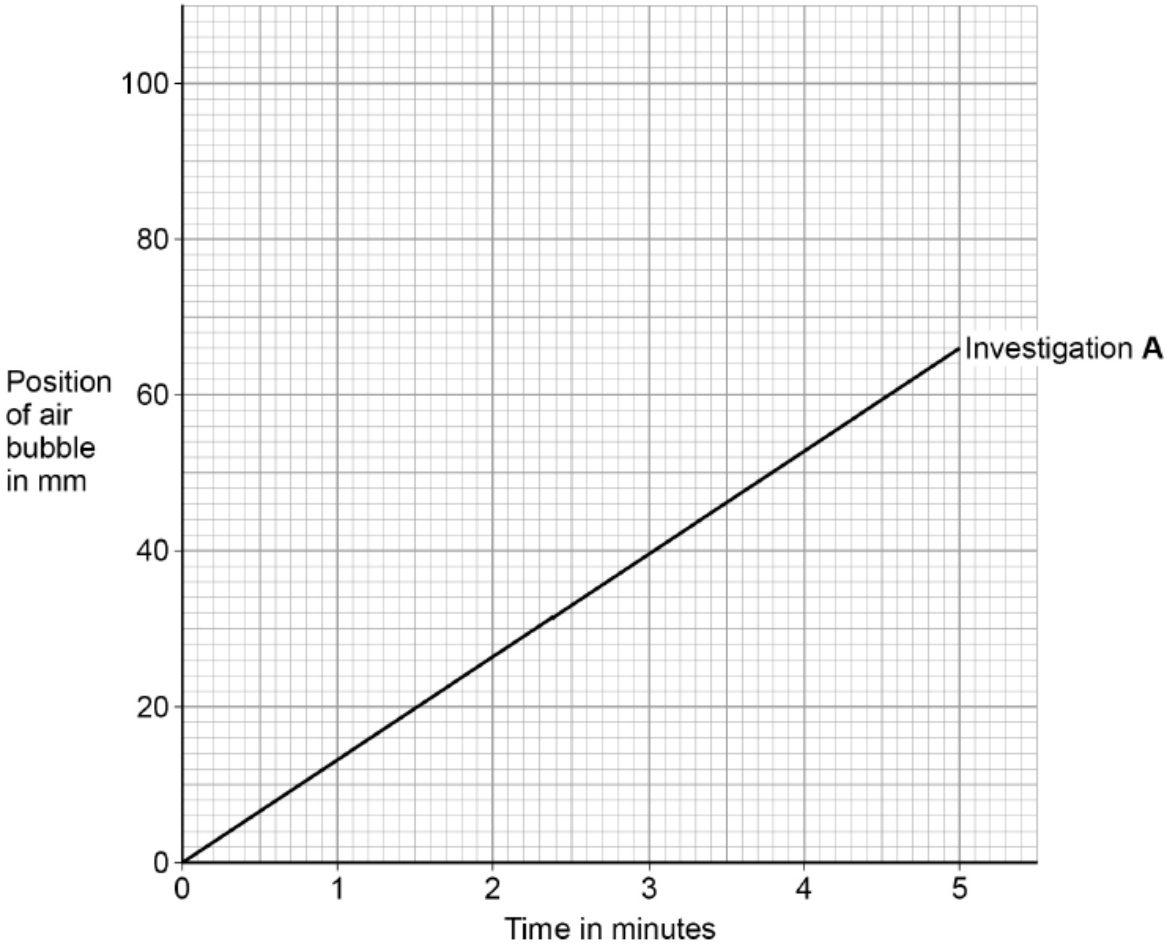
0 3 . 2 Capillary tubing is very narrow.

Explain why narrow tubing was used.

[2 marks]

Figure 4 shows the results for investigation **A**.

Figure 4



0 3 . 3 The cross-sectional area of the capillary tube was 0.8 mm^2

Calculate the rate of water uptake for investigation **A** in mm^3/min

[3 marks]

Rate = _____ mm^3/min

0 3 . 4 **Table 4** shows the results from investigation **B**.

Table 4

Time in minutes	Position of air bubble in mm
0	0
1	6
2	16
3	22
4	30
5	42

Plot the data from **Table 4** on **Figure 4**.

You should:

- draw a line of best fit
- label the line **B**.

[3 marks]

0 3 . 5 Investigation **C** was carried out in dry air at 25 °C

Draw a line on **Figure 4** to show the results you would expect for investigation **C**.

Label the line **C**.

[1 mark]

0 3 . 6 The investigations were carried out in daylight.

The air bubble would **not** move if the investigations were done in the dark.

Explain why.

[3 marks]