

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

# H

Higher Tier  
Biology Paper 1H

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>	



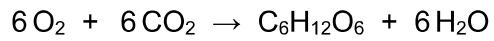
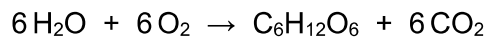
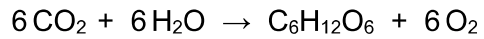
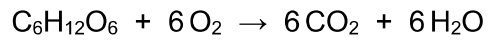
0 1

Plants absorb light for photosynthesis.

0 1 . 1

Which is the equation for photosynthesis?

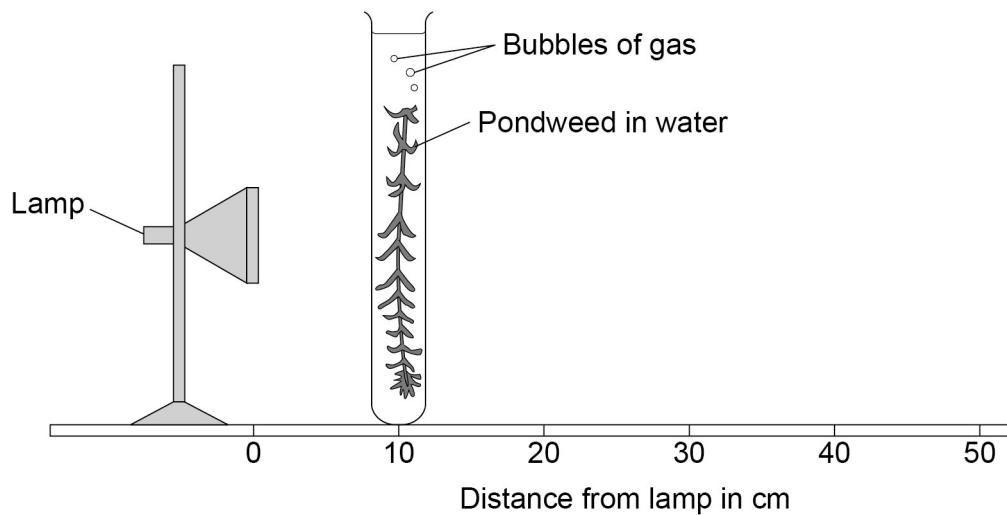
[1 mark]

Tick (✓) **one** box.

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

**Figure 1** shows the apparatus.

**Figure 1**



This is the method used.

1. Set up the apparatus as shown in **Figure 1**.
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 1 . 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 1 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 1 . 3** Explain how an increase in temperature would affect the results of this investigation. **[2 marks]**

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**0 1 . 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 1 . 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]**

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2 

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**Table 1** shows the results.

**Table 1**

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 1 . 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 1 . 7** Give **one** conclusion that can be made from **Table 1**.

**[1 mark]**

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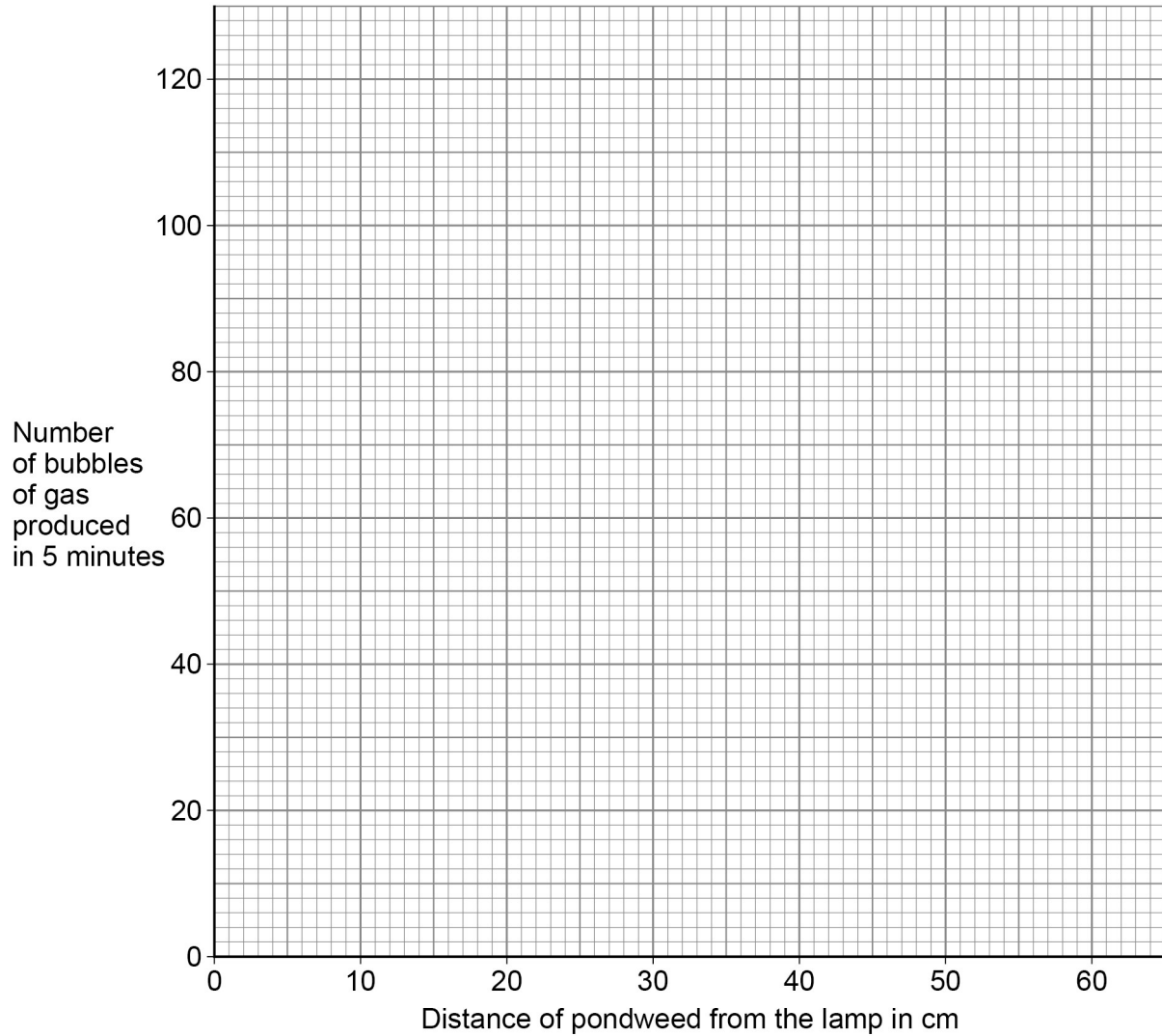


**0 1 . 8** Plot the data from **Table 1** on **Figure 2**.

Draw a line of best fit.

**[3 marks]**

**Figure 2**



**0 1 . 9** Predict the number of bubbles that would be produced in 5 minutes if the pondweed was 60 cm from the lamp.

Use **Figure 2**.

**[1 mark]**

Number of bubbles produced in 5 minutes = \_\_\_\_\_

13

**Turn over ►**





**0 3**

Fermentation in yeast is used in the manufacture of bread and alcoholic drinks.

The equation for fermentation is:

**0 3****1**

Fermentation is an exothermic reaction.

What does exothermic mean?

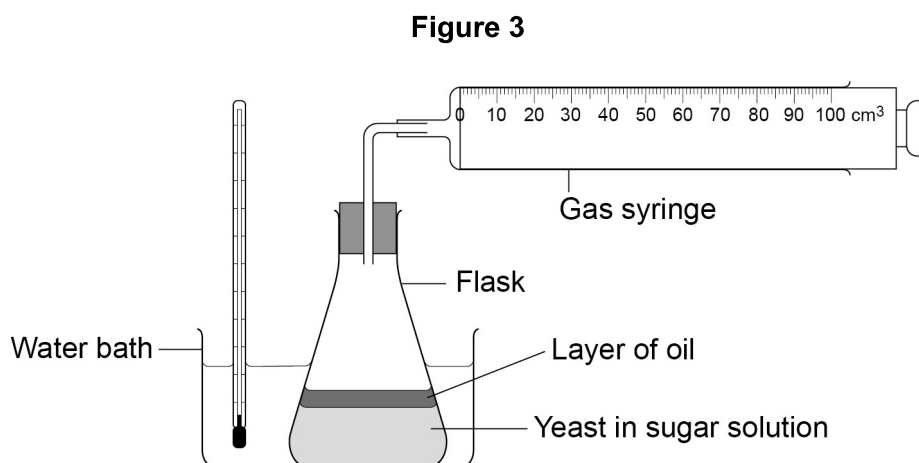
**[1 mark]**

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A student investigated the effect of temperature on fermentation in yeast.

**Figure 3** shows the apparatus.



This is the method used.

1. Mix yeast with sugar solution in a flask.
2. Pour a layer of oil over the surface of the mixture.
3. Put the flask in a water bath at 2 °C and leave for 20 minutes.
4. Attach a gas syringe.
5. Record the volume of gas collected every 5 minutes for 30 minutes.
6. After 30 minutes move the flask to a water bath at 35 °C.
7. Continue to record the volume of gas collected every 5 minutes.

0 3 . 2 Suggest why a layer of oil was needed on the surface of the mixture.

[1 mark]

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0 3 . 3 Suggest why the mixture was left for 20 minutes before the gas syringe was attached.

[1 mark]

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**Question 3 continues on the next page**

**Turn over ►**



Steps 1 to 4 of the method were repeated at 35 °C.

The volume of gas collected was recorded every 5 minutes for 45 minutes.

**Table 2** shows the results for both flasks for the first 30 minutes.

**Table 3** shows the results for the last 15 minutes, when both flasks were at 35 °C.

**Table 2**

Time in minutes	Volume of gas collected in cm <sup>3</sup>	
	Flask at 2 °C	Flask at 35 °C
0	0	0
5	0	26
10	0	52
15	0	78
20	0	98
25	0	108
30	0	115

**Table 3**

Time in minutes	Volume of gas collected in cm <sup>3</sup>	
	Flask at 2 °C moved to 35 °C	Flask kept at 35 °C
35	2	120
40	7	123
45	22	124



0 3 . 4

Explain the results from 0 minutes to 45 minutes for the flask that was at 2 °C and was then moved to 35 °C.

Use **Table 2** and **Table 3**.

[3 marks]

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0 3 . 5

Explain the results from 0 minutes to 45 minutes for the flask kept at 35 °C.

Use **Table 2** and **Table 3**.

[4 marks]

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10

Turn over for the next question

Turn over ►



0 4

Pathogens are microorganisms that cause diseases.

Gonorrhoea, malaria and measles are three diseases in humans.

0 4

1

Draw **one** line from each disease to the pathogen that causes the disease.

**[3 marks]****Disease****Pathogen**

Gonorrhoea

Bacterium

Malaria

Fungus

Measles

Protist

Virus

**Question 4 continues on the next page**

**Turn over ►**



0 4 . 2

Malaria is transmitted by mosquitos.

Male mosquitos can be sterilised so they are infertile.

The spread of malaria is reduced by releasing sterile mosquitos into the environment.

Explain how releasing sterile mosquitos reduces the spread of malaria.

[2 marks]

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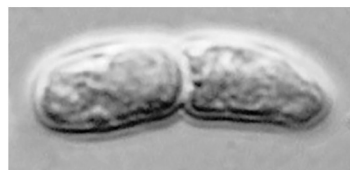
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Pathogens also cause diseases in plants.

**Figure 4** shows a rose black spot fungal spore and a tobacco mosaic virus.

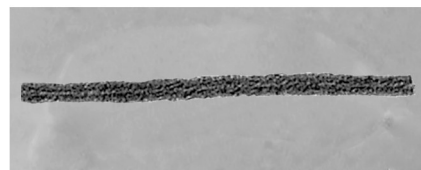
**Figure 4**

**Rose black spot fungal spore**



← 16  $\mu\text{m}$  →

**Tobacco mosaic virus**



←  $2.5 \times 10^{-7} \text{ m}$  →

Images are **not** to the same scale

0 4 . 3

Name the piece of equipment used to view the virus.

[1 mark]

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0 4 . 4

How many times longer is the fungal spore than the virus?

Use **Figure 4**.

[3 marks]

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Number of times longer = \_\_\_\_\_

0 4 . 5

Explain why plants infected with tobacco mosaic virus grow slowly.

[3 marks]

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Turn over for the next question

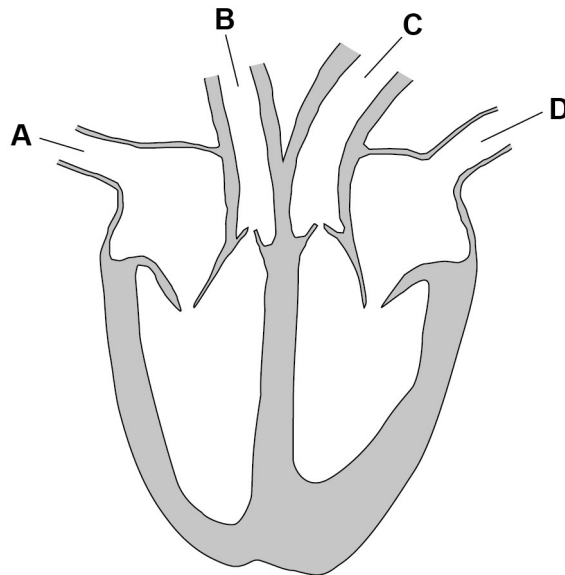
Turn over ►



0 5

Figure 5 shows the human heart.

Figure 5



0 5 . 1

Which blood vessel transports blood with the highest oxygen concentration **into** the heart?

[1 mark]

Tick (✓) **one** box.

A       B       C       D

0 5 . 2

Blood pressure is a measure of the force of the blood against the walls of the blood vessels.

Which blood vessel transports blood at the highest pressure?

[1 mark]

Tick (✓) **one** box.

A       B       C       D



0 5 . 3

What is the correct order for blood flowing through the heart to the lungs?

**[1 mark]**Tick (✓) **one** box.

left atrium → left ventricle → pulmonary artery

left atrium → left ventricle → pulmonary vein

right atrium → right ventricle → pulmonary artery

right atrium → right ventricle → pulmonary vein

**Question 5 continues on the next page****Turn over ►**



0 5 . 5

Many people who survive a heart attack get out of breath easily when they exercise gently.

Explain why heart attack survivors get out of breath easily.

**[4 marks]**

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**Question 5 continues on the next page**

**Turn over ►**



Scientists have developed patches of beating heart cells to repair damaged heart tissue.

The patches are placed onto areas of the heart where cells have died. New cells grow to replace the dead cells.

The patches are made using a person's own cells that are converted into stem cells.

0 5 . 6 Explain why stem cells are used to make the patches.

[2 marks]

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0 5 . 7 The scientists could have used human embryonic stem cells to make the patches.

Give **two** advantages of using stem cells made from the person's own cells, rather than using embryonic stem cells.

[2 marks]

1 \_\_\_\_\_

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2 \_\_\_\_\_

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17



0 6

This question is about plant transport systems.

0 6 . 1

Describe how water is transported from the soil to the atmosphere through a plant.

**[4 marks]**

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0 6 . 2

Dissolved sugars are moved through a plant in phloem tissue.

What is the name of the process that moves dissolved sugars through phloem tissue?

**[1 mark]**

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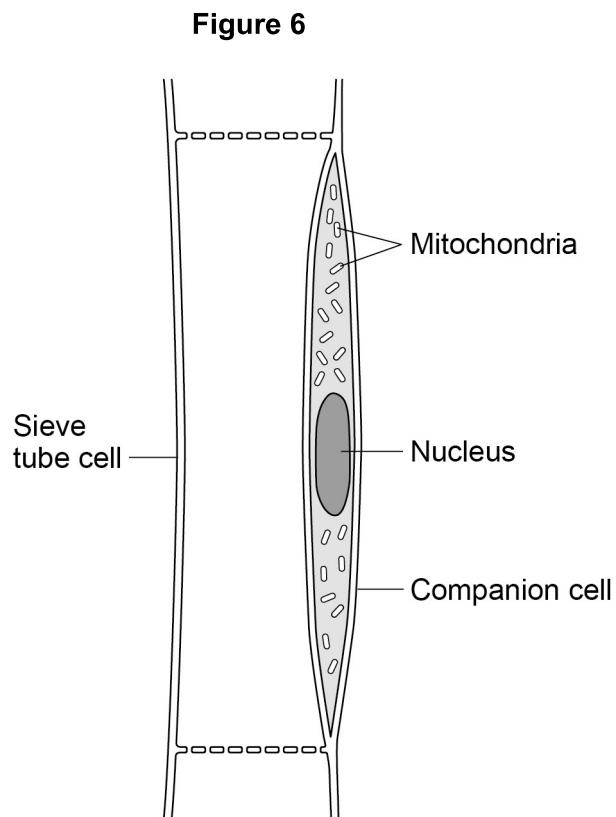
**Question 6 continues on the next page**

**Turn over ►**



Phloem tissue is made of sieve tube cells and companion cells.

**Figure 6** shows a section of phloem tissue.



0 6 . 3

Explain **one** way **sieve tube cells** are specialised for their function.

Use **Figure 6**.

**[2 marks]**

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0 6 . 4

What does the structure of the companion cells suggest about the process that moves dissolved sugars through the phloem tissue?

Give a reason for your answer.

Use **Figure 6**.

[2 marks]

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0 6 . 5

Describe why it is important that dissolved sugars are moved both upwards **and** downwards in a plant.

[3 marks]

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**END OF QUESTIONS**

