AQA

GCSE
COMBINED SCIENCE: TRILOGY

F

Foundation Tier   Biology Paper 1F

Specimen 2018 (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.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- 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.
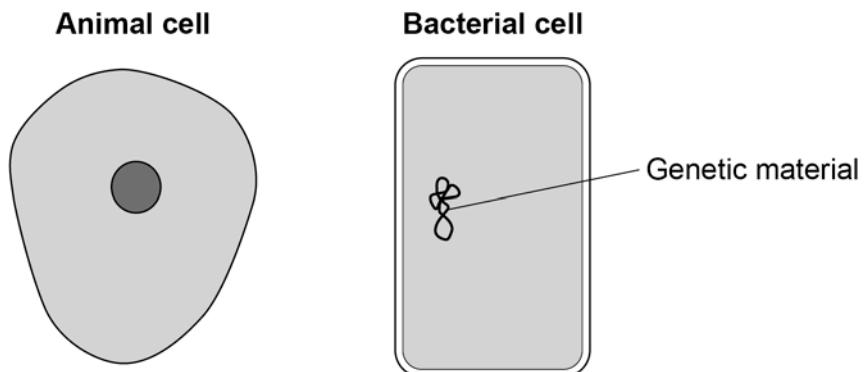
Information
- The maximum mark for this paper is 70.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

0 1 **Figure 1** shows an animal cell and a bacterial cell.

Figure 1

0 1 . **1** Compare the structure of the cells in **Figure 1**.

Complete the sentences.

Choose the answers from the box.

[2 marks]

cell membrane	cell wall	chloroplast
cytoplasm		nucleus
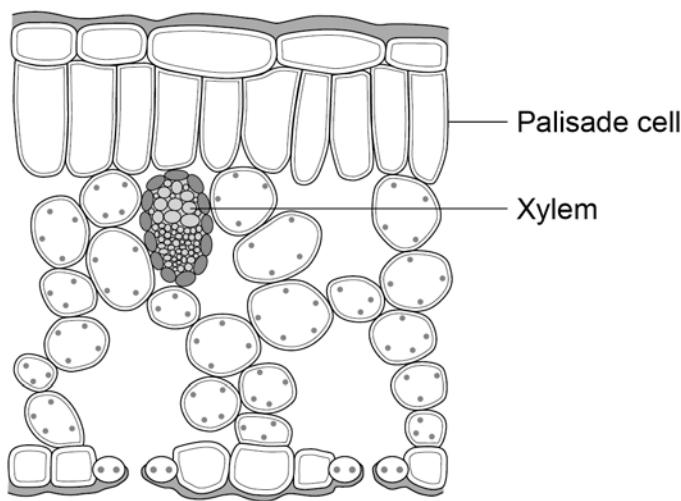
Only the animal cell contains a _____ .

Only the bacterial cell contains a _____ .

Figure 2 shows a section through a leaf.

Figure 2

0 1 . 2 The function of palisade cells is to photosynthesise.

Describe **one** way palisade cells are adapted to carry out their function.

[1 mark]

_____

_____

0 1 . 3 Complete **Table 1** to show whether each structure is a tissue, an organ or an organ system.

[2 marks]

Tick **one** box for each structure.

Table 1

Structure	Tissue	Organ	Organ system
Leaf			
Xylem			
Roots, stem and leaves			

Question 1 continues on the next page

Turn over ►

A student observed palisade cells using a microscope.

The microscope had four objective lenses, each with a different magnification.

0 1 . 4 Which objective lens should the student use first?

Tick **one** box.

Give a reason for your answer.

[2 marks]

×4 magnification ☐

×10 magnification ☐

×40 magnification ☐

×100 magnification ☐

Reason _____

_____

The student measured the width of 5 different palisade cells at a total magnification of ×400

0 1 . 5 Eyepiece lenses are usually ×5 or ×10 magnification.

What combination of eyepiece and objective lenses would give a total magnification of ×400?

[1 mark]

Eyepiece lens _____

Objective lens _____

Table 2 shows the student's results.

Table 2

Cell	Width of cell image in mm
1	12
2	13
3	16
4	10
5	11

0 1 . 6 Calculate the mean width of the palisade cell images.

[1 mark]

Mean width = _____ mm

0 1 . 7 Calculate the real width of a palisade cell.

[2 marks]

Use the mean width you calculated in Question **01.6**.

Use the equation:

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

Real width = _____ mm

11
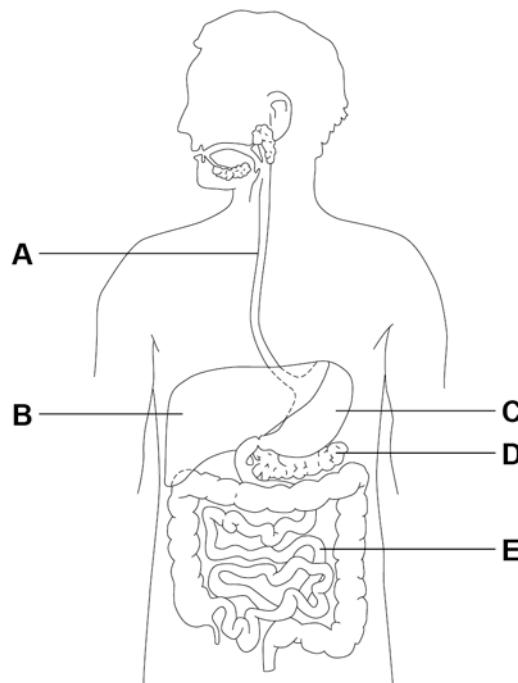
Turn over for the next question

Turn over ▶

0 2   **Figure 3** shows the human digestive system.

Figure 3

0 2 . 1   Which organ in **Figure 3** produces acid?

[1 mark]

Tick **one** box.

A ☐   B ☐   C ☐   D ☐   E ☐

0 2 . 2   Which organ in **Figure 3** produces bile?

[1 mark]

Tick **one** box.

A ☐   B ☐   C ☐   D ☐   E ☐

0 2 . 3 Where in **Figure 3** are digested foods absorbed into the blood?

[1 mark]

Tick **one** box.

A ☐   **B** ☐   **C** ☐   **D** ☐   **E** ☐

0 2 . 4 Food molecules such as proteins **cannot** be absorbed unless they are digested.

Give **one** reason why.
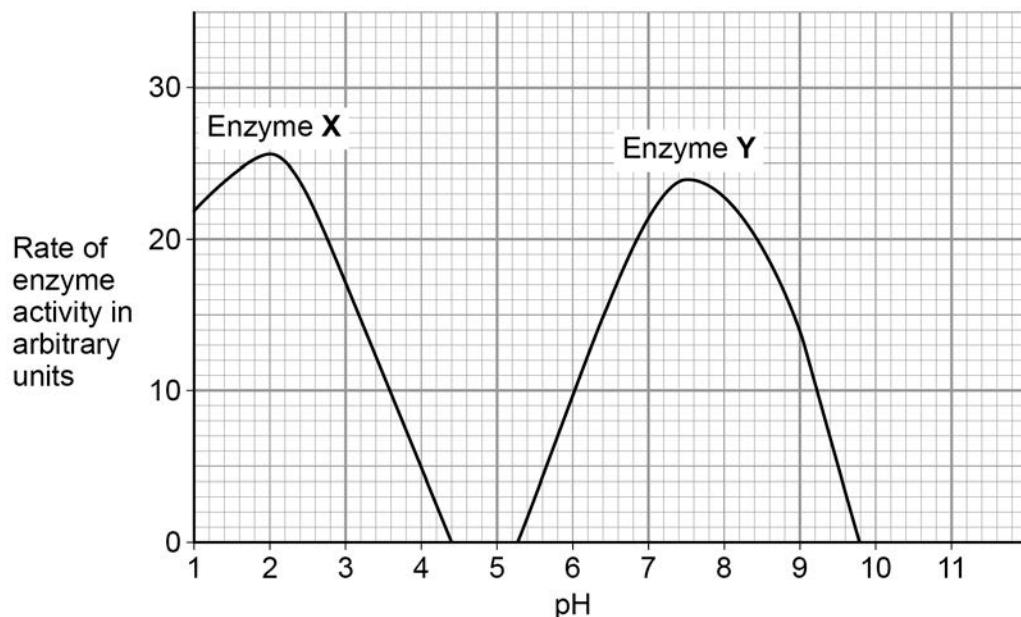
[1 mark]

_____

_____

Question 2 continues on the next page

Turn over ▶

A scientist investigated the effect of pH on the activity of two protease enzymes.

Figure 4 shows the results.

Figure 4

| 0 | 2 |.| 5 | What is the optimum pH for enzyme **Y**?

[1 mark]

pH _____

0 2 . 6 Where in the digestive system might the two protease enzymes be produced?

[1 mark]

Tick **one** box.

Enzyme X	Enzyme Y	
Mouth	Stomach	☐
Pancreas	Mouth	☐
Small intestine	Pancreas	☐
Stomach	Small intestine	☐

Question 2 continues on the next page

Turn over ▶

Figure 5 shows a model of an enzyme molecule.
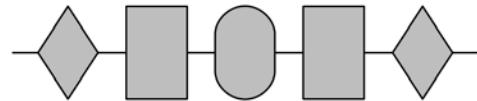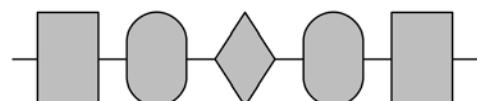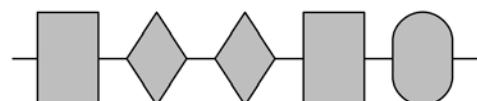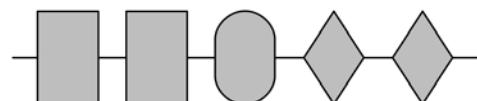
Figure 5

| 0 | 2 | . | 7 | Which substrate fits the enzyme molecule in **Figure 5**?

Tick **one** box.

[1 mark]

0 2 . 8 The enzyme and substrate diagrams are used as a model for a theory of enzyme action.

What is the name of this theory?

[1 mark]

Tick **one** box.

Evolution ☐

Lock and key ☐

Natural selection ☐

Protein synthesis ☐
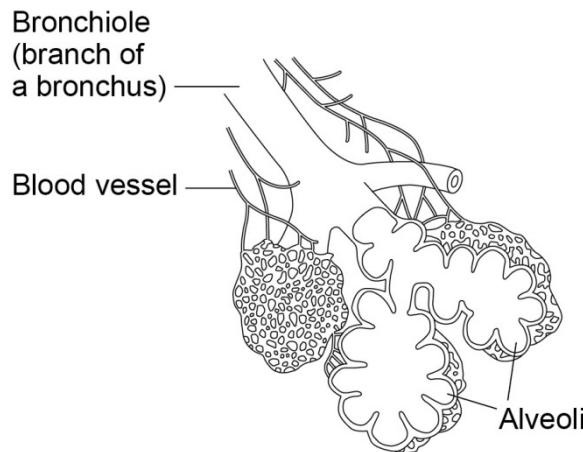
**0 2 . 9** Explain why pH affects enzyme activity.

[2 marks]

_____

_____

_____

_____

10

Turn over for the next question

Turn over ▶

0 3   **Figure 6** shows part of the lungs.

Figure 6

Bronchiole
(branch of
a bronchus)

Blood vessel

Alveoli

0 3 . 1   Give **two** ways the lungs are adapted for efficient exchange of gases.

Describe how each adaptation helps to maintain efficient gas exchange.

[4 marks]

Adaptation 1 _____

_____

Description _____

_____

Adaptation 2 _____

_____

Description _____

_____

0 3 . 2 There are 5.4 million people with asthma in the UK.

What type of disease is asthma?

[1 mark]

Tick **one** box.

An allergy ☐

A bacterial infection ☐
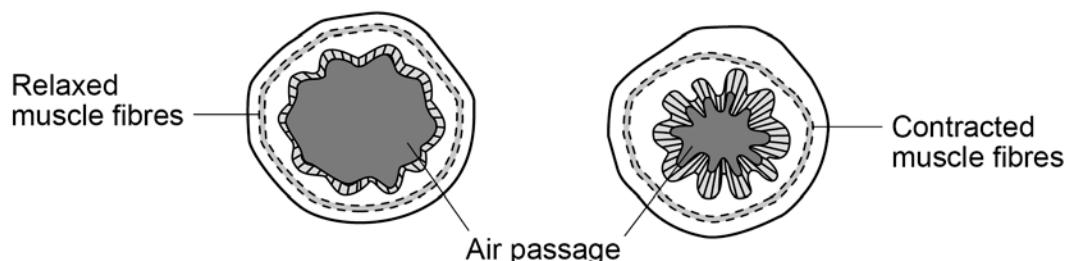
A cancer ☐

A viral infection ☐

0 3 . 3 **Figure 7** shows cross-sections of bronchioles of two people.

Figure 7

Person without asthma   Person with asthma

Relaxed muscle fibres

Contracted muscle fibres

Air passage

Suggest why people with asthma often find it difficult to breathe.

[1 mark]

_____

_____
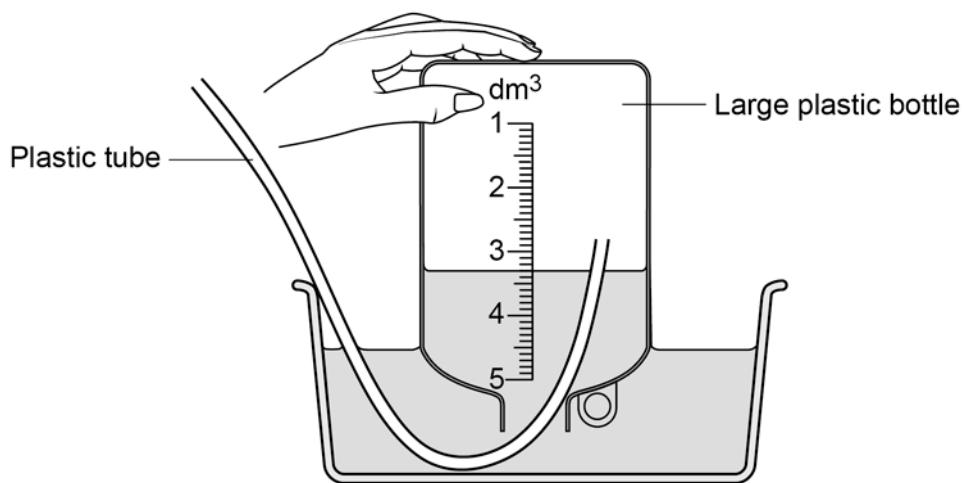
Question 3 continues on the next page

Turn over ▶

0 3 . 4 People with asthma often have a reduced lung volume.

Figure 8 shows the apparatus a student used to measure his lung volume.

Figure 8

This is the method used.

1   Fill the bottle with water.

2   Breathe out through the tube.

The volume of water pushed out of the bottle is equal to his lung volume.

What is the student's lung volume?

[1 mark]

Voulme = _____ dm³

Scientists tested a new drug to treat asthma.

The scientists measured the lung volume of:

- volunteers without asthma
- some volunteers during a mild asthma attack
- other volunteers during a severe asthma attack.

Half the people in each group were given a placebo.

The other half of the people in each group were given the new drug.

The tests were carried out as a double blind trial.

0 3 . 5 What is a placebo?

[1 mark]

_____

_____

0 3 . 6 Who knows which volunteers in a double blind trial are given the drug and which volunteers are given the placebo?

[1 mark]

Tick **one** box.

The scientists but not the volunteers ☐

The scientists and the volunteers ☐

The volunteers but not the scientists ☐

Neither the volunteers nor the scientists ☐
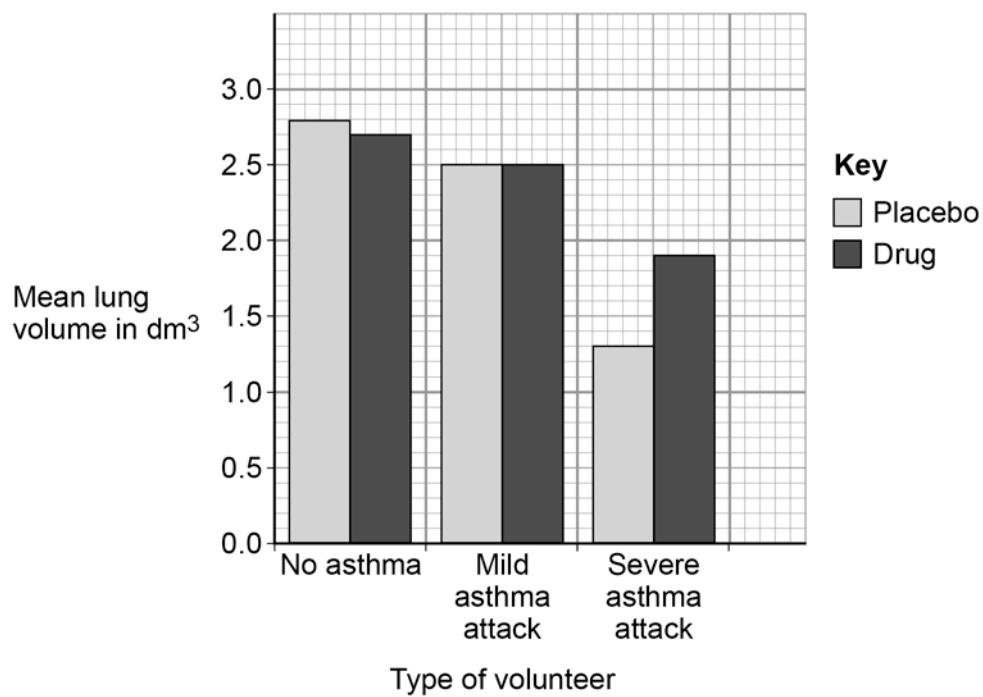
Question 3 continues on the next page

Turn over ▶

**0 3 . 7** Suggest why it is a good idea that double blind trials should be used in drug testing?

[1 mark]

0 3 . 8 **Figure 9** shows the results of the drug tests.

Figure 9

Give **two** conclusions that can be made about the usefulness of the drug.

[2 marks]

1

2

12

Turn over for the next question

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Turn over ▶

0 4 Antibiotics are used to kill some types of pathogen.

0 4 . 1 Which illness could be treated with an antibiotic?

[1 mark]

Tick **one** box.

AIDS ☐

Measles ☐

Salmonella ☐
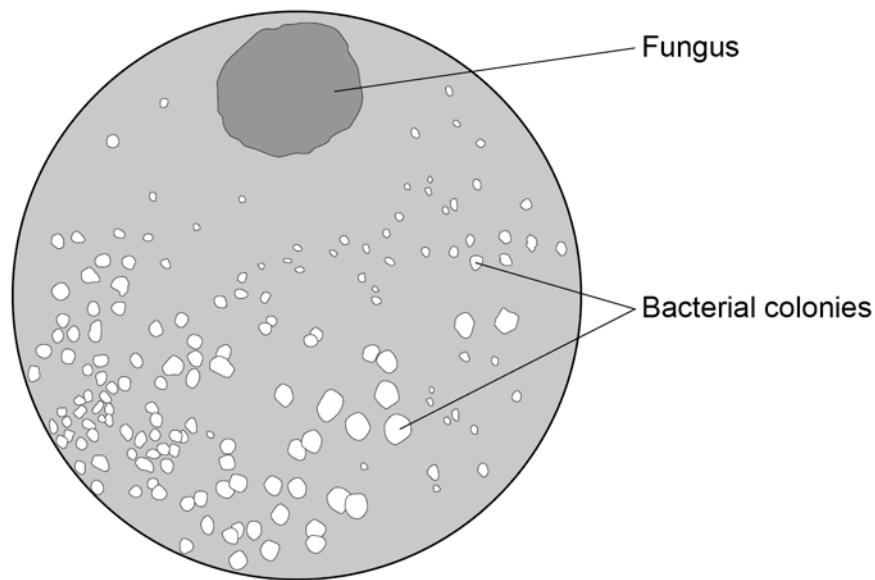
Type 2 diabetes ☐

Alexander Fleming discovered the antibiotic penicillin.

He noticed that one of his Petri dishes containing bacteria had become contaminated with a fungus.

Figure 10 shows the Petri dish.

Figure 10

Fungus

Bacterial colonies

0 4 . 2 Read the information about the discovery of penicillin.

Draw **one** line from each piece of information to its description.

[4 marks]

Information   **Description**

Conclusion

Fleming noticed that there were only a few bacterial colonies growing near the fungus.

Hypothesis

Fleming thought the fungus must have produced a chemical (penicillin) that killed the bacteria around it.

Investigation

He injected 8 mice with bacteria and gave 4 of these mice an injection of penicillin.

Observation

The 4 mice injected with penicillin survived. The 4 mice **not** given penicillin died.

Result

0 4 . 3 Look at **Figure 10**.

The greater the distance from the fungus the more bacteria grew.

Suggest **one** reason for this.

[1 mark]

_____

_____

0 4 . 4 Give **two** reasons why Fleming's discovery was important.

[2 marks]

1 _____

_____

2 _____

_____

8

Turn over ▶

0 5   A student investigated the effect of different concentrations of a salt solution on the mass of pieces of potato.

This is the method used.

1.   Weigh five pieces of potato.

2.   Put each piece of potato into a different concentration of salt solution.

3.   Leave the potato pieces for 24 hours.

4.   Remove each piece of potato, dry it and re-weigh it.

5.   Calculate the change in mass of each piece of potato.

Table 3 shows the results.

Table 3

Concentration of salt solution in arbitrary units	Mass at start in g	Final mass in g	Change in mass in g
0	2.60	3.04	0.44
1	2.71	2.98	**X**
2	2.60	2.70	0.10
3	2.63	2.56	−0.07
4	2.46	2.22	−0.24

0 5 . 1   Calculate value **X** in **Table 3**.

[1 mark]

X = _____ g

0 5 . 2 Two of the numbers for the change in mass have a negative value.

What do these negative values indicate?

[1 mark]

_____

_____
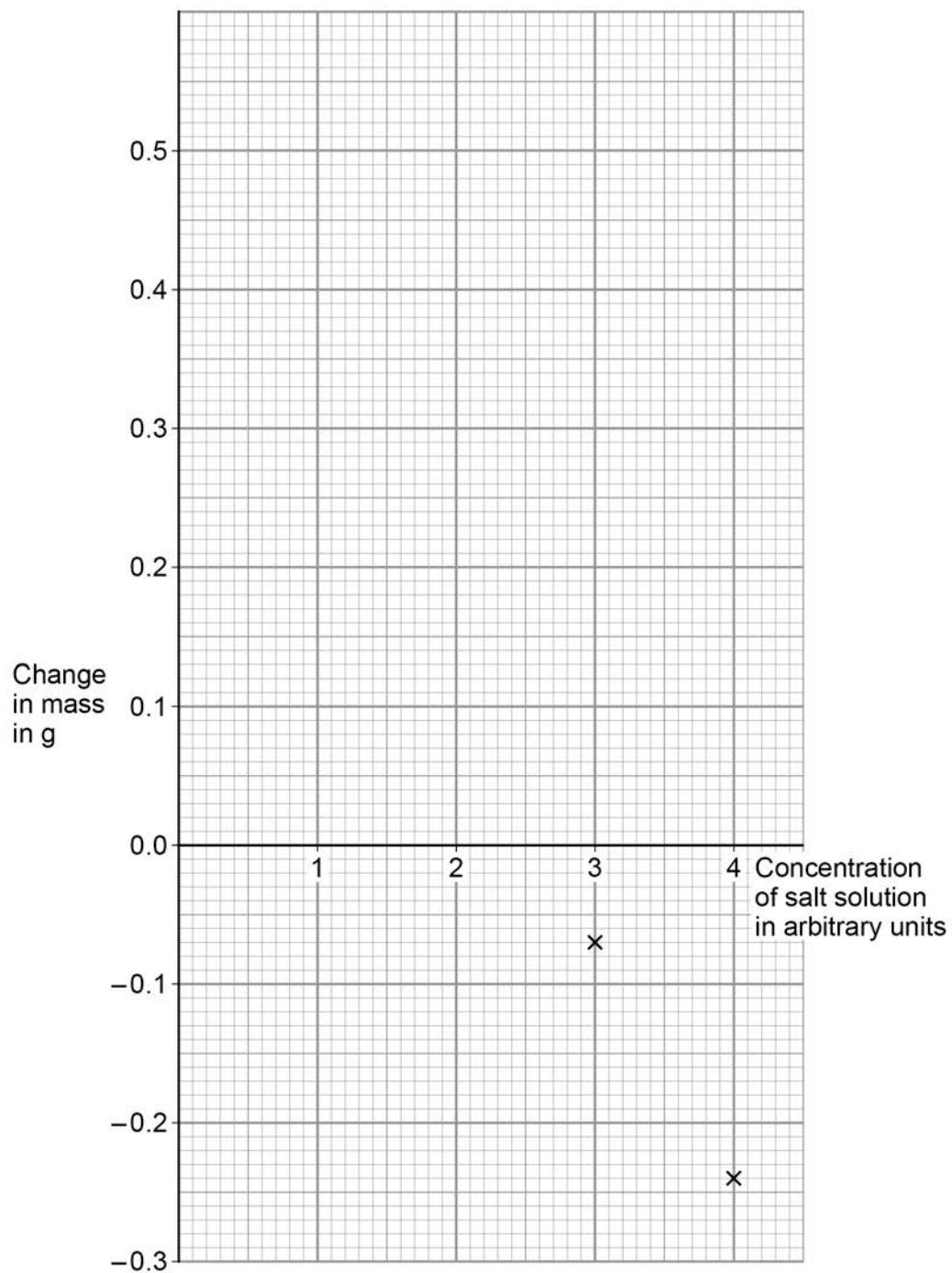
**Question 5 continues on the next page**

Turn over ►

0 5 . 3 Complete **Figure 11**.

- Plot data from **Table 3** and your answer to Question **05.1**.

- Draw a line of best fit.

[3 marks]

Figure 11

0 5 . 4 Which concentration of salt solution would give no change in mass?

Use **Figure 11**.

[1 mark]

Concentration = _____ arbitrary units

0 5 . 5 Explain why there would be no change in mass of a piece of potato at the salt concentration you gave in Question **05.4**.

[3 marks]

_____

_____

_____

_____

_____

9

Turn over for the next question

Turn over ▶

There are no questions on this page

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ANSWER IN THE SPACES PROVIDED

0 6 Plants make glucose by photosynthesis.

0 6 . 1 Complete the word equation for photosynthesis.

[1 mark]

_____ + _____ → glucose + _____

0 6 . 2 What is the name of the chemical that makes a leaf look green?

[1 mark]

Tick **one** box.

Cellulose ☐

Chlorophyll ☐

Chloroplast ☐

Chromosome ☐

0 6 . 3 A test for starch is used to show that a plant has photosynthesised.

How does the presence of starch show that photosynthesis has taken place?

[1 mark]

_____

_____
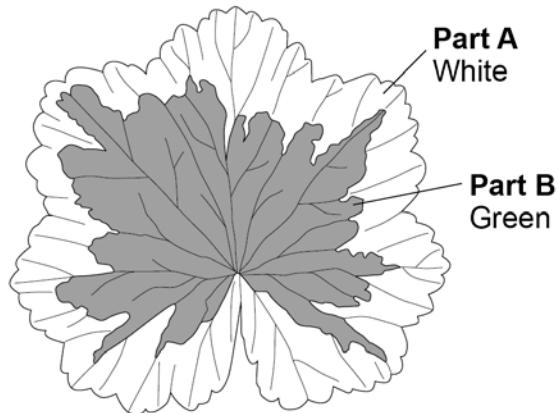
Question 6 continues on the next page

Turn over ▶

A student investigated where starch was made in a leaf.

She used a leaf that was part green and part white as shown in **Figure 12**.

Figure 12

Part A
White

Part B
Green

This is the method used.

1. Put the leaf in boiling water for 1 minute.
    Reason: stops all chemical reactions in the leaf.

2. Transfer the leaf to boiling ethanol for 5 minutes.
    Reason: removes the green colour.

3. Dip the leaf in hot water.
    Reason: softens the leaf.

4. Spread the leaf on a white tile and test with iodine solution.
    Reason: stains any starch.

0 6 . 4 If the chemical reactions in the leaf were not stopped, the amount of starch in the leaf would decrease.

Give the reason why.

[1 mark]

_____

_____

0 6 . 5 Suggest why it is important to remove the green colour from the leaf before adding iodine solution.

[1 mark]

_____

_____

0 6 . 6 Ethanol is flammable.

The student wore safety goggles when testing the leaf for starch.

Give **one** other safety precaution the student should have taken.

[1 mark]

_____

_____

0 6 . 7 Look at the leaf in **Figure 12**.

What colour would part **A** and part **B** stain with iodine solution after the starch test?

[2 marks]

**A** _____

B _____
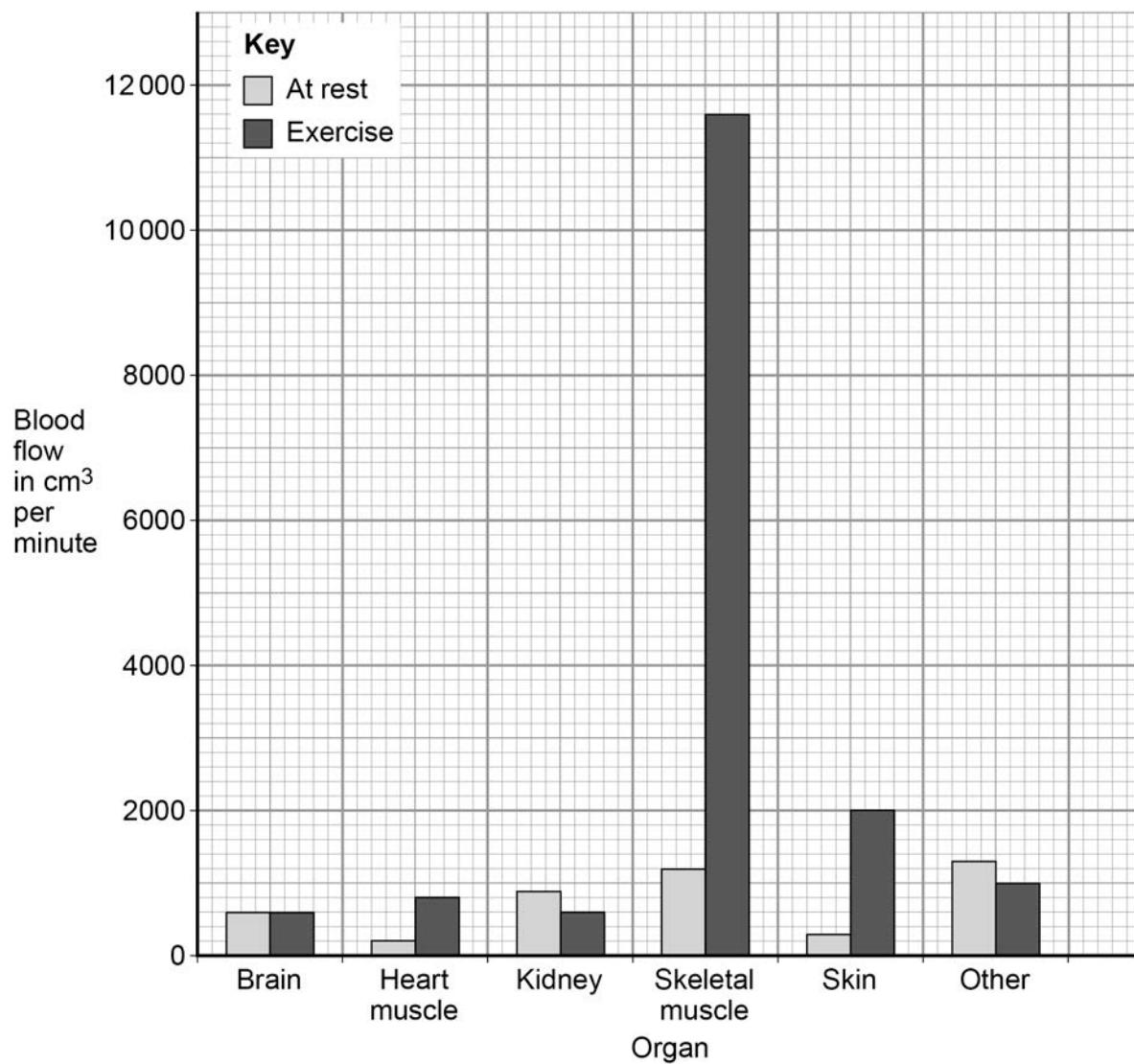
8

Turn over for the next question

0 7 **Figure 13** shows the rate of blood flow through different organs at rest and during exercise.

Figure 13

0 7 . 1 Determine the total volume of blood that flows through the brain in 1 hour.

[1 mark]

Volume = _____ cm³

0 7 . 2 Look at the blood flow through the skeletal muscle.

Calculate how many times the blood flow increases by during exercise compared to at rest.

[2 marks]

_____

_____

_____

Answer = _____

0 7 . 3 Explain why the blood flow to the skeletal muscles increases during exercise.

[3 marks]

_____

_____

_____

_____

_____

_____

Question 7 continues on the next page

Turn over ▶

0 7 . 4 Arteries and veins have different structures and different functions.

Explain how the different structure of arteries and veins relates to their different functions.

[6 marks]

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

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END OF QUESTIONS

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