



Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

I declare this is my own work.

GCSE

COMBINED SCIENCE: TRILOGY

Foundation Tier

Biology Paper 1F

8464/B/1F

F

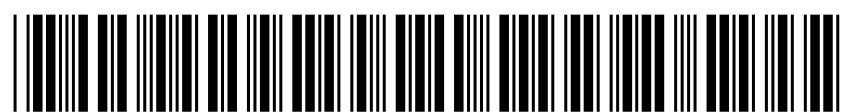
Tuesday 12 May 2020

Afternoon

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 0 8 4 6 4 B 1 F 0 1

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.**
- **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
---	---

Being overweight can affect the health and life expectancy of a person.

0	1	.	1
---	---	---	---

**What is ONE lifestyle change a person could make to help them lose body mass?
[1 mark]**

Tick (✓) ONE box.

Drink more alcohol

Eat less fatty food

Stop smoking



01.2

Exercise has many health benefits.

Give TWO health benefits of regular exercise.

Do NOT refer to losing body mass in your answer. [2 marks]

1 _____

2 _____

[Turn over]



During exercise, breathing rate increases to provide more oxygen for aerobic respiration.

0 1 . 3

What is the equation for aerobic respiration? [1 mark]

Tick (✓) ONE box.

**carbon dioxide + water →
glucose + oxygen**

**glucose + oxygen →
carbon dioxide + water**

**oxygen + water →
glucose + carbon dioxide**



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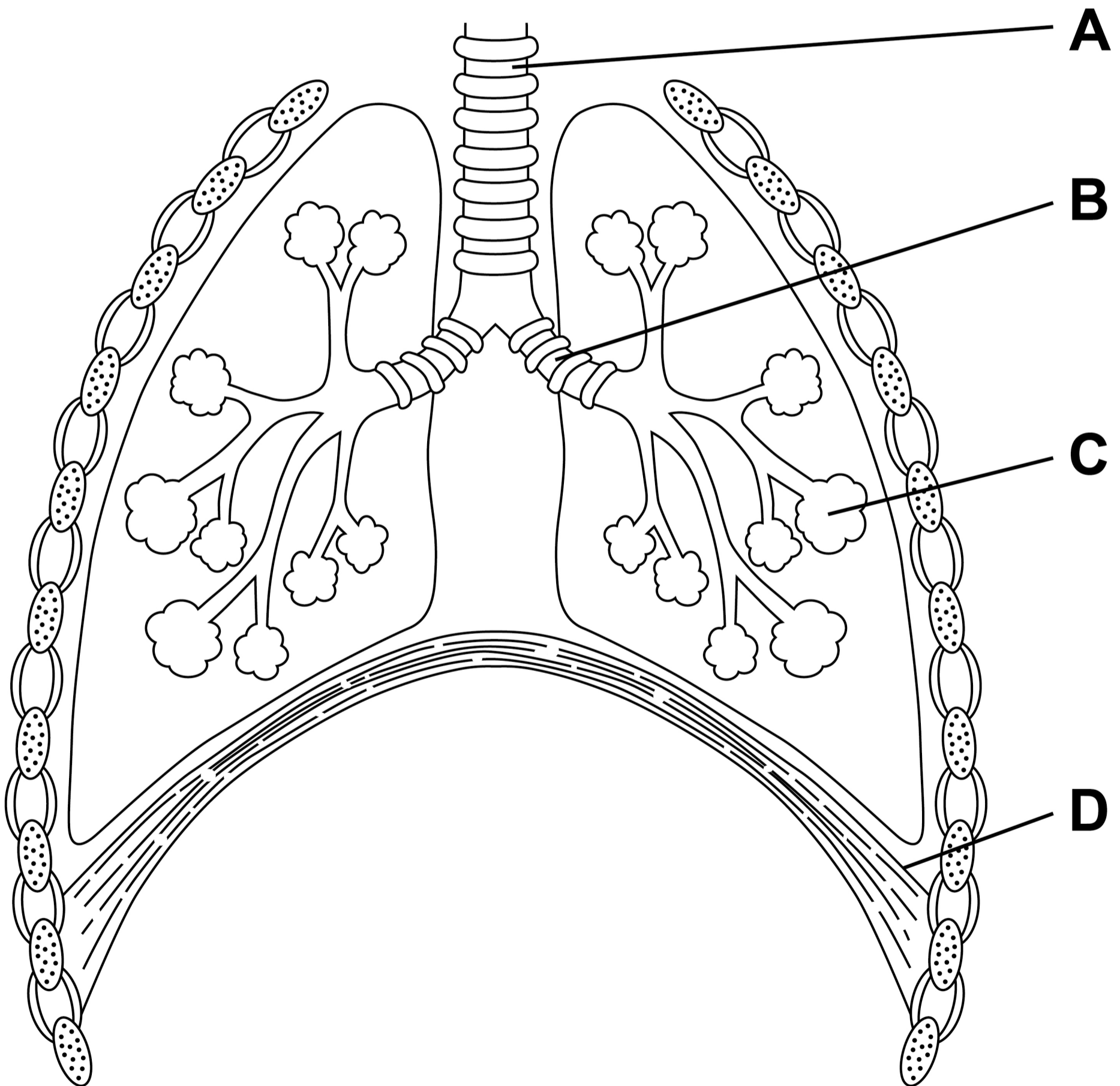
[Turn over]



01.4

FIGURE 1 shows the human breathing system.

FIGURE 1



Where does gas exchange take place?
[1 mark]

Tick (✓) ONE box.

A

B

C

D

[Turn over]



A scientist investigated the effect of exercise on the breathing rate of four people.

This is the method used.

- 1. Measure the resting breathing rate.**
- 2. Exercise for 10 minutes.**
- 3. Measure the breathing rate as soon as exercise stops.**
- 4. Record the time taken for the breathing rate to return to the resting rate.**

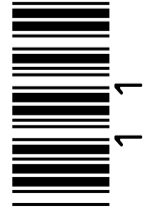
10

TABLE 1, on the opposite page, shows the results.



TABLE 1

Person	Resting breathing rate in breaths per minute	Breathing rate after exercise in breaths per minute	Increase in breathing rate in breaths per minute	Time for breathing rate to return to resting rate in minutes
A	12	45	33	5.5
B	10	28	18	4.0
C	11	35	24	6.5
D	13	52	39	10.0

[Turn over]

REPEAT OF TABLE 1

Person	Resting breathing rate in breaths per minute	Breathing rate after exercise in breaths per minute	Increase in breathing rate in breaths per minute	Time for breathing rate to return to resting rate in minutes
A	12	45	33	5.5
B	10	28	18	4.0
C	11	35	24	6.5
D	13	52	39	10.0



0 1 . 5

The scientist concluded that person B was the fittest.

Give TWO reasons that support the scientist's conclusion.

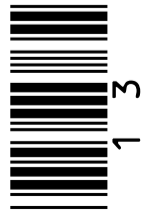
Use TABLE 1 on page 12. [2 marks]

1

13

2

[Turn over]



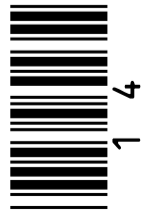
0 1 . 6

Suggest TWO reasons why the scientist's conclusion may NOT be valid. [2 marks]

1

2

14



01.7

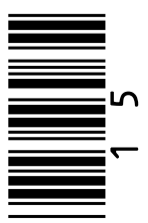
Give TWO changes that happen in the body during aerobic exercise.

**Do NOT refer to increased breathing rate in your answer.
[2 marks]**

- 1** _____
- _____
- _____
- 2** _____
- _____
- _____

15

[Turn over]



0	1	.	8
---	---	---	---

Muscles respire anaerobically during vigorous exercise.

Complete the sentences on the opposite page.

Choose answers from the list. [2 marks]

- **amino acids**
- **carbon dioxide**
- **glucose**
- **lactic acid**
- **oxygen**



Muscles respire anaerobically if they do not have enough _____ .

Anaerobic respiration of glucose produces _____ .

[Turn over]

13



0 2

New drugs are tested before they can be licensed for use with patients.

FIGURE 2, on the opposite page, shows how much time the different stages of testing took for one new drug.

0 2 . 1

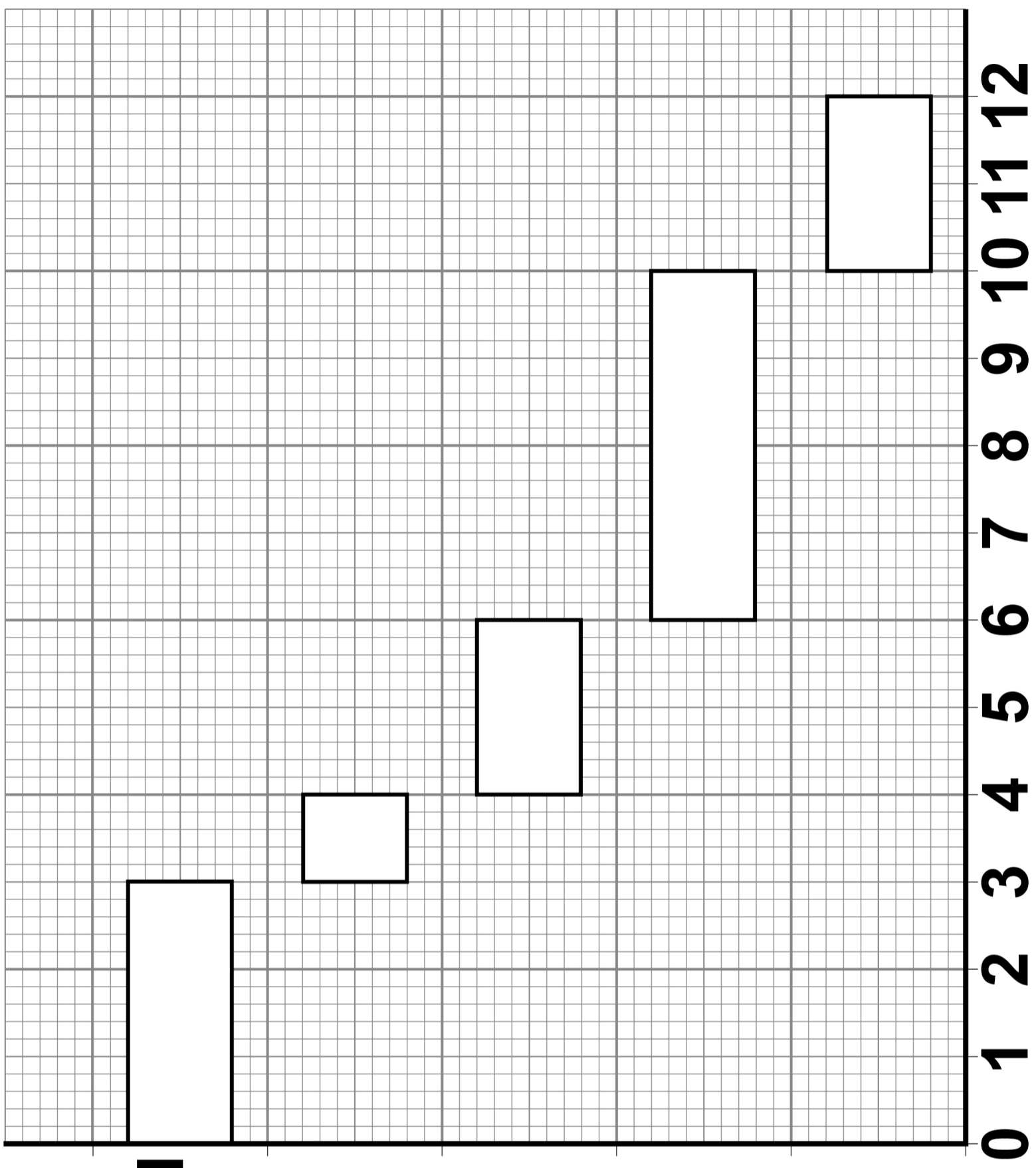
Preclinical testing is done in a laboratory.

What is the drug tested on in a laboratory?

Give ONE example. [1 mark]



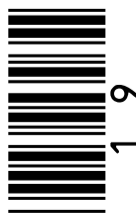
FIGURE 2



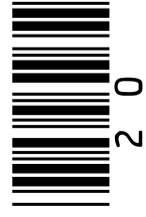
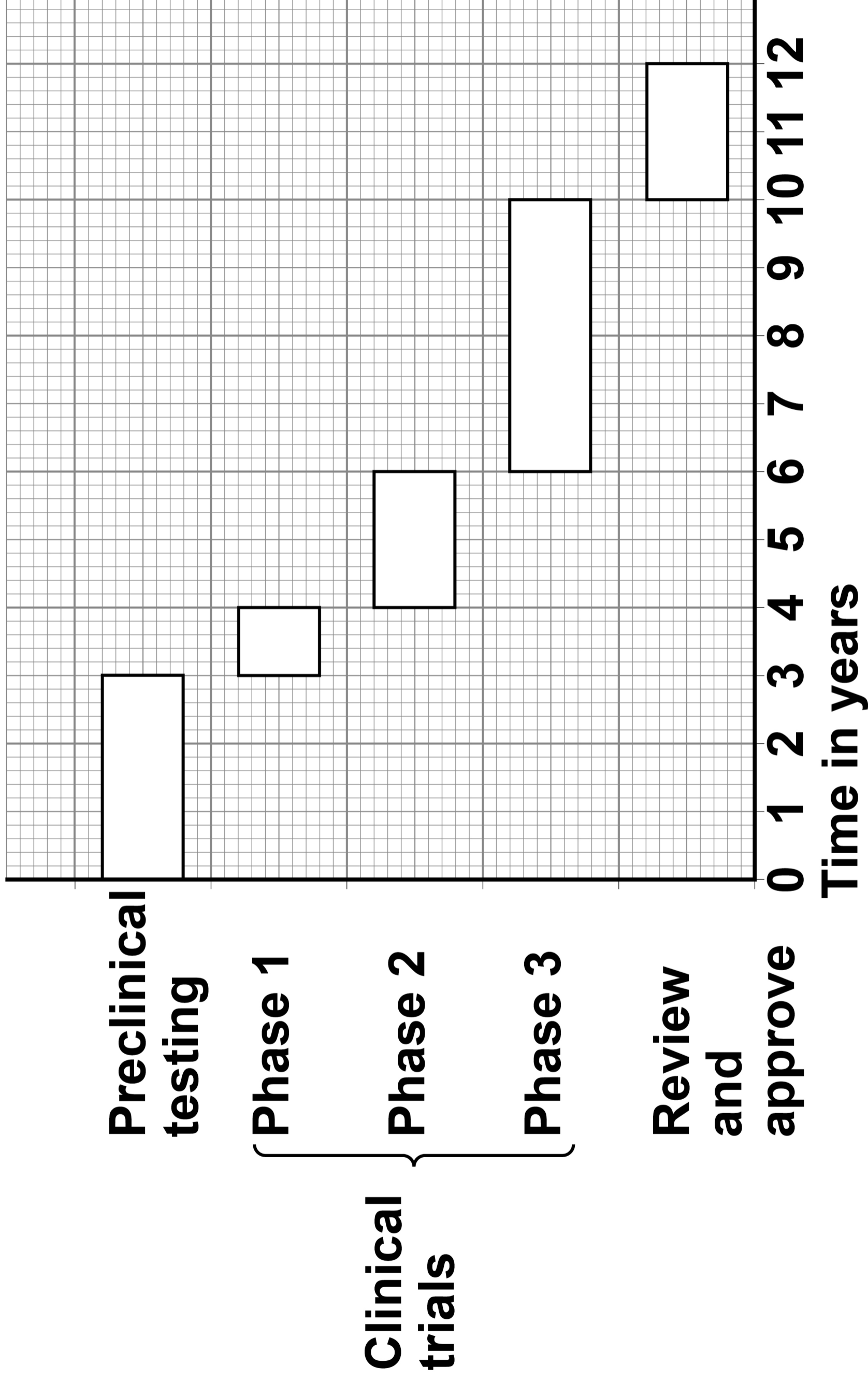
Clinical trials

{ Phase 1
Phase 2
Phase 3 }

[Turn over]



REPEAT OF FIGURE 2



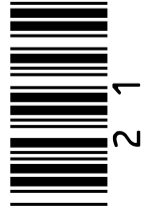
02.2

**How many years did the clinical trials take for the drug in
FIGURE 2 on the opposite page? [1 mark]**

Time for clinical trials = _____ years

21

[Turn over]



0	2	.	3
---	---	---	---

During Phase 1 clinical trials, the drug is tested on HEALTHY volunteers using LOW doses.

What is the main purpose of Phase 1 testing? [1 mark]

Tick (✓) ONE box.

To find the best dose to use.

To see if the drug is safe to use.

To see if the drug works.



During clinical trials, half of the patients are given a placebo in a double blind trial.

0 2 . 4

What is a placebo? [1 mark]

[Turn over]



0 2 . 5

Who knows which patients are given the placebo and which patients are given the drug in a double blind trial? [1 mark]

Tick (✓) ONE box.

Not the patients or the doctors

The patients and the doctors

The patients but not the doctors



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[Turn over]



Paracetamol and ibuprofen are two medicines used to reduce a high body temperature.

Doctors investigated which medicine was more effective at reducing high body temperature in 200 children who were ill.

The children were put into two groups, which were matched for:

- **age**
- **gender**
- **body mass.**

Each group had 100 children.

This is the method used.

- 1. Measure the body temperature of each child before any medicine is given.**
- 2. Give children in Group 1 paracetamol.**
- 3. Give children in Group 2 ibuprofen.**



4. Measure the body temperature of each child every hour after the medicine is given.

0 2 . 6

Give TWO control variables in this investigation. [2 marks]

1 _____

2 _____

0 2 . 7

None of the children was given a placebo.

Suggest ONE reason why. [1 mark]

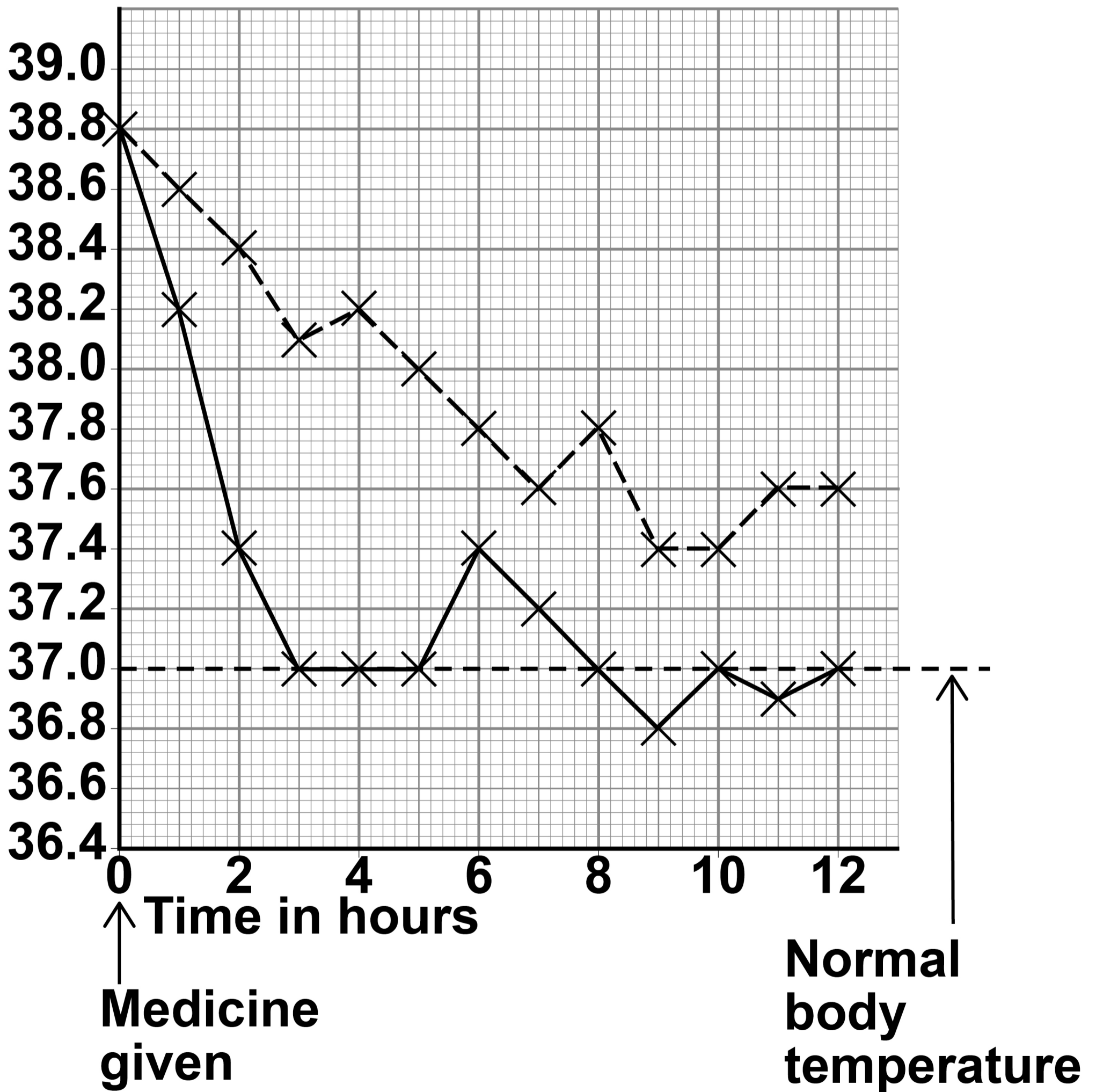
[Turn over]



FIGURE 3 shows the results.

FIGURE 3

Mean body temperature
in °C



KEY**--- Paracetamol****— Ibuprofen****0 2 . 8**

What was the mean body temperature after 6 hours for the children given ibuprofen? [1 mark]

Mean body temperature = _____ °C

[Turn over]



BLANK PAGE



02.9

The doctors concluded that children with a high body temperature should be given ibuprofen and not paracetamol.

Give TWO reasons for the doctors' conclusion.

Use FIGURE 3 on page 28. [2 marks]

1 _____

2 _____

[Turn over]

11



0	3
---	---

Water is lost from the leaves of plants through pores called stomata.

0	3	.	1
---	---	---	---

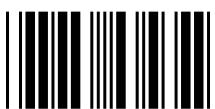
What is the loss of water from a leaf called? [1 mark]

Tick (✓) ONE box.

Osmosis

Respiration

Transpiration



0	3	.	2
---	---	---	---

Which cells control the size of stomata?
[1 mark]

Tick (✓) ONE box.

Guard cells

Phloem cells

Xylem cells

[Turn over]



A student investigated the water loss when different surfaces of leaves were covered in grease.

The grease blocks the stomata.

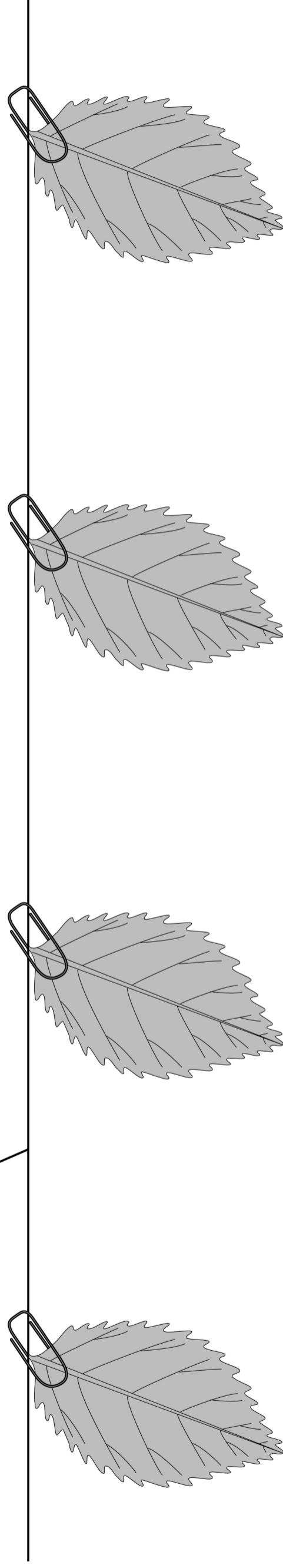
This is the method used.

- 1. Remove four similar leaves from one plant.**
- 2. Put grease on different surfaces of the leaves as shown in FIGURE 4, on the opposite page.**
- 3. Record the mass of each leaf and attach the four leaves to a string.**
- 4. After 24 hours record the mass of each leaf again.**



FIGURE 4

String



LEAF A
(upper and lower
surfaces covered
with grease)

LEAF B
(upper surface
covered with
grease)

LEAF C
(lower surface
covered with
grease)

LEAF D
(no grease)

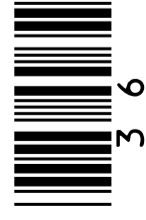
[Turn over]



TABLE 2 shows the results.

TABLE 2

Leaf	Surfaces covered with grease	Mass of leaf at start in grams	Mass of leaf after 24 hours in grams	Loss in mass after 24 hours in grams
A	Upper and lower	2.01	1.97	X
B	Only upper	2.00	1.87	0.13
C	Only lower	2.01	1.96	0.05
D	None	1.98	1.83	0.15



0 3 . 3

Calculate value X in TABLE 2, on the opposite page.
[1 mark]

Value X = _____ 9

37

[Turn over]



REPEAT OF TABLE 2

Leaf	Surfaces covered with grease	Mass of leaf at start in grams	Mass of leaf after 24 hours in grams	Loss in mass after 24 hours in grams
A	Upper and lower	2.01	1.97	X
B	Only upper	2.00	1.87	0.13
C	Only lower	2.01	1.96	0.05
D	None	1.98	1.83	0.15



03.4

The loss in mass of water was measured after 24 hours.

Calculate the mass of water lost in grams per hour for leaf D. [2 marks]

39

Mass of water lost per hour = _____ g

[Turn over]



REPEAT OF TABLE 2

Leaf	Surfaces covered with grease	Mass of leaf at start in grams	Mass of leaf after 24 hours in grams	Loss in mass after 24 hours in grams
A	Upper and lower	2.01	1.97	X
B	Only upper	2.00	1.87	0.13
C	Only lower	2.01	1.96	0.05
D	None	1.98	1.83	0.15



The student concluded:

‘More water is lost from the lower surface of a leaf than from the upper surface.’

0 3 . 5

What evidence is there in TABLE 2, on the opposite page, to support the student’s conclusion? [1 mark]

41

[Turn over]



03.6

What do the results in TABLE 2 show about the number of stomata on the surfaces of a leaf? [1 mark]

Tick (✓) ONE box.

There are more stomata on the lower surface.

There are more stomata on the upper surface.

There are the same number of stomata on both surfaces.



03.7

The investigation was done at 20 °C

How would the mass of water lost be different if the investigation was done at 25 °C?

Give a reason for your answer. [2 marks]

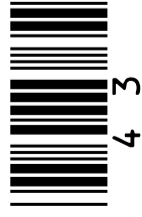
43

Difference

Reason

9

[Turn over]



4 3

0	4
---	---

Pathogens cause infectious diseases.

0	4	.	1
---	---	---	---

**Draw ONE line from each disease to the type of pathogen that causes the disease.
[2 marks]**

DISEASE

**TYPE OF
PATHOGEN**

Bacterium

Gonorrhoea

Fungus

Measles

Protist

Virus



The body defends itself against pathogens in different ways.

0 4 . 2

Give TWO ways that the body prevents pathogens entering the body. [2 marks]

1 _____

2 _____

[Turn over]



04.4

Give ONE reason why antibiotics cannot be used to treat HIV infections. [1 mark]

04.5

Give TWO ways to prevent the spread of HIV. [2 marks]

1 _____

2 _____

0 4 . 6

Some people with a HIV infection develop AIDS.

Some people with AIDS may die from a different type of infection, such as a chest infection.

Why do people with AIDS die from a different type of infection? [1 mark]

Tick (✓) ONE box.

HIV damages the immune system.

Pathogens enter the body more easily.

People with AIDS are immune to HIV.

[Turn over]

14



0	5
---	---

A student investigated the effect of different concentrations of sugar solution on pieces of potato.

This is the method used.

- 1. Cut five pieces of potato.**
- 2. Record the starting mass of each piece of potato.**
- 3. Place each piece of potato in a different concentration of sugar solution.**
- 4. After 24 hours remove the pieces of potato from the solutions.**
- 5. Record the final mass of each piece of potato.**
- 6. Calculate the change in mass for each piece of potato.**



0	5	.	1
---	---	---	---

What is the independent variable?
[1 mark]

Tick (✓) ONE box.

Change in mass of the pieces of potato

Concentration of the sugar solution

Length of time the pieces of potato are in the solution

Starting mass of the pieces of potato

[Turn over]



TABLE 3 shows the results.

TABLE 3

Concentration of sugar solution in mol/dm³	Mass of potato at start in grams	Mass of potato after 24 hours in grams	Change in mass in grams
0.0	7.94	10.14	2.20
0.1	7.95	9.10	1.15
0.2	7.96	8.21	0.25
0.3	7.93	7.53	-0.40
0.4	7.93	7.18	-0.75
0.5	7.95	7.00	-0.95



05.2

Explain why the potato in 0.0 mol/dm^3 sugar solution increased in mass. [2 marks]

53

[Turn over]



05.3

Complete FIGURE 5 on page 55.

Some of the results have been plotted for you.

You should:

- **plot the data from TABLE 3, on page 52**
- **draw a line of best fit through all the points.**

[2 marks]

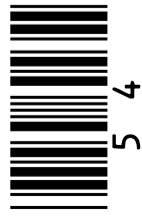
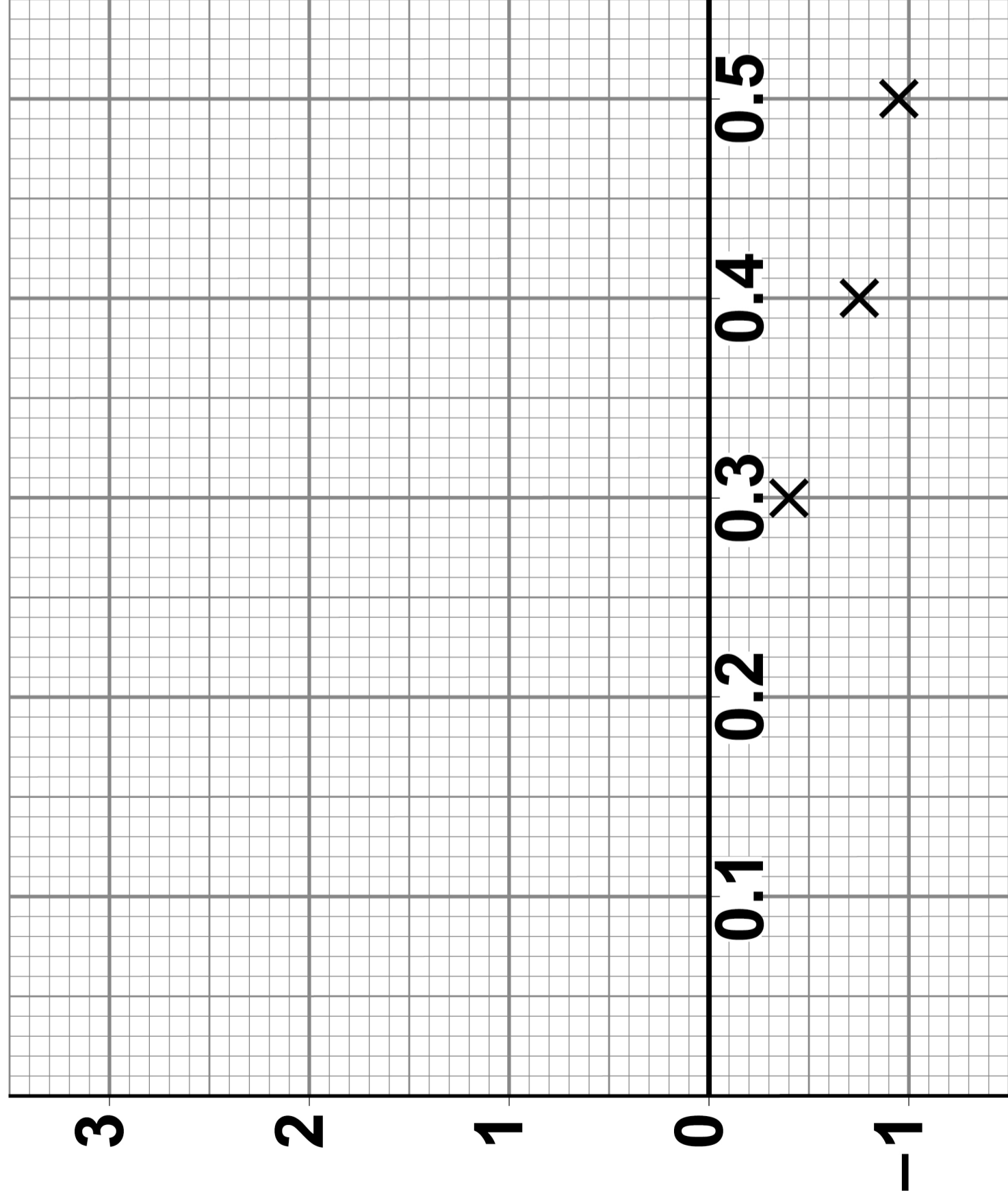


FIGURE 5

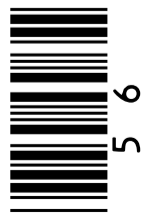
Change in mass in grams



Concentration of sugar solution in mol/dm³



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0 5 . 4

The mass of a piece of potato does NOT change when:
concentration of solution inside cells = concentration of
solution outside cells

Determine the concentration of sugar solution inside the
potato cells.

57

Use FIGURE 5 on page 55. [1 mark]

Concentration = _____ mol/dm³

[Turn over]



TABLE 3 is repeated below.

TABLE 3

Concentration of sugar solution in mol/dm³	Mass of potato at start in grams	Mass of potato after 24 hours in grams	Change in mass in grams
0.0	7.94	10.14	2.20
0.1	7.95	9.10	1.15
0.2	7.96	8.21	0.25
0.3	7.93	7.53	-0.40
0.4	7.93	7.18	-0.75
0.5	7.95	7.00	-0.95



0 5 . 5

Calculate the percentage change in mass for the potato in 0.2 mol/dm³ sugar solution.

Use TABLE 3 on the opposite page.

Use the equation:

$$\text{percentage change in mass} = \frac{\text{change in mass}}{\text{mass of potato at start}} \times 100$$

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

Percentage change in mass (3 significant figures) = _____ %

 [Turn over]

9

06

Starch is digested to form sugar molecules in the digestive system.

06.1

What is the name of the enzyme that digests starch? [1 mark]

06.2

Where are most food molecules absorbed? [1 mark]

Tick (✓) ONE box.

Large intestine

Liver

Small intestine

Stomach

[Turn over]



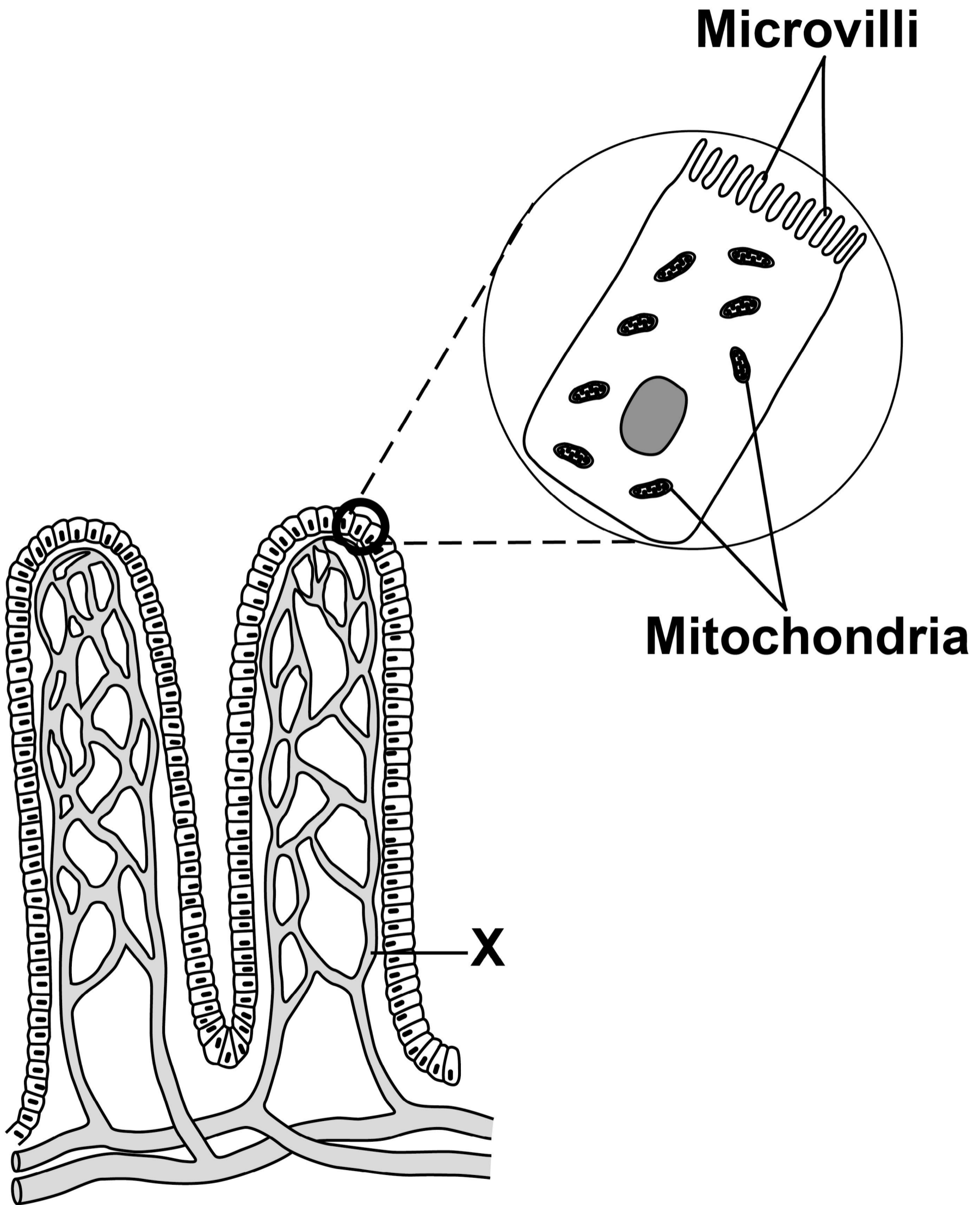
FIGURE 6, on the opposite page, shows two villi.

FIGURE 6 also shows one cell on the surface of a villus as seen using an electron microscope.

0 6 . 3

Give ONE advantage of using an electron microscope compared with using a light microscope. [1 mark]

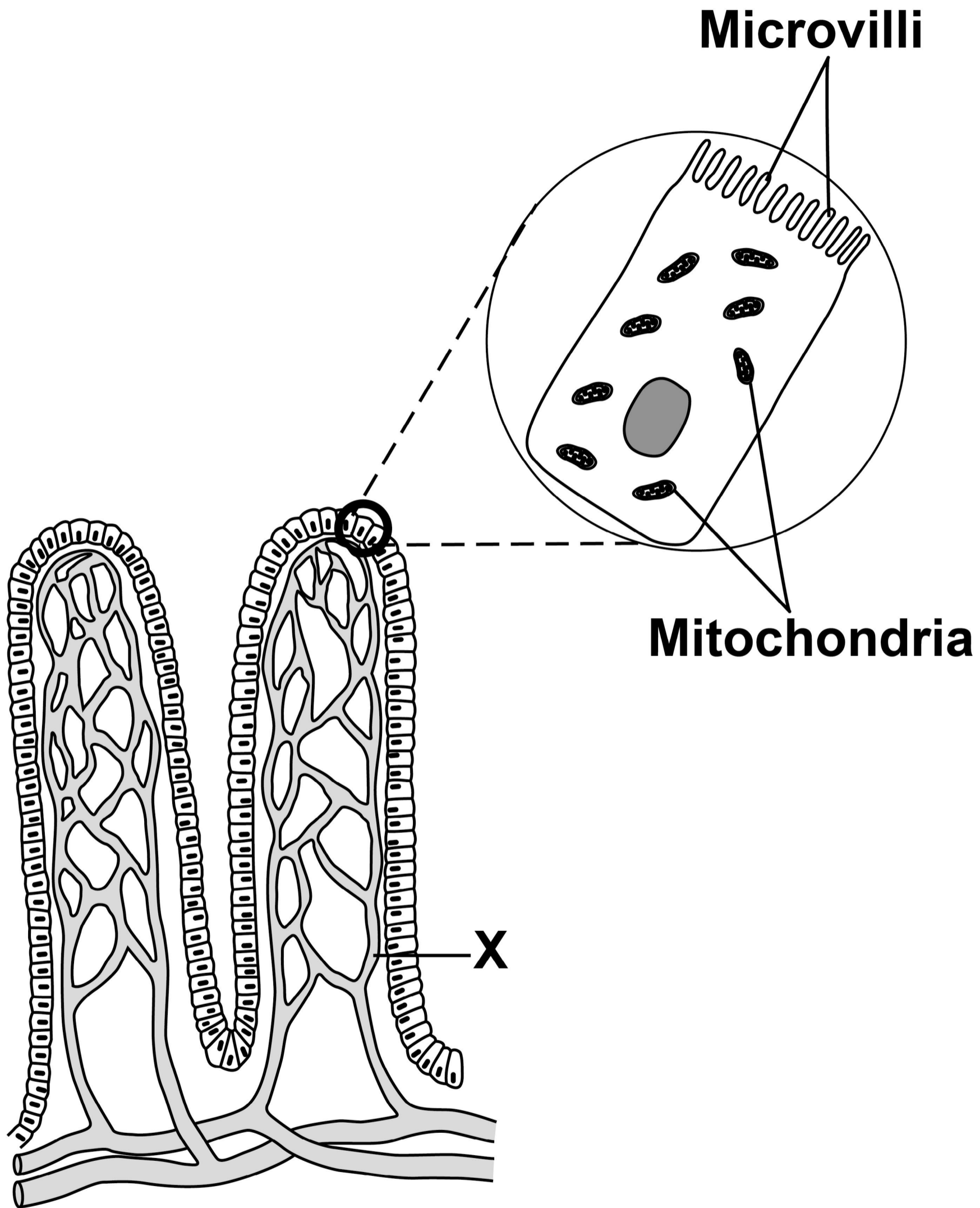
FIGURE 6



[Turn over]



REPEAT OF FIGURE 6



06.4

**What type of blood vessel is labelled X?
[1 mark]**

Tick (✓) ONE box.

Artery

Capillary

Vein

[Turn over]



0	6	.	5
---	---	---	---

The real length of one villus is 0.8 mm

Calculate the image length if the villus is viewed at a magnification of $\times 20$

Use the equation:

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

[3 marks]

Image length = _____ mm



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[Turn over]

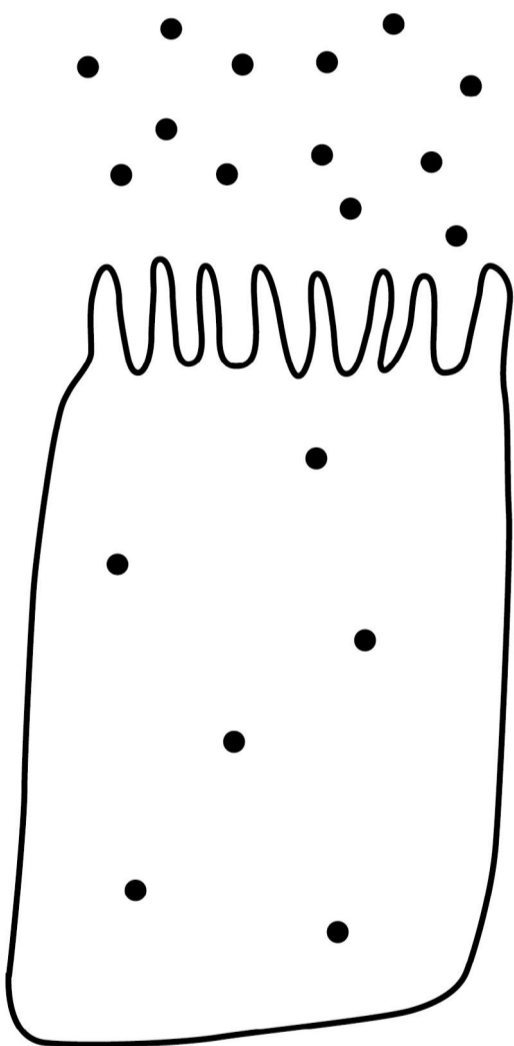


FIGURE 7 shows two cells from the surface of a villus.

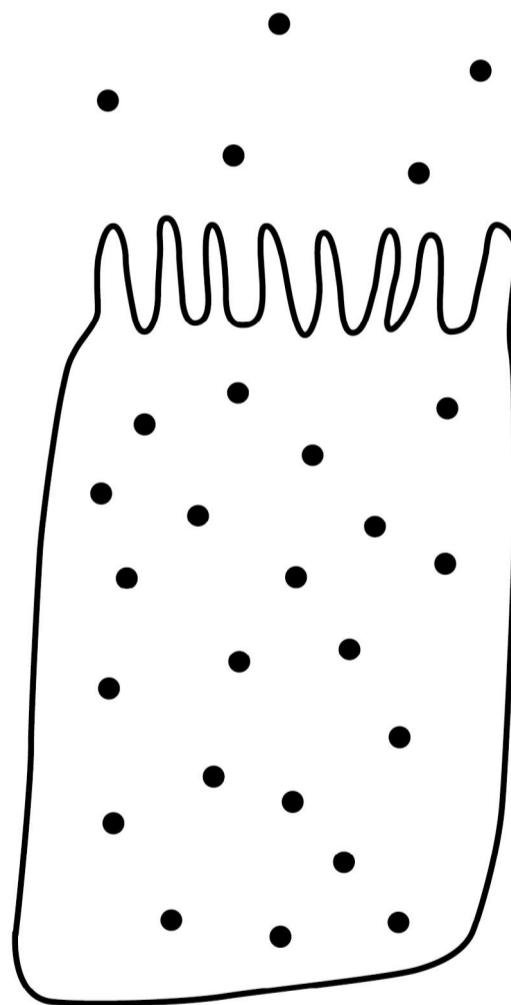
There are sugar molecules inside and next to each cell.

FIGURE 7

Cell A



Cell B



KEY

- **Sugar molecule**



0	6	.	6
---	---	---	---

Name the process by which sugar moves into cell A. [1 mark]

0	6	.	7
---	---	---	---

Name the process by which sugar moves into cell B. [1 mark]

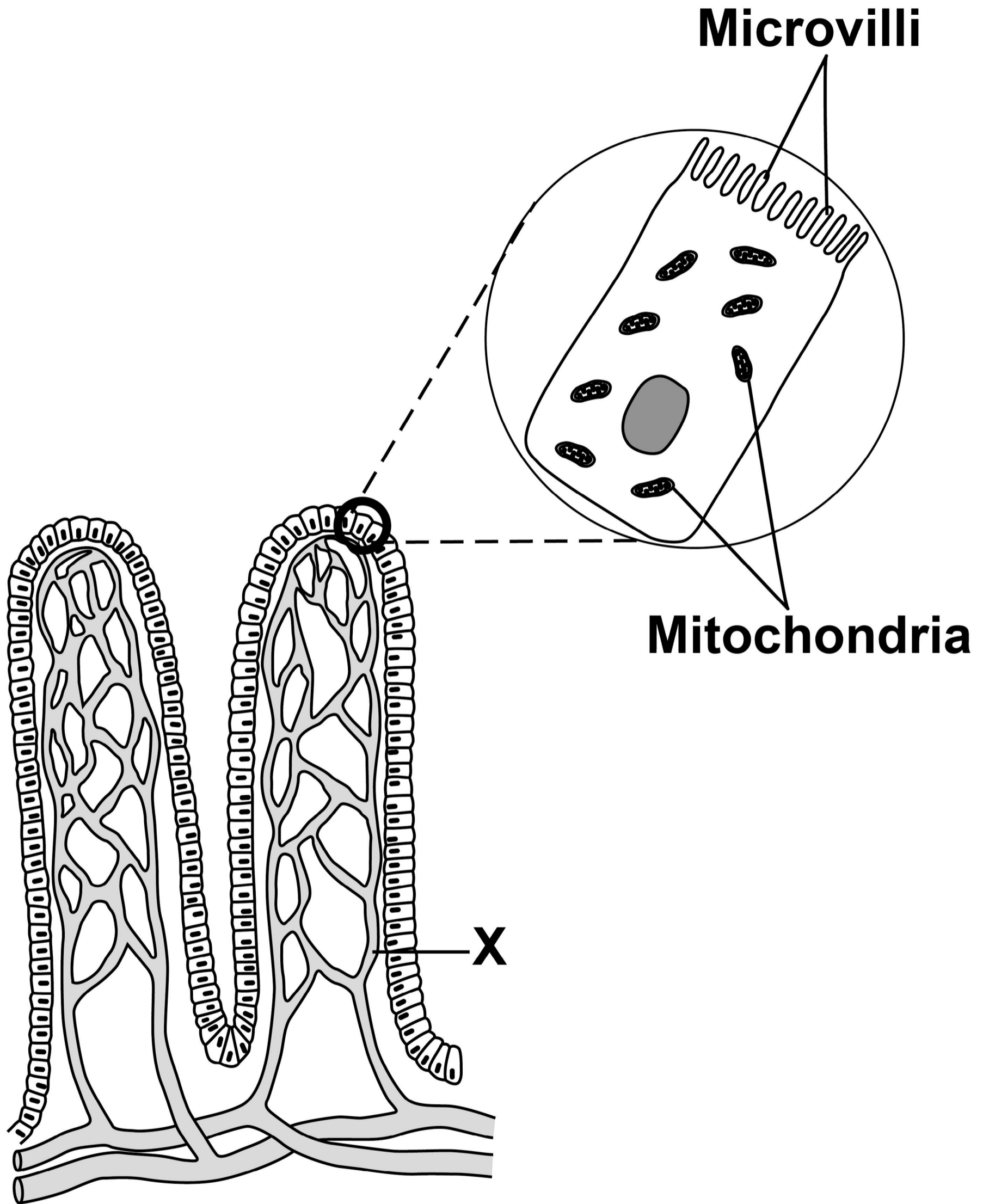
0	6	.	8
---	---	---	---

Give ONE use of sugar in the body. [1 mark]

[Turn over]



FIGURE 6



END OF QUESTIONS



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

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7 4



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