

AQA Style

GCSE

COMBINED SCIENCE: TRILOGY

Higher Tier

Biology Paper 1

H

Time allowed: 1 hour 15 minutes

Materials

- A ruler
- A pen and pencil
- A scientific calculator

Instructions

- Answer **all** questions using a black pen.
- Answer the questions in the space available and cross through any work you do not want to be marked.
- In any calculations, make sure you show your working out.

Information

- The maximum mark for this paper is 70.
- The marks available for each question are shown in brackets.
- You must make your work as neat as possible and use good English in your answers.
- You should make sure you leave time to check your answers.

Question	Mark
1	
2	
3	
4	
5	
6	
7	
Total	

Name _____

Date _____

0 1

During digestion, digestive enzymes convert food into small soluble molecules.

0 1 . 1

Name the enzyme that breaks down fats into fatty acids and glycerol.

[1 mark]

0 1 . 2

Name the type of molecule produced when carbohydrates are broken down by carbohydrase.

[1 mark]

0 1 . 3

Starch is broken down by an enzyme called amylase.
Name **two** places in the body where amylase is produced.

[2 marks]

1. _____

2. _____

0 1 . 4

Describe how you would test a piece of food to show it contains protein.

[2 marks]

0 1 . 5

Bile is a substance that increases the rate of fat digestion.

Name the organ that produces bile.

[1 mark]

0 1 . 6

Explain **one** way that bile increases the rate of fat digestion.

[2 marks]

9

0 2

Some students investigated the effect of different concentrations of sugar solution on pieces of carrot.

The students used the method below.

1. Cut a carrot into six sticks.
2. Measure the mass of each carrot stick.
3. Place each carrot stick into a test tube containing a different concentration of sugar solution and leave them for 2 hours.
4. After 2 hours, remove each carrot stick from the solution and place on blotting paper for 30 seconds.
5. Measure the mass of each carrot stick again.

0 2 . 1

Suggest why students placed the carrots on blotting paper for 30 seconds.

[1 mark]

0 2 . 2

Suggest **two** improvements that the students could make to their method.

[2 marks]

1. _____

2. _____

Question 2 continues on the next page.

0 2 . 3 **Table 1** shows the students' results.

Table 1

Concentration of Sugar Solution (arbitrary units)	Mass of Carrot Stick at Start (g)	Mass of Carrot Stick after 24 Hours (g)	Change in Mass (g)	Percentage (%) Change in Mass
1.0	20.0	28.8	+8.8	+44
2.0	18.0	21.6	+3.6	+20
3.0	16.0	16.8	+0.8	
4.0	21.2	17.8	-3.4	-16
5.0	13.0	10.4	-2.6	-20
6.0	17.0	7.5	-9.5	-56

Calculate the percentage change in mass for the carrot stick that was placed in the sugar solution of 3.0 arbitrary units.

Show your working.

[2 marks]

percentage change in mass = _____ %

0 2 . 4 Explain why it is useful to calculate the percentage (%) change in mass of each carrot stick.

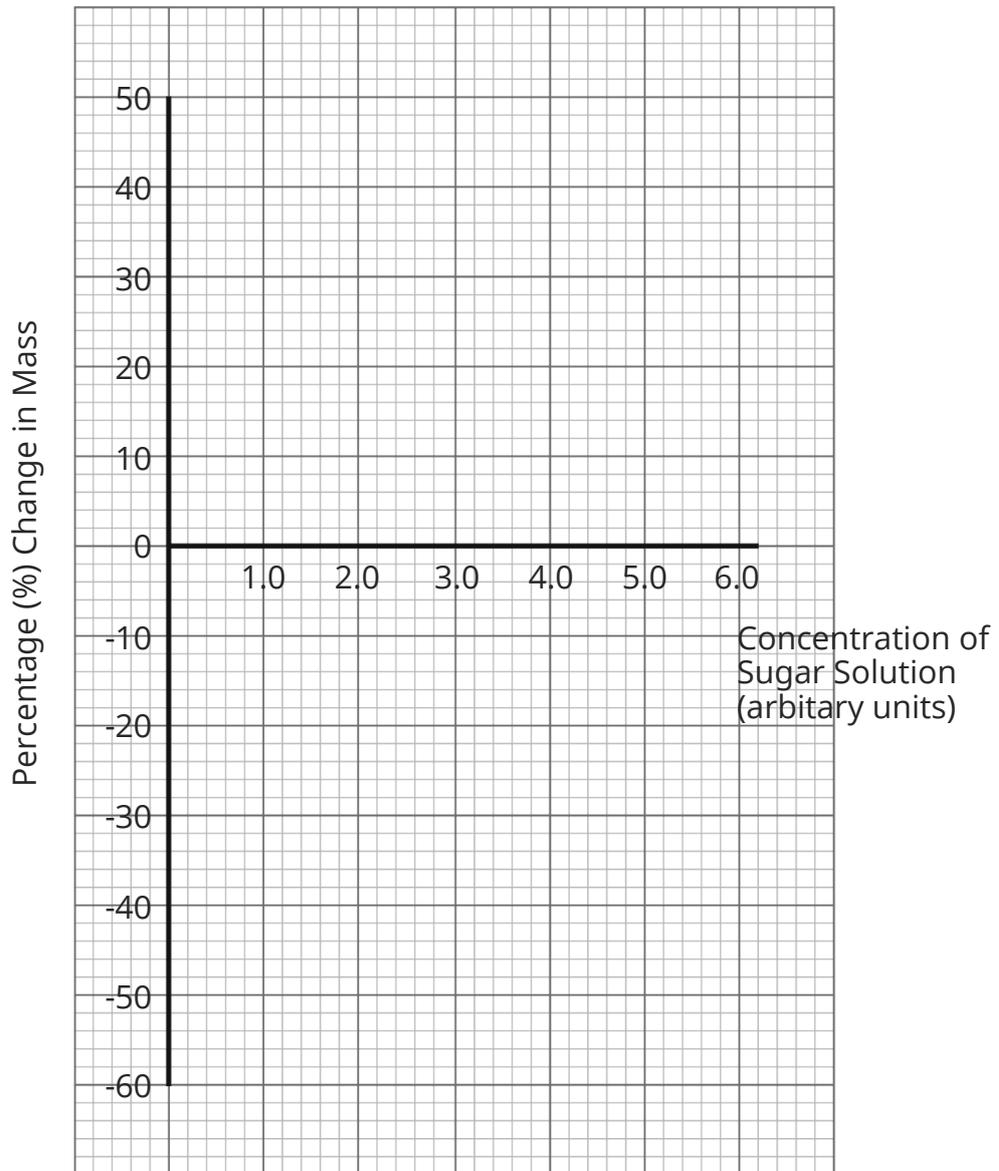
[2 marks]

0 2 . 5 Complete **Figure 1** using the results in **Table 1**.

- Plot the percentage change in mass for each concentration of sugar solution.
- Draw a line of best fit, ignoring any anomalous results.

[3 marks]

Figure 1

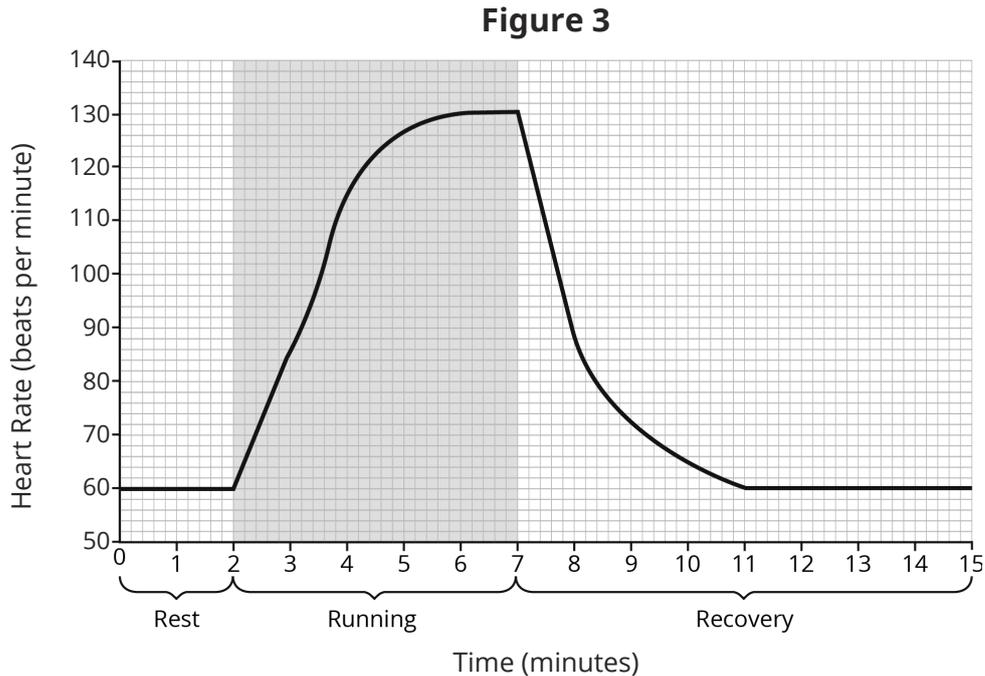


0 2 . 6 Explain why the percentage change in mass was negative in sugar solutions with a concentration above 4.0 arbitrary units.

[3 marks]

0 4

A person is training for a running event. Their heart rate was measured during their training. The results are shown in **Figure 3**.



0 4 . 1

Describe how the person's heart rate changes during each stage shown on the graph.

You should include data from the graph in your answer.

[3 marks]

0 4 . 2

Explain why the person's heart rate increased during exercise.

[4 marks]

04.3 After 5 minutes, the person's legs began to ache due to a build-up of lactic acid. This created an oxygen debt.

Explain how the body deals with a build-up of lactic acid.

[4 marks]

11

0 5 Measles is a highly contagious disease that causes fever and a red skin rash. It can be fatal if complications arise.

0 5 . 1 Name the pathogen that causes measles.

[1 mark]

0 5 . 2 Measles spreads easily through groups of young children.

Explain why children pass on the disease so easily.

[2 marks]

0 5 . 3 Before the introduction of the measles vaccine in 1963, measles caused an estimated 2.6 million deaths each year worldwide.

Explain how the introduction of the measles vaccine helped to reduce the number of deaths from measles.

[4 marks]

0 5 . 4 The World Health Organisation (WHO) sets a target for 95% of five-year-olds to be vaccinated against measles. In 2017, the UK met this target and was granted measles elimination status. This 'measles-free' status was lost when vaccination rates for the second dose of the measles vaccine fell to 87.4% in 2019.

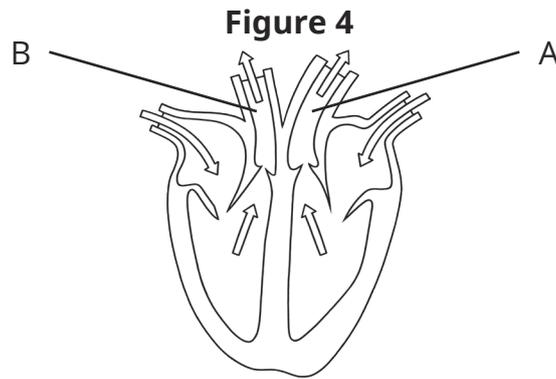
Explain why it is important that a high percentage of children are vaccinated against measles.

[2 marks]

9

0 | 6

Figure 4 shows a diagram of the human heart.



0 | 6

. 1

Name and describe the function of structures **A** and **B**.

[4 marks]

Structure **A**

name _____

function _____

Structure **B**

name _____

function _____

0 | 6

. 2

The heart contains valves to prevent blood from flowing in the wrong direction. In some people, the valves may leak or become faulty. Faulty heart valves can be replaced using biological or mechanical valves.

Evaluate the advantages and disadvantages of replacing faulty heart valves with mechanical valves over biological valves.

[4 marks]

06.3

In the UK, around 73 000 people die from coronary heart disease every year.

Explain why statins are increasingly prescribed to anyone at risk of developing coronary heart disease.

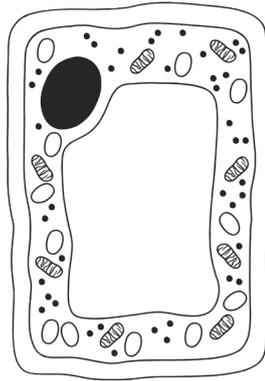
[2 marks]

10

07

Figure 5 shows a plant cell.

Figure 5



07.1

The plant cell is $70\mu\text{m}$ long.

The cell is magnified 400 times.

Use the equation to calculate the size of the microscope image of the cell in μm .

$$\text{magnification} = \frac{\text{image size}}{\text{real size}}$$

Give your answer in standard form.

[3 marks]

image size = _____ μm

07.2

Plant cells contain chloroplasts to absorb light energy for photosynthesis.

Complete the word equation for photosynthesis.

[2 marks]

carbon dioxide + _____ $\xrightarrow{\text{light energy}}$ _____ + _____

07.3

A farmer grows spinach in a greenhouse. He needs to optimise photosynthesis to produce the highest crop yield. He increases the amount of light available for photosynthesis by using lamps.

The intensity of light on the spinach plants can be calculated using the inverse square law:

$$\text{light intensity} \propto \frac{1}{\text{distance}^2}$$

Calculate the light intensity when the greenhouse lamps are 25cm from the spinach plants.

[2 marks]

light intensity = _____ arbitrary units

07.4

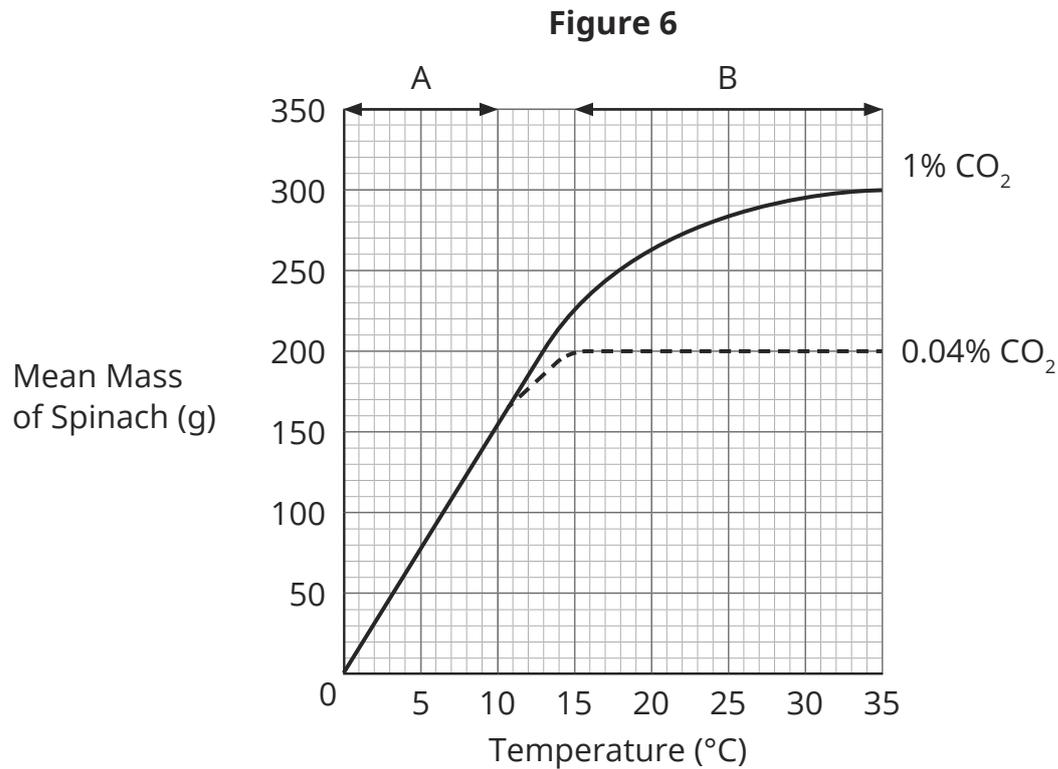
The distance between the greenhouse lamps and the spinach is doubled.

Describe what will happen to the light intensity.

[1 mark]

07.5 The farmer compares the mass of spinach plants grown in different conditions.

The results are shown in **Figure 6**.



Explain the effect of temperature and carbon dioxide concentration on the mean mass of spinach plants.

You should refer to the limiting factors in sections **A** and **B** of the graph in your answer.

[4 marks]

END OF QUESTIONS