

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

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Forename(s)

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Candidate signature

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I declare this is my own work.

# GCSE COMBINED SCIENCE: TRILOGY

# F

Foundation Tier  
Biology Paper 1F

Time allowed: 1 hour 15 minutes

## Materials

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.
- Fill in the boxes at the top of this page.
- 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.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
<b>TOTAL</b>	



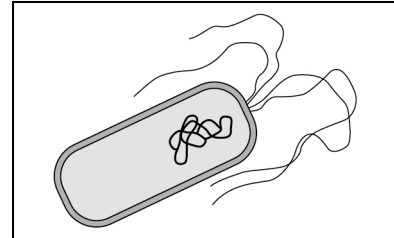
0 1

Cells are the building blocks of life.

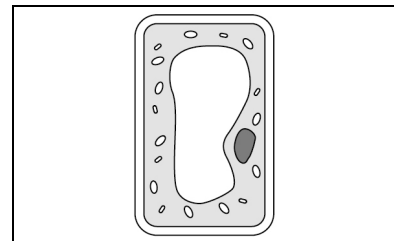
0 1 . 1

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**

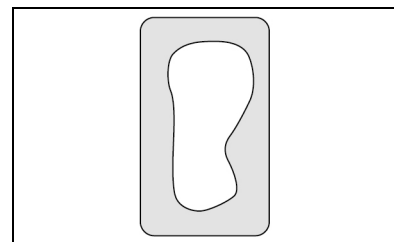
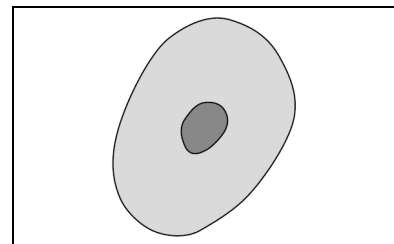
Animal



Bacterium



Plant



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**

Contains genetic information

Cell membrane

Cell wall

Controls what enters and leaves a cell

Chloroplast

Where photosynthesis happens

Nucleus

**Question 1 continues on the next page**

**Turn over ►**



**0 1 . 3** Chemicals are produced in cells.

Complete the sentences.

Choose answers from the box.

**[4 marks]**

**cellulose**

**DNA**

**glycogen**

**starch**

**urea**

A chemical excreted by animals is \_\_\_\_\_.

A chemical stored in animal cells is \_\_\_\_\_.

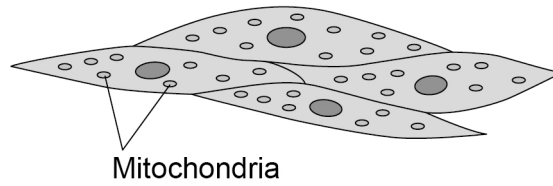
A chemical stored in plant cells is \_\_\_\_\_.

A chemical that strengthens plant cell walls is \_\_\_\_\_.



Figure 1 shows a diagram of muscle cells.

Figure 1



0 1 . 4

Give **one** function of muscle cells.

[1 mark]

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0 1 . 5

Explain how muscle cells are adapted for their function.

Use **Figure 1**.

[2 marks]

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Question 1 continues on the next page

Turn over ►



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]

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Magnification = × \_\_\_\_\_

15



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**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]**

---

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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 \_\_\_\_\_

\_\_\_\_\_

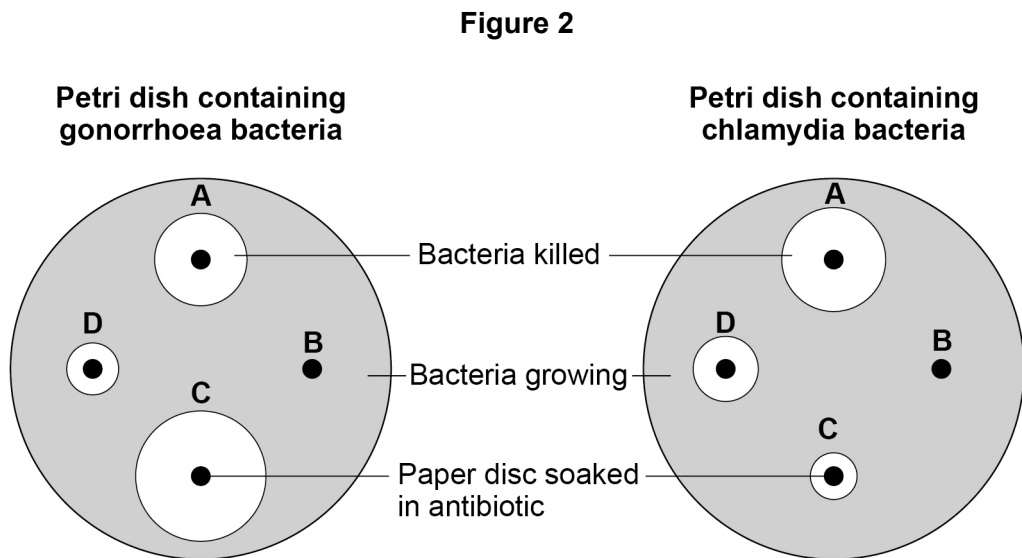
**Question 2 continues on the next page**

**Turn over ►**



Figure 2 shows the results.

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



**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]

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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]

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**0 2 . 9** Suggest **one** reason why fungal infection of toenails is more common than fungal infection of fingernails.

[1 mark]

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10

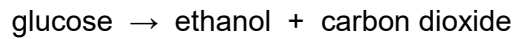
Turn over ►



**0 3**

Anaerobic respiration in yeast is called fermentation.

The equation for fermentation is:

**0 3 . 1**

How does the equation show that fermentation is an **anaerobic** reaction?

**[1 mark]**

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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]**

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**0 3 . 3**

Explain why fermentation is used when making bread.

**[2 marks]**

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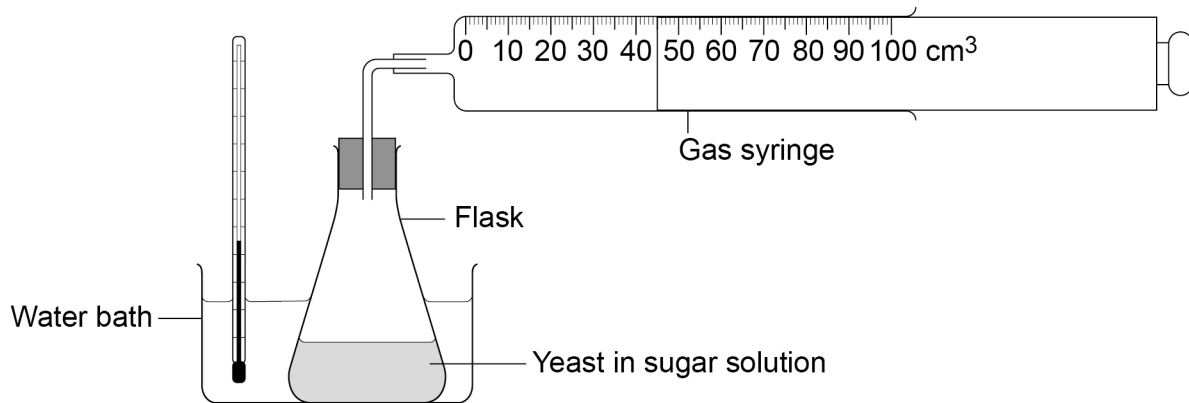
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A student investigated fermentation in yeast.

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<sup>3</sup>

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

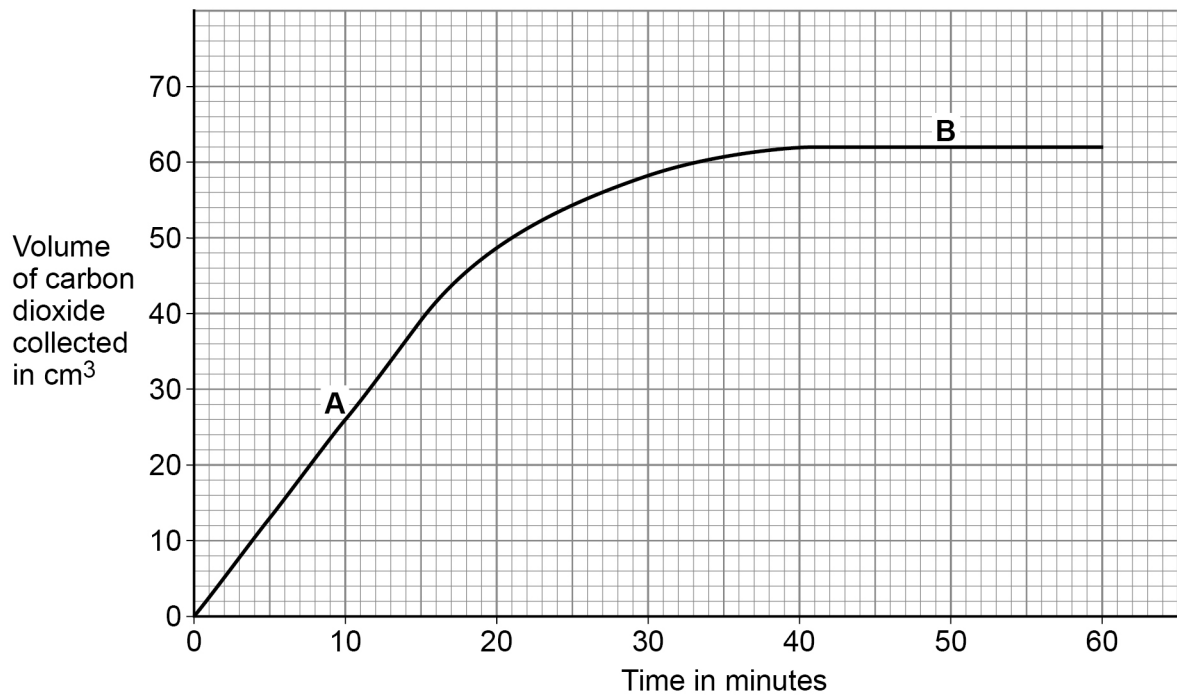
To allow time to draw a results table

Turn over ►



Figure 4 shows the results.

Figure 4



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

A

Carbon dioxide is  
**not** being produced

B

Carbon dioxide production is  
**fastest**

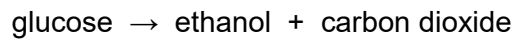
Carbon dioxide production is  
**slowing down**

Question 3 continues on the next page

Turn over ►



The equation for fermentation is repeated here.



**0 3 . 7** Suggest **one** reason why fermentation in the flask stopped.

**[1 mark]**

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**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 box.

**[2 marks]**

carbon dioxide

ethanol

glucose

lactic acid

water

\_\_\_\_\_ → \_\_\_\_\_

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**13**





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0	4
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This question is about plant transport systems.

0	4	.	1
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Which **organ** in a plant absorbs water from the soil?

[1 mark]

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0	4	.	2
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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]**

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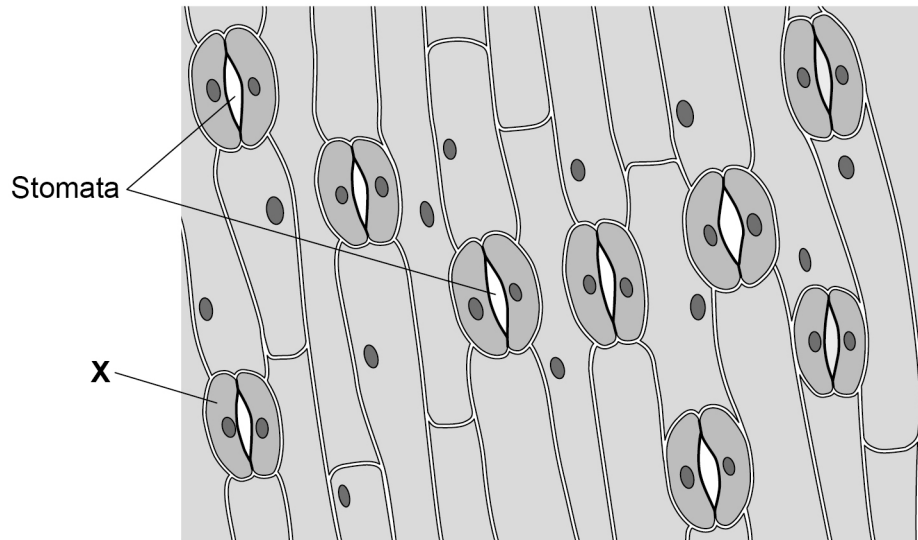


Stomata are openings on the surface of a leaf.

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

**0 4 . 7** The area of the leaf shown in **Figure 5** is 0.25 mm<sup>2</sup>.

Calculate the number of stomata per mm<sup>2</sup> 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]**

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Number of stomata per mm<sup>2</sup> = \_\_\_\_\_

**Question 4 continues on the next page**

**Turn over ►**



A student investigated the number of stomata per  $\text{mm}^2$  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 $\text{mm}^2$	
	Upper surface	Lower surface
1	0	37
2	1	36
3	2	30
4	1	32
5	1	35
<b>Mean</b>	1	<b>X</b>

**0 4 . 8** Calculate mean value **X** in **Table 1**.

**[2 marks]**

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**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]**

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13

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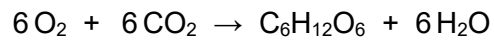
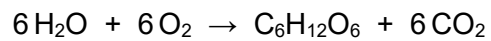
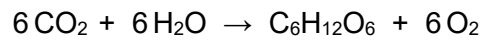
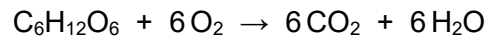
0 5

Plants absorb light for photosynthesis.

0 5

. 1 Which is the equation for photosynthesis?

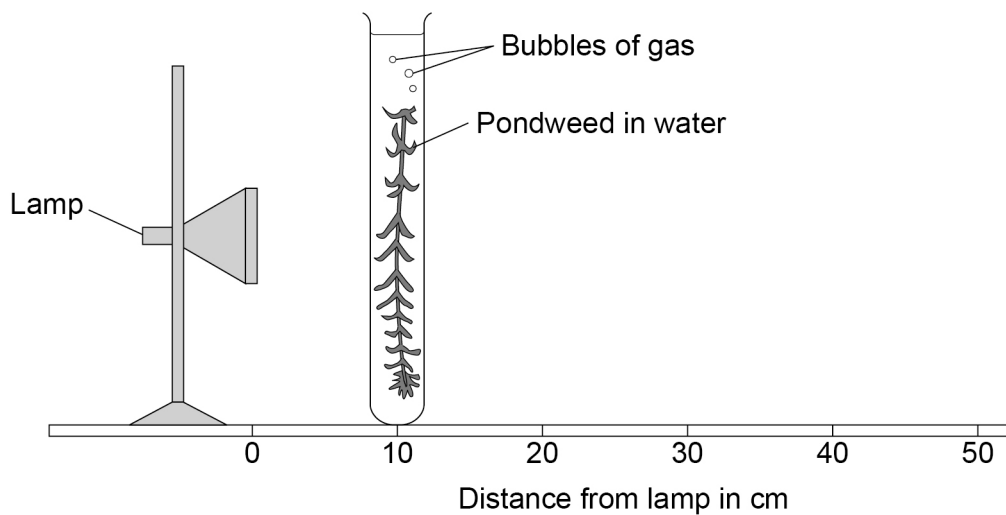
[1 mark]

Tick (✓) **one** box.

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.

**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

**Question 5 continues on the next page**

**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]

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0 5 . 4

Suggest **one** way the investigation could be improved so the temperature of the water does **not** increase.

[1 mark]

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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 \_\_\_\_\_

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2 \_\_\_\_\_

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**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]**

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Rate = \_\_\_\_\_ bubbles of gas produced per minute

**0 5 . 7** Give **one** conclusion that can be made from **Table 2**.

**[1 mark]**

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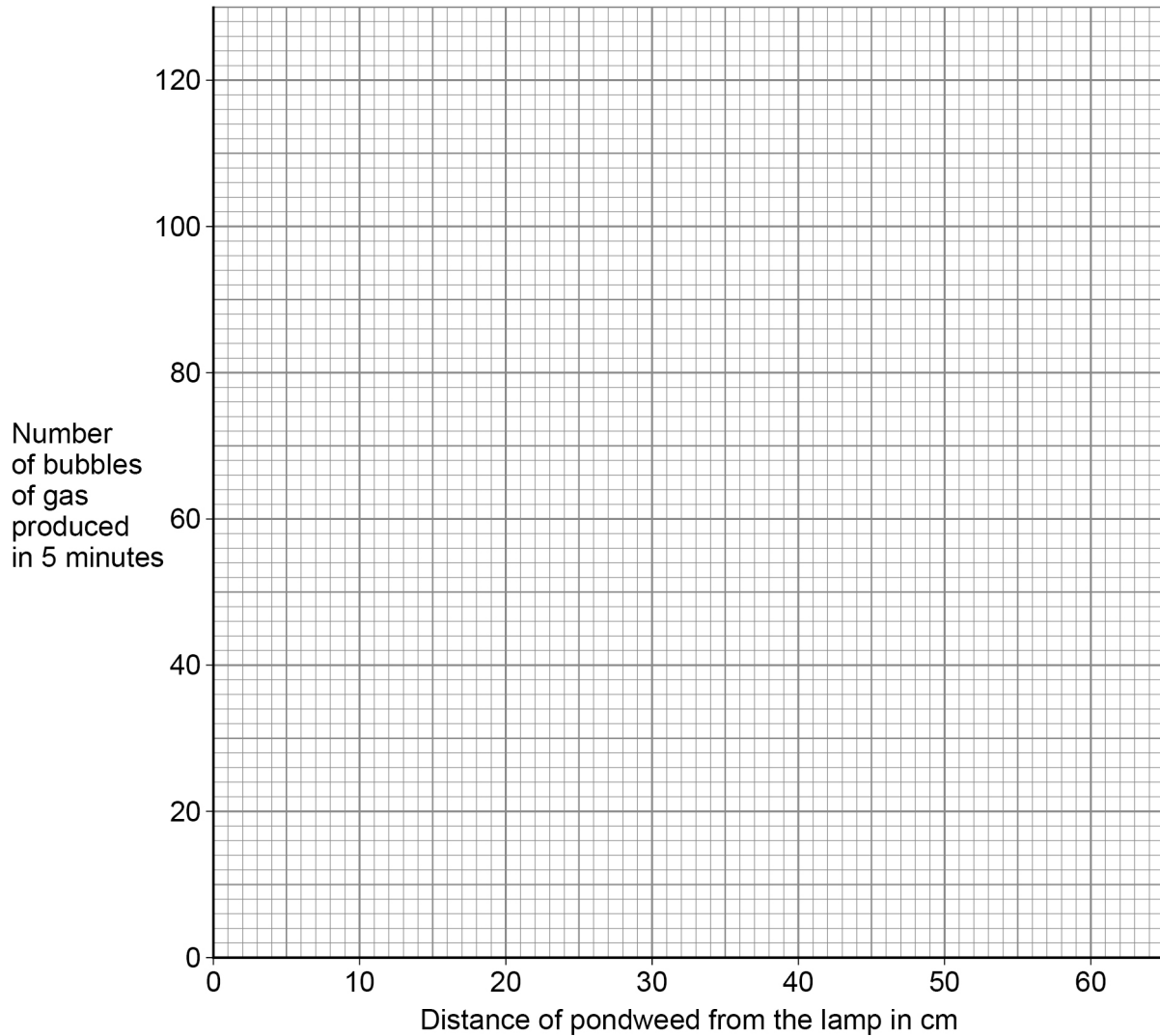


**0 5 . 8** Plot the data from **Table 2** on **Figure 7**.

Draw a line of best fit.

**[3 marks]**

**Figure 7**



**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 = \_\_\_\_\_

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