A

AQA

Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

I declare this is my own work.

GCSE

COMBINED SCIENCE: TRILOGY

H

Higher Tier

Biology Paper 1H

8464/B/1H

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]

J U N 2 2 8 4 6 4 B 1 H 0 1

For this paper you must have:
- **a ruler**
- **a scientific calculator**
- **a Diagram Booklet.**

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

Bacteria can cause a variety of diseases in humans.

0 1 . 1

What are TWO similarities between a bacterial cell and an animal cell? [2 marks]

Tick (✓) TWO boxes.

- ☐ **Both have a cell membrane.**
- ☐ **Both have a cell wall.**
- ☐ **Both have a nucleus.**
- ☐ **Both have cytoplasm.**
- ☐ **Both have plasmids.**

0 1 . 2

Salmonella food poisoning is caused by bacteria in food.

Give ONE symptom of salmonella food poisoning.

Do NOT refer to vomiting or diarrhoea in your answer.
[1 mark]

0 1 . 3

What is the name of the first antibiotic developed?
[1 mark]

[Turn over]

A child with a severe bacterial infection was given a course of antibiotics.

FIGURE 1, in the Diagram Booklet, shows how the concentration of live bacteria in the child's body changed when taking the course of antibiotics.

0 1 . 4

The concentration of live bacteria in the body continued to increase after starting the course of antibiotics.

Suggest ONE reason why. [1 mark]

0 1 . 5

After 3 days of taking the antibiotic:

- **the child felt better**
- **there were still bacteria in the child's body.**

Why did the child feel better? [1 mark]

Tick (✓) ONE box.

☐ **Bacteria had become immune to the antibiotic.**

☐ **The child had become resistant to the bacteria.**

☐ **There were fewer toxins in the body than at day 0**

0 1 . 6

Suggest why doctors do NOT give antibiotics to patients with minor infections. [1 mark]

_____

_____

_____

[Turn over]

FIGURE 2, in the Diagram Booklet, shows blood viewed using a microscope.

0 1 . 7

A vaccine will stimulate the production of antibodies.

Which part of the blood in FIGURE 2, in the Diagram Booklet, produces antibodies? [1 mark]

Tick (✓) ONE box.

- ☐ **A**
- ☐ **B**
- ☐ **C**
- ☐ **D**

0 1 . 8

Which part of the blood in FIGURE 2, in the Diagram Booklet, starts the clotting process? [1 mark]

Tick (✓) ONE box.

☐ **A**

☐ **B**

☐ **C**

☐ **D**

[Turn over]

9

0 2

This question is about cell division.

0 2 . 1

Write the biological structures from the box in the correct order of size. [1 mark]

cell	**chromosome**	**gene**	**nucleus**

Smallest _____

_____

_____

Largest _____

FIGURE 3, in the Diagram Booklet, shows how a fertilised egg cell can produce specialised cells.

0 2 . 2

Name PROCESS A. [1 mark]

_____

0 2 . 3

How many cell divisions are needed to form a 16-cell embryo from the original fertilised egg cell? [1 mark]

Number of cell divisions = _____

0 2 . 4

In humans a fertilised egg cell contains 23 pairs of chromosomes.

How many chromosomes will there be in each of the embryo cells? [1 mark]

[Turn over]

0 2 . 5

FIGURE 4, in the Diagram Booklet, represents a cell cycle for a human embryonic cell.

Describe ONE change in the cell that occurs during EACH of the stages of the cell cycle. [3 marks]

Stage 1 _____

_____

_____

Stage 2 _____

_____

_____

Stage 3 _____

_____

_____

Cell division is important in the growth of multicellular organisms.

0 2 . 6

FIGURE 5, in the Diagram Booklet, shows the mean height of boys and of girls from birth to age 18 years.

Compare the growth of boys with the growth of girls.

Use data from FIGURE 5 in your answer. [6 marks]

0 2 . 7

Give ONE way that cell division by mitosis is important in FULLY GROWN animals. [1 mark]

_____

_____

_____

[Turn over]

14

0 3

Amylase is an enzyme that digests starch.

0 3 . 1

Which organs in the human digestive system produce amylase? [1 mark]

Tick (✓) ONE box.

- ☐ **Liver, small intestine and large intestine**
- ☐ **Salivary glands, stomach and liver**
- ☐ **Salivary glands, pancreas and small intestine**
- ☐ **Stomach, pancreas and large intestine**

A student investigated the effect of pH on the activity of amylase.

This is the method used.

1. **Prepare amylase solution at pH 5**
2. **Mix the amylase solution with starch in a boiling tube.**

3. Remove a drop of the amylase-starch mixture every 30 seconds and test it for the presence of starch.
4. Record the time when all the starch has been digested.
5. Repeat steps 1 to 4 using amylase solution prepared at pH 6, then at pH 7 and then at pH 8

0 3 . 2

What was the independent variable in this investigation? [1 mark]

0 3 . 3

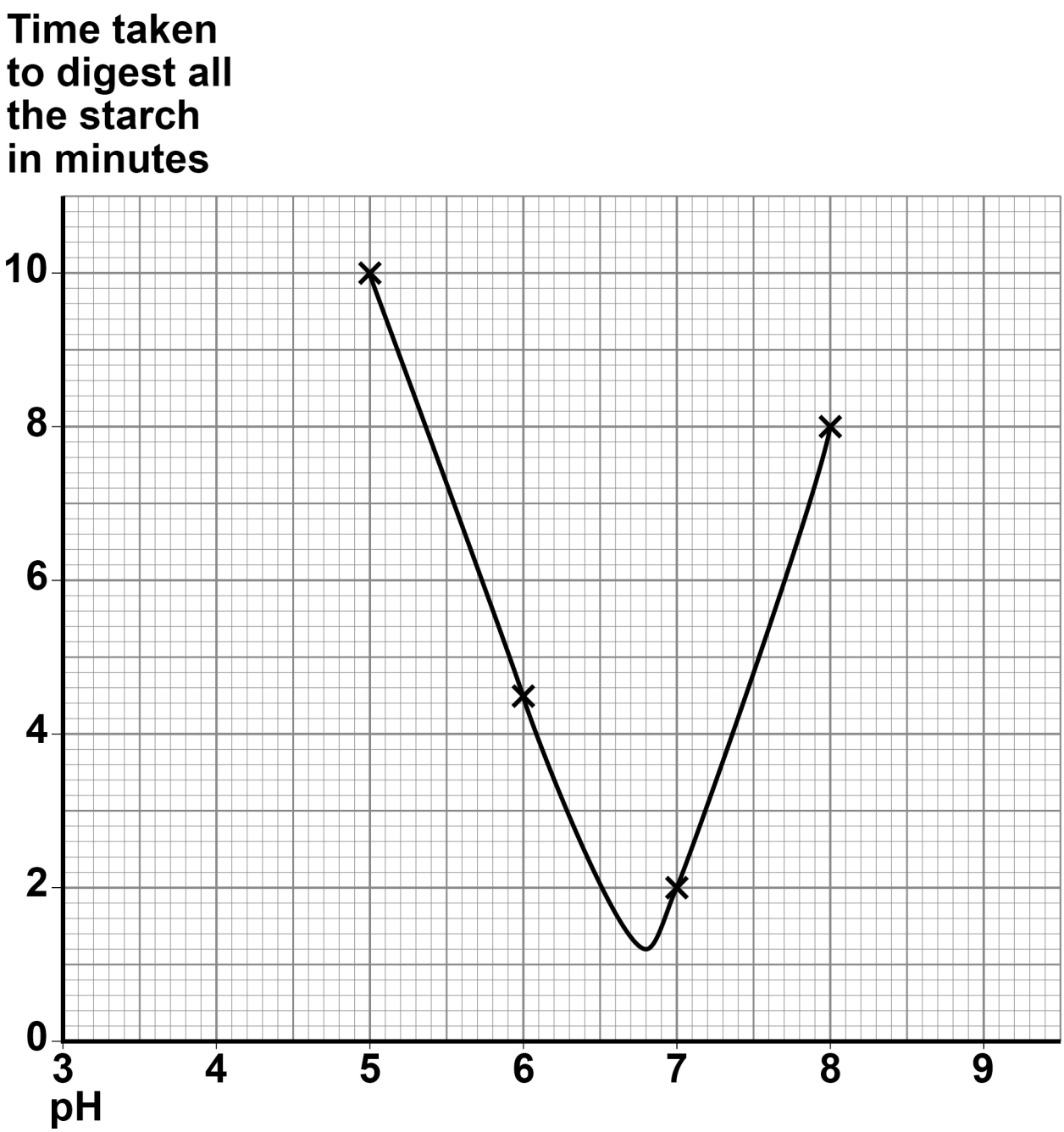
Describe how the student would know when all the starch had been digested. [1 mark]

[Turn over]

0 3 . 4

FIGURE 6 shows the student's results.

FIGURE 6



What was the optimum pH for the amylase?

Use FIGURE 6. [1 mark]

Optimum pH = _____

[Turn over]

A scientist did a different investigation.

This is the method used.

1. **Prepare amylase solution at the optimum pH.**
2. **Mix the amylase solution with starch in a boiling tube.**
3. **Measure the concentration of sugar every 10 seconds for 2 minutes.**

FIGURE 7, on the opposite page, shows the scientist's results.

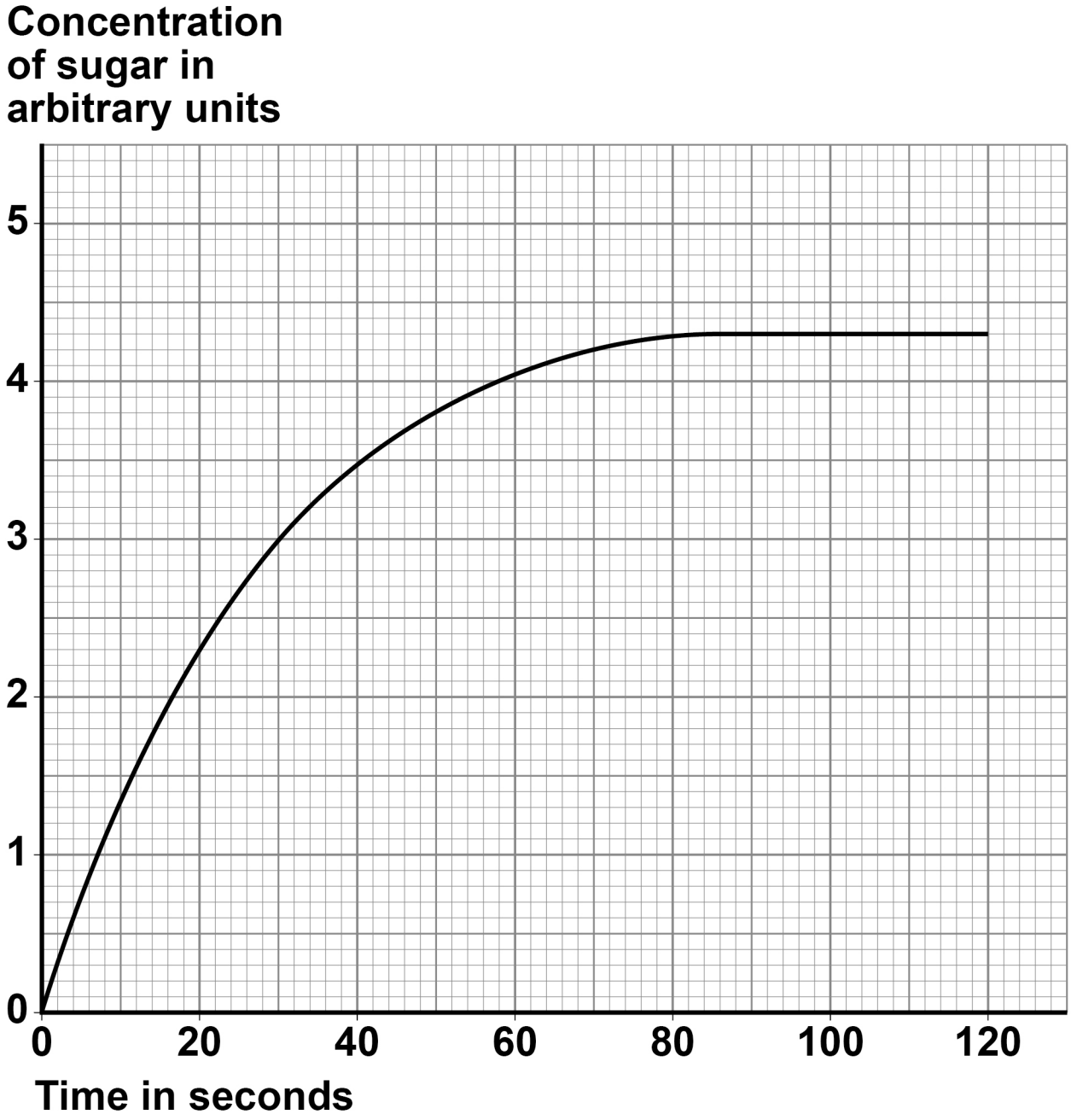
0 3 . 5

How much time did it take for the amylase to digest all the starch?

Use FIGURE 7, on the opposite page. [1 mark]

Time to digest all the starch = _____ seconds

FIGURE 7



[Turn over]

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0 3 . 6

Determine the rate of sugar production per minute at 40 seconds. [4 marks]

Rate = _____ arbitrary units per minute

[Turn over]

0 3 . 7

Explain how the structure of enzyme molecules is related to the effect of pH on the activity of amylase.
[6 marks]

[Turn over]

15

0 4

Photosynthesis is an important chemical reaction in plants.

0 4 . 1

Why is light needed for photosynthesis? [1 mark]

0 4 . 2

What is the equation for photosynthesis? [1 mark]

Tick (✓) ONE box.

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

☐ $CO_2 + H_2O \longrightarrow CH_2O + O_2$

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

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

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[Turn over]

0 4 . 3

A student investigated the effect of different colours of light on the rate of photosynthesis at room temperature.

The student used pondweed in water.

A piece of pondweed was placed in red light, then in blue light and then in green light.

Each colour of light was the same intensity.

Describe how the student should make accurate measurements to obtain valid results for the rate of photosynthesis. [4 marks]

[Turn over]

A scientist investigated the effect of different wavelengths of light on the rate of photosynthesis.

The wavelength of light determines the colour of the light.

FIGURE 8, in the Diagram Booklet, shows the student's results.

FIGURE 9, in the Diagram Booklet, shows the scientist's results.

0 4 . 4

Why are the results for the two investigations presented differently? [2 marks]

0 4 . 5

Suggest the range in wavelength of green light.

Use FIGURE 8 and FIGURE 9, provided in the Diagram Booklet. [1 mark]

Range in wavelength of green light =

from _____ nm to _____ nm

[Turn over]

9

0 5

This question is about tumours.

0 5 . 1

Describe the similarities and differences between benign tumours and malignant tumours. [4 marks]

[Turn over]

FIGURE 10, in the Diagram Booklet, shows data about skin cancer in males and females for different age groups in the UK.

It shows:

- **the number of new cases of skin cancer in 1 year**
- **the number of people with skin cancer per 100 000 population in 1 year.**

0 5 . 2

There are no new cases of skin cancer diagnosed in people younger than 15 years of age.

Explain why. [2 marks]

0 5 . 3

Give TWO conclusions about the number of NEW CASES of skin cancer.

Use FIGURE 10, in the Diagram Booklet. [2 marks]

1 _____

_____

_____

2 _____

_____

_____

[Turn over]

0 5 . 4

The data for the number of people with skin cancer is given per 100 000 population.

Suggest why the data is NOT given as the total number of people. [1 mark]

0 5 . 5

Describe TWO trends shown in FIGURE 10, in the Diagram Booklet.

Use ONLY the data for the number of people with skin cancer per 100 000 population. [2 marks]

1

2 _____

_____

_____

_____

[Turn over]

0 5 . 6

The estimated population of males aged 80 to 84 years was 694 000

Calculate the number of males aged 80 to 84 years with skin cancer in that year.

Use FIGURE 10, in the Diagram Booklet.

Give your answer to 3 significant figures. [3 marks]

Number of males with skin cancer (3 significant figures) = _____

14

0 6

This question is about the heart.

0 6 . 1

Why is the heart described as an organ? [1 mark]

_____

_____

_____

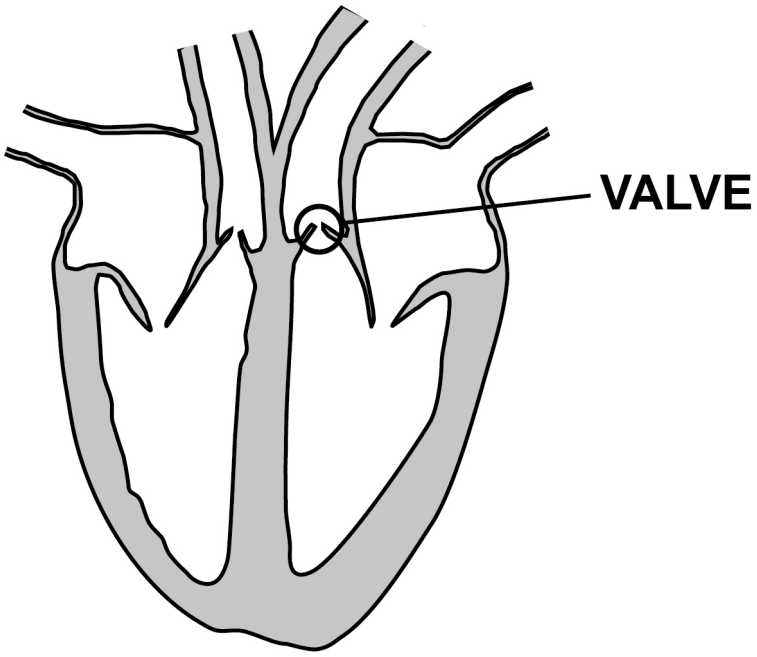
[Turn over]

0 6 . 2

Valves in the heart keep the blood flowing through the heart in one direction.

FIGURE 11 shows the heart with one of the valves labelled.

FIGURE 11



Explain the effects on a person if the valve labelled in FIGURE 11 developed a leak. [4 marks]

[Turn over]

0 6 . 3

Faulty heart valves can be replaced using biological or mechanical valves.

The faulty valve is replaced during an operation.

Biological valves:

- **are from animals or human donors**
- **allow blood to flow through them normally**
- **wear out and stiffen over time, so may need to be replaced.**

Mechanical valves:

- **are made from synthetic materials**
- **may cause blood clots on the surface of the valve**
- **require anti-clotting drugs to be taken for the rest of the patient's life**
- **can last for a very long time in ideal conditions.**

A young woman enjoys extreme sports and would like to start a family.

The woman needs a heart valve replacing.

Describe the advantages and disadvantages for this young woman of having a biological heart valve instead of a mechanical heart valve. [4 marks]

END OF QUESTIONS

9

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	
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5	
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TOTAL	