Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE
COMBINED SCIENCE: TRILOGY

H

Higher Tier
Biology Paper 1H

Friday 10 May 2024 Morning 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.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	

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.

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0 1 Drinks contain different substances.

A drinks company claims that a drink contains sugar, protein and fat.

0 1 . 1 Glucose and fructose are different sugars.

Fructose has a much sweeter taste than glucose.

Suggest **two** reasons why the drinks company uses fructose in the drink rather than using glucose.

Do **not** refer to sweetness in your answer.

[2 marks]

1 _____

_____

2 _____

_____

0 1 . 2 Describe how a student could test the drink for **sugar**.

Give the colour of a positive result.

[3 marks]

Test _____

_____

_____

_____

Colour of positive result _____

Do not write outside the box

0 1 . 3 Describe how a student could test the drink for **protein**.

Give the colour of a positive result.

[2 marks]

Test _____

_____

_____

Colour of positive result _____

Question 1 continues on the next page

Do not write outside the box

0 1 . 4 The human digestive system breaks down protein and fat in the drink.

Describe how **protein** and **fat** are digested.

You should include:

- the enzymes involved
- where the enzymes are produced.

[6 marks]

13

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Turn over for the next question

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ANSWER IN THE SPACES PROVIDED

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0 2 A student investigated the concentration of salt in solution **Z**.

The student used a method involving osmosis.

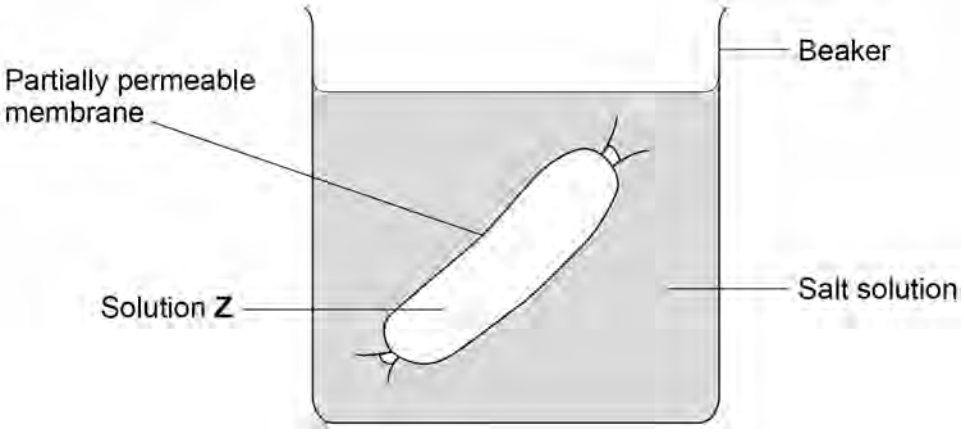
The student used tubing made of partially permeable membrane.

This is the method used.

1. Cut six pieces of tubing to the same length.
2. Tie one end of each piece of tubing.
3. Put the same volume of solution **Z** into each piece of tubing.
4. Tie the other end of each piece of tubing to form a sealed tube.
5. Record the mass of each tube.
6. Place each tube into a different concentration of salt solution.
7. After 2 hours, remove each tube from the salt solutions.
8. Record the mass of each tube.

Figure 1 shows one of the sealed tubes in a salt solution.

Figure 1



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0 2 . 1 What was the independent variable for the investigation?

[1 mark]

Tick (✓) **one** box.

Change in mass of tube ☐

Concentration of salt solution ☐

Time in salt solution ☐

Volume of solution **Z** ☐

0 2 . 2 The student dried the outside of each tube with a paper towel before recording the mass.

Why was it important to dry the tubes?

[1 mark]

Question 2 continues on the next page

Do not write outside the box

Table 1 shows the results.

Table 1

Concentration of salt solution in mol/dm^3	Mass of tube in grams			Percentage (%) change in mass
	At start	After 2 hours	Change	
0.0	15.54	16.50	0.96	**X**
0.2	15.16	15.78	0.62	4.1
0.4	15.00	15.35	0.35	2.3
0.6	15.29	15.37	0.08	0.5
0.8	14.95	14.75	–0.20	–1.3
1.0	14.77	14.40	–0.37	–2.5

0 2 . 3 Calculate value **X** in **Table 1**.

Give your answer to 1 decimal place.

[3 marks]

Value **X** (1 decimal place) = _____ %

0 2 . 4 Complete **Figure 2**.

You should:

- plot the percentage change in mass from **Table 1** for salt concentrations of **only** 0.2 mol/dm^3 to 1.0 mol/dm^3
- draw a line of best fit.

One of the results has been plotted for you.

[3 marks]

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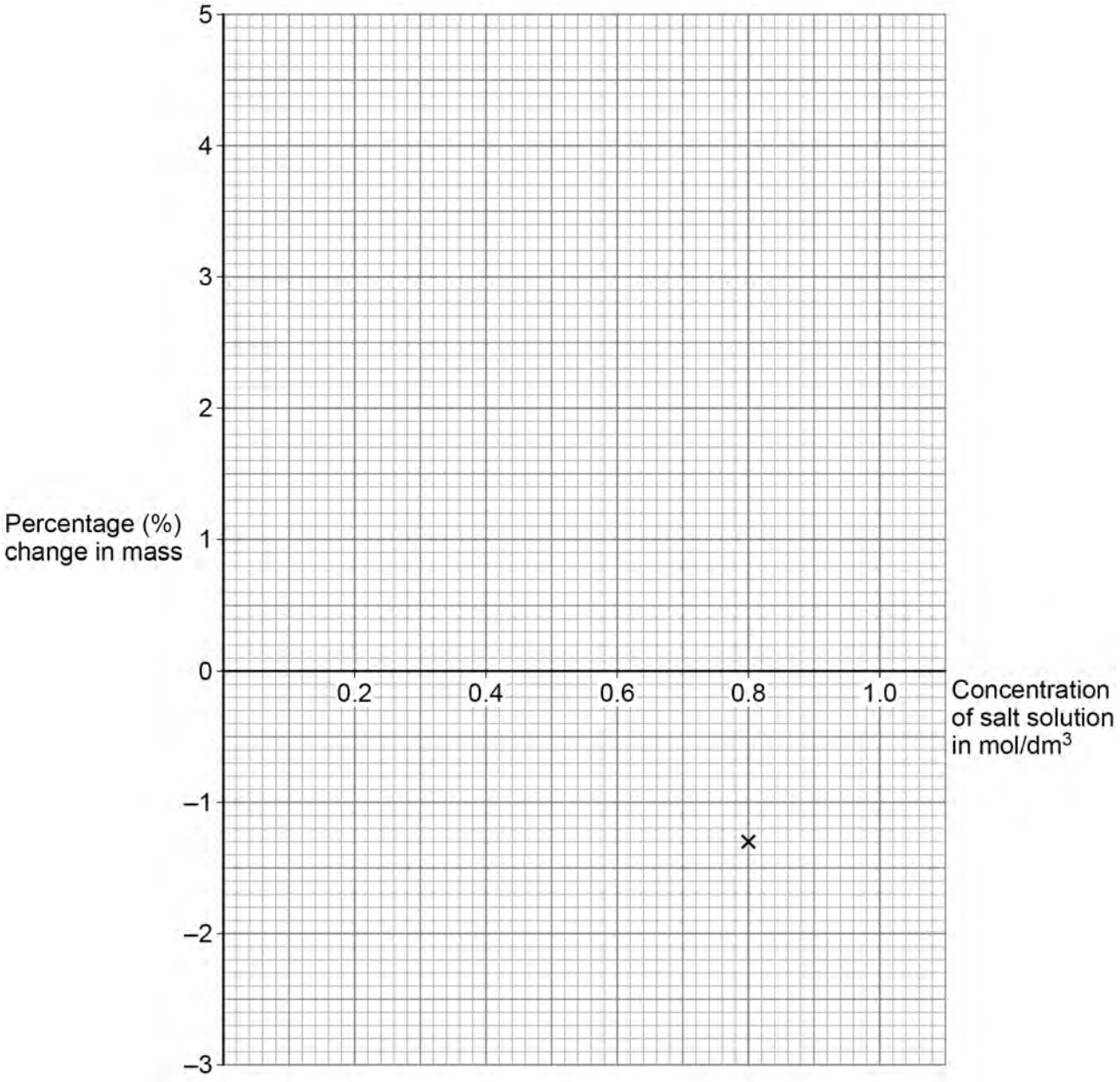
Figure 2



0 2 . 5 Determine the concentration of salt in solution **Z**.

Use **Figure 2**.

[1 mark]

Concentration = _____ mol/dm^3

9

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0 3 This question is about communicable diseases.

Measles is a communicable disease caused by a pathogen.

0 3 . 1 What type of microorganism causes measles?

[1 mark]

Vaccinations help reduce the spread of measles.

0 3 . 2 Suggest **two** ways the spread of measles can be reduced.

Do **not** refer to vaccination in your answer.

[2 marks]

1

2

0 3 . 3 Describe how the measles vaccine helps a person to become immune to the measles pathogen.

[4 marks]

Do not write outside the box

Norovirus is a type of virus.

0 3 . 4 Explain how viruses cause illness.

[2 marks]

0 3 . 5 Drugs can help to reduce the symptoms of the norovirus infection.

New drugs must go through clinical trials before being licensed for use.

Give **three** reasons why clinical trials are needed.

[3 marks]

1

2

3

12

Turn over for the next question

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0 4 This question is about photosynthesis.

0 4 . 1 What is the symbol equation for photosynthesis?

[1 mark]

Tick (✓) **one** box.

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

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

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

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

Question 4 continues on the next page

Do not write outside the box

A student investigated the relationship between temperature and the rate of photosynthesis.

The student measured the volume of gas produced by an aquatic plant in 1 hour.

The student collected the gas in a measuring cylinder.

Table 2 shows the results.

Table 2

Temperature in °C	**Volume of gas produced in 1 hour in cm^3**
10	1
15	2
20	4
25	8
30	16
35	16
40	2
45	0

0 4 . 2 Describe the effect of increasing temperature on the **rate** of photosynthesis.

Use data from **Table 2**.

[3 marks]

Do not write outside the box

0 4 . 3 Explain why no gas was produced by the plant at 45 °C.

[2 marks]

0 4 . 4 How could the student increase the accuracy of the results?

[1 mark]

Tick (✓) **one** box.

Repeat the investigation, collecting the gas for 24 hours. ☐

Repeat the investigation, measuring the volume of gas to 0.5 cm^3. ☐

Repeat the investigation using a different aquatic plant. ☐

Repeat the investigation, using temperatures of 5 °C and 50 °C. ☐

Question 4 continues on the next page

Do not write outside the box

A person grows tomatoes in a greenhouse.

0 4 . 5 The mean temperature of the greenhouse is 15 °C.

A heater would keep the temperature of the greenhouse at 25 °C.

Suggest **two** reasons **against** using a heater set at 25 °C in the greenhouse.

Do **not** refer to cost in your answer.

[2 marks]

1 _____

_____

2 _____

_____

0 4 . 6 The person cut a stem from one of the tomato plants.

The cut stem was placed in soil to grow new roots.

Which tissue in the cut stem will differentiate into new root cells?

[1 mark]

Tick (✓) **one** box.

Epidermis ☐

Meristem ☐

Mesophyll ☐

Phloem ☐

10

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0 5 This question is about microscopy.

0 5 . 1 **Figure 3** shows bacteria viewed using a microscope.

Figure 3

What type of microscope was used to view the bacteria in **Figure 3**?

Give a reason for your answer.

[1 mark]

Type of microscope _____

Reason _____

_____

_____

Question 5 continues on the next page

Do not write outside the box

0 5 . 2 Bacterial cells are prokaryotic cells.

Give **three** ways that a prokaryotic cell is different from a eukaryotic cell.

[3 marks]

1 _____

_____

2 _____

_____

3 _____

_____

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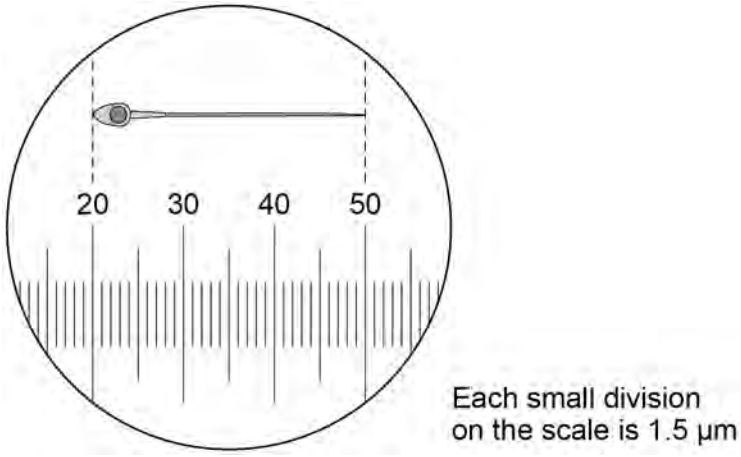
0 5 . 3 **Figure 4** shows a special slide used to determine the size of a cell viewed using a microscope.

Figure 4



Calculate the magnification of the cell shown in **Figure 4**.

[5 marks]

Magnification = × _____

9

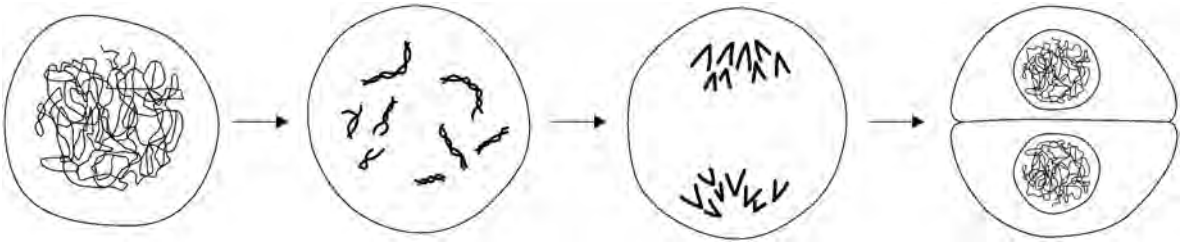
Turn over for the next question

Do not write outside the box

0 6 Smoking increases the risk of lung cancer.

0 6 . 1 **Figure 5** shows a lung cell dividing.

Figure 5



Describe the process of the cell cycle shown in **Figure 5**.

[4 marks]

Do not write outside the box

0 6 . 2 Lung cancer is malignant.

Explain what is meant by a malignant tumour.

[3 marks]

Question 6 continues on the next page

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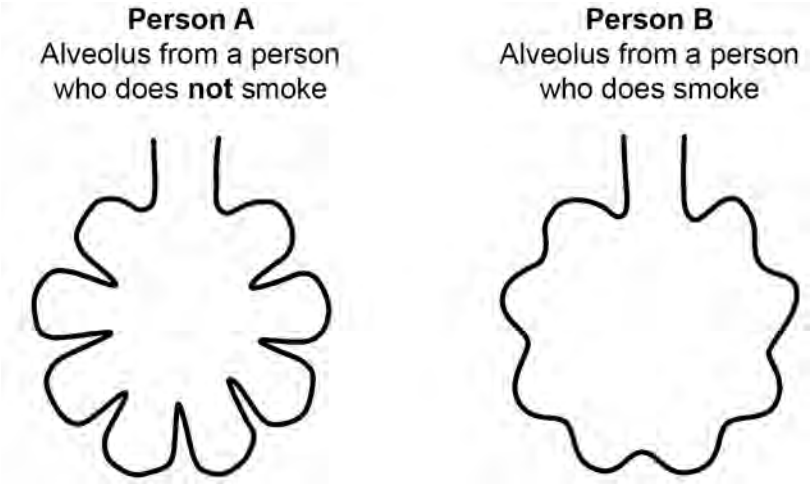
0 6 . 3 Smoking can damage the lungs in different ways.

Figure 6 shows alveoli from the lungs of two people.

Figure 6



Person **A** and person **B** do the same exercise.

Explain why person **B** breathes much faster than person **A** during the exercise.

[4 marks]

11

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0 7 Angina is a condition many people get as coronary heart disease (CHD) develops.

Angina can cause chest pain and tiredness.

People with angina are sometimes treated with a drug called GTN.

GTN widens the coronary arteries.

Explain:

- the causes and symptoms of angina
- how GTN reduces the symptoms of angina.

[6 marks]

6

END OF QUESTIONS

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