A

AQA

Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

GCSE

BIOLOGY

H

Higher Tier Paper 1H

8461/1H

Tuesday 14 May 2019 Afternoon

Time allowed: 1 hour 45 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]

JUN198461 1H01

For this paper you must have:

- **a ruler**
- **a scientific calculator.**

INSTRUCTIONS

- **Use black ink or black ball-point pen.**
- **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 100.**
- **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.**

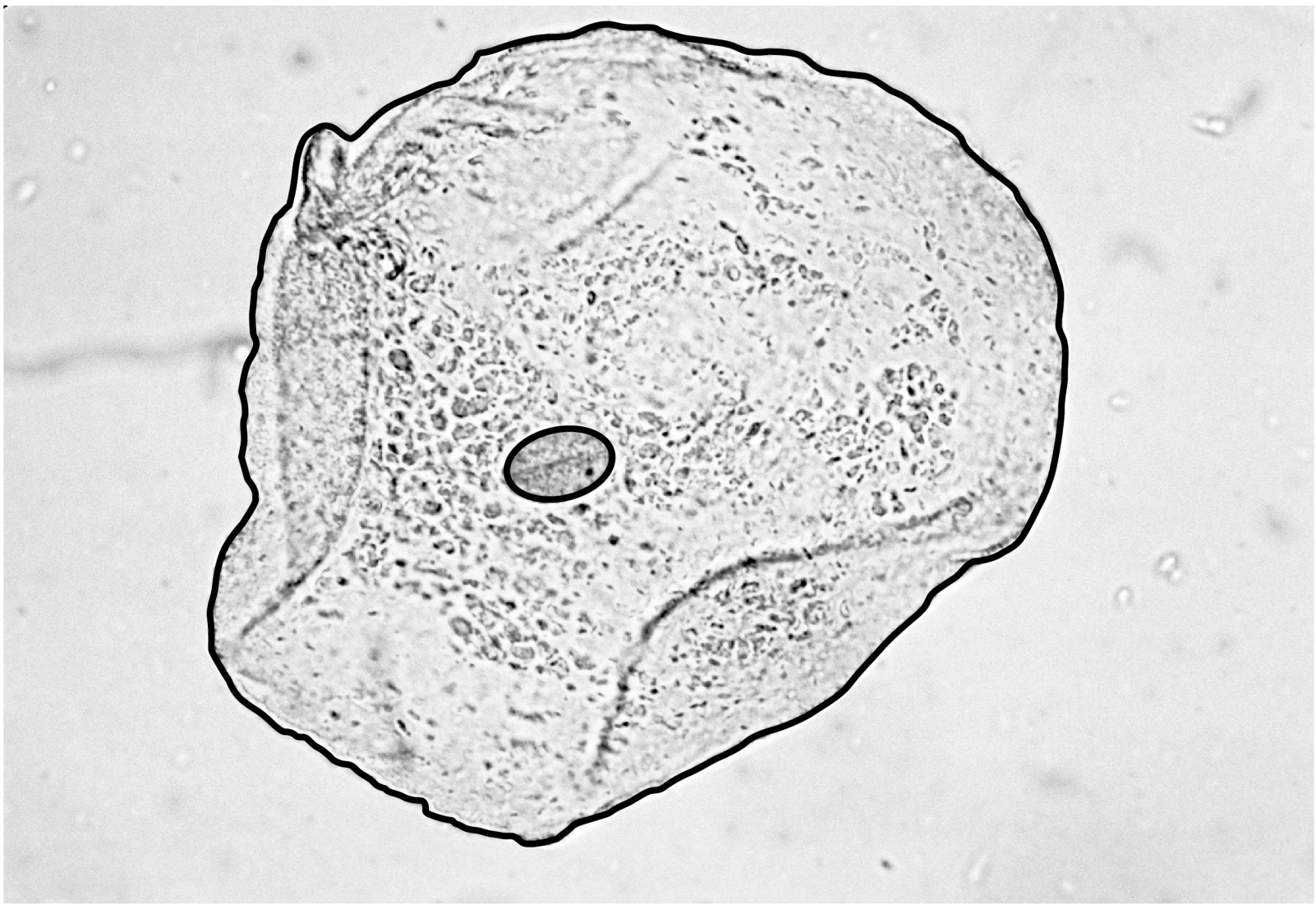
DO NOT TURN OVER UNTIL TOLD TO DO SO

Answer ALL questions in the spaces provided.

0 1

FIGURE 1 shows an animal cell viewed using a microscope.

FIGURE 1



0 1 . 1

The cell contains a nucleus.

What is the function of the nucleus?
[1 mark]

---

0 1 . 2

Name ONE type of cell that does NOT contain a nucleus. [1 mark]

[Turn over]

0 1 . 3

In the space below, draw a simple diagram of the cell in FIGURE 1, on page 4.

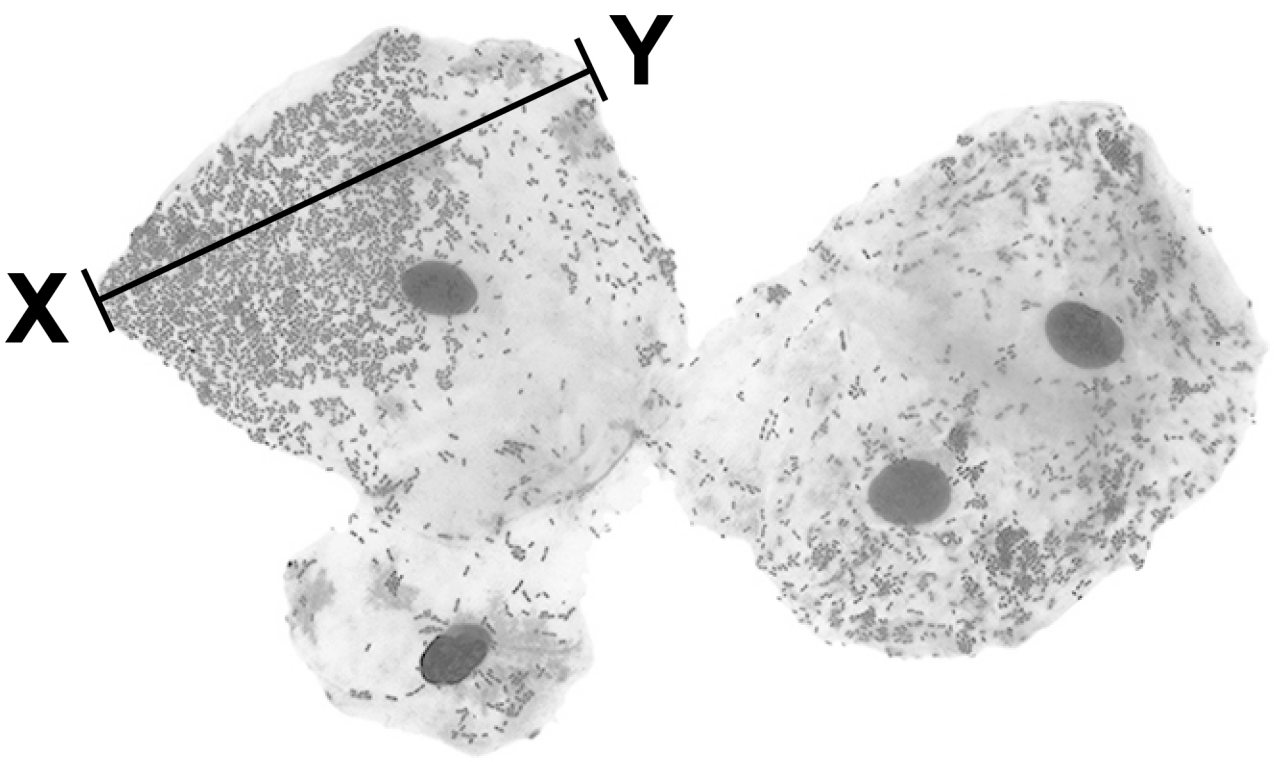
Label TWO parts of the cell. [2 marks]

0 1 . 4

Name ONE structure found in a plant cell but NOT found in an animal cell.
[1 mark]

FIGURE 2 shows some different cells.

FIGURE 2



0 1 . 5

The real length from point X to point Y is 0.06 mm

Take the image length from point X to point Y to be 24 mm

Calculate the magnification.

Use the equation:

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

[3 marks]

Magnification = × _____

[Turn over]

0 1 . 6

The cells shown in FIGURE 2, on page 8, were viewed using a light microscope.

Give TWO advantages of using an electron microscope instead of a light microscope. [2 marks]

1

2

10

0 2

Mosquitoes carry a pathogen that causes malaria.

0 2 . 1

What type of pathogen causes malaria?

[1 mark]

Tick (✓) ONE box.

- ☐ **A bacterium**
- ☐ **A fungus**
- ☐ **A protist**
- ☐ **A virus**

[Turn over]

Mosquito nets can help prevent the spread of malaria.

TABLE 1 shows the results of a study in one area of Africa.

TABLE 1

Total number of people in the study	Number of people who use mosquito nets when sleeping	Percentage of people with malaria	
		Who use mosquito nets when sleeping	Who do NOT use mosquito nets when sleeping
476	426	1.2	40

A newspaper made the following statement:

‘Study shows mosquito nets are scientifically proven to prevent malaria.’

0 2 . 2

Give ONE piece of evidence that supports the statement.

[1 mark]

_____

_____

_____

BLANK PAGE

0 2 . 3

Suggest ONE reason why the statement on page 13 may NOT be valid. [1 mark]

_____

_____

_____

[Turn over]

TABLE 2 shows information about the number of deaths from malaria in the same area of Africa.

TABLE 2

Year	Number of deaths from malaria per 100 000 people
2005	161
2007	136
2009	114
2011	97
2013	94
2015	92

0 2 . 4

Predict the number of people per 100 000 who died from malaria in 2017 if the trend stayed the same. [1 mark]

Number of people per 100 000 =

0 2 . 5

Use of mosquito nets has helped to reduce the number of deaths from malaria each year.

Suggest ONE other reason for the reduced number of deaths from malaria each year. [1 mark]

_____

_____

_____

0 2 . 6

Describe how the human body:

- **prevents pathogens from entering**
- **defends itself against pathogens inside the body.**

[6 marks]

20

11

[Turn over]

0 3

This question is about photosynthesis.

0 3 . 1

Complete the word equation for photosynthesis: [2 marks]

_____ + _____ → _____ + oxygen

BLANK PAGE

[Turn over]

A student investigated photosynthesis using pondweed.

FIGURE 3, on the opposite page, shows the apparatus the student used.

This is the method used.

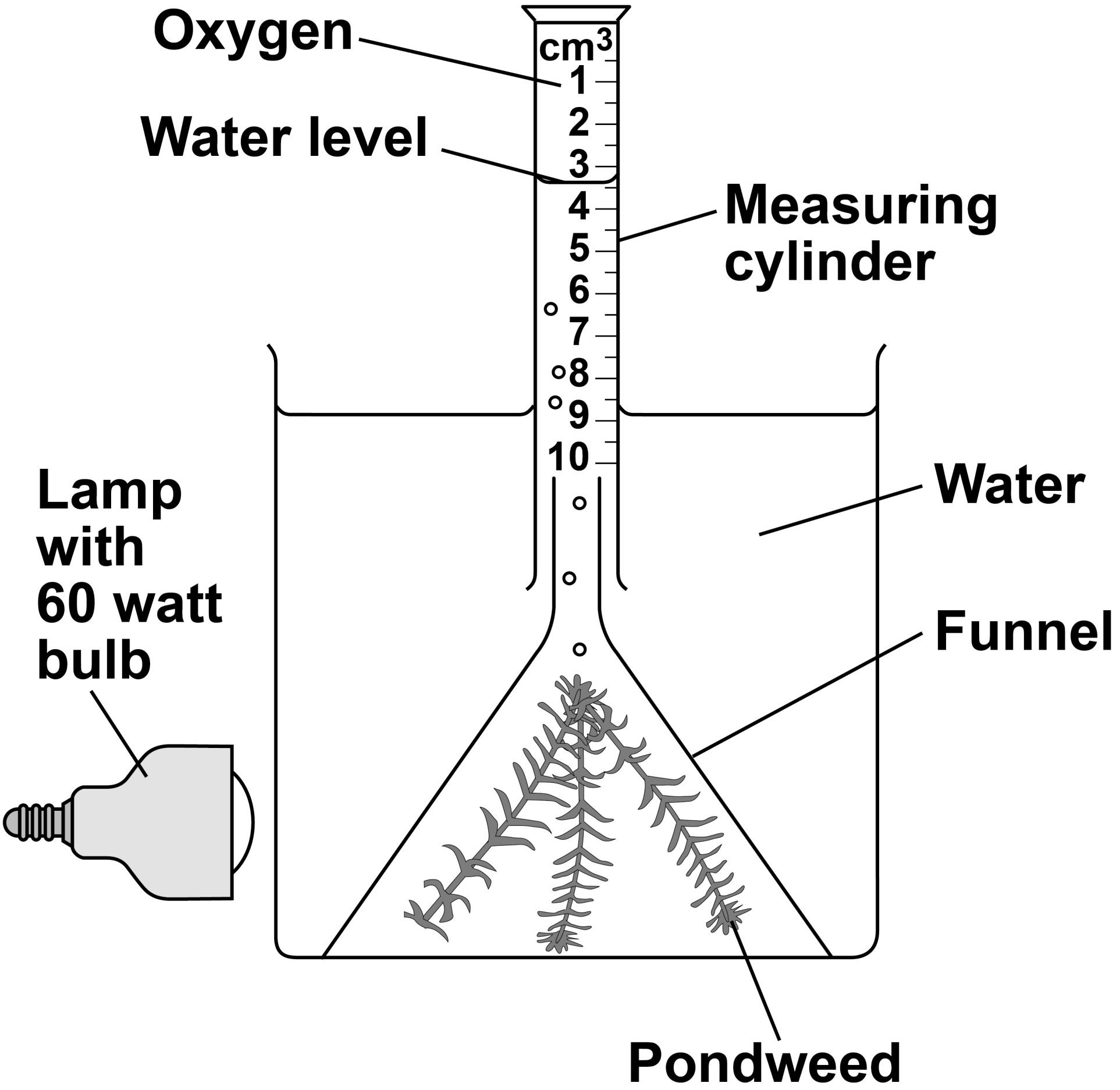
1. **Set up the apparatus as shown in FIGURE 3.**

2. **Switch on the lamp.**

3. **After 20 minutes, record the volume of oxygen collected in the measuring cylinder.**

4. **Repeat steps 1–3 using bulbs of different power output.**

FIGURE 3



[Turn over]

0 3 . 2

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

Tick (✓) ONE box.

- ☐ **Power output of bulb**
- ☐ **Rate of photosynthesis**
- ☐ **Time to collect oxygen**
- ☐ **Volume of oxygen collected**

0 3 . 3

Suggest TWO ways the method could be improved so the results would be more valid. [2 marks]

1 _____

_____

2 _____

_____

_____

TABLE 3 shows the student's results.

TABLE 3

Power output of bulb in watts	Volume of oxygen collected in 20 minutes in cm^3	Rate of photosynthesis in cm^3/hour
60	0.5	1.5
100	0.8	2.4
150	1.1	X
200	1.2	3.6
250	1.2	3.6

0 3 . 4

Calculate value X in TABLE 3, on page 28. [1 mark]

X = _____ cm^3/hour

[Turn over]

0 3 . 5

Complete FIGURE 4, on the opposite page. [4 marks]

You should:

- **label the x-axis**
- **use a suitable scale**
- **plot the data from TABLE 3, on page 28, and your answer to Question 03.4, on page 29.**
- **draw a line of best fit.**

0 3 . 6

Determine the expected rate of photosynthesis with a bulb of power output 75 watts.

Use FIGURE 4. [1 mark]

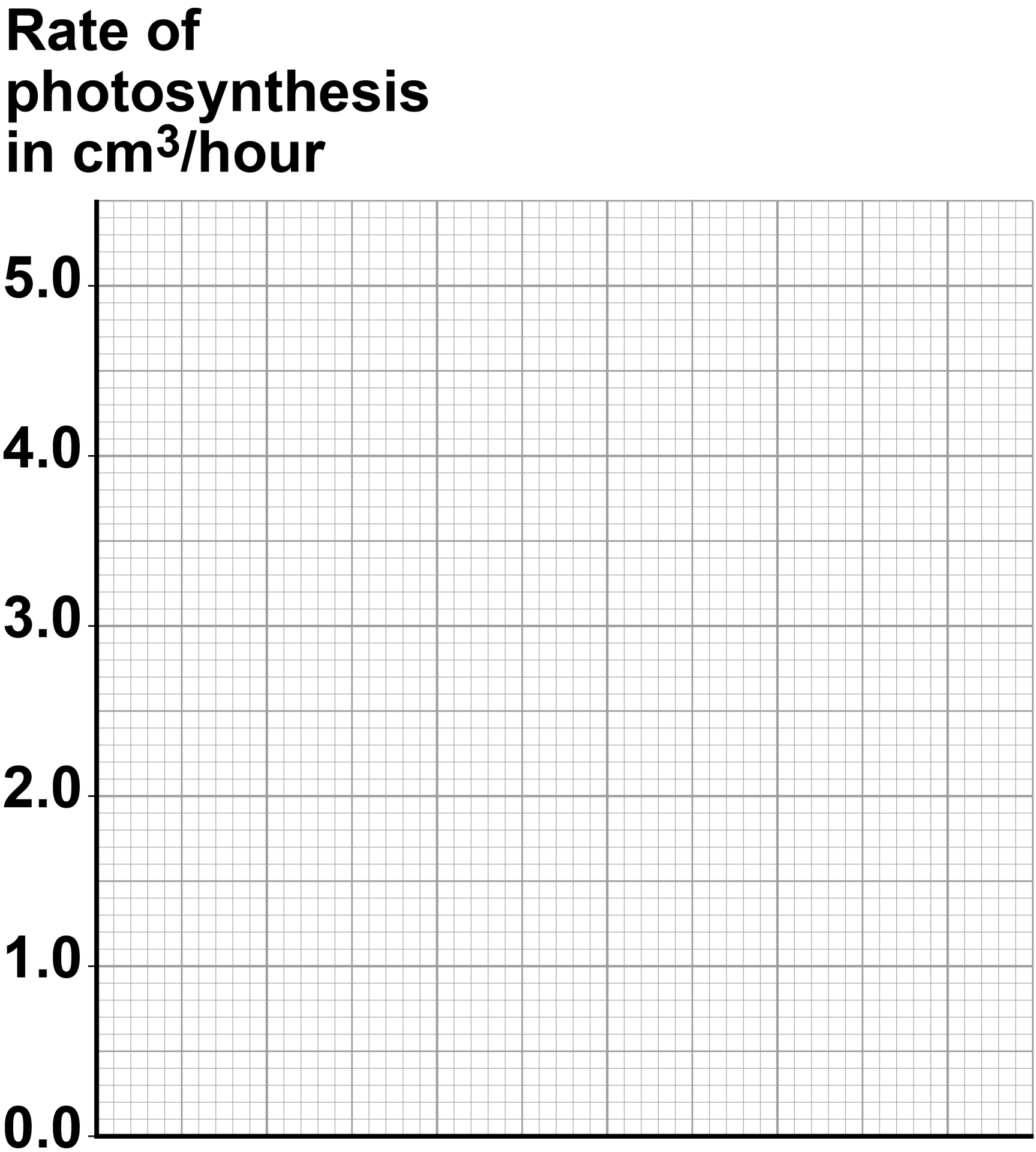
_____

_____

Rate of photosynthesis at 75 watts =

_____ cm^3/hour

FIGURE 4



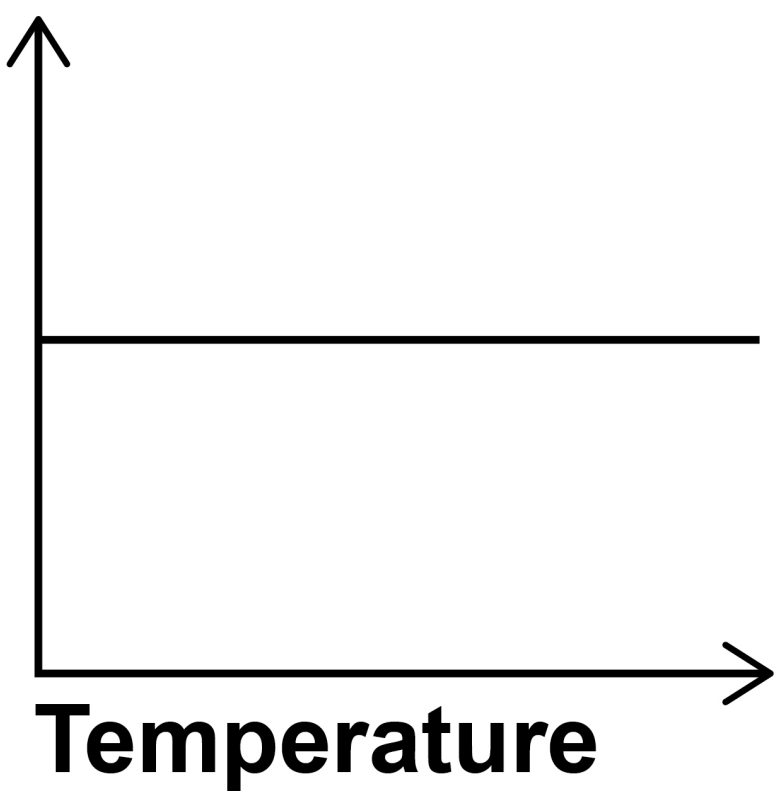
[Turn over]

0 3 . 7

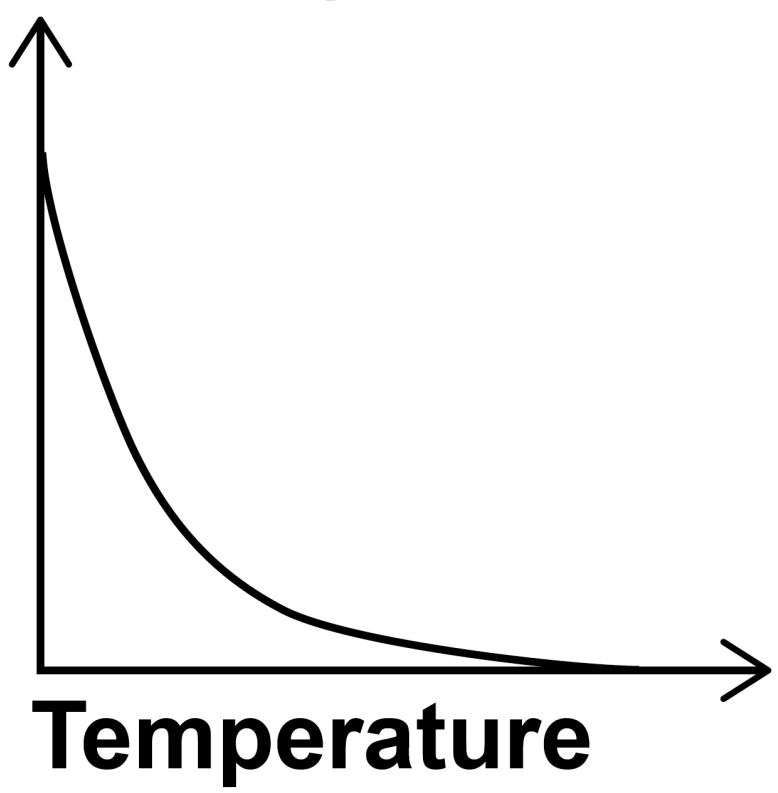
Which graph shows the effect of temperature on the rate of photosynthesis? [1 mark]

Tick (✓) ONE box.

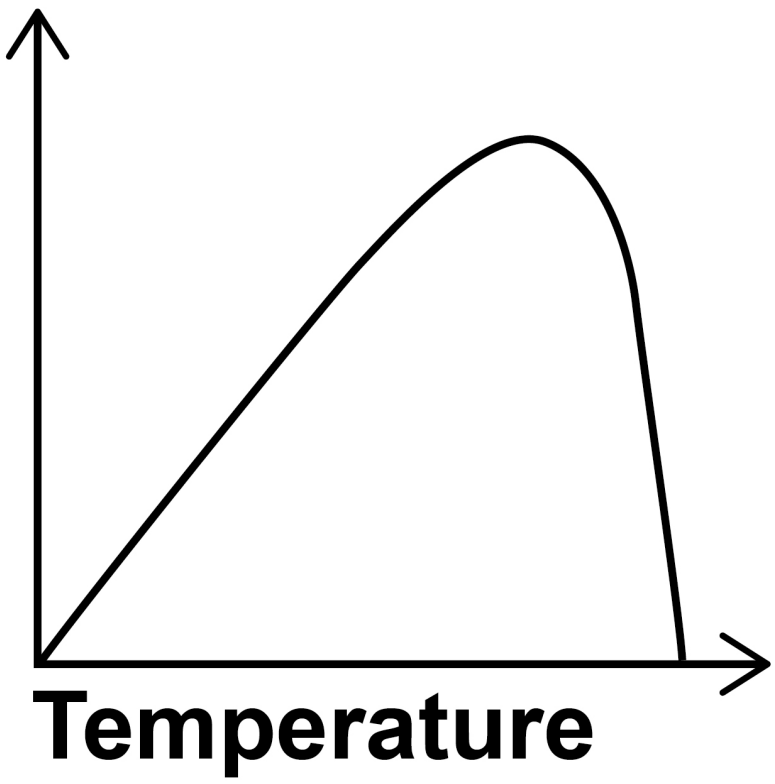
☐ **Rate of photosynthesis**



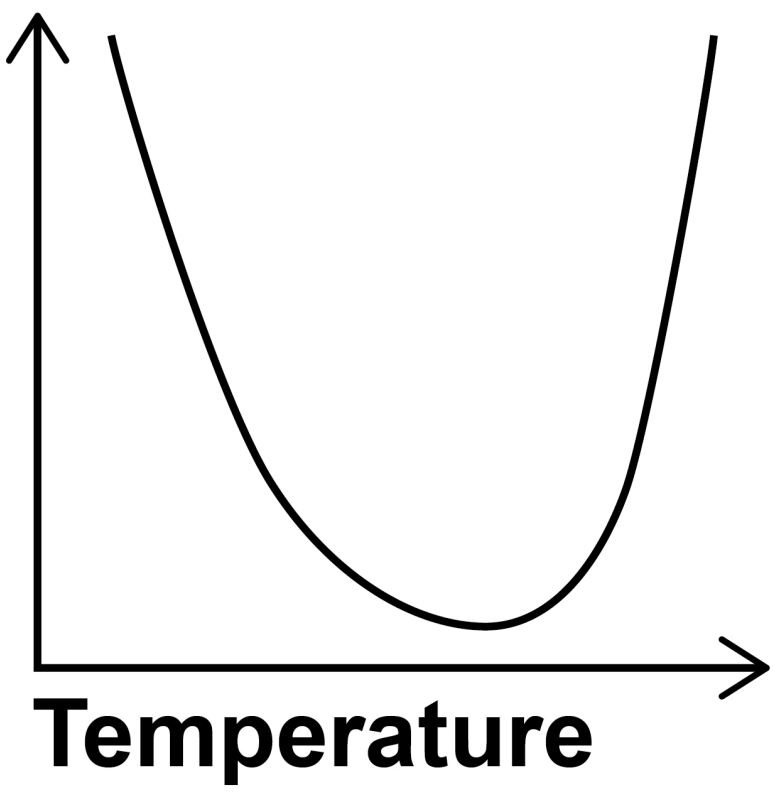
☐ **Rate of photosynthesis**



☐ Rate of photosynthesis



☐ Rate of photosynthesis



[Turn over]

12

0 4

Water moves from a plant to the atmosphere through the leaves.

0 4 . 1

How is the volume of water lost from the leaves controlled? [1 mark]

0 4 . 2

Describe the transport of water through a plant from the roots to the atmosphere. [3 marks]

A student investigated the volume of water lost from two plants of different species.

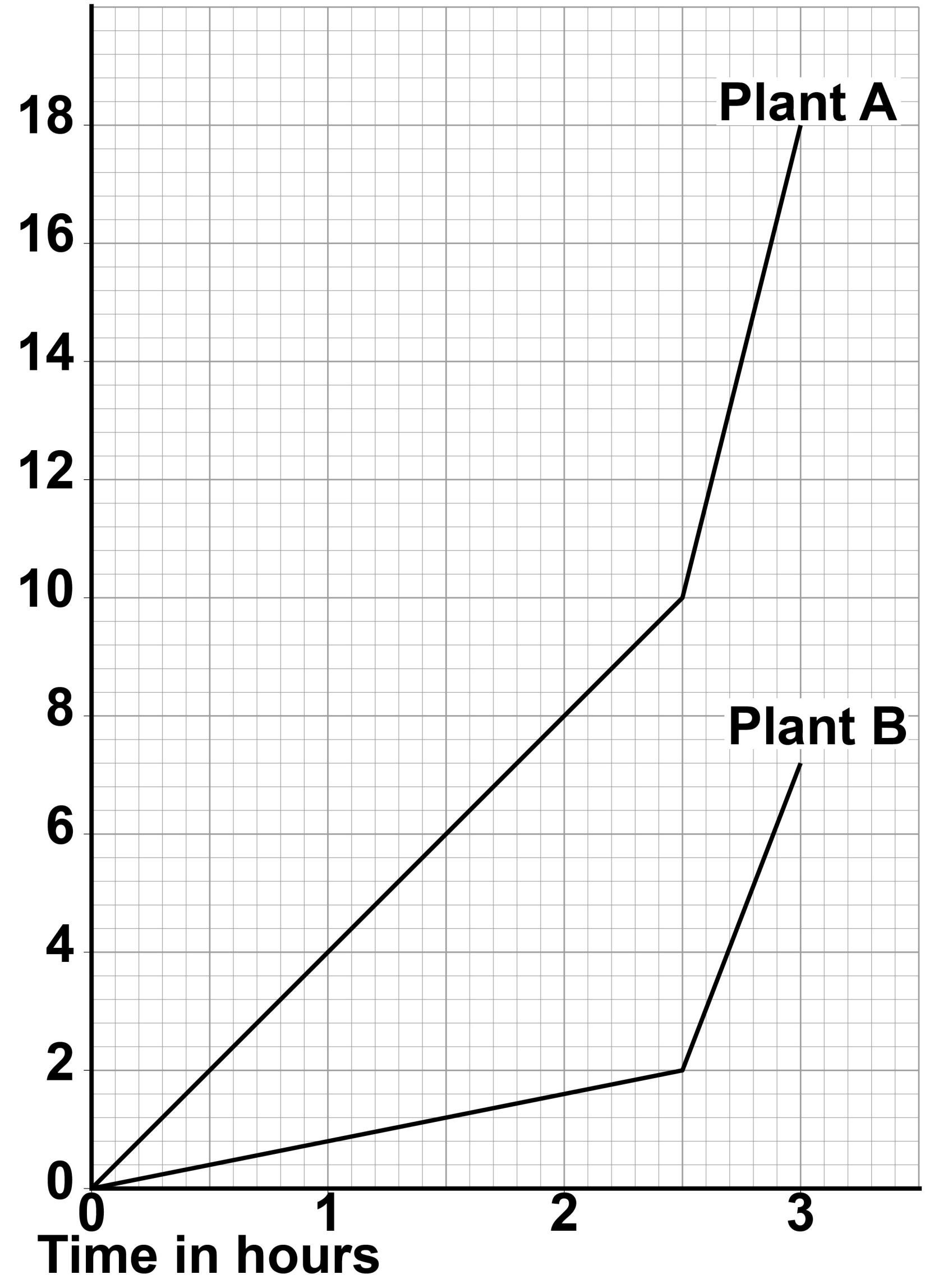
Both plants were kept together.

FIGURE 5, on the opposite page, shows the student's results.

0 4 . 3

Suggest ONE reason for the difference in the rate of water loss from the two plants in the first 2.5 hours. [1 mark]

FIGURE 5



[Turn over]

Both plants were moved to a different place at 2.5 hours.

0	4	.	4

Calculate the rate of water loss per hour in plant B from 2.5 hours to 3 hours.

Give your answer to 2 significant figures.
[3 marks]

Rate of water loss = _____ cm^3/hour

0 4 . 5

Suggest TWO reasons why the rate of water loss in both plants changed after 2.5 hours. [2 marks]

1 _____

_____

2 _____

_____

_____

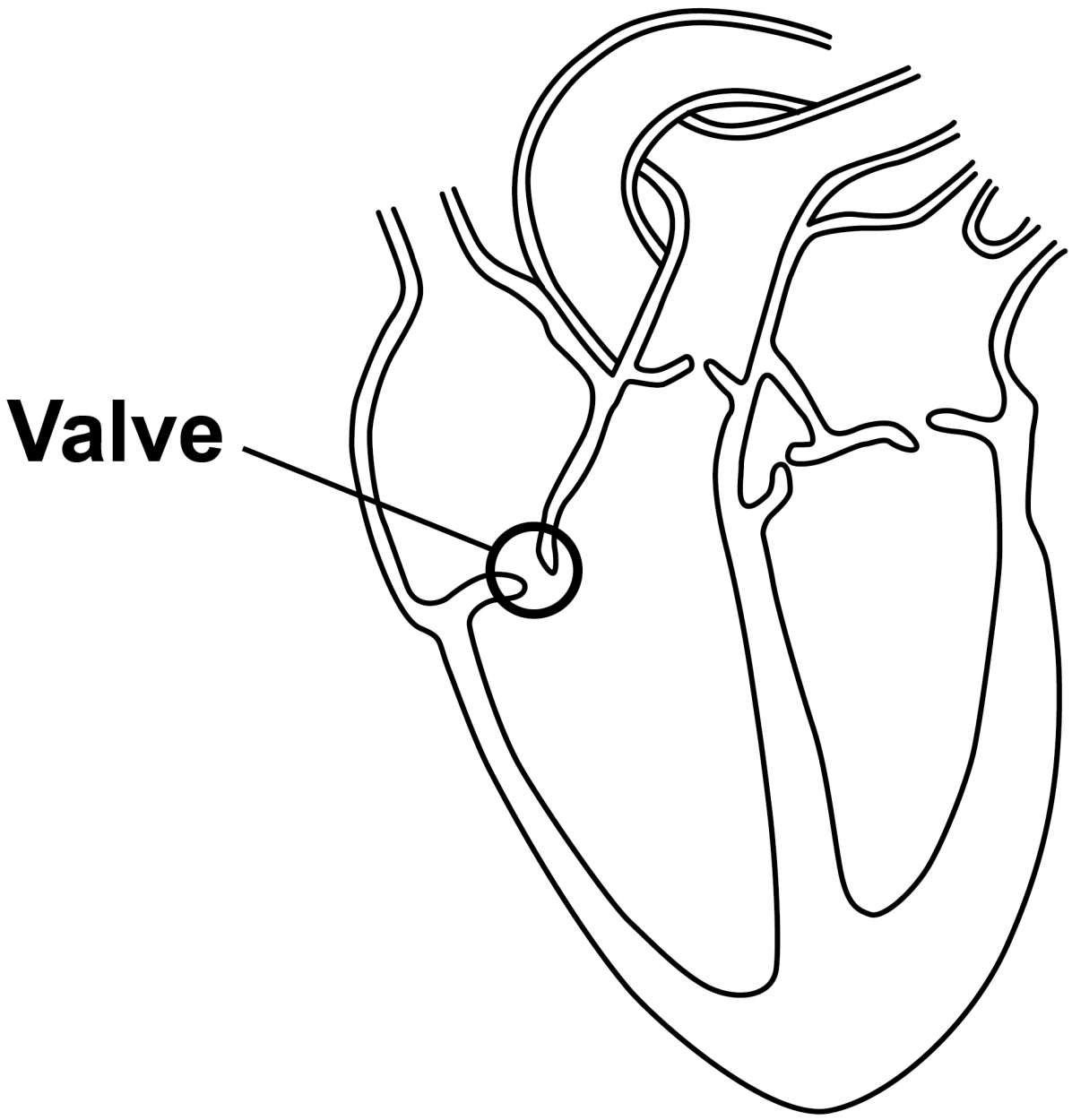
10

0 5

FIGURE 6 shows the internal structure of the human heart.

One of the heart valves is labelled.

FIGURE 6



Sometimes a valve in the heart can start to leak.

0 5 . 1

Explain why a person with a leaking heart valve has difficulty exercising. [4 marks]

A patient with a leaking heart valve may have the valve replaced.

A study compared two different types of replacement heart valve:

- mechanical valves
- biological valves from pigs.

The data used in the study was collected from female patients aged 50–69.

TABLE 4, on pages 44 and 45, shows the data.

[Turn over]

TABLE 4

	Type of replacement heart valve	
	Mechanical	Biological
Number of patients given the valve	2852	1754
Number of patients who died from heart-related problems after valve replacement	180	178
Percentage of patients alive after 5 years	91	89
Percentage of patients needing a second valve replacement within 6 years	2.2	5.2

Percentage of patients who had a blood clot on the brain after surgery	5.8	0.1

0 5 . 2

Give ONE conclusion about the death of patients from heart-related problems after a valve replacement.

Include calculations to support your answer. [3 marks]

0 5 . 3

One risk of mechanical valves is that blood clots can form on the surface of the valve.

Name the component of the blood that starts the process of blood clotting.
[1 mark]

0 5 . 4

Evaluate the use of mechanical replacement heart valves and biological replacement heart valves.

Use information from TABLE 4, on pages 44 and 45, and your own knowledge. [6 marks]

14

[Turn over]

0 6

People with diabetes have difficulty controlling their blood glucose concentration.

0 6 . 1

Which part of the blood transports glucose? [1 mark]

Tick (✓) ONE box.

- ☐ **Lymphocytes**
- ☐ **Plasma**
- ☐ **Platelets**
- ☐ **Red blood cells**

Glucose is often found in the urine of people with diabetes.

0 6 . 2

Name a chemical used to test for glucose. [1 mark]

0 6 . 3

Describe a test that could be used to show that a person's urine contains glucose. [2 marks]

Test _____

_____

Positive result _____

_____

_____

0 6 . 4

The body cells of a person with untreated diabetes lose more water than the body cells of a person who does NOT have diabetes.

Explain how diabetes can cause the body cells to lose more water. [3 marks]

[Turn over]

0 6 . 5

Glucose is absorbed into the blood in the small intestine by both diffusion and active transport.

Describe how the small intestine is adapted for efficient absorption.

[5 marks]

[Turn over]

0 7

A small animal called an axolotl lives in water. The axolotl has a double circulatory system.

0 7 . 1

Define the term double circulatory system. [1 mark]

0 7 . 2

The heart of the axolotl has only one ventricle.

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

FIGURE 7 shows the double circulatory system of the axolotl.

FIGURE 7

The following figure cannot be reproduced here due to third-party copyright restrictions.

[Turn over]

0 7 . 3

Explain why having only one ventricle makes the circulatory system less efficient than having two ventricles.
[2 marks]

FIGURE 8 shows an axolotl.

FIGURE 8

0 7 . 4

Explain why an axolotl may die in water with a low concentration of oxygen.
[4 marks]

If a gill of an axolotl is removed, a new gill will grow in its place.

Scientists hope to use information on how axolotls grow new gills to help with regenerating human tissue.

0 7 . 5

Name the type of cell that divides when a new gill grows. [1 mark]

0 7 . 6

Name ONE condition that could be treated using regenerated human tissue. [1 mark]

0 7 . 7

Suggest ONE reason why an axolotl is a suitable animal for research in the laboratory. [1 mark]

[Turn over]

0 7 . 8

An axolotl may NOT be a suitable animal to study when researching regeneration in human tissue.

Suggest ONE reason why. [1 mark]

12

0 8

Pancreatic cancer develops when a malignant tumour grows inside the pancreas.

0 8 . 1

The pancreas produces digestive enzymes.

What is an enzyme? [2 marks]

0 8 . 2

Carbohydrase is an enzyme produced by the pancreas.

Name TWO other organs in the digestive system that produce carbohydrase.
[2 marks]

1 _____

2 _____

0 8 . 3

One symptom of pancreatic cancer is weight loss.

Explain how pancreatic cancer may cause a person to lose weight.

Do NOT refer to hormones in your answer. [4 marks]

_____

_____

[Turn over]

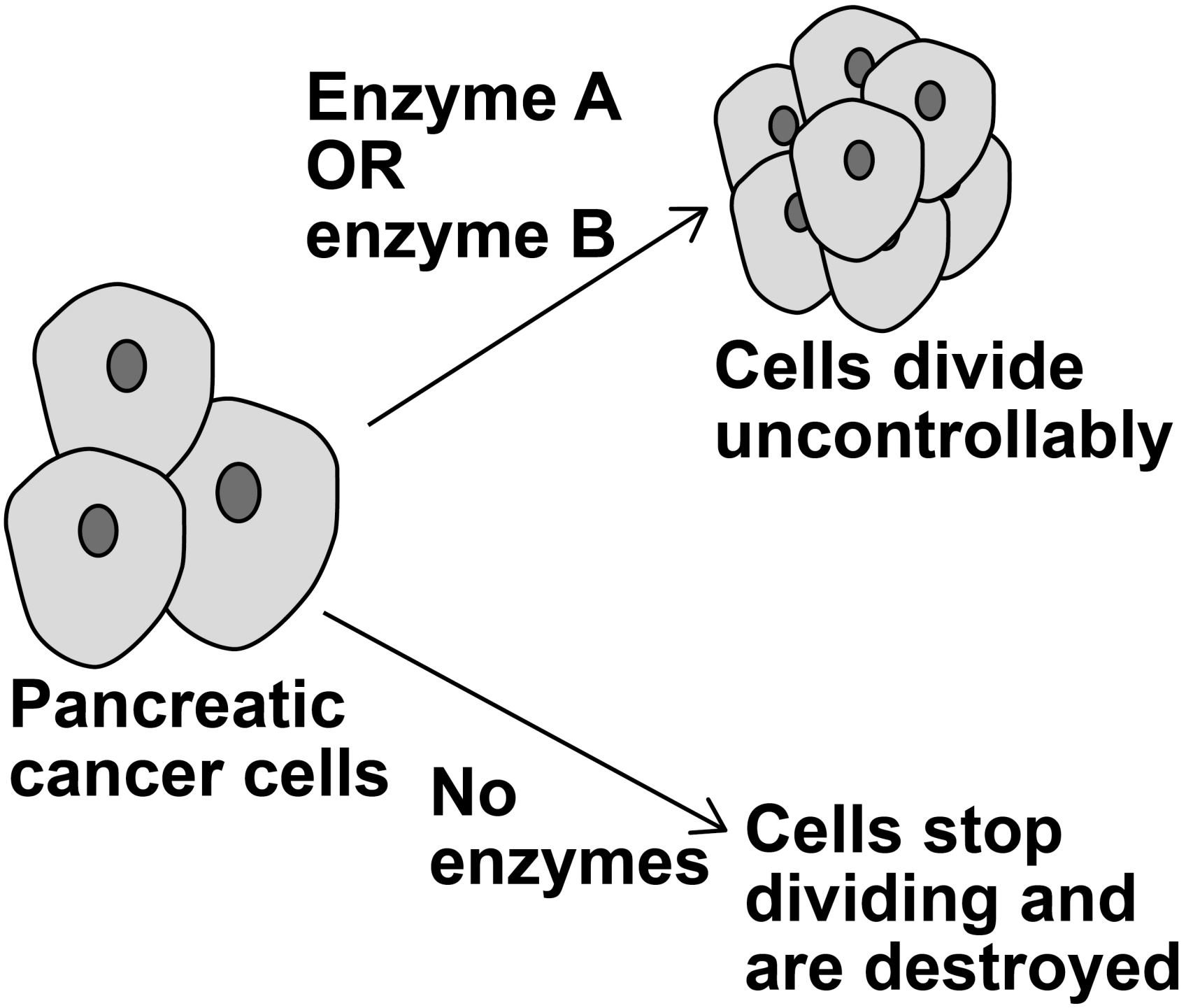
Enzyme A and enzyme B are involved in controlling cell division in pancreatic cancer cells.

Most cancer cells produce both enzyme A and enzyme B.

Some people have a gene mutation that stops cancer cells producing enzyme B.

FIGURE 9, on the opposite page, shows how cell division is controlled in pancreatic cancer cells.

FIGURE 9



Scientists have developed a drug that inhibits enzyme A.

The drug is given to pancreatic cancer patients who have the gene mutation that stops cancer cells producing enzyme B.

The drug only targets cancer cells.

[Turn over]

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0 8 . 4

Explain why the drug can be used to treat pancreatic cancer in patients with the gene mutation.

Use information from FIGURE 9, on page 67. [3 marks]

[Turn over]

0 8 . 5

Explain why the drug could NOT be used to treat pancreatic cancer in a patient that produces both enzyme A and enzyme B.
[2 marks]

0 8 . 6

The drug was trialled before it was licensed for use.

To improve validity of the results in the trial:

- **some patients were given a placebo**
- **a double-blind trial was used.**

Give reasons why a placebo and a double-blind trial were used. [2 marks]

A placebo ______________________________

____

____

A double-blind trial ______________________

____

____

____

____

0 8 . 7

One stage in a drug trial is to test the drug on healthy volunteers.

What is the next stage in the drug trial? [1 mark]

Tick (✓) ONE box.

☐ **Testing on all patients with the disease**

☐ **Testing on human tissue**

☐ **Testing on live animals**

☐ **Testing on volunteers with the disease**

0 8 . 8

A monoclonal antibody has been produced to treat pancreatic cancer.

Explain how the monoclonal antibody works to treat pancreatic cancer.

[3 marks]

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END OF QUESTIONS

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For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	