A

Surname ____________________

Other Names ____________________

Centre Number ____________________

Candidate Number ____________________

Candidate Signature ____________________

I declare this is my own work.

GCSE
COMBINED SCIENCE: TRILOGY

Foundation Tier

Biology Paper 1F

F

8464/B/1F

Time allowed: 1 hour 15 minutes

At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.

[Turn over]

For this paper you must have:
- **a ruler**
- **a scientific calculator.**

INSTRUCTIONS

- **Use black ink or black ball-point pen.**
- **Pencil should only be used for drawing.**
- **Answer ALL questions in the spaces provided.**
- **If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).**
- **Do all rough work in this book. Cross through any work you do not want to be marked.**
- **In all calculations, show clearly how you work out your answer.**

INFORMATION

- **The maximum mark for this paper is 70.**
- **The marks for questions are shown in brackets.**
- **You are expected to use a calculator where appropriate.**
- **You are reminded of the need for good English and clear presentation in your answers.**

DO NOT TURN OVER UNTIL TOLD TO DO SO

0 1

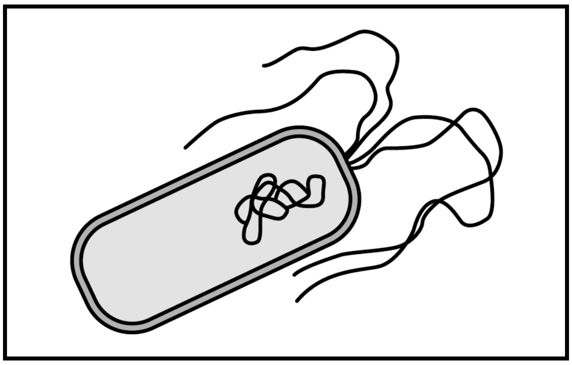
Cells are the building blocks of life.

0 1 . 1

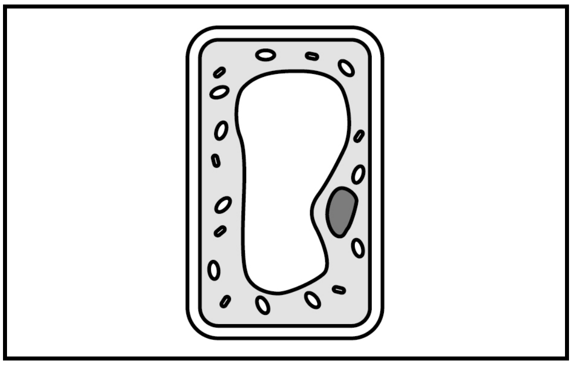
On the opposite page, draw ONE line from each type of organism to the diagram of one of its cells. [3 marks]

Type of organism

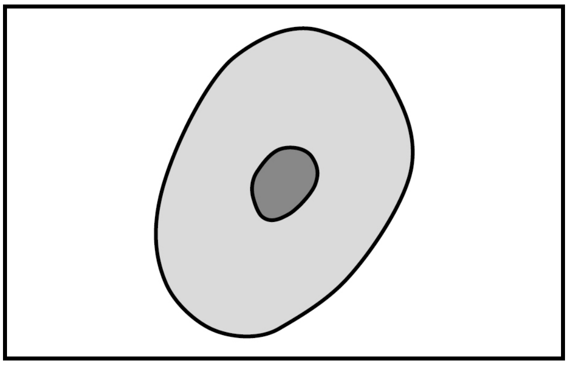
Diagram of one cell



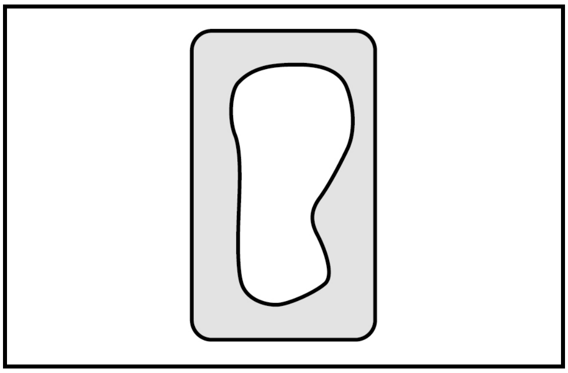
Animal



Bacterium



Plant



[Turn over]

0 1 . 2

Cells contain structures. These structures have different functions.

Draw ONE line from each function to the correct structure. [3 marks]

FUNCTION	STRUCTURE
	Cell membrane
Contains genetic information	
	Cell wall
Controls what enters and leaves a cell	
	Chloroplast
Where photosynthesis happens	
	Nucleus

0 1 . 3

Chemicals are produced in cells.

Complete the sentences.

Choose answers from the list. [4 marks]

- **cellulose**
- **DNA**
- **glycogen**
- **starch**
- **urea**

A chemical excreted by animals is ____________________ .

A chemical stored in animal cells is ____________________ .

A chemical stored in plant cells is ____________________ .

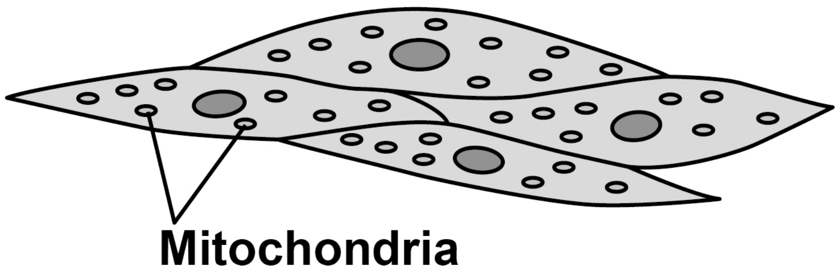
A chemical that strengthens plant cell walls is

____________________ .

[Turn over]

FIGURE 1 shows a diagram of muscle cells.

FIGURE 1



0 1 . 4

Give ONE function of muscle cells. [1 mark]

____

____

____

0 1 . 5

Explain how muscle cells are adapted for their function.

Use FIGURE 1. [2 marks]

____

____

____

0 1 . 6

One muscle cell was 0.05 mm wide.

When viewed using a microscope the image of the muscle cell was 2 mm wide.

Calculate the magnification used to view the cell.

Use the equation:

$$\text{magnification} = \frac{\text{width of image}}{\text{width of real cell}}$$

[2 marks]

Magnification = × ____________________

[Turn over]

15

0 2

Antibiotics are used to treat bacterial infections.

0 2 . 1

Which substance is used as an antibiotic? [1 mark]

Tick (✓) ONE box.

- [ ] **Aspirin**
- [ ] **Digitalis**
- [ ] **Penicillin**

Gonorrhoea and chlamydia are two sexually transmitted infections.

Gonorrhoea and chlamydia infections can be treated with antibiotics.

0 2 . 2

Give ONE symptom of gonorrhoea. [1 mark]

[Turn over]

A scientist investigated which antibiotics were most effective at treating gonorrhoea and chlamydia.

This is the method used.

1. **Grow gonorrhoea bacteria in a Petri dish.**
2. **Prepare four different antibiotic solutions, A, B, C and D, of the same concentration.**
3. **Cut four filter paper discs to the same size.**
4. **Soak each paper disc in a different antibiotic solution.**
5. **Put the four paper discs into the Petri dish.**
6. **Repeat steps 3 to 5 using a Petri dish with chlamydia bacteria growing in it.**
7. **Keep both Petri dishes at 25 °C for 3 days.**

0 2 . 3

Give TWO control variables used in this investigation.
[2 marks]

1 ____

____

____

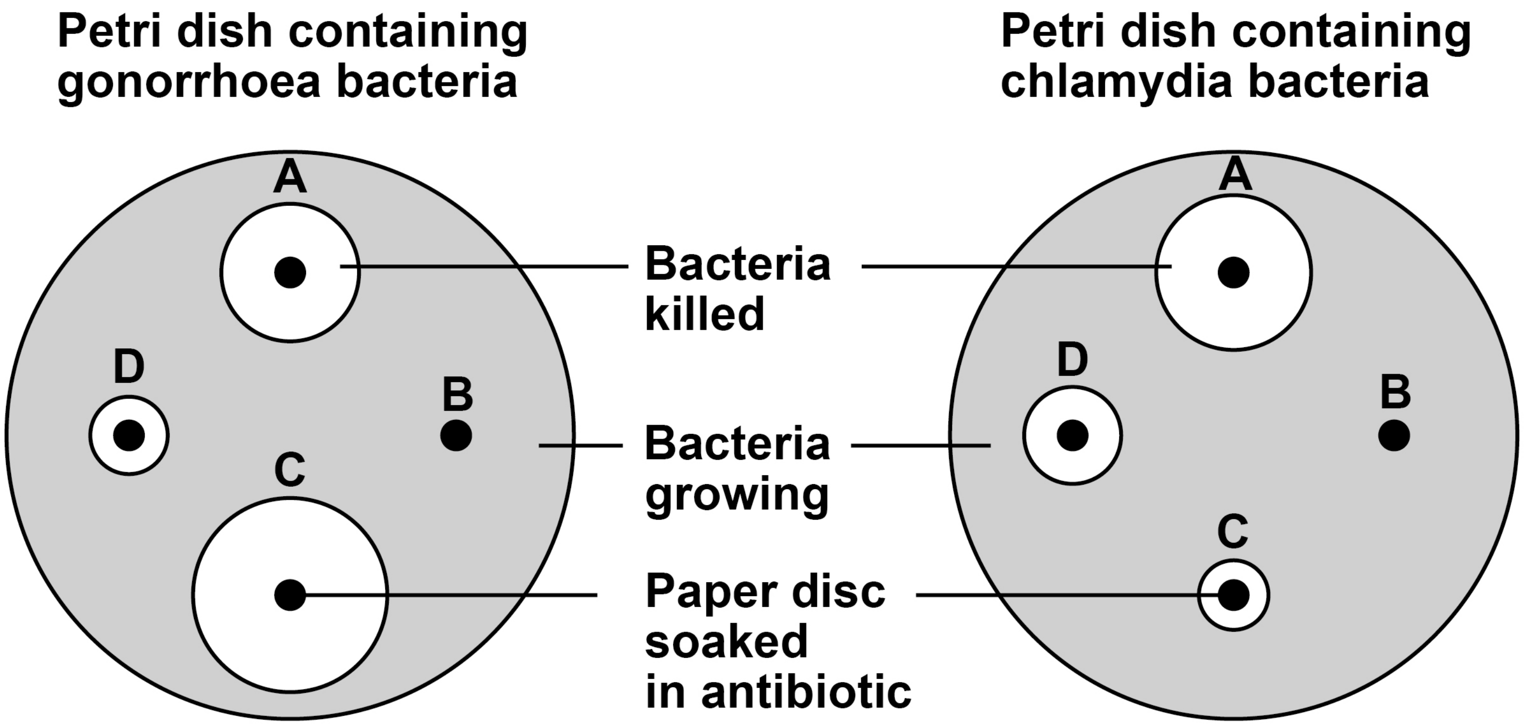
2

[Turn over]

FIGURE 2 shows the results.

A clear area around a paper disc is where the antibiotic has killed the bacteria.

FIGURE 2



0 2 . 4

Which antibiotic did NOT kill either type of bacterium? [1 mark]

Tick (✓) ONE box.

☐ **A**

☐ **B**

☐ **C**

☐ **D**

[Turn over]

0 2 . 5

Which antibiotic would be the most effective to treat a person with a GONORRHOEA infection? [1 mark]

Tick (✓) ONE box.

☐ **A**

☐ **B**

☐ **C**

☐ **D**

0 2 . 6

Which antibiotic would be the most effective to treat a person who had both gonorrhoea AND chlamydia infections? [1 mark]

Tick (✓) ONE box.

☐ **A**

☐ **B**

☐ **C**

☐ **D**

[Turn over]

0 2 . 7

Antibiotics CANNOT be used to treat HIV infections.

Suggest ONE reason why. [1 mark]

Fungi can cause an infection of the fingernails and toenails.

Fungal nail infections can spread from one person to another person.

0 2 . 8

Some people go to nail salons to have their nails shaped and painted.

Suggest ONE way workers in nail salons can reduce the risk of infections being spread. [1 mark]

0 2 . 9

Suggest ONE reason why fungal infection of toenails is more common than fungal infection of fingernails.
[1 mark]

[Turn over]

10

0 3

Anaerobic respiration in yeast is called fermentation.

The equation for fermentation is:

glucose $\longrightarrow$ ethanol + carbon dioxide

0 3 . 1

How does the equation show that fermentation is an ANAEROBIC reaction? [1 mark]

Fermentation in yeast is used in the manufacture of beer, wine and bread.

0 3 . 2

Why is fermentation used when making beer and wine?
[1 mark]

0 3 . 3

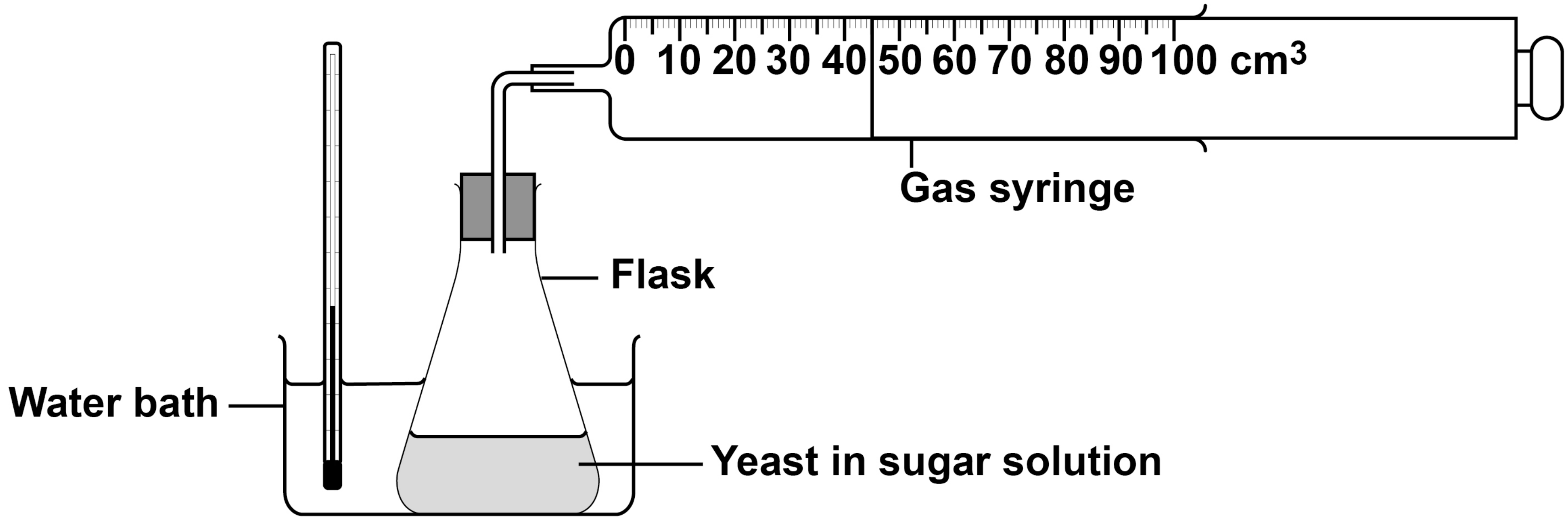
Explain why fermentation is used when making bread.
[2 marks]

[Turn over]

A student investigated fermentation in yeast.

FIGURE 3 shows the apparatus.

FIGURE 3



This is the method used.

1. Mix yeast with sugar solution in a flask.
2. Put the flask in a water bath at 35 °C.
3. After 10 minutes attach a gas syringe to the flask.
4. Record the volume of carbon dioxide collected every 5 minutes for 1 hour.

0 3 . 4

What volume of carbon dioxide has been collected in the gas syringe in FIGURE 3? [1 mark]

Volume of carbon dioxide = ________________________ cm^3

[Turn over]

0 3 . 5

Why did the student wait 10 minutes before attaching the gas syringe? [1 mark]

Tick (✓) ONE box.

- [ ] **To allow time for the mixture to reach 35 °C**
- [ ] **To allow time for the sugar to dissolve**
- [ ] **To allow time to draw a results table**

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[Turn over]

FIGURE 4, on the opposite page, shows the results.

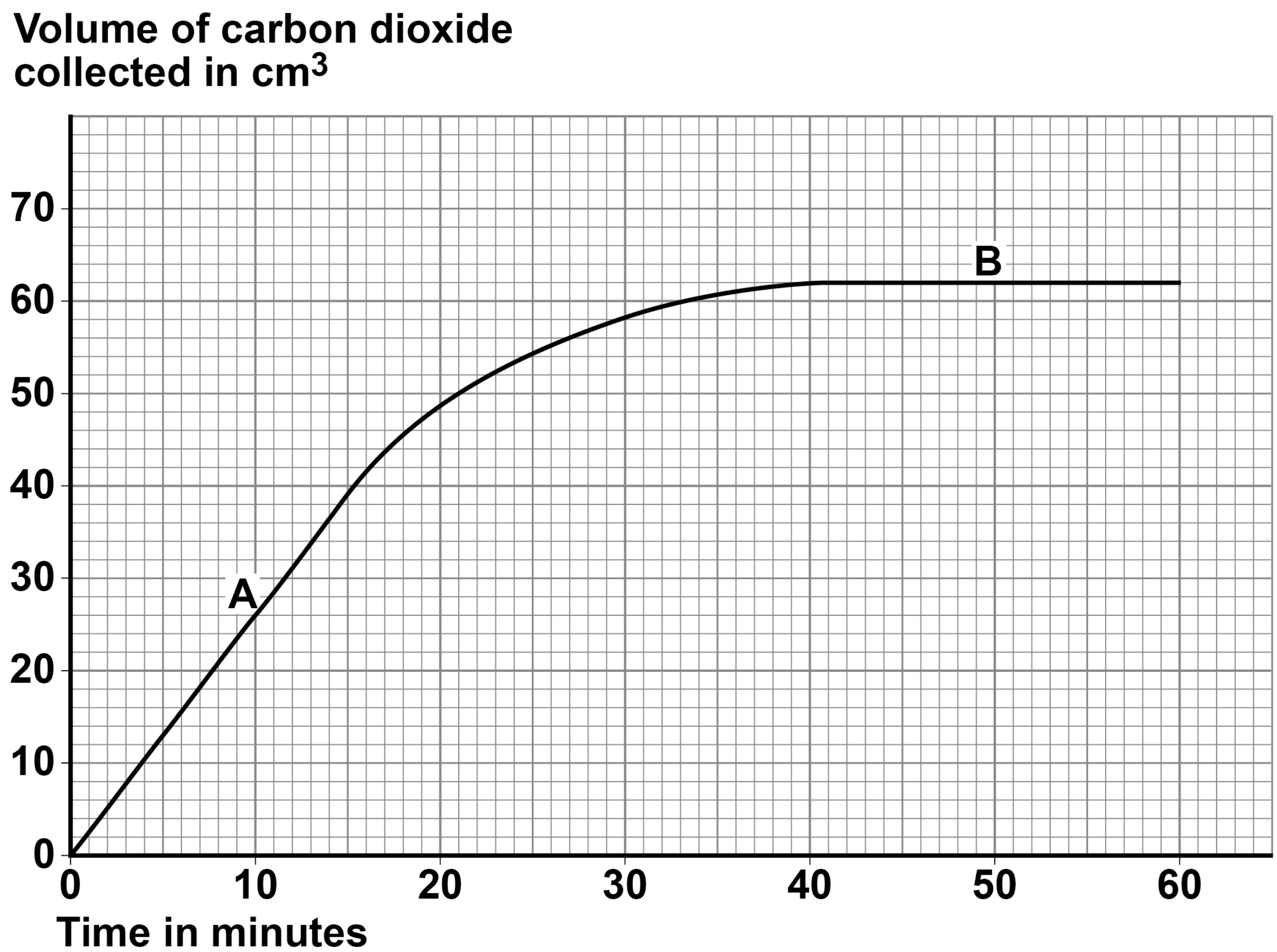
0 3 . 6

A and B are different parts of the graph in FIGURE 4.

Draw ONE line from each part of the graph to the description of the reaction.
[2 marks]

Part of the graph	Description of the reaction
	Carbon dioxide is NOT being produced
A	
	Carbon dioxide production is FASTEST
B	
	Carbon dioxide production is SLOWING DOWN

FIGURE 4


Volume of carbon dioxide collected in cm3
70
60
50
40
30
20
10
0
A
B
0
10
20
30
40
50
60
Time in minutes

The equation for fermentation is repeated here.

glucose $\rightarrow$ ethanol + carbon dioxide

0 3 . 7

Suggest ONE reason why fermentation in the flask stopped. [1 mark]

0 3 . 8

Fermentation is controlled by enzymes.

The investigation was repeated at 2 °C and at 75 °C.

No carbon dioxide was produced at either of these temperatures.

Suggest why NO carbon dioxide was produced at 2 °C or at 75 °C. [2 marks]

Reason at 2 °C

Reason at 75 °C ______________________________

____

____

0 3 . 9

Anaerobic respiration also happens in animal cells.

Complete the equation for anaerobic respiration in animal cells.

Choose answers from the list. [2 marks]

- **carbon dioxide**
- **ethanol**
- **glucose**
- **lactic acid**
- **water**

______________________ → ______________________

[Turn over]

13

0 4

This question is about plant transport systems.

0 4 . 1

Which ORGAN in a plant absorbs water from the soil? [1 mark]

____

____

0 4 . 2

The concentration of nitrate ions in the soil is lower than the concentration of nitrate ions inside a plant.

How would the nitrate ions move from the soil into the cells of this plant? [1 mark]

Tick (✓) ONE box.

☐ **By active transport**

☐ **By diffusion**

☐ **By osmosis**

Dissolved sugars are transported in the phloem.

0 4 . 3

What is the name of the process that moves dissolved sugars through the phloem? [1 mark]

Tick (✓) ONE box.

☐ **Evaporation**

☐ **Osmosis**

☐ **Translocation**

0 4 . 4

Give ONE use of sugars in a plant. [1 mark]

____

____

____

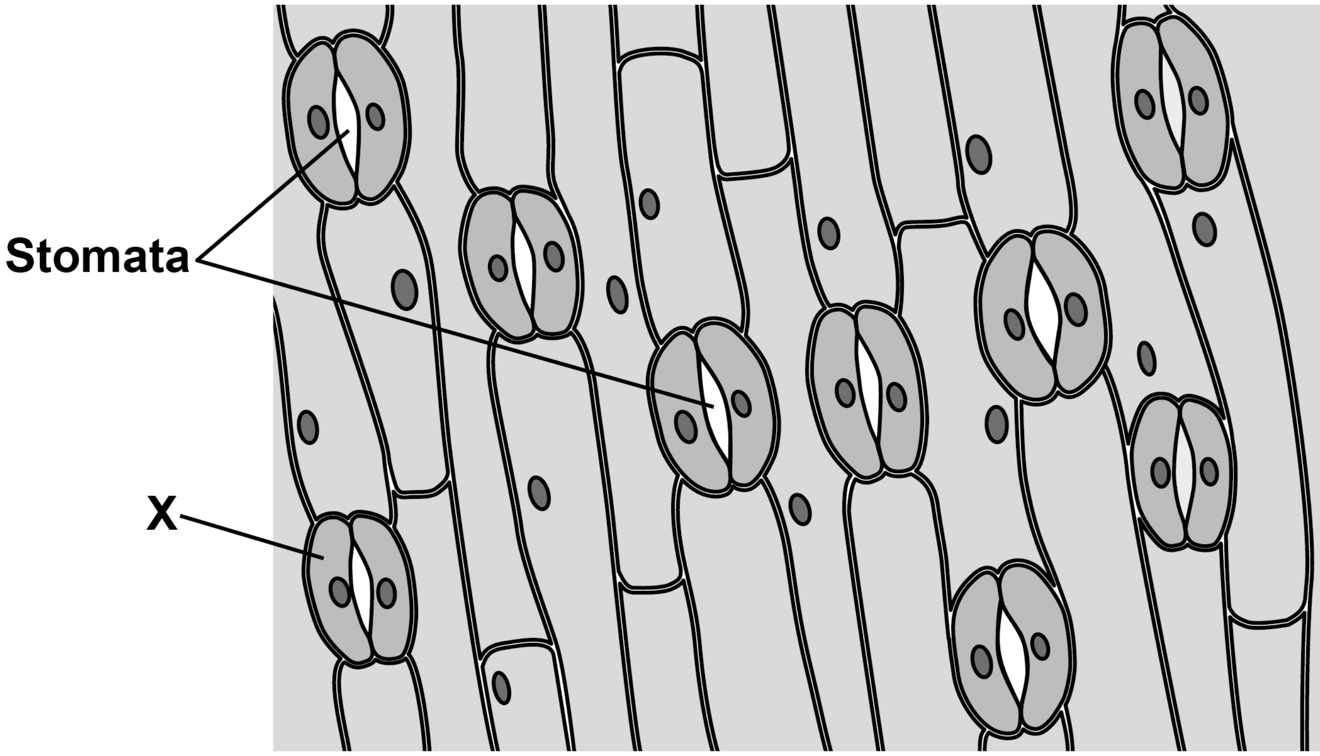
[Turn over]

Stomata are openings on the surface of a leaf.

Stomata allow gases to move into and out of a leaf.

FIGURE 5 shows the surface of a leaf.

FIGURE 5



0 4 . 5

What is cell X? [1 mark]

Tick (✓) ONE box.

- [ ] **Guard cell**
- [ ] **Meristem cell**
- [ ] **Palisade cell**

0 4 . 6

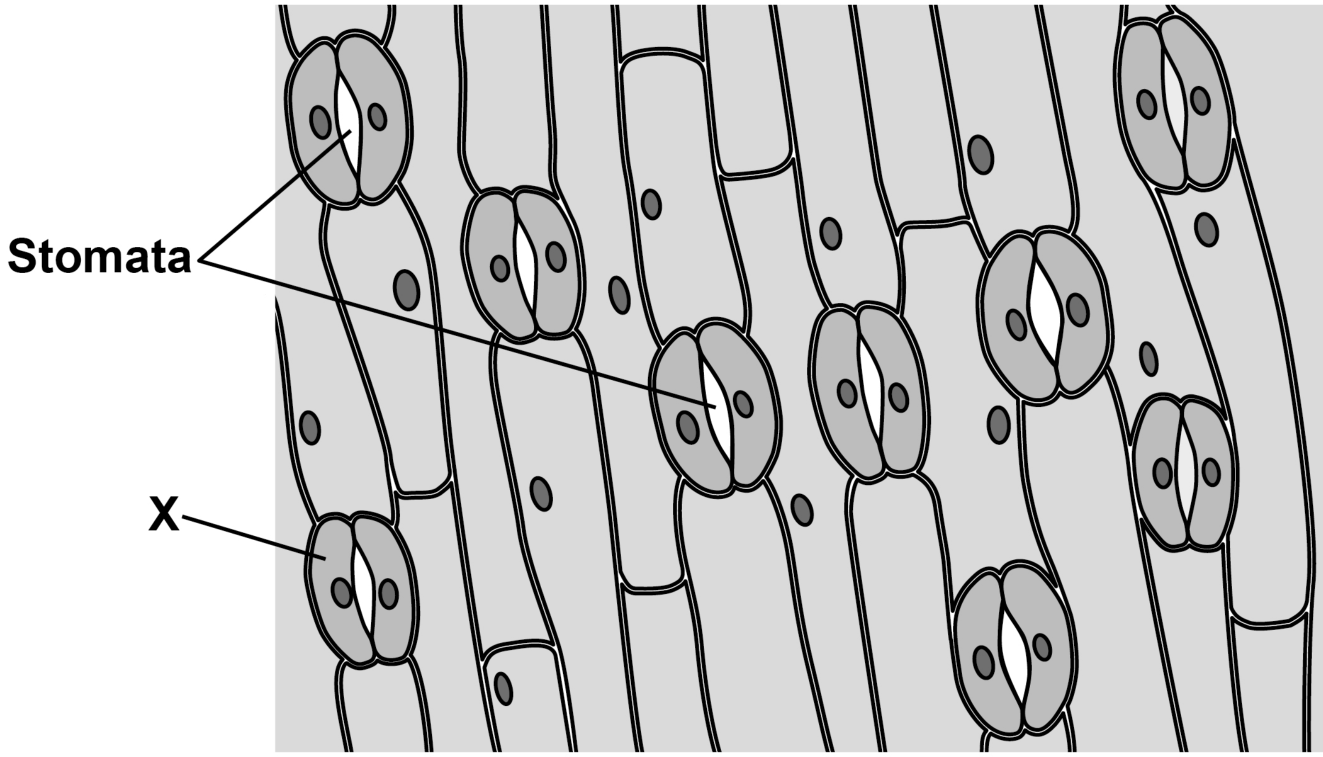
Why do the stomata open during the day? [1 mark]

Tick (✓) ONE box.

- [ ] **To allow carbon dioxide in**
- [ ] **To allow nitrogen in**
- [ ] **To allow oxygen in**

[Turn over]

REPEAT OF FIGURE 5



04.7

The area of the leaf shown in FIGURE 5 is 0.25 mm^2.

Calculate the number of stomata per mm^2 for the leaf in FIGURE 5.

Use the equation:

$$\text{number of stomata per mm}^2 = \frac{\text{number of stomata}}{\text{area in mm}^2}$$

[2 marks]

____

____

____

____

Number of stomata per mm^2 = ____________________

[Turn over]

A student investigated the number of stomata per mm^2 on the upper and lower surfaces of leaves.

The leaves were taken from the same plant.

TABLE 1 shows the results.

TABLE 1

Leaf	Number of stomata per mm^2	
	Upper surface	Lower surface
1	0	37
2	1	36
3	2	30
4	1	32
5	1	35
Mean	1	X

0 4 . 8

Calculate mean value X in TABLE 1. [2 marks]

X=

0 4 . 9

Water vapour is lost through stomata.

Explain the difference in the number of stomata on the upper and lower surfaces of the leaves.

Use TABLE 1. [3 marks]

[Turn over]

13

0 5

Plants absorb light for photosynthesis.

0 5 . 1

Which is the equation for photosynthesis? [1 mark]

Tick (✓) ONE box.

☐ $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

☐ $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

☐ $6H_2O + 6O_2 \rightarrow C_6H_{12}O_6 + 6CO_2$

☐ $6O_2 + 6CO_2 \rightarrow C_6H_{12}O_6 + 6H_2O$

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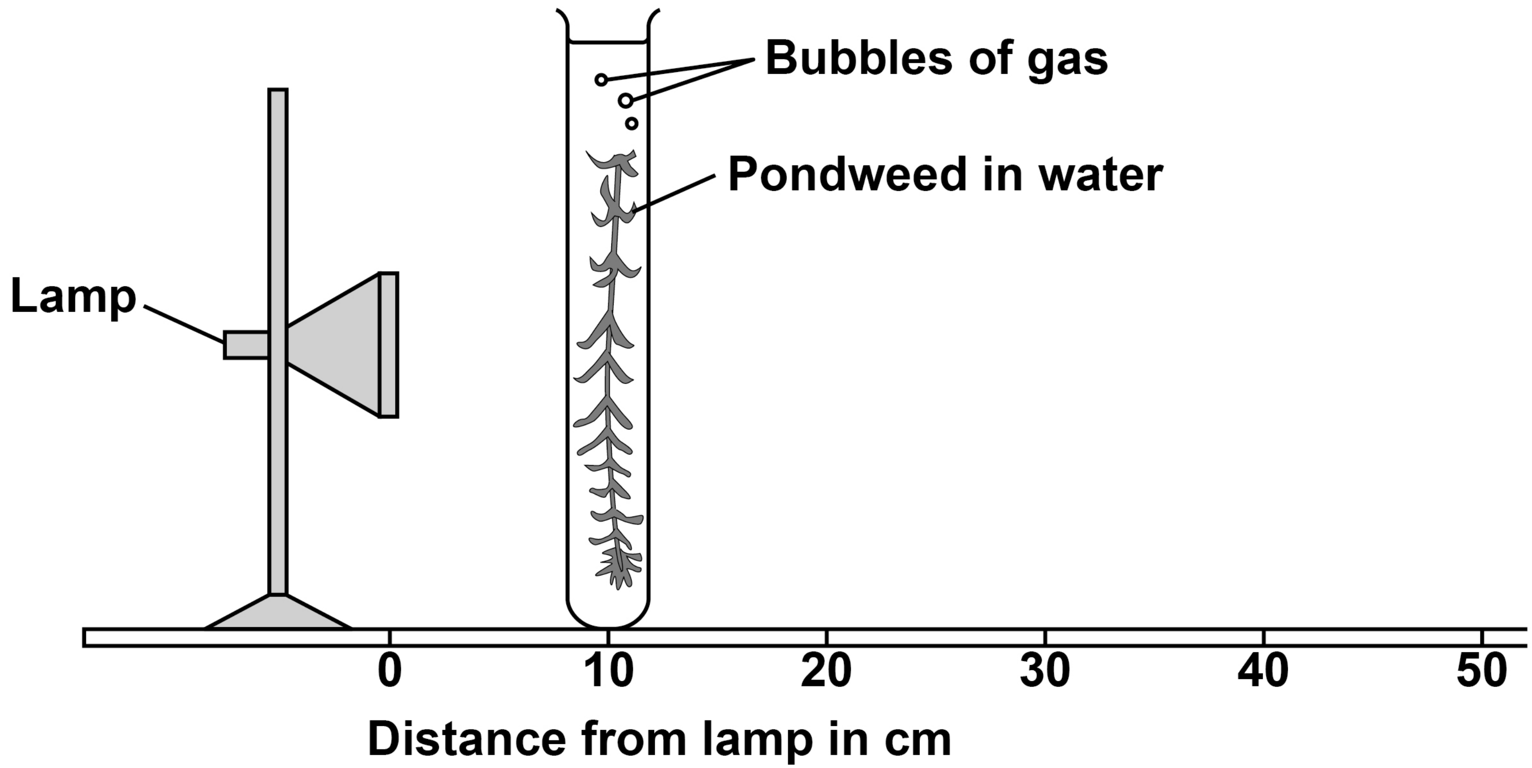
[Turn over]

A student investigated the effect of light intensity on the rate of photosynthesis.

FIGURE 6 shows the apparatus.

FIGURE 6



This is the method used.

1. Set up the apparatus as shown in FIGURE 6.
2. Place the pondweed 10 cm away from the lamp.
3. Switch on the lamp.
4. Record the number of bubbles of gas produced in 5 minutes.
5. Repeat steps 2 to 4 with the pondweed at different distances from the lamp.

[Turn over]

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0 5 . 2

What was the independent variable in this investigation? [1 mark]

Tick (✓) ONE box.

- ☐ **Distance of the pondweed from the lamp**
- ☐ **Length of the piece of pondweed**
- ☐ **Number of bubbles of gas produced**
- ☐ **Time taken to collect the gas**

[Turn over]

The lamp gets warm when it is on. This causes the temperature of the water to increase.

0 5 . 3

Explain how an increase in temperature would affect the results of this investigation. [2 marks]

0 5 . 4

Suggest ONE way the investigation could be improved so the temperature of the water does NOT increase. [1 mark]

0 5 . 5

Suggest TWO improvements to the investigation so the results would be more valid.

Do NOT refer to controlling the temperature of the water. [2 marks]

1 ____

____

____

2 ____

____

____

[Turn over]

TABLE 2 shows the results.

TABLE 2

Distance of pondweed from the lamp in cm	Number of bubbles of gas produced in 5 minutes
10	120
20	56
30	31
40	16
50	10

0 5 . 6

Calculate the rate of photosynthesis when the pondweed was 40 cm from the lamp.

Give the rate of photosynthesis as the number of bubbles of gas produced per minute. [1 mark]

____

____

____

Rate = ___________ bubbles of gas produced per minute

05.7

Give ONE conclusion that can be made from TABLE 2.
[1 mark]

[Turn over]

REPEAT OF TABLE 2

Distance of pondweed from the lamp in cm	Number of bubbles of gas produced in 5 minutes
10	120
20	56
30	31
40	16
50	10

0 5 . 8

Plot the data from TABLE 2 on FIGURE 7, on the opposite page.

Draw a line of best fit. [3 marks]

0 5 . 9

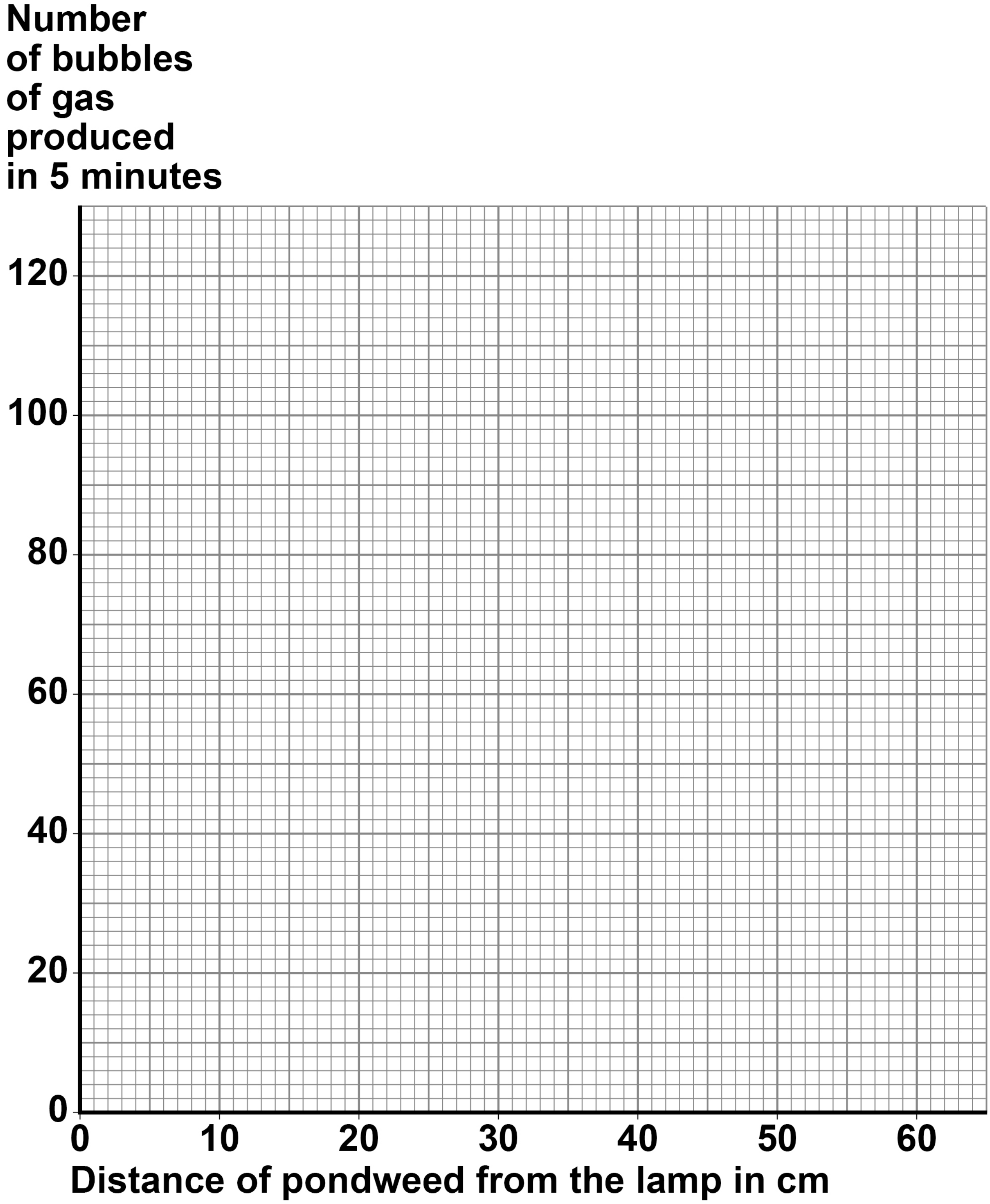
Predict the number of bubbles that would be produced in 5 minutes if the pondweed was 60 cm from the lamp.

Use FIGURE 7. [1 mark]

Number of bubbles produced in 5 minutes =

____

FIGURE 7


Number of bubbles of gas produced in 5 minutes
120
100
80
60
40
20
0
0
10
20
30
40
50
60
Distance of pondweed from the lamp in cm

13

0 6

Describe how to test a sample of food for protein, starch and sugar.

Give the colours that would be seen if the food sample contained protein, starch and sugar. [6 marks]

END OF QUESTIONS

6

Additional page, if required.

Write the question numbers in the left-hand margin.

Additional page, if required.

Write the question numbers in the left-hand margin.

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For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
TOTAL	

IB/M/CD/Jun21/8464/B/1F/E2