AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE
COMBINED SCIENCE: TRILOGY

F

Foundation Tier
Biology Paper 1F

Tuesday 12 May 2020 Afternoon 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.
- Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- 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.

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

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 write outside the box

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 ☐

0 1 . 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 _____

_____

Do not write outside the box

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.

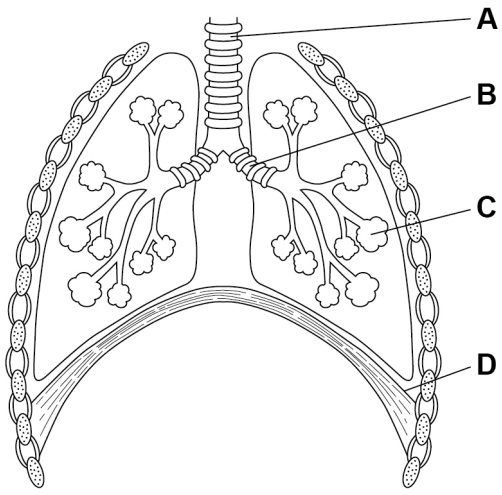
carbon dioxide + water → glucose + oxygen ☐

glucose + oxygen → carbon dioxide + water ☐

oxygen + water → glucose + carbon dioxide ☐

0 1 . 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** ☐

Do not write outside the box

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.

Table 1 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

0 1 . 5 The scientist concluded that person **B** was the fittest.

Give **two** reasons that support the scientist's conclusion.

Use **Table 1**.

[2 marks]

1 _____

_____

2 _____

_____

Do not write outside the box

0 1 . 6 Suggest **two** reasons why the scientist's conclusion may **not** be valid.

[2 marks]

1 _____

_____

2 _____

_____

0 1 . 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 _____

_____

0 1 . 8 Muscles respire anaerobically during vigorous exercise.

Complete the sentences.

Choose answers from the box.

[2 marks]

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

Muscles respire anaerobically if they do not have

enough _____ .

Anaerobic respiration of glucose produces _____ .

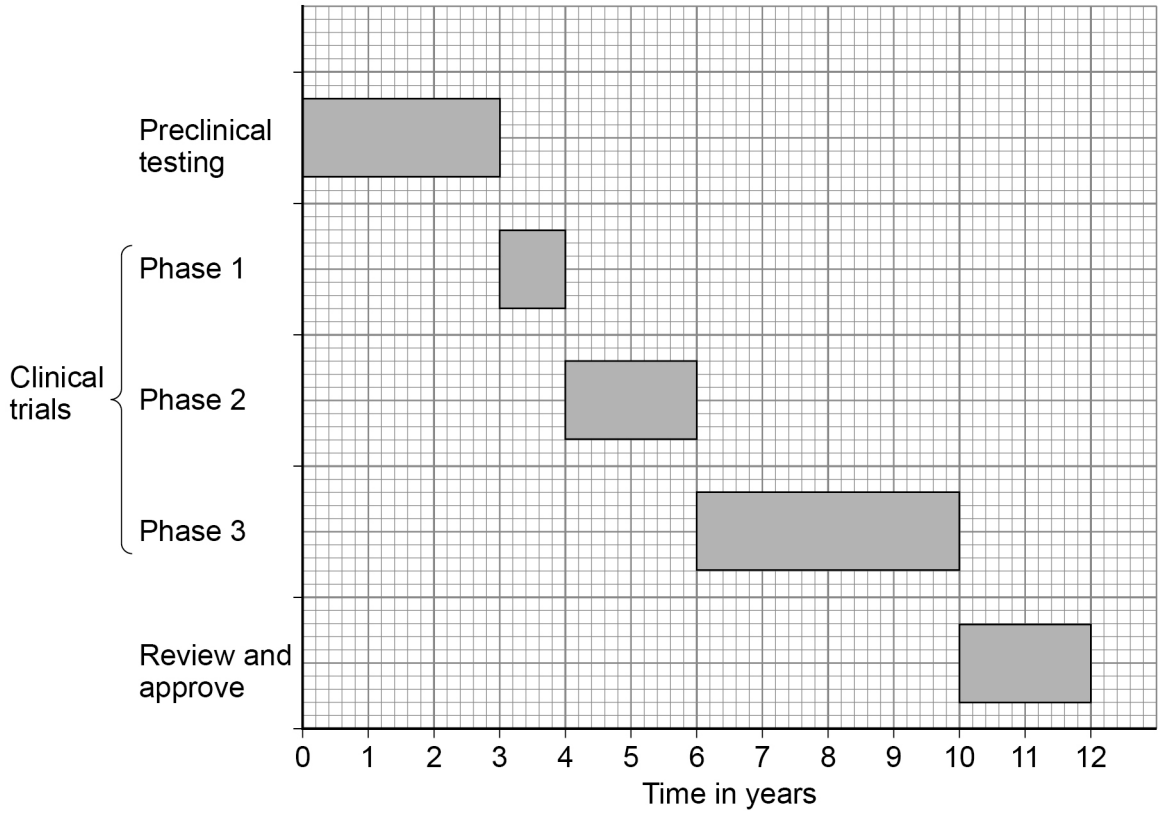
13

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0 2 New drugs are tested before they can be licensed for use with patients.

Figure 2 shows how much time the different stages of testing took for one new drug.

Figure 2



0 2 . 1 Preclinical testing is done in a laboratory.

What is the drug tested on in a laboratory?

Give **one** example.

[1 mark]

0 2 . 2 How many years did the clinical trials take for the drug in **Figure 2**?

[1 mark]

Time for clinical trials = _____ years

Do not write outside the box

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]

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 ☐

Do not write outside the box

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 _____

Do not write outside the box

0 2 . 7 None of the children was given a placebo.

Suggest **one** reason why.

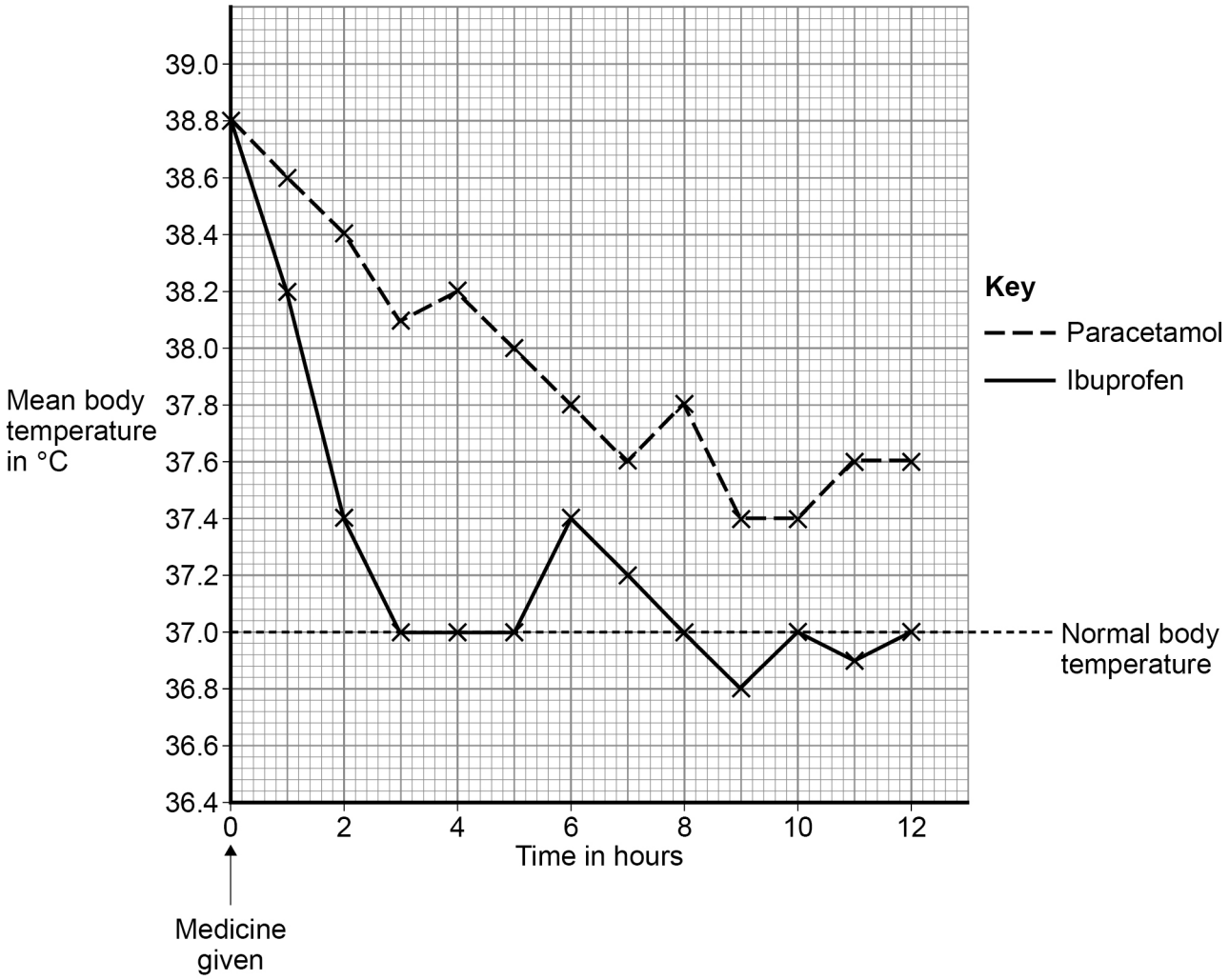
[1 mark]

Question 2 continues on the next page

Do not write outside the box

Figure 3 shows the results.

Figure 3



0 2 . 8 What was the mean body temperature after 6 hours for the children given ibuprofen?

[1 mark]

Mean body temperature = _____ °C

Do not write outside the box

0 2 . 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**.

[2 marks]

1 _____

_____

2 _____

_____

11

Turn over for the next question

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ANSWER IN THE SPACES PROVIDED

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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 ☐

Question 3 continues on the next page

Do not write outside the box

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**.

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

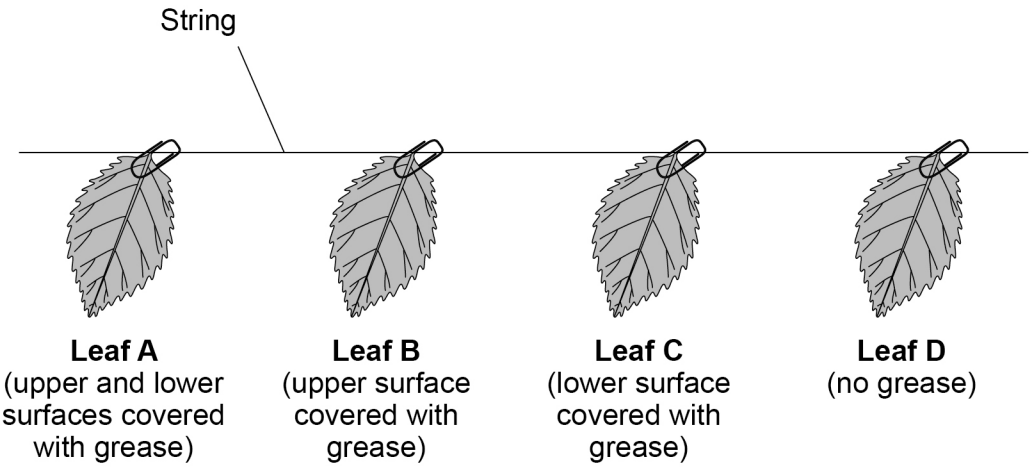


Table 2 shows the results.

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

Do not write outside the box

0 3 . 3 Calculate value **X** in **Table 2**.

[1 mark]

Value **X** = _____ g

0 3 . 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]

Mass of water lost per hour = _____ g

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** to support the student's conclusion?

[1 mark]

0 3 . 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. ☐

Turn over ►

Do not write outside the box

0 3 . 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]

Difference _____

_____

Reason _____

_____

9

Do not write outside the box

Turn over for the next question

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ANSWER IN THE SPACES PROVIDED

Do not write outside the box

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 _____

_____

Do not write outside the box

0 4 . 3 If pathogens do enter the body the immune system tries to destroy the pathogens.

Describe how the immune system defends the body against disease.

[6 marks]

Question 4 continues on the next page

Do not write outside the box

0 4 . 4 Give **one** reason why antibiotics cannot be used to treat HIV infections.

[1 mark]

0 4 . 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. ☐

14

Do not write outside the box

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 ☐

Question 5 continues on the next page

Do not write outside the box

Table 3 shows the results.

Table 3

Concentration of sugar solution in mol/dm^3	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 . 2 Explain why the potato in 0.0 mol/dm^3 sugar solution increased in mass.

[2 marks]

Do not write outside the box

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

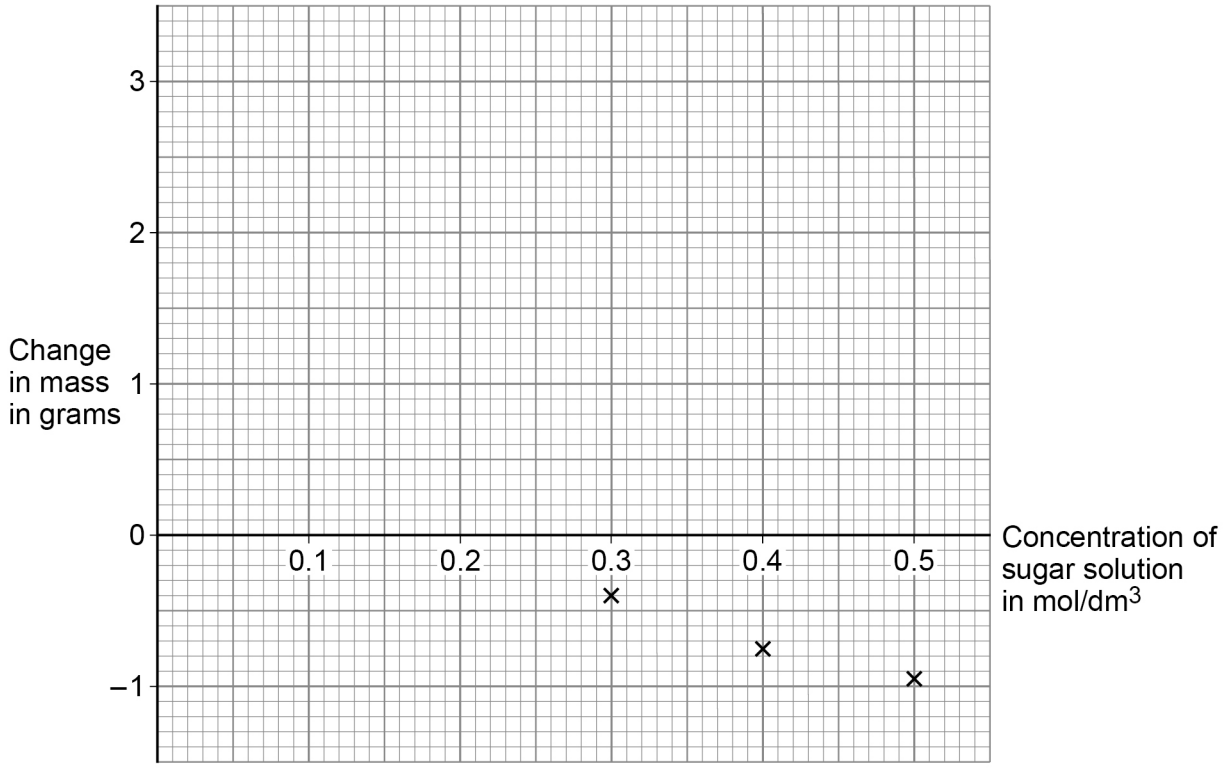
Some of the results have been plotted for you.

You should:

- plot the data from **Table 3**
- draw a line of best fit through all the points.

[2 marks]

Figure 5



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.

Use **Figure 5**.

[1 mark]

Concentration = _____ mol/dm^3

Turn over ►

Do not write outside the box

Table 3 is repeated below.

Table 3

Concentration of sugar solution in mol/dm^3	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/dm^3 sugar solution.

Use **Table 3**.

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) = _____ %

9

Do not write outside the box

0 6 Starch is digested to form sugar molecules in the digestive system.

0 6 . 1 What is the name of the enzyme that digests starch?

[1 mark]

---

0 6 . 2 Where are most food molecules absorbed?

[1 mark]

Tick (✓) **one** box.

- Large intestine ☐
- Liver ☐
- Small intestine ☐
- Stomach ☐

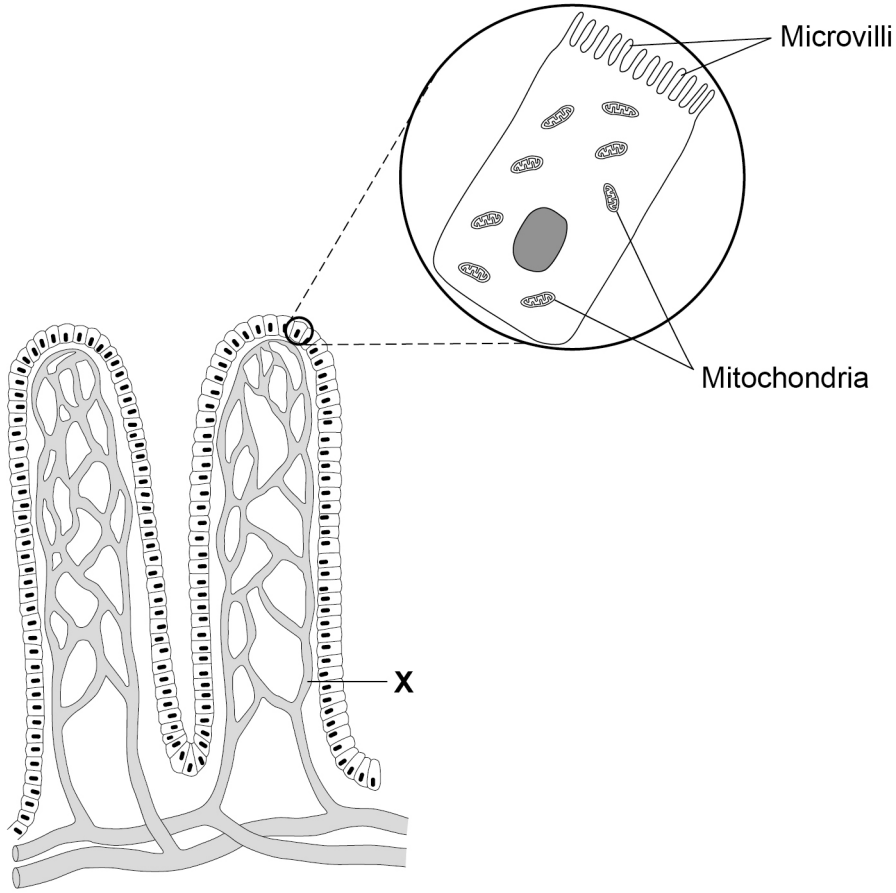
Question 6 continues on the next page

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Figure 6 shows two villi.

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

Figure 6



0 6 . 3 Give **one** advantage of using an electron microscope compared with using a light microscope.

[1 mark]

Do not write outside the box

0 6 . 4 What type of blood vessel is labelled **X**?

[1 mark]

Tick (✓) **one** box.

Artery ☐

Capillary ☐

Vein ☐

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 ×20

Use the equation:

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

[3 marks]

Image length = _____ mm

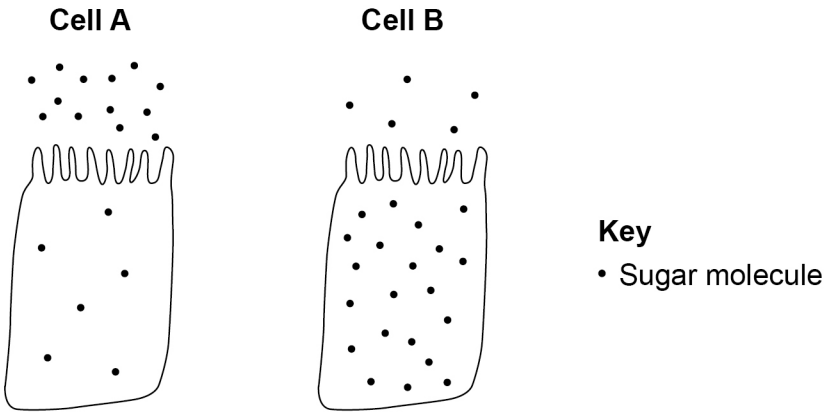
Question 6 continues on the next page

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

There are sugar molecules inside and next to each cell.

Figure 7



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]

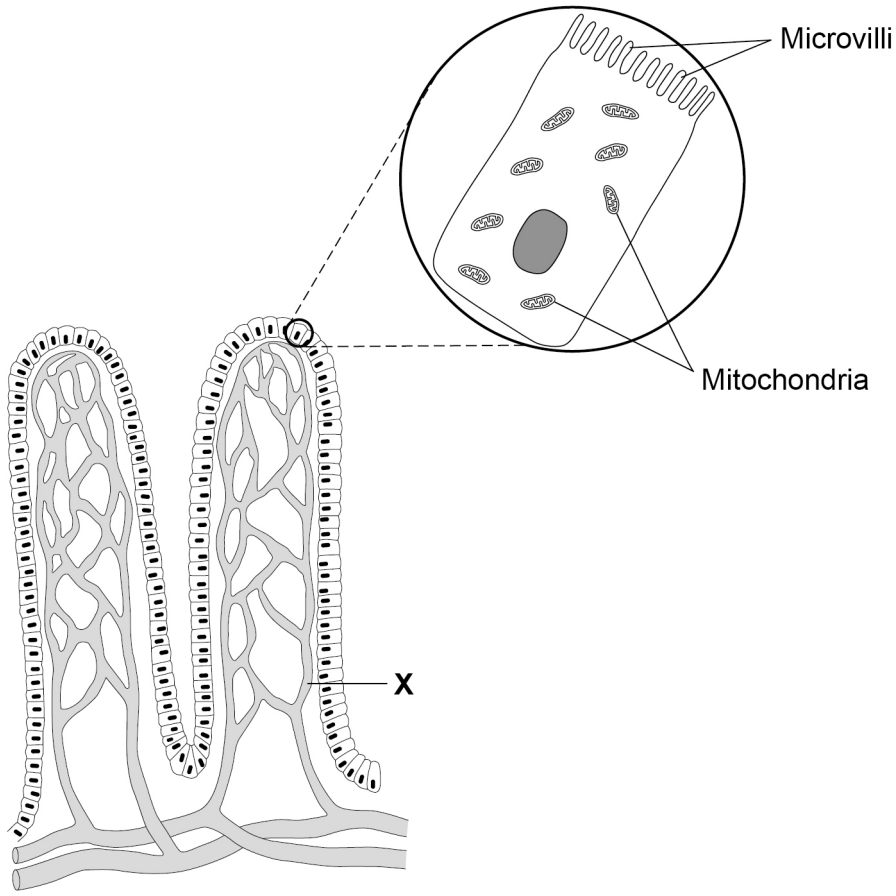
0 6 . 8 Give **one** use of sugar in the body.

[1 mark]

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0 6 . 9 **Figure 6** is repeated below.

Figure 6



Explain how villi are adapted for efficient absorption of sugar molecules.

[4 marks]

14

END OF QUESTIONS

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