



Surname \_\_\_\_\_

Other Names \_\_\_\_\_

Centre Number \_\_\_\_\_

Candidate Number \_\_\_\_\_

Candidate Signature \_\_\_\_\_

I declare this is my own work.

**GCSE  
COMBINED SCIENCE: TRILOGY**

**H**

Higher Tier

Biology Paper 1H

**8464/B/1H**

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]



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**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
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**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 1 . 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 1 shows the results.**

**TABLE 1**

<b>Concentration of sugar solution in mol/dm<sup>3</sup></b>	<b>Mass of potato at start in grams</b>	<b>Mass of potato after 24 hours in grams</b>	<b>Change in mass in grams</b>
<b>0.0</b>	<b>7.94</b>	<b>10.14</b>	<b>2.20</b>
<b>0.1</b>	<b>7.95</b>	<b>9.10</b>	<b>1.15</b>
<b>0.2</b>	<b>7.96</b>	<b>8.21</b>	<b>0.25</b>
<b>0.3</b>	<b>7.93</b>	<b>7.53</b>	<b>-0.40</b>
<b>0.4</b>	<b>7.93</b>	<b>7.18</b>	<b>-0.75</b>
<b>0.5</b>	<b>7.95</b>	<b>7.00</b>	<b>-0.95</b>

9



**01.2** Explain why the potato in  $0.0 \text{ mol/dm}^3$  sugar solution increased in mass.  
**[2 marks]**

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**[Turn over]**



**01.3** Complete FIGURE 1, on the opposite page.

Some of the results have been plotted for you.

You should:

- plot the data from TABLE 1, on page 6
- draw a line of best fit through all the points.

[2 marks]

∞

**01.4** 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.

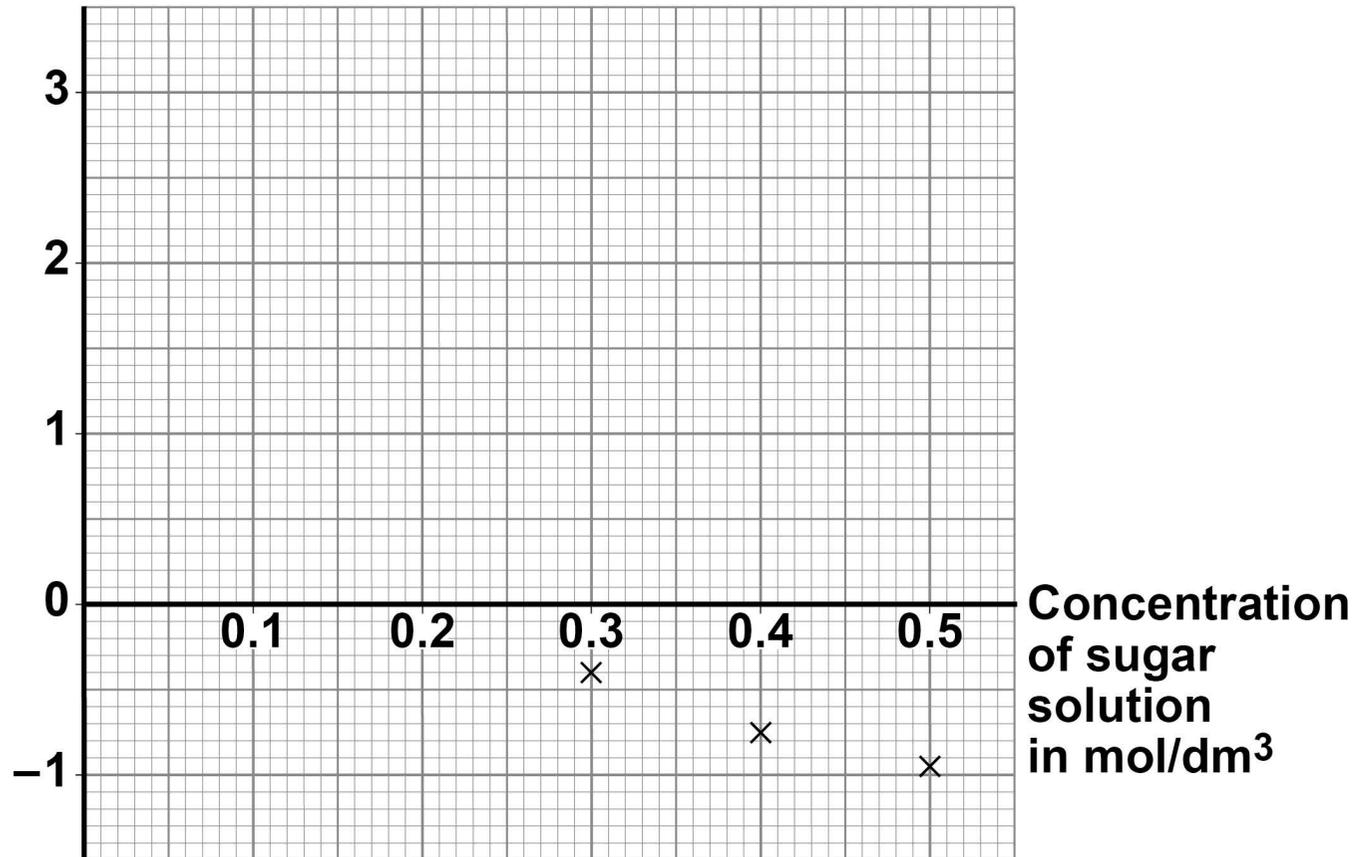
Use FIGURE 1. [1 mark]

Concentration = \_\_\_\_\_ mol/dm<sup>3</sup>



**FIGURE 1**

**Change  
in mass  
in grams**



**[Turn over]**



**TABLE 1 is repeated below.**

**TABLE 1**

<b>Concentration of sugar solution in mol/dm<sup>3</sup></b>	<b>Mass of potato at start in grams</b>	<b>Mass of potato after 24 hours in grams</b>	<b>Change in mass in grams</b>
<b>0.0</b>	<b>7.94</b>	<b>10.14</b>	<b>2.20</b>
<b>0.1</b>	<b>7.95</b>	<b>9.10</b>	<b>1.15</b>
<b>0.2</b>	<b>7.96</b>	<b>8.21</b>	<b>0.25</b>
<b>0.3</b>	<b>7.93</b>	<b>7.53</b>	<b>-0.40</b>
<b>0.4</b>	<b>7.93</b>	<b>7.18</b>	<b>-0.75</b>
<b>0.5</b>	<b>7.95</b>	<b>7.00</b>	<b>-0.95</b>



**01.5** Calculate the percentage change in mass for the potato in 0.2 mol/dm<sup>3</sup> sugar solution.

Use TABLE 1, on page 10.

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]

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Percentage change in mass (3 significant figures) = \_\_\_\_\_ %

[Turn over]



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**0 2** Starch is digested to form sugar molecules in the digestive system.

**0 2 . 1** What is the name of the enzyme that digests starch? [1 mark]

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**0 2 . 2** Where are most food molecules absorbed? [1 mark]

Tick (✓) ONE box.

Large intestine

Liver

Small intestine

Stomach

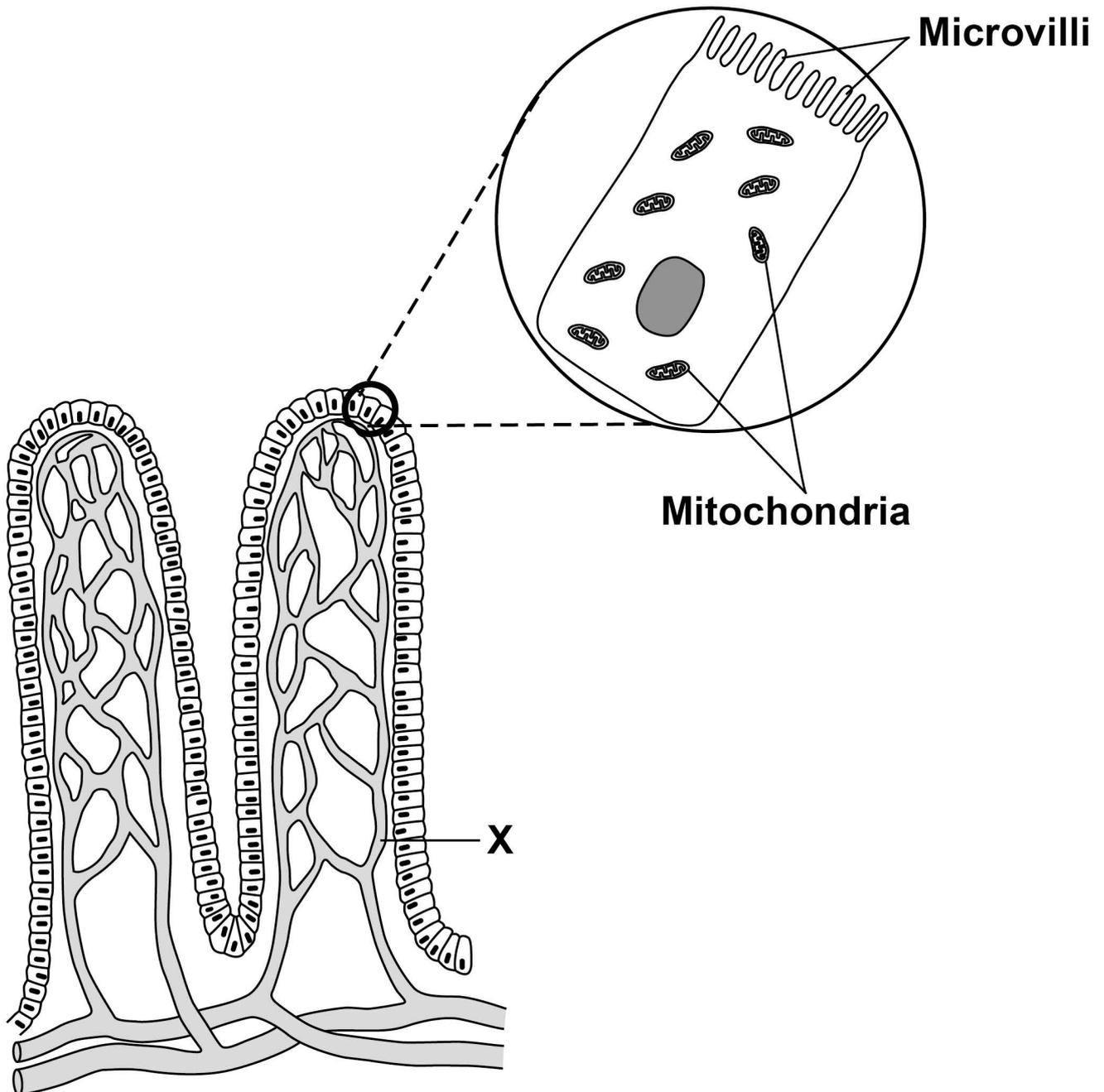
[Turn over]



FIGURE 2 shows two villi.

FIGURE 2 also shows one cell on the surface of a villus as seen using an electron microscope.

FIGURE 2



**0 2 . 3** Give **ONE** advantage of using an electron microscope compared with using a light microscope. [1 mark]

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**0 2 . 4** What type of blood vessel is labelled X? [1 mark]

Tick (✓) **ONE** box.

**Artery**

**Capillary**

**Vein**

**[Turn over]**



**0 2 . 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]

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Image length = \_\_\_\_\_ mm



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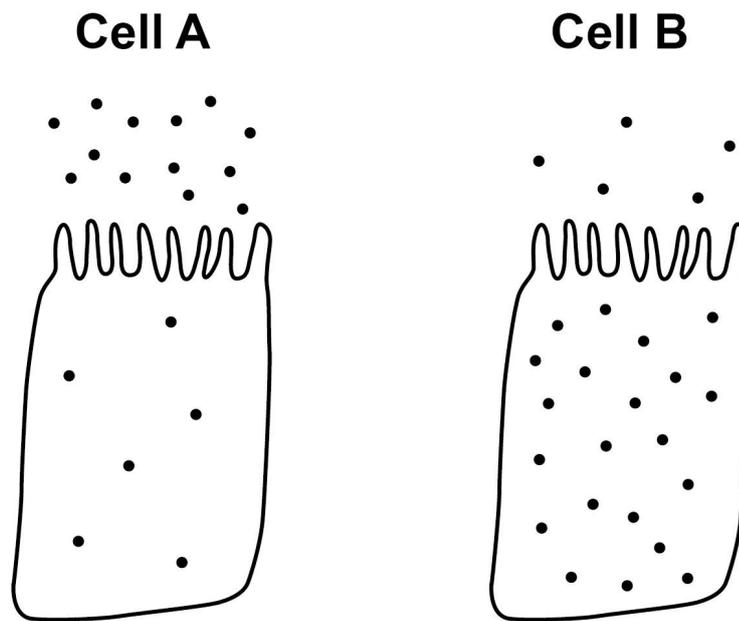
**[Turn over]**



**FIGURE 3** shows two cells from the surface of a villus.

There are sugar molecules inside and next to each cell.

**FIGURE 3**



**KEY**

- Sugar molecule



**0 2 . 6** Name the process by which sugar moves into cell A. [1 mark]

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**0 2 . 7** Name the process by which sugar moves into cell B. [1 mark]

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**0 2 . 8** Give ONE use of sugar in the body. [1 mark]

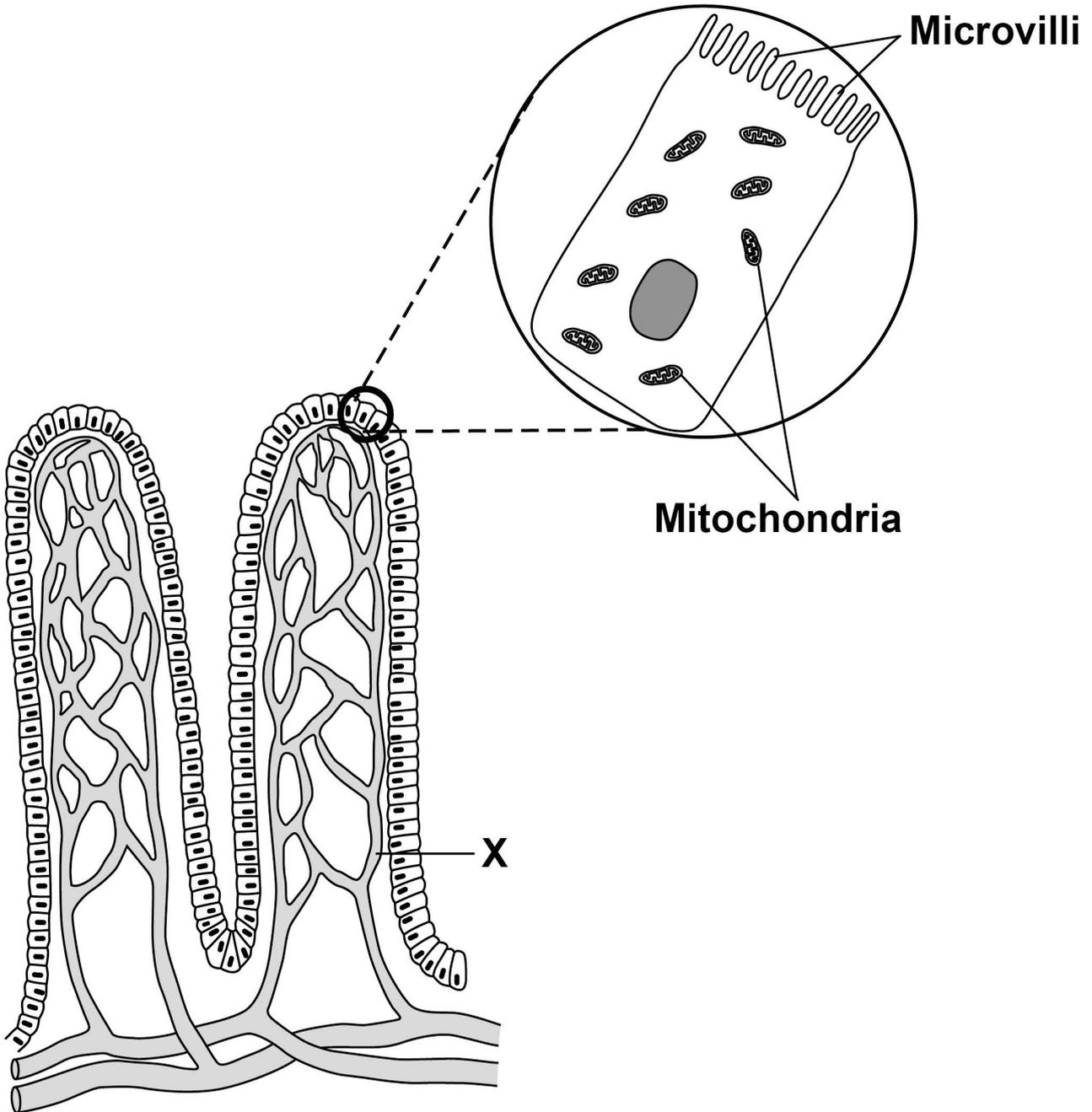
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**[Turn over]**



02.9 FIGURE 2 is repeated below.

FIGURE 2





**0 3**

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

**0 3**

**. 1**

**Give ONE disease related to being overweight.  
[1 mark]**

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- 03.2** Body mass index (BMI) helps to show if a person has a healthy body mass for their height.

BMI is calculated using the equation:

$$\text{BMI} = \frac{\text{body mass in kg}}{(\text{height in m})^2}$$

A woman has a BMI of 27 and a body mass of 68.1 kg

Calculate the woman's height in metres.  
[3 marks]

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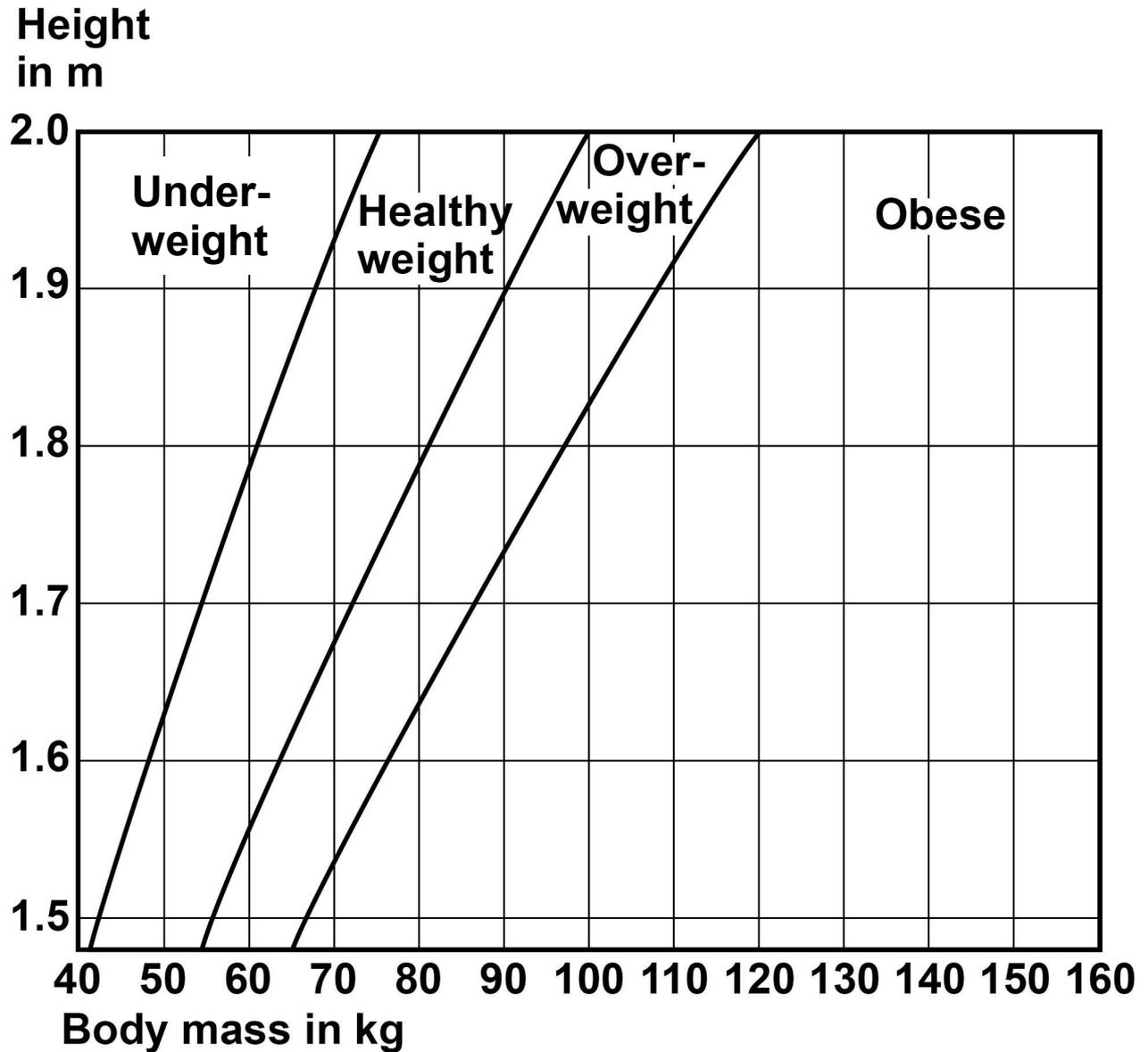
Height = \_\_\_\_\_ m

[Turn over]



**03.3** FIGURE 4 shows a height-body mass chart for adults.

**FIGURE 4**



**Which weight category describes the woman in Question 03.2, on page 23?  
[1 mark]**

**Tick (✓) ONE box.**

**Underweight**

**Healthy weight**

**Overweight**

**Obese**

**[Turn over]**









04

Cells are the basic units of all forms of life.

04

1

Describe FOUR differences between a bacterial cell and a plant cell. [4 marks]

1

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[Turn over]





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**[Turn over]**



**Another disease caused by bacteria is salmonella food poisoning.**

**In the UK, chickens are vaccinated against Salmonella bacteria to reduce the number of cases of food poisoning in humans.**

**0 4 . 3 Explain how vaccinating chickens reduces the number of cases of salmonella food poisoning. [2 marks]**

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**0 4 . 4** Give **ONE** way that the spread of salmonella food poisoning from one human to another is controlled.

**Do NOT refer to vaccination in your answer.**  
**[1 mark]**

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**0 4 . 5** The number of cases of salmonella food poisoning is usually higher in summer than in winter.

**Suggest ONE reason why. [1 mark]**

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**[Turn over]**

12



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05

This question is about photosynthesis and food production.

05.1

How can oxygen production be used to show the RATE of photosynthesis? [1 mark]

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[Turn over]



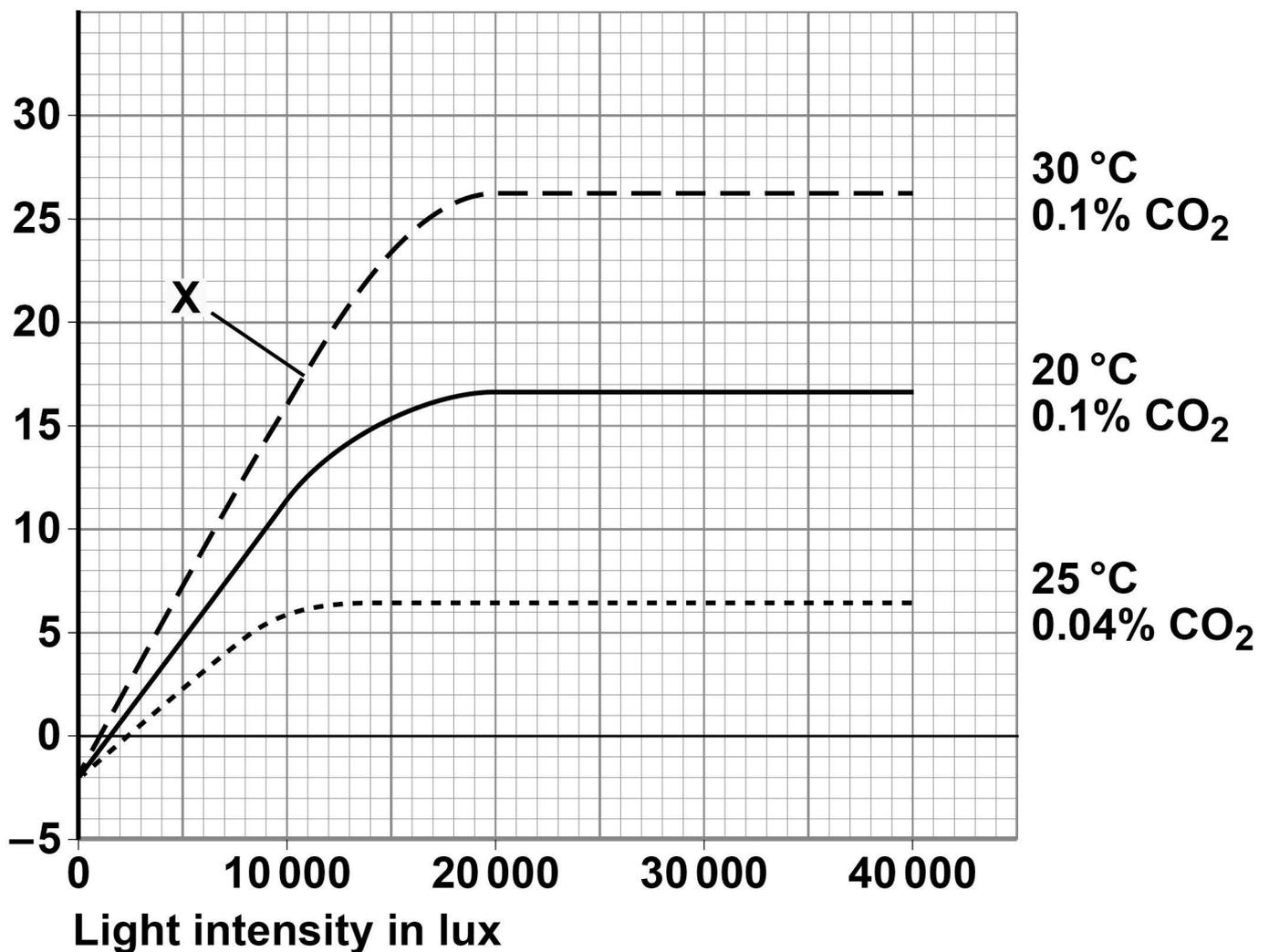
Scientists investigated factors affecting the rate of photosynthesis in tomato plants.

The tomato plants were growing in a commercial greenhouse in the UK during winter.

FIGURE 5 shows the results.

### FIGURE 5

Rate of oxygen production in arbitrary units



The percentage of carbon dioxide in the Earth's atmosphere is 0.04%

**0 5 . 2** Name the factor that is limiting the rate of photosynthesis at point X. [1 mark]

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Farmers growing tomatoes commercially try to control the rate of photosynthesis and make maximum profit.

A farmer can control the temperature and carbon dioxide concentration in a greenhouse.

**0 5 . 3** What is the MINIMUM light intensity a farmer should use to get the maximum rate of photosynthesis shown in FIGURE 5, on the opposite page? [1 mark]

Light intensity = \_\_\_\_\_ lux

[Turn over]



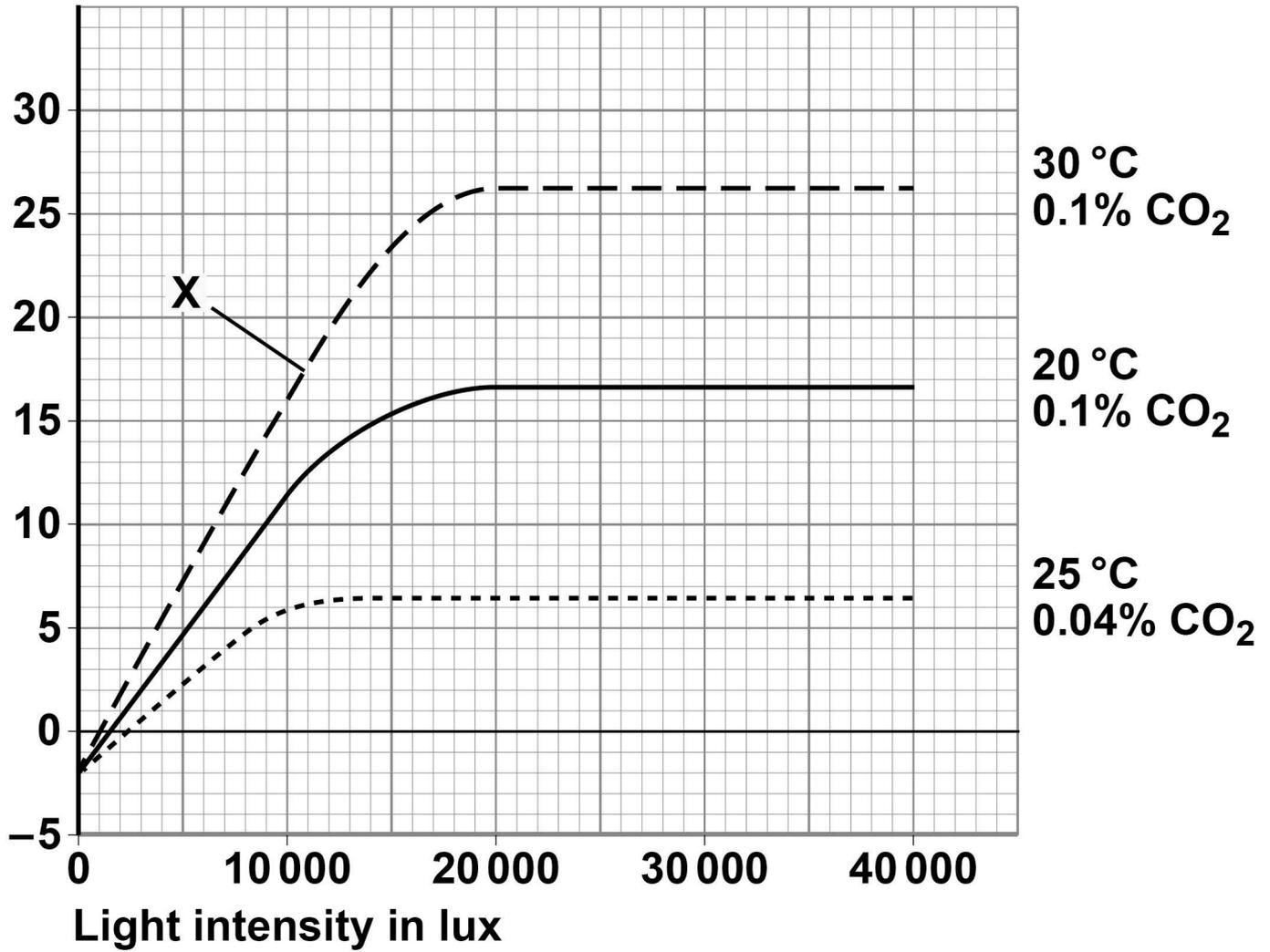
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## REPEAT OF FIGURE 5

Rate of oxygen  
production in  
arbitrary units



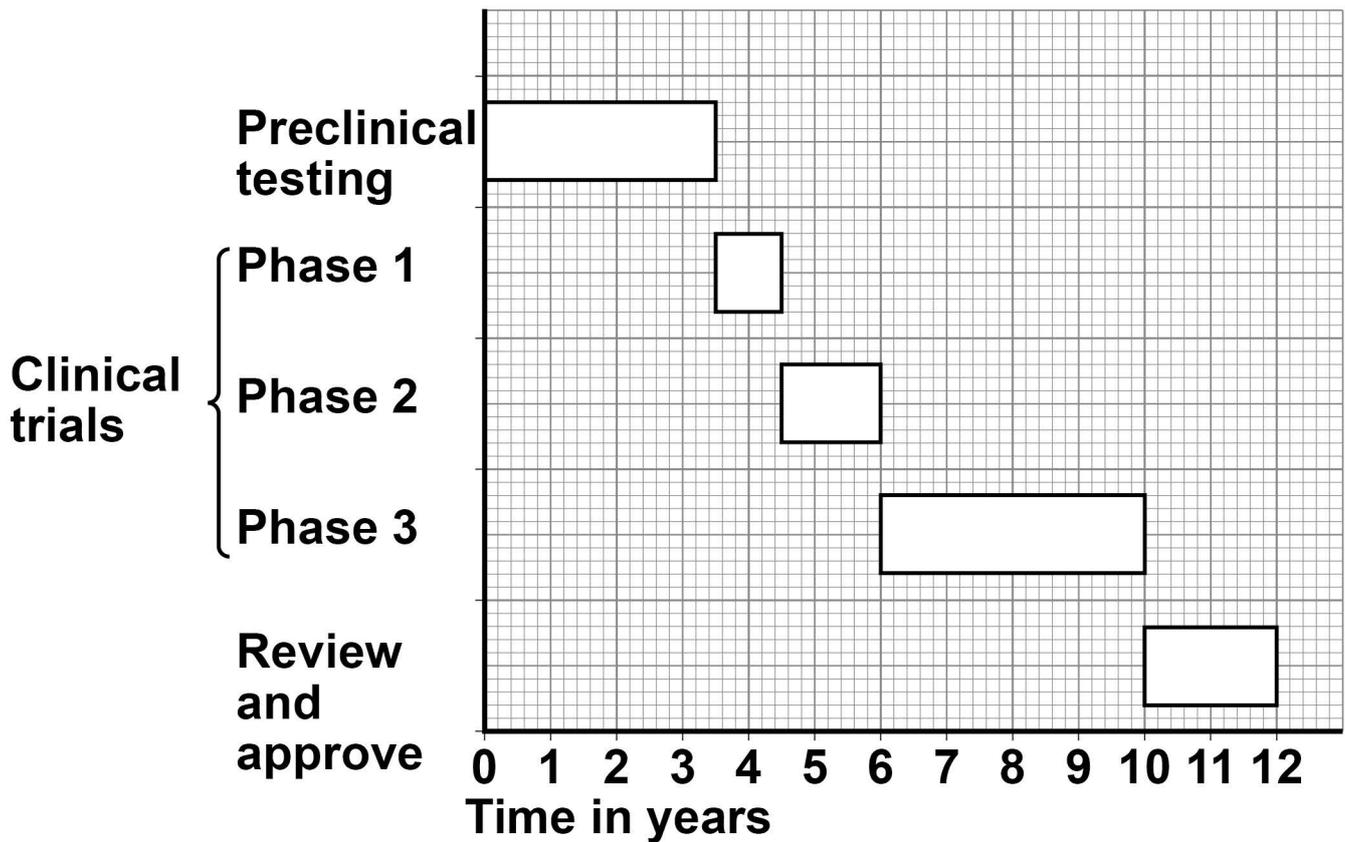


06

New drugs are tested and trialled before they can be licensed to treat patients.

FIGURE 6 shows how much time the different stages of testing took for one new drug.

FIGURE 6



**06.1** How much more time did the clinical trials take compared with the preclinical testing?  
[1 mark]

Tick (✓) ONE box.

**3 years**

**3.5 years**

**5 years**

**6.5 years**

**[Turn over]**



**During Phase 1 clinical trials low doses of the drug are tested on healthy volunteers.**

**06.2** Suggest **ONE** reason why **LOW DOSES** of the drug are used in Phase 1 clinical trials.  
[1 mark]

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**06.3** Suggest **TWO** reasons why **HEALTHY** volunteers are used in Phase 1 clinical trials.  
[2 marks]

**1**

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**2**

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**0 6 . 4** The results of clinical trials can only be published after peer review by other scientists.

**Suggest ONE reason why the results must be reviewed by other scientists. [1 mark]**

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**[Turn over]**

**06.5** A drug is only licensed for the medical conditions it was tested to treat in the clinical trials.

**Drug regulations:**

- control what drugs a doctor can prescribe
- ensure doctors can prescribe a drug with confidence
- protect patients.

**AMD is an eye condition that can result in very poor vision.**

**Doctors treat approximately 40 000 new cases of AMD each year.**

**Two drugs licensed to treat AMD in the UK are drug A and drug B.**

**In many other countries drug C is used to treat AMD. Drug C is only licensed in the UK to treat cancer.**

**The cost per injection for each drug is:**

- drug A £561
- drug B £800
- drug C £28

**The number of injections required to treat AMD is the same for each drug.**













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For Examiner's Use	
Question	Mark
1	
2	
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4	
5	
6	
<b>TOTAL</b>	

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