Please write clearly in block capitals.

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Centre number ☐☐☐☐☐ Candidate number ☐☐☐☐

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE

COMBINED SCIENCE: TRILOGY

Higher Tier Biology Paper 1

Practice Paper Series – Set 2

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.
- Do not write outside the box around each page or on blank pages.
- 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 marks for questions are shown in brackets.
- The maximum mark for this paper is 70.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- When answering question 06.4 you need to make sure that your answer:
  - is clear, logical, sensibly structured
  - fully developed
  - shows how the points that you make are related or follow on from each other where appropriate.

For Examiner's Use

Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	

This is an original practice paper written for sciencegcse.co.uk to match the style and demand of AQA GCSE Combined Science: Trilogy (8464) Biology Paper 1 (Higher Tier). It is not an AQA examination paper and has not been produced or endorsed by AQA. It is not a prediction of a future examination.

0 1 A student investigated photosynthesis and respiration in pondweed.

Hydrogencarbonate indicator changes colour when the concentration of carbon dioxide changes.

Table 1 shows the colours.

Table 1

Concentration of carbon dioxide	Colour of indicator
Higher than in air	Yellow
The same as in air	Red
Lower than in air	Purple

The student set up three tubes, **A**, **B** and **C**, as shown in **Figure 1**.

- Each tube contained the same volume of red indicator.
- Tubes **A** and **B** each contained the same mass of pondweed.
- Tube **C** contained no pondweed.
- Tube **B** was covered with aluminium foil.
- The tubes were left near a lamp for 4 hours

Figure 1

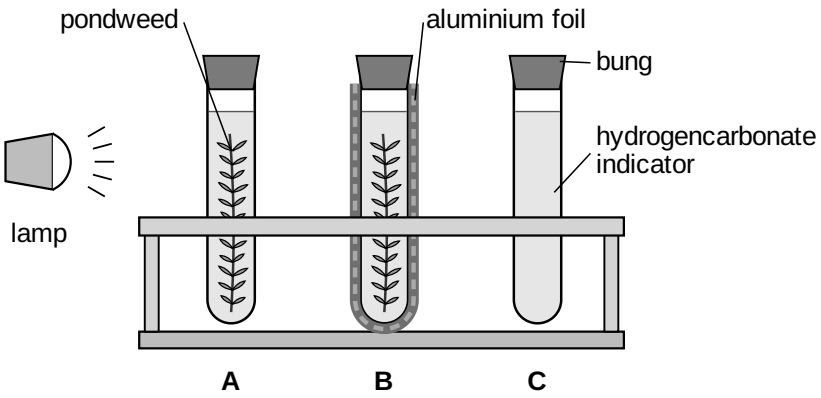


Table 2 shows the results.

Table 2

Tube	Colour of indicator after 4 hours
A	Purple
B	Yellow
C	Red

Question 1 continues on the next page

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0 1 . 1 Explain the colour of the indicator in tube **A** after 4 hours [2 marks]

0 1 . 2 Explain the colour of the indicator in tube **B** after 4 hours [2 marks]

0 1 . 3 Why did the student set up tube **C**? [1 mark]

0 1 . 4 Give **one other** variable the student should have kept the same in tubes **A** and **B**. [1 mark]

0 1 . 5 The lamp could increase the temperature of the tubes. [1 mark]

Suggest how the student could stop this happening.

0 1 . 6 The pondweed uses some of the glucose made in photosynthesis for respiration. [2 marks]

Give **two** other ways the pondweed uses glucose.

1

2

Turn over for the next question

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0 2 New drugs must be tested before they can be used to treat patients.

0 2 . 1 New drugs are first tested on cells, tissues and live animals. [2 marks]

Explain why.

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Scientists tested a new drug to lower blood pressure.

800 patients with high blood pressure took part in a double-blind trial. Half of the patients were given the new drug and half were given a placebo.

Table 3 shows the results after 8 weeks.

Table 3

	New drug	**Placebo**
Mean decrease in blood pressure in mmHg	18	4
Percentage of patients with side effects	12	9

0 2 . 2 Explain why the trial was double blind. [2 marks]

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0 2 . 3 Calculate the ratio of the mean decrease in blood pressure with the new drug to the mean decrease with the placebo. [1 mark]

Ratio = ... : 1

Question 2 continues on the next page

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0 2 . 4 A doctor says the new drug should be used to treat patients with high blood pressure. [2 marks]

Give **one** reason for and **one** reason against the doctor's view.

For

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Against

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0 3 Malaria is a disease caused by a protist.

0 3 . 1 Describe how malaria is spread from one person to another. [2 marks]

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0 3 . 2 Give **two** ways of reducing the spread of malaria. [2 marks]

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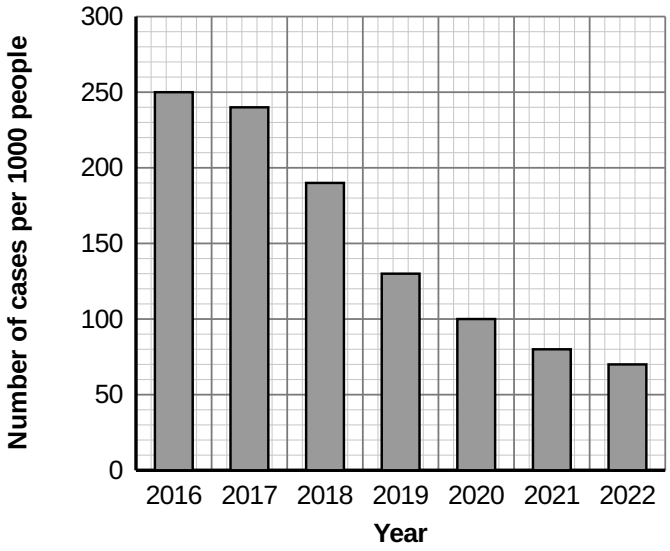
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Question 3 continues on the next page

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Figure 2 shows the number of cases of malaria in one country from 2016 to 2022

Figure 2



0 3 . 3 Calculate the percentage decrease in the number of cases of malaria from 2016 to 2022 [2 marks]

Percentage decrease = ... %

0 3 . 4 In 2016 the government set a target to halve the number of cases of malaria by 2020 [2 marks]

Did the government meet its target?

Use data from **Figure 2** to support your answer.

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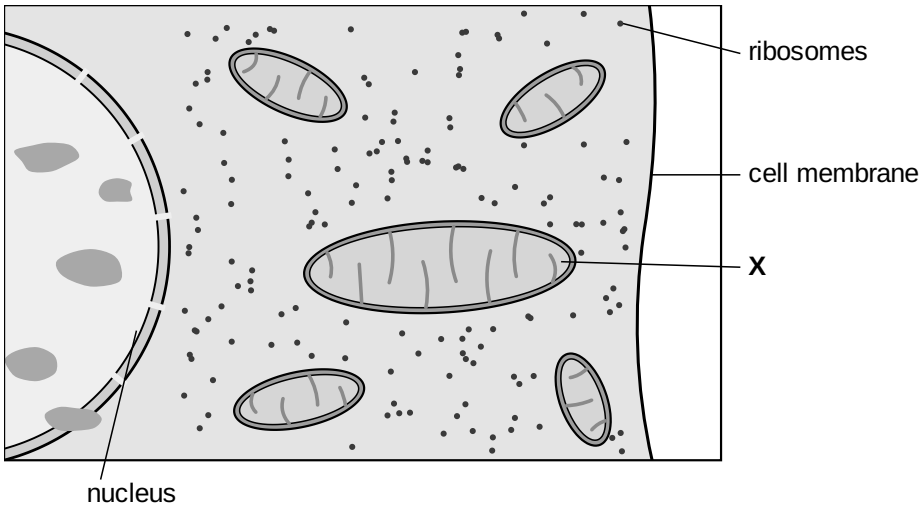
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0 4 **Figure 3** shows part of an animal cell seen with an electron microscope.

Figure 3



0 4 . 1 Name structure **X**. [1 mark]

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0 4 . 2 Give **one** advantage of using an electron microscope rather than a light microscope to study cells. [1 mark]

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0 4 . 3 The image of structure **X** in **Figure 3** is 36 mm long. [2 marks]

The magnification of **Figure 3** is ×12 000

Calculate the real length of structure **X** in micrometres (µm).

1 mm = 1000 µm

Real length = ... µm

0 4 . 4 Give the real length of structure **X** in metres. [1 mark]

Give your answer in standard form.

Real length = ... m

Question 4 continues on the next page

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0 4 . 5 Heart muscle cells contain a large number of structure **X**. [2 marks]

Explain why.

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0 4 . 6 Bacterial cells are prokaryotic cells. [2 marks]

Name **two** sub-cellular structures that are found in both bacterial cells and animal cells.

1 .....

2 .....

0 5 Yeast is a single-celled fungus. Yeast can respire anaerobically.

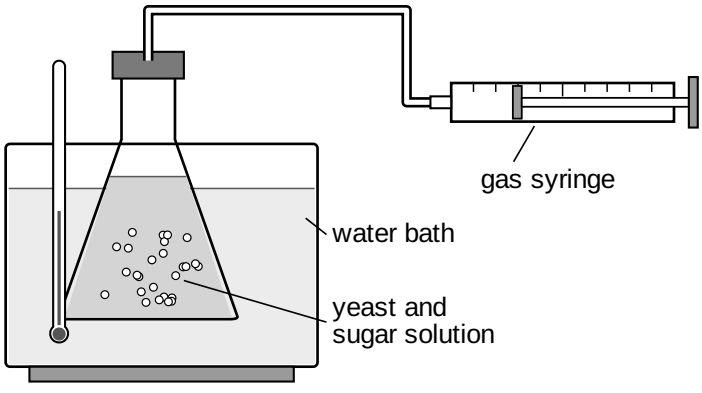
0 5 . 1 Complete the word equation for anaerobic respiration in yeast. [1 mark]

glucose ⟶ ..... + ...

A student investigated how the type of sugar affects the rate of anaerobic respiration in yeast.

Figure 4 shows the apparatus.

Figure 4



0 5 . 2 Explain why the flask was kept in a water bath. [1 mark]

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Question 5 continues on the next page

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The student used the same sugar concentration, volume of solution and mass of yeast in each test.

The student measured the volume of gas collected in 10 minutes with each sugar.

Table 4 shows the results.

Table 4

Sugar	Volume of gas collected in 10 minutes in cm^3		
	Test 1	**Test 2**	**Test 3**
Glucose	23.5	24.8	23.7
Sucrose	18.2	17.6	18.5
Lactose	0.0	0.0	0.0

0 5 . 3 Calculate the mean rate of gas production with glucose. [2 marks]

Give your answer in cm^3 per minute.

Mean rate = ... cm^3 per minute

0 5 . 4 Suggest why no gas was produced with lactose. [1 mark]

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0 5 . 5 The student concluded: [2 marks]

'Yeast respires glucose faster than it respires sucrose.'

Evaluate how well the results support this conclusion.

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Question 5 continues on the next page

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0 5 . 6 Metabolism is the sum of all the reactions in a cell or in the body. [2 marks]

Give **two** examples of metabolic reactions in the human body, other than respiration.

1 .....

2 .....

0 6 Bile and the enzyme lipase help to digest fats in the small intestine.

0 6 . 1 Lipase breaks down lipids into two products. [1 mark]

Name **both** products.

1 .....

2 .....

A student investigated the digestion of the fat in milk.

- The student put milk, sodium carbonate solution and an indicator into two test tubes, **A** and **B**.
- The indicator is pink in alkaline solutions. It becomes colourless when the pH falls below 8
- The student added lipase and bile to tube **A**, and lipase and water to tube **B**.
- The total volume and starting pH were the same in both tubes.
- The student timed how long it took for the pink colour to disappear.

Table 5 shows the results.

Table 5

Tube	Solutions added	Time for the pink colour to disappear in seconds
A	lipase and bile	210
B	lipase and water	480

0 6 . 2 Explain why the pink colour disappeared in tube **B**. [2 marks]

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Question 6 continues on the next page

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0 6 . 3 Explain why the pink colour disappeared faster in tube **A** than in tube **B**. [2 marks]

0 6 . 4 The student wants to find out how the concentration of bile affects the rate of digestion of fat by lipase. [6 marks]

Plan an investigation the student could carry out using the method described above.

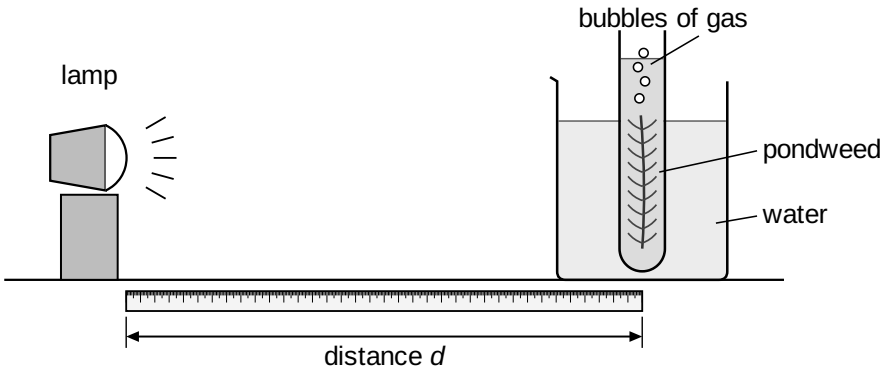
Your plan should give valid results.

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0 7 A student investigated how light intensity affects the rate of photosynthesis in pondweed.

Figure 5 shows the apparatus.

Figure 5



The student counted the number of bubbles of gas released in one minute at different distances, *d*, from the lamp.

Table 6 shows the results.

Table 6

Distance *d* in cm	10	15	20	30	40
Number of bubbles per minute	64	28	16	7	4

0 7 . 1 Light intensity is inversely proportional to the square of the distance from the lamp. [2 marks]

Use data from **Table 6** to show that the rate of photosynthesis is inversely proportional to the square of the distance.

0 7 . 2 Explain why the rate of photosynthesis decreased as the distance increased. [2 marks]

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Question 7 continues on the next page

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A grower tested different conditions for growing tomato plants in a greenhouse. The light intensity was high.

Table 7 shows the rate of photosynthesis and the extra cost of each condition.

Table 7

Condition	Temperature in °C	Concentration of carbon dioxide in %	Rate of photosynthesis in arbitrary units	Extra cost per day in £
A	15	0.04	4.0	0
B	15	0.10	4.4	15
C	25	0.04	6.0	40
D	25	0.10	9.0	55

0 7 . 3 Explain why adding carbon dioxide at 15 °C increased the rate of photosynthesis by only a small amount. [2 marks]

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0 7 . 4 Each extra unit of rate of photosynthesis produces extra tomatoes worth £20 per day. [2 marks]

Which condition, **B**, **C** or **D**, gives the greatest extra profit compared with condition **A**?

Show your working.

Condition .....

0 7 . 5 Suggest **one** reason why the grower might not use condition **D** in winter. [1 mark]

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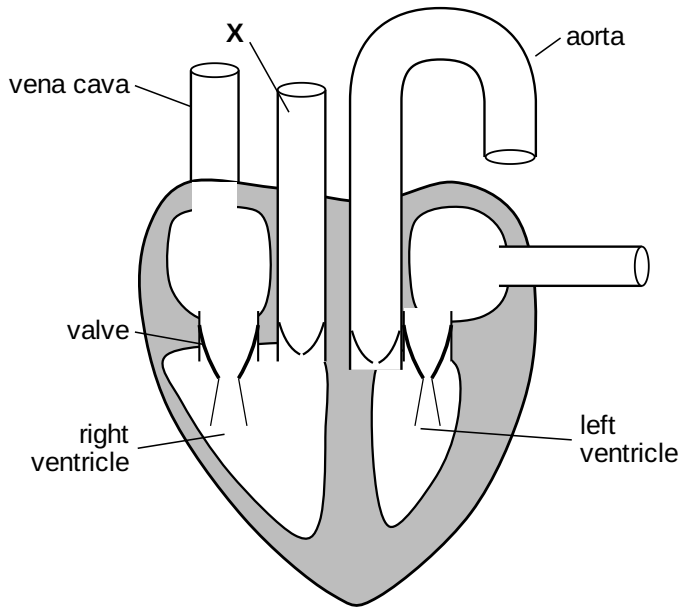
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0 8 **Figure 6** shows a section through the human heart.

Figure 6



0 8 . 1 Name blood vessel **X**. [1 mark]

0 8 . 2 Describe the route taken by blood through the right side of the heart, from the vena cava to the lungs. [2 marks]

0 8 . 3 The wall of the left ventricle is thicker than the wall of the right ventricle. [2 marks]

Explain why.

Question 8 continues on the next page

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A faulty heart valve can be replaced by a mechanical valve or by a biological valve.

Table 8 gives information about the two types of valve.

Table 8

	Mechanical valve	**Biological valve**
Made from	metal and carbon	tissue from pigs or cows
Average time before the valve needs to be replaced	more than 25 years	10 to 15 years
Medicines needed after surgery	anticoagulant tablets every day for life	usually none after the first 3 months
Other information	blood clots can form on the valve; anticoagulants increase the risk of bleeding	replacing a worn-out valve needs more open-heart surgery

0 8 . 4 Doctors usually recommend a mechanical valve for a 35-year-old patient but a biological valve for a 75-year-old patient. [3 marks]

Suggest why.

Use **Table 8**.

END OF QUESTIONS

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