A

Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

I declare this is my own work.

GCSE

COMBINED SCIENCE: TRILOGY

Foundation Tier

F

Biology Paper 1F

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]

JUN218464B1F01

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.**

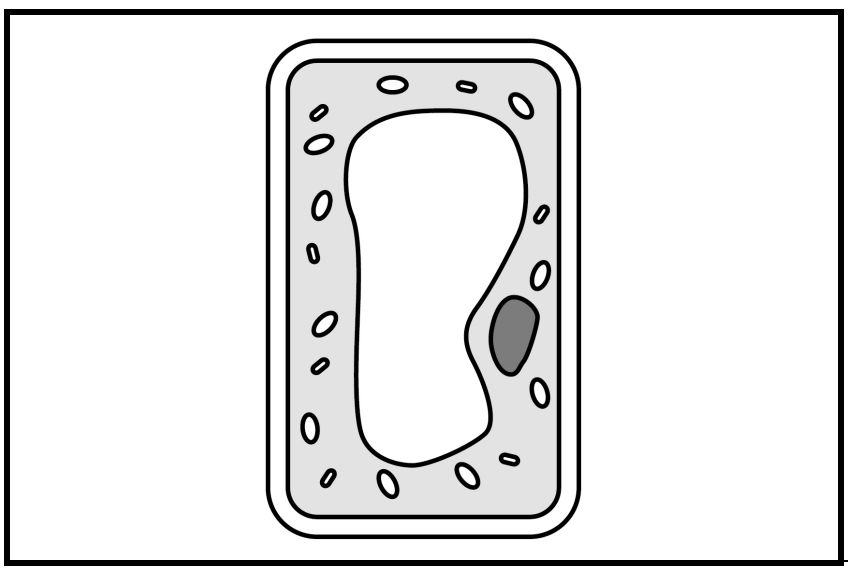
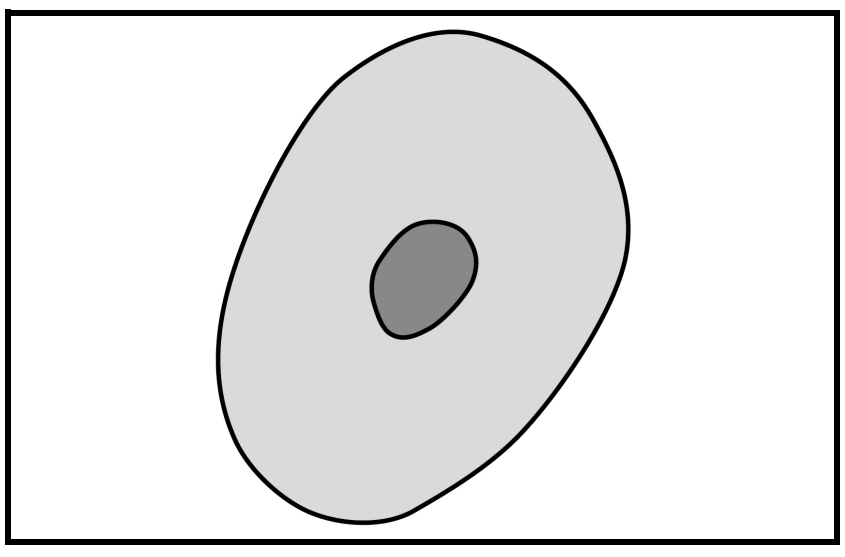
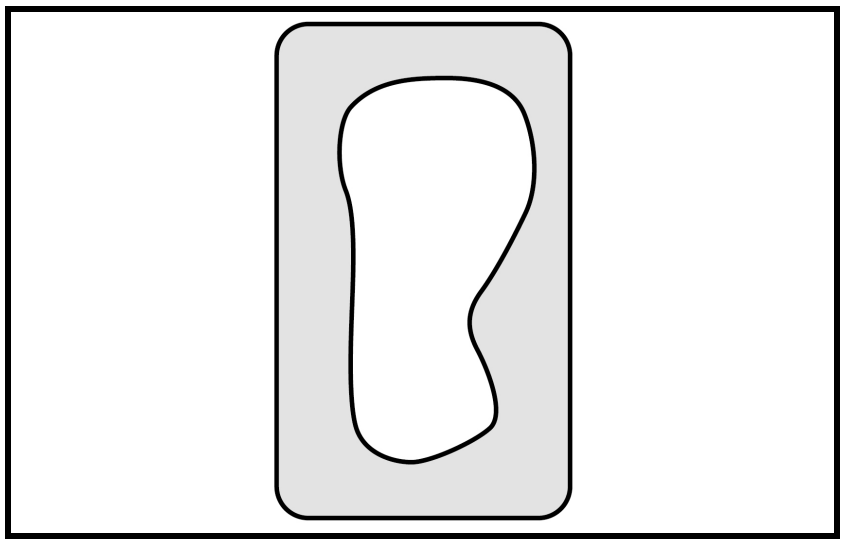
DO NOT TURN OVER UNTIL TOLD TO DO SO

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.

On the opposite page, 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

_____.

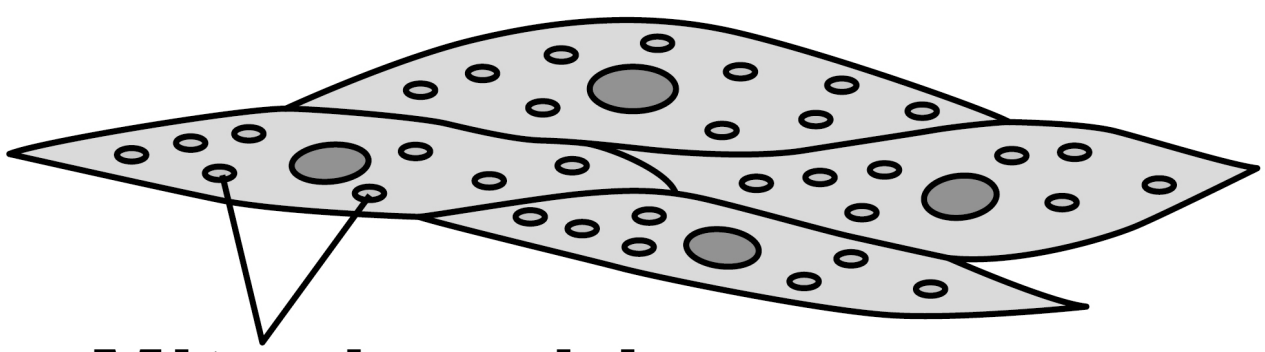
A chemical stored in plant cells is _____.

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 = ×

15

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[Turn over]

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]

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 _____

_____

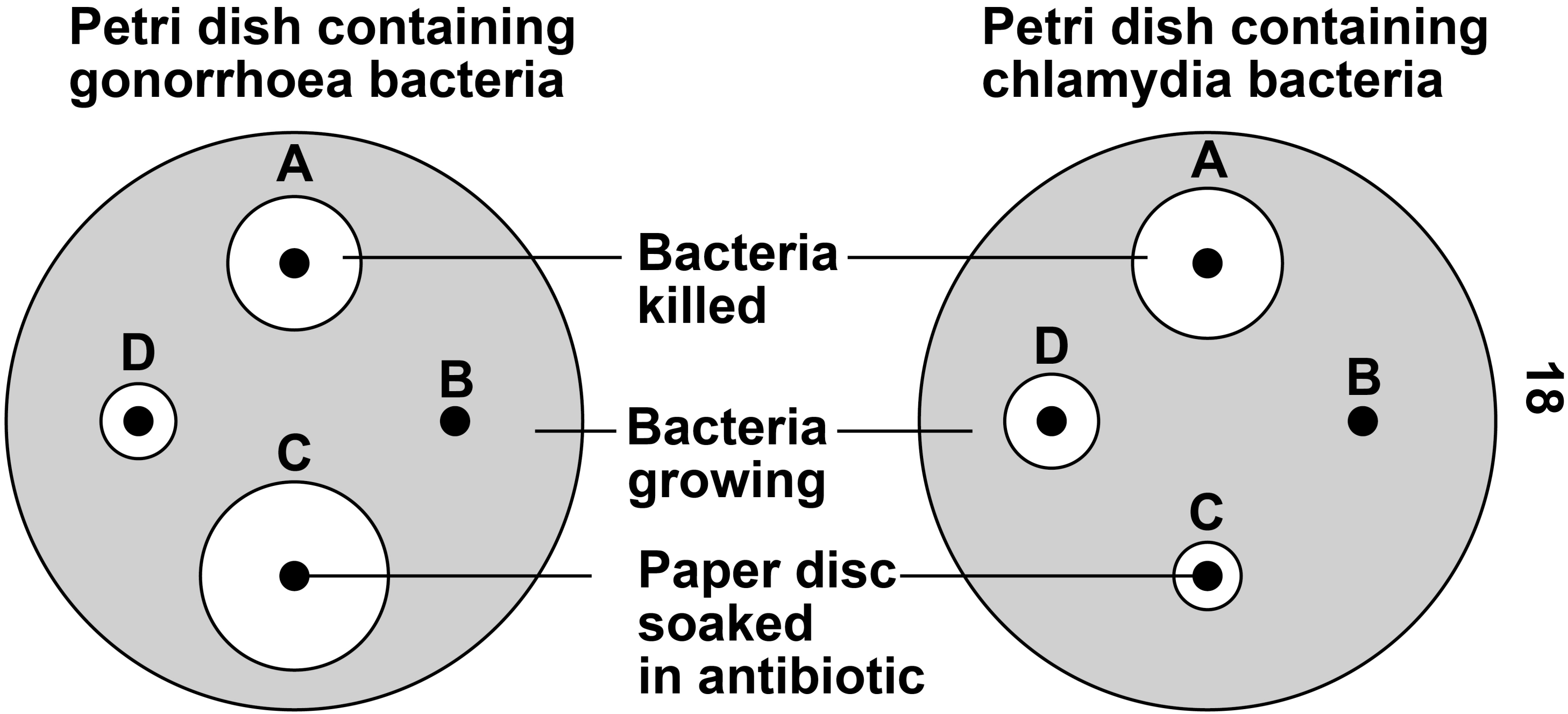
_____

FIGURE 2, on page 18, shows the results.

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

[Turn over]

FIGURE 2


Petri dish containing gonorrhoea bacteria
Petri dish containing chlamydia bacteria
A
B
C
D
Bacteria killed
Bacteria growing
Paper disc soaked in antibiotic

0 2 . 4

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

Tick (✓) ONE box.

☐ **A**

☐ **B**

☐ **C**

☐ **D**

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**

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]

_____

_____

_____

[Turn over]

0 2 . 9

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

10

0 3

Anaerobic respiration in yeast is called fermentation.

The equation for fermentation is:

glucose ⟶ 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]

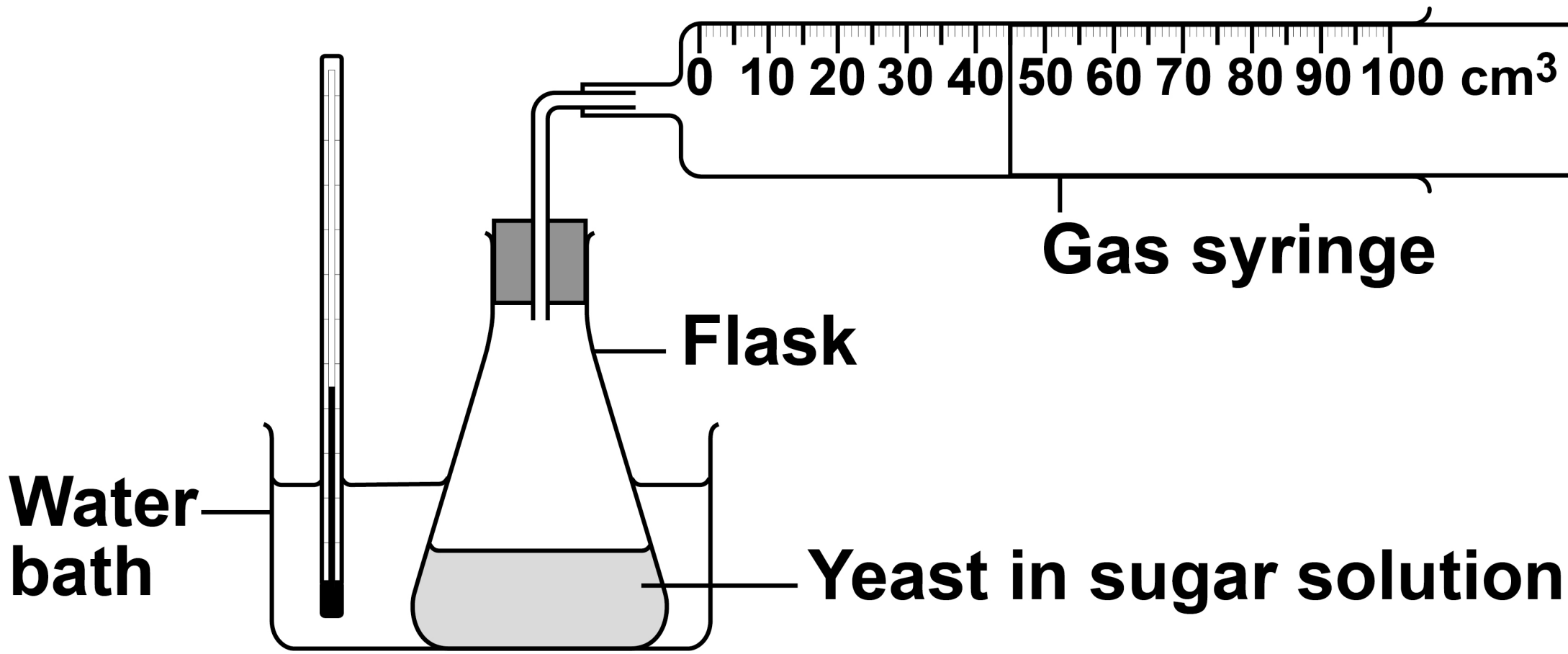
0 3 . 3

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

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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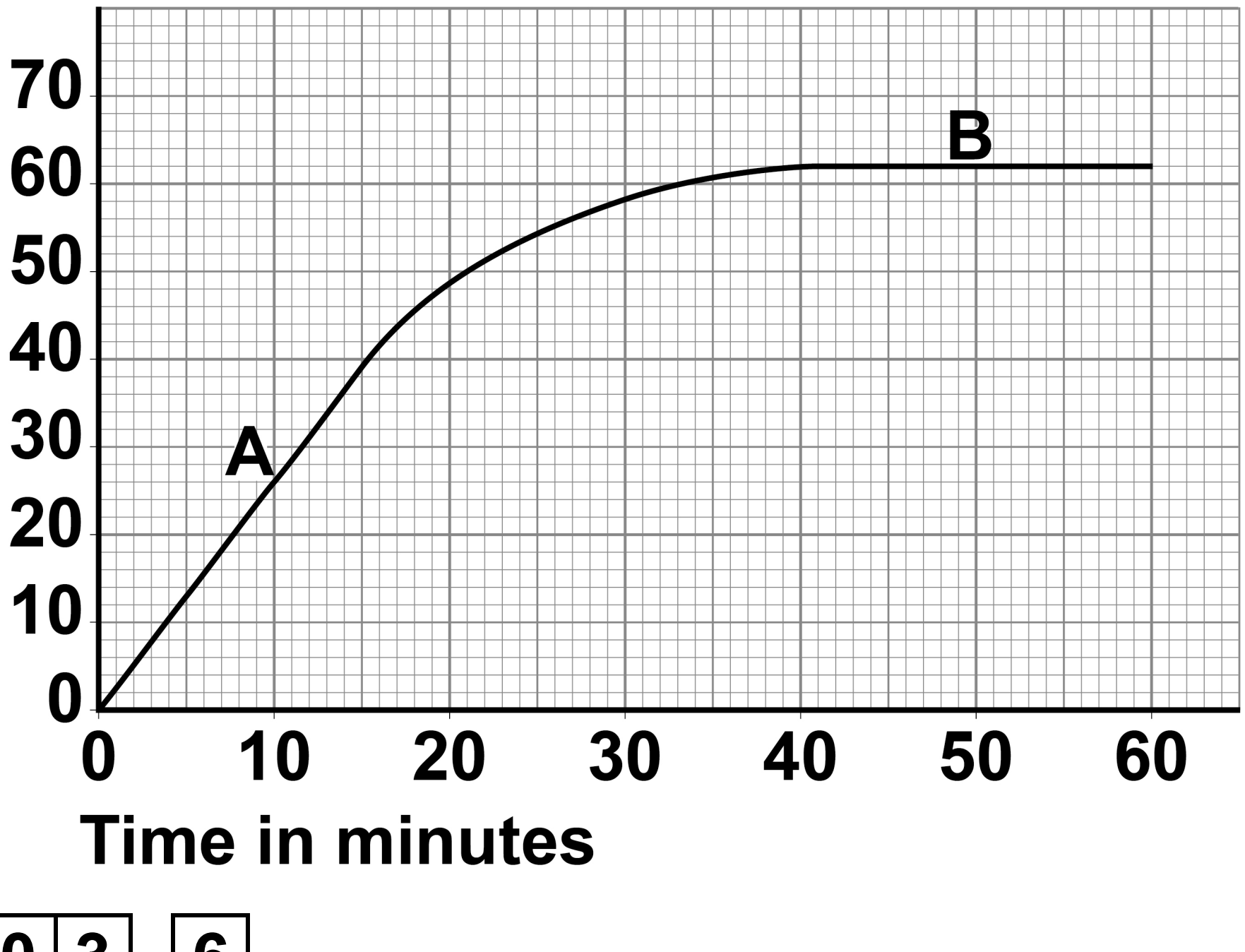
[Turn over]

FIGURE 4 shows the results.

FIGURE 4



0 3 . 6

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

One the opposite page, 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

The equation for fermentation is repeated here.

glucose ⟶ 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

_____

_____

_____

[Turn over]

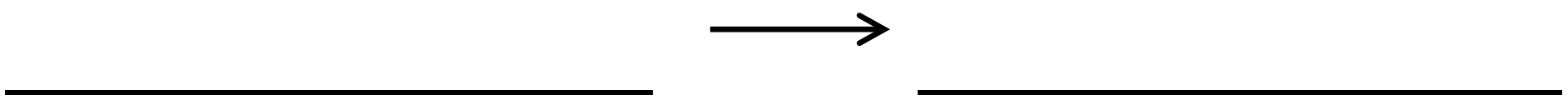
0 3 . 9

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**



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]

_____

_____

[Turn over]

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**

[Turn over]

0 4 . 4

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

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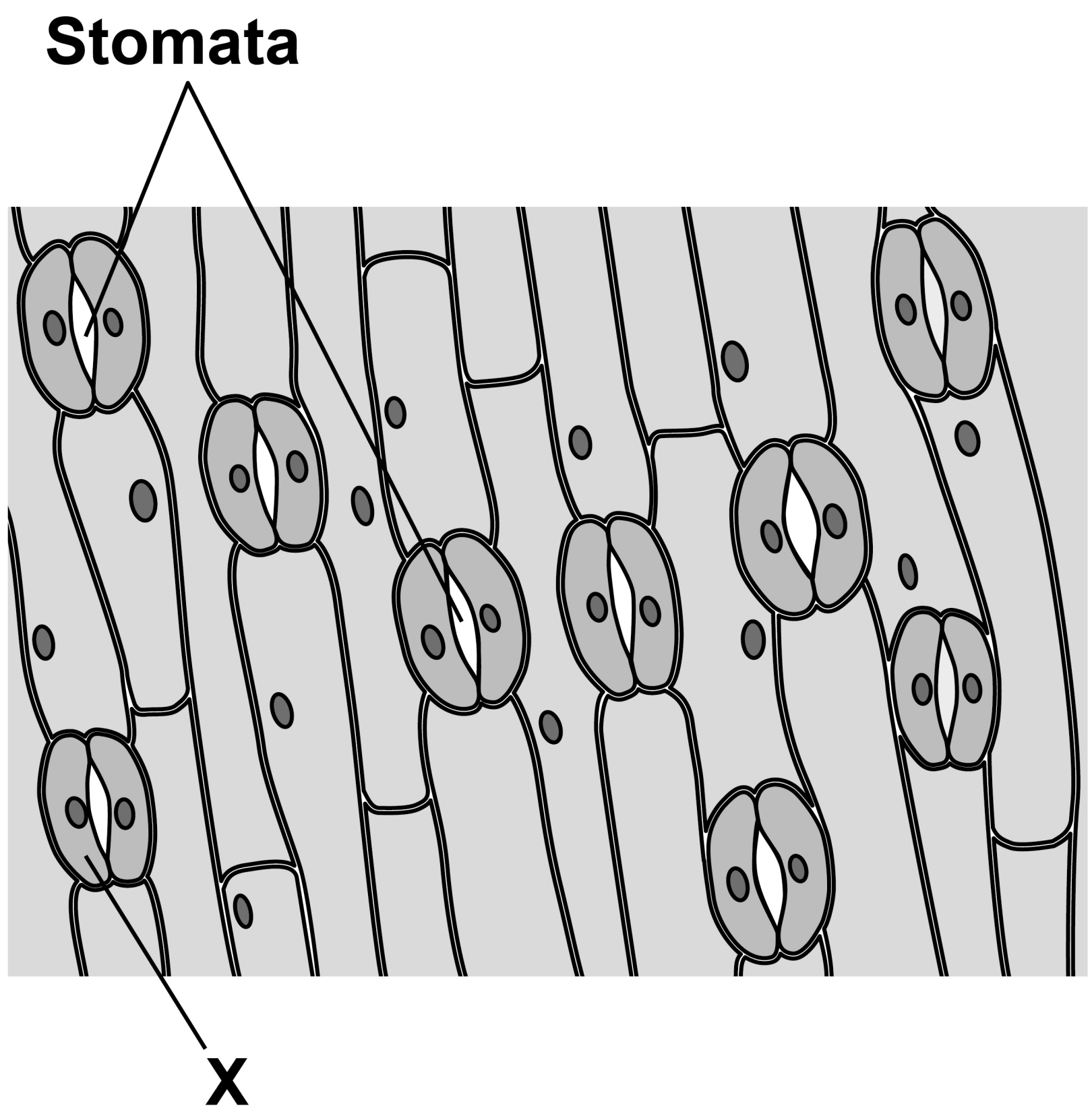
[Turn over]

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**

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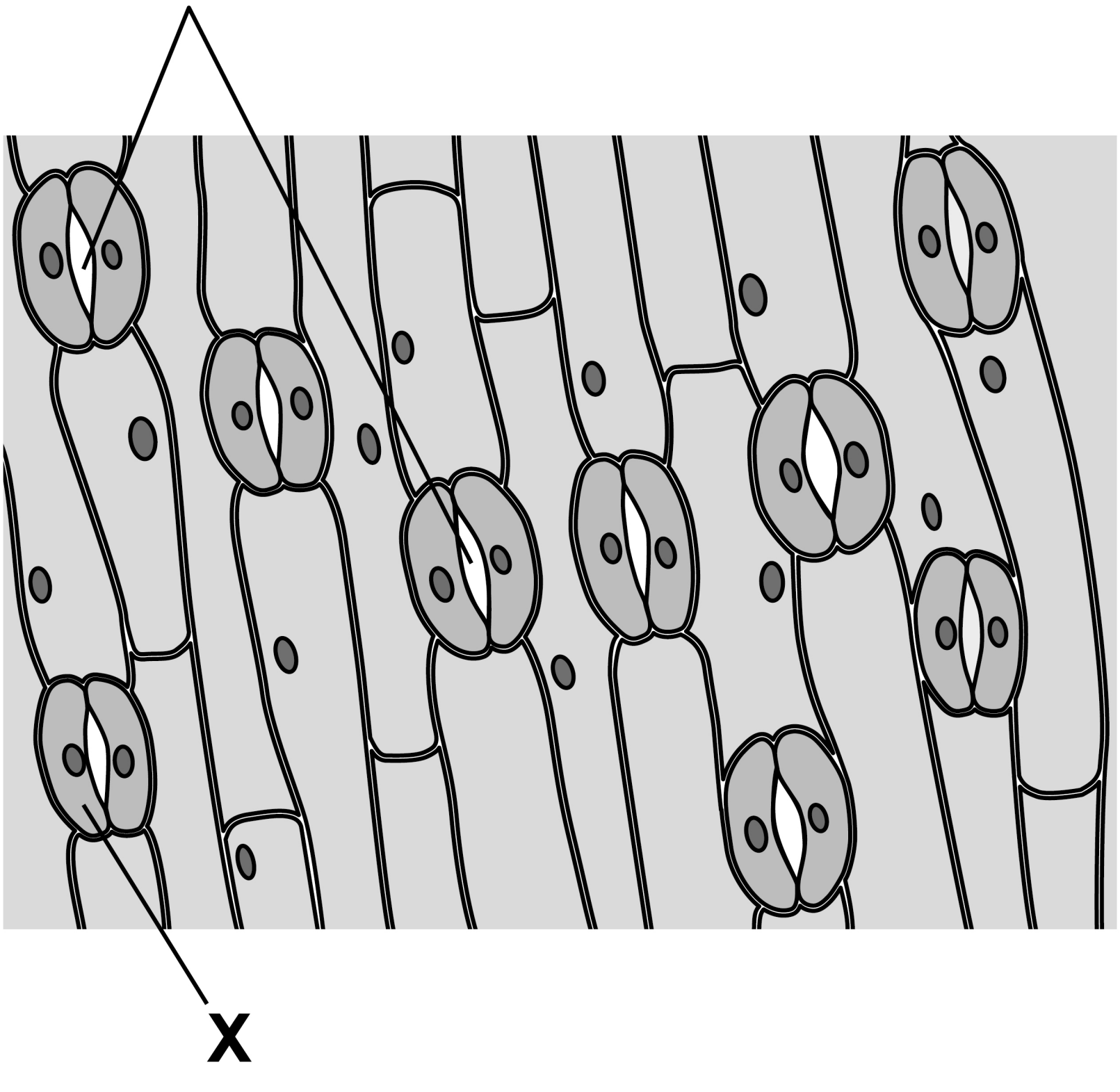
0 4 . 6

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**

REPEAT OF FIGURE 5



0 4 . 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 =

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 = _____

REPEAT OF 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 . 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]

13

0	5

Plants absorb light for photosynthesis.

0 5 . 1

Which is the equation for photosynthesis? [1 mark]

Tick (✓) ONE box.

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

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

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

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

[Turn over]

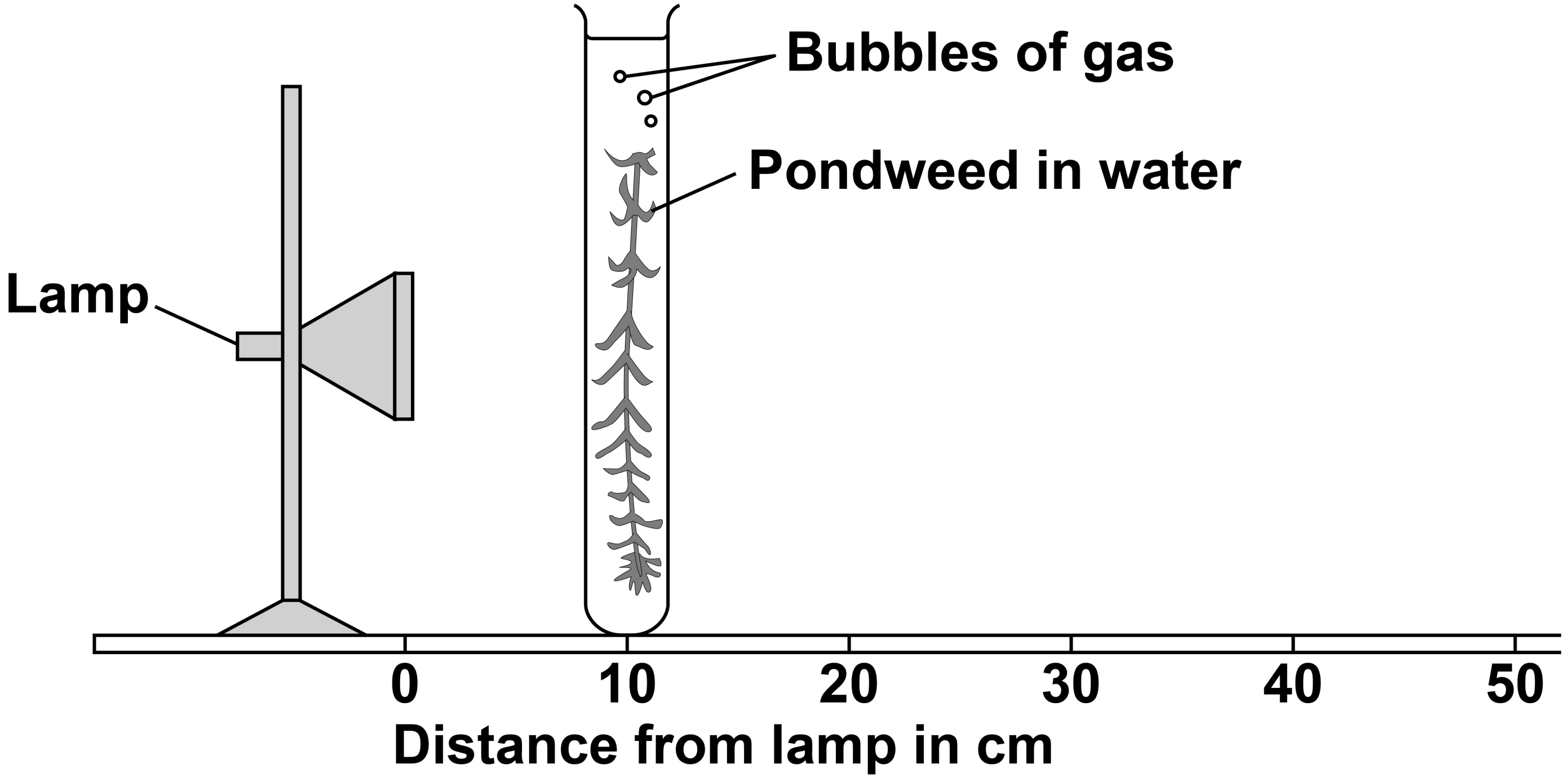
A student investigated the effect of light intensity on the rate of photosynthesis.

FIGURE 6, on the opposite page, shows the apparatus.

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.**

FIGURE 6



[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 _____

_____

_____

BLANK PAGE

[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 of gas produced per minute

[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 . 7

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

_____

_____

_____

[Turn over]

0 5 . 8

Plot the data from TABLE 2, on page 64, on FIGURE 7, on the opposite page.

Draw a line of best fit. [3 marks]

0 5 . 9

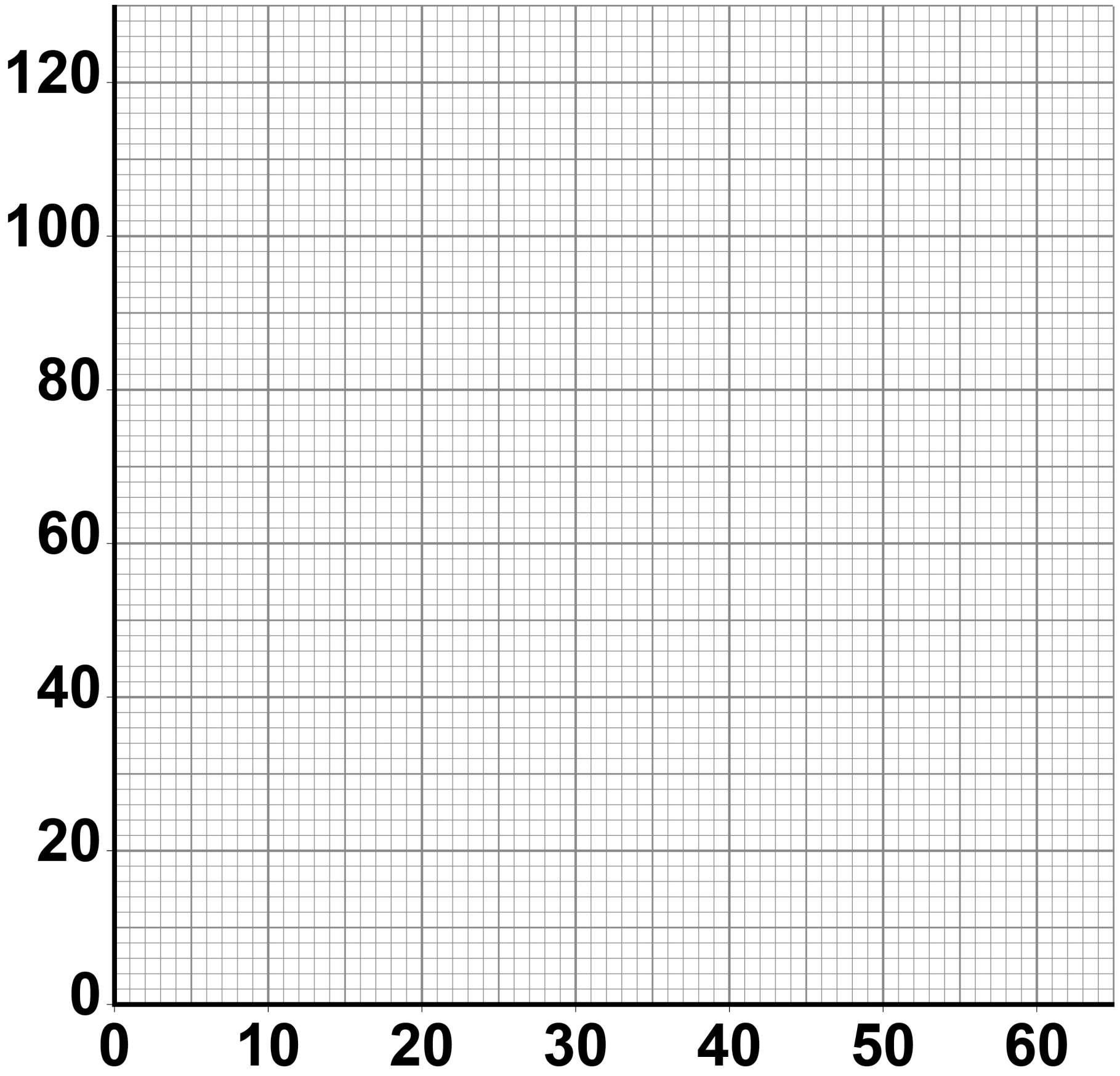
Predict the number of bubbles that would be produced in 5 minutes if the pondweed was 60 cm from the lamp.

Use FIGURE 7. [1 mark]

Number of bubbles produced in

5 minutes =

FIGURE 7



[Turn over]

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/E1