

Paper Reference(s)     **1BI0/1F**

Pearson Edexcel Level 1/Level 2 GCSE (9–1)

**Biology**  
**Paper 1**  
**Foundation Tier**

**Tuesday 15 May 2018 – Afternoon**

**Time: 1 hour 45 minutes plus your additional  
time allowance**

**INSTRUCTIONS TO CANDIDATES**  
**Write your centre number, candidate number,  
surname, other names and your signature in the  
boxes below. Check that you have the correct  
question paper.**

<b>Centre No.</b>					
<b>Candidate No.</b>					
<b>Surname</b>					
<b>Other names</b>					
<b>Signature</b>					
<b>Paper Reference</b>	<b>1</b>	<b>B</b>	<b>I</b>	<b>0</b>	<b>/ 1 F</b>

- Use **BLACK** ink or ball-point pen.
- Answer **ALL** questions.
- Answer the questions in the spaces provided – there may be more space than you need.
- Calculators may be used.
- Any diagrams may **NOT** be accurately drawn, unless otherwise indicated.
- You must show all your working out with your answer clearly identified at the end of your solution.

## **MATERIALS REQUIRED FOR EXAMINATION**

**Calculator, ruler**

## **ITEMS INCLUDED WITH QUESTION PAPERS**

**Nil**

## **INFORMATION FOR CANDIDATES**

- The total mark for this paper is 100.
- The marks for **EACH** question are shown in brackets – use this as a guide as to how much time to spend on each question.
- In questions marked with an **ASTERISK (\*)**, marks will be awarded for your ability to structure your answer logically showing how the points that you make are related or follow on from each other where appropriate.

## **ADVICE TO CANDIDATES**

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

**(Turn over)**

**Answer ALL questions. Write your answers in the spaces provided.**

**Some questions must be answered with a cross in a box ☐. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☐.**

**(Questions begin on next page)**

1 (a) Pathogens cause disease.

Draw one straight line from each type of pathogen to the disease that is caused by that pathogen.  
(2 marks)

**TYPE OF  
PATHOGEN**

fungus

virus

**DISEASE**

AIDS

malaria

tuberculosis

cholera

Chalara ash dieback

(b) Antibiotics can be used to treat diseases.

Antibiotics kill (1 mark)

☐ A antibodies

☐ B antigens

☐ C bacteria

☐ D viruses

(c) Figure 1 shows the number of white blood cells in blood samples from three patients.

	Patient X	Patient Y	Patient Z
Number of white blood cells per $\mu\text{l}$	8 500	5 700	12 500

**FIGURE 1**

**Explain why the data suggests that Patient Z has a bacterial infection. (2 marks)**

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(d) HIV is diagnosed by blood tests.

State TWO safety precautions that need to be taken when handling blood samples. (2 marks)

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2 \_\_\_\_\_

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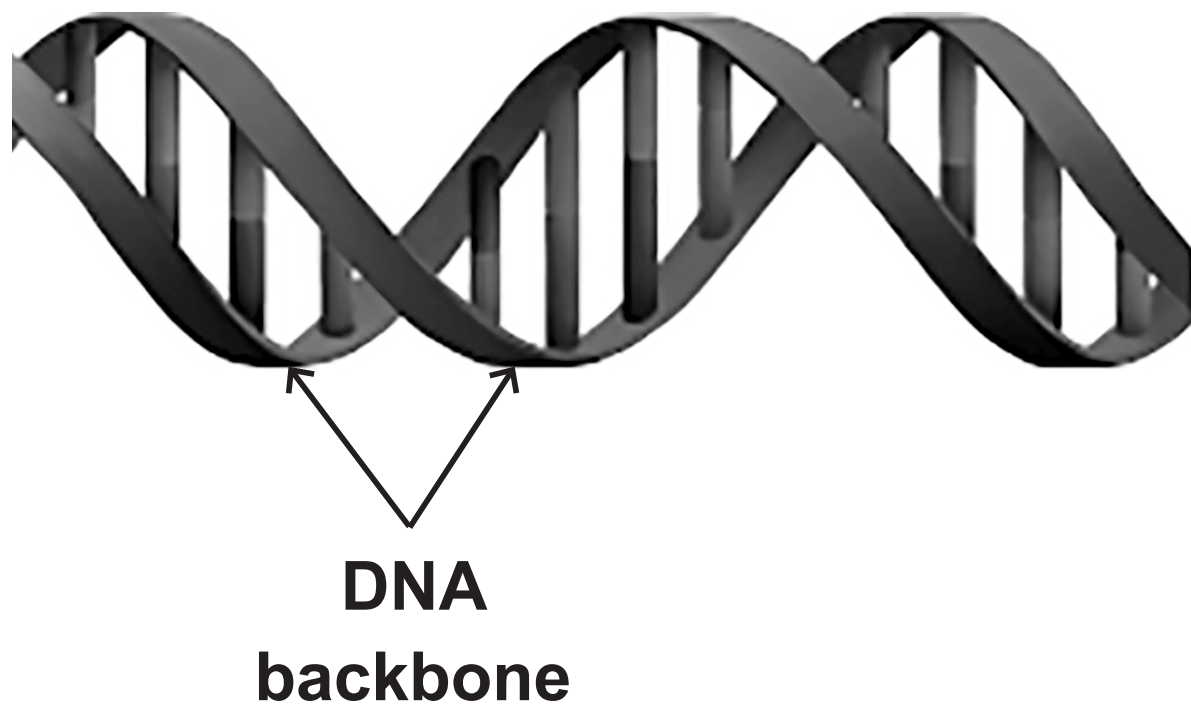
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(TOTAL FOR QUESTION 1 = 7 MARKS)

(Questions continue on next page)

(Turn over)

**2 Figure 2 shows part of a DNA molecule.**



**FIGURE 2**

**(a) (i) What is the shape of a DNA molecule? (1 mark)**

- ☐ **A single helix**
- ☐ **B double helix**
- ☐ **C complementary helix**
- ☐ **D triple helix**

**(Question continues on next page)**

**(Turn over)**

**(ii) Which molecules are present in the DNA backbone? (1 mark)**

- ☐ **A    sugars and phosphates**
- ☐ **B    amino acids and bases**
- ☐ **C    sugars and bases**
- ☐ **D    amino acids and phosphates**

**(iii) State the type of bond that joins the bases together in the DNA molecule. (1 mark)**

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**(Question continues on next page)**



**(b) DNA can be extracted from fruit.**

**Describe how cells are broken down to release DNA. (2 marks)**

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**(Question continues on next page)**

- (c) In 2003, scientists finished sequencing the 3 billion base pairs in the human genome.

**State TWO benefits that the Human Genome Project could have for medicine. (2 marks)**

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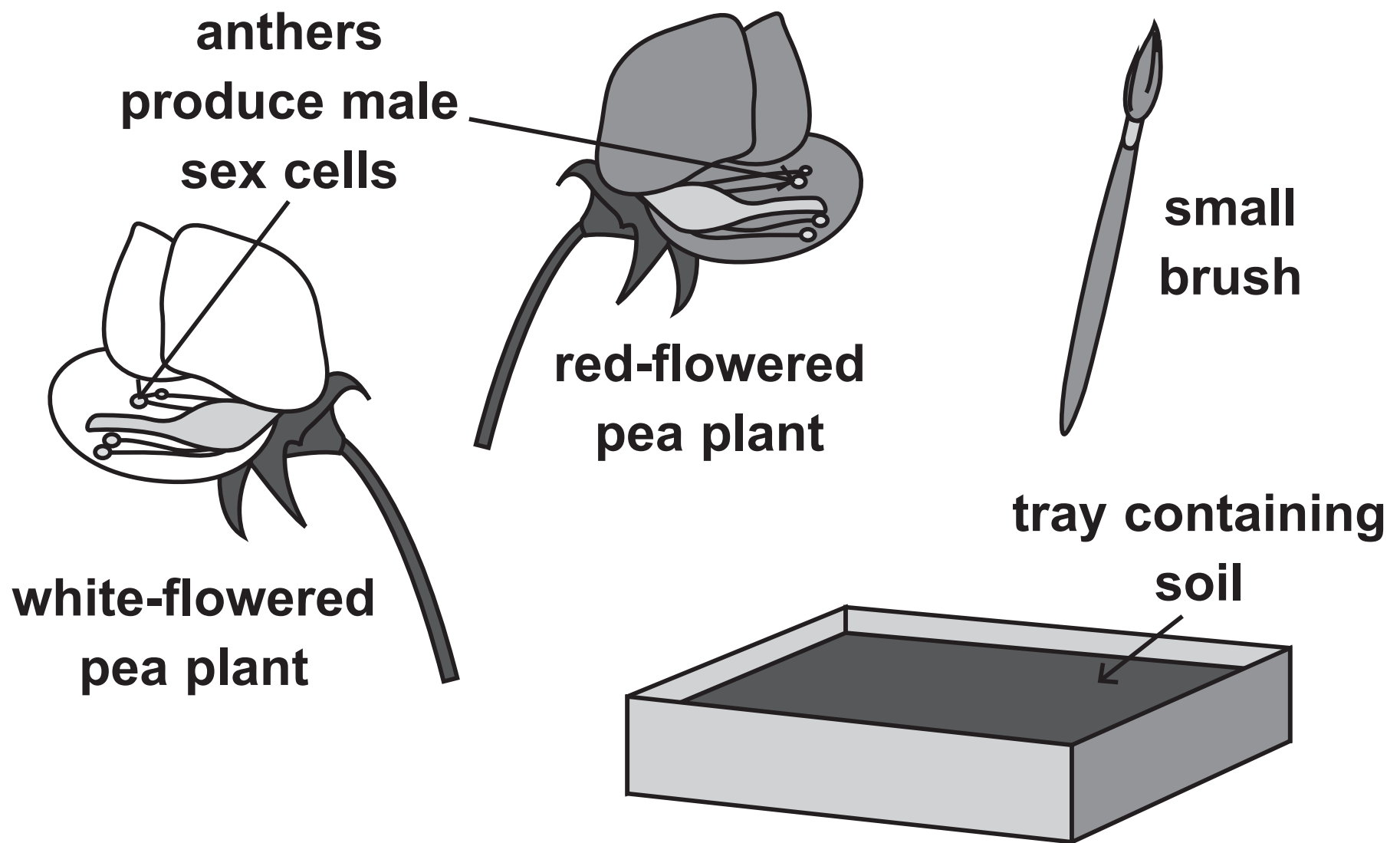
**(TOTAL FOR QUESTION 2 = 7 MARKS)**

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**(Questions continue on next page)**

- 3 **Gregor Mendel investigated genetic inheritance using pea plants.**

**Figure 3 shows some of the equipment used in this investigation.**



**FIGURE 3**

**(Question continues on next page)**

**(Turn over)**

- (a) (i) Gregor Mendel crossed red-flowered pea plants with white-flowered pea plants.

Describe how this equipment could be used to do this cross and discover the flower colour of the new pea plants produced. (3 marks)

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- (ii) Describe how to make sure that the results obtained from this investigation are not anomalous. (2 marks)

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(Question continues on next page)

- (b) In a different investigation, Mendel crossed pea plants that produced yellow seeds (AA) with pea plants that produced green seeds (aa). The dominant allele is shown as A.

The Punnett square shows the genotypes of the offspring from this cross.

	A	A
a	Aa	Aa
a	Aa	Aa

Explain a conclusion that can be made from the results of this cross. (2 marks)

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**(c) Mendel did his investigations in the 19th century.**

**State ONE reason why Mendel could not fully explain the results of his investigations. (1 mark)**

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**(TOTAL FOR QUESTION 3 = 8 MARKS)**

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**(Questions continue on next page)**

**(Turn over)**

- 4 Figure 4 shows a picture seen through healthy eyes and the same picture seen through eyes affected by cataracts.



picture seen through  
healthy eyes



picture seen through  
eyes with cataracts

**FIGURE 4**

- (a) (i) In which part of the eye do cataracts form?  
(1 mark)

- ☐ A retina
- ☐ B iris
- ☐ C cornea
- ☐ D lens

(Question continues on next page)

(Turn over)



**(ii) Explain why the picture seen through eyes with cataracts is less clear. (2 marks)**

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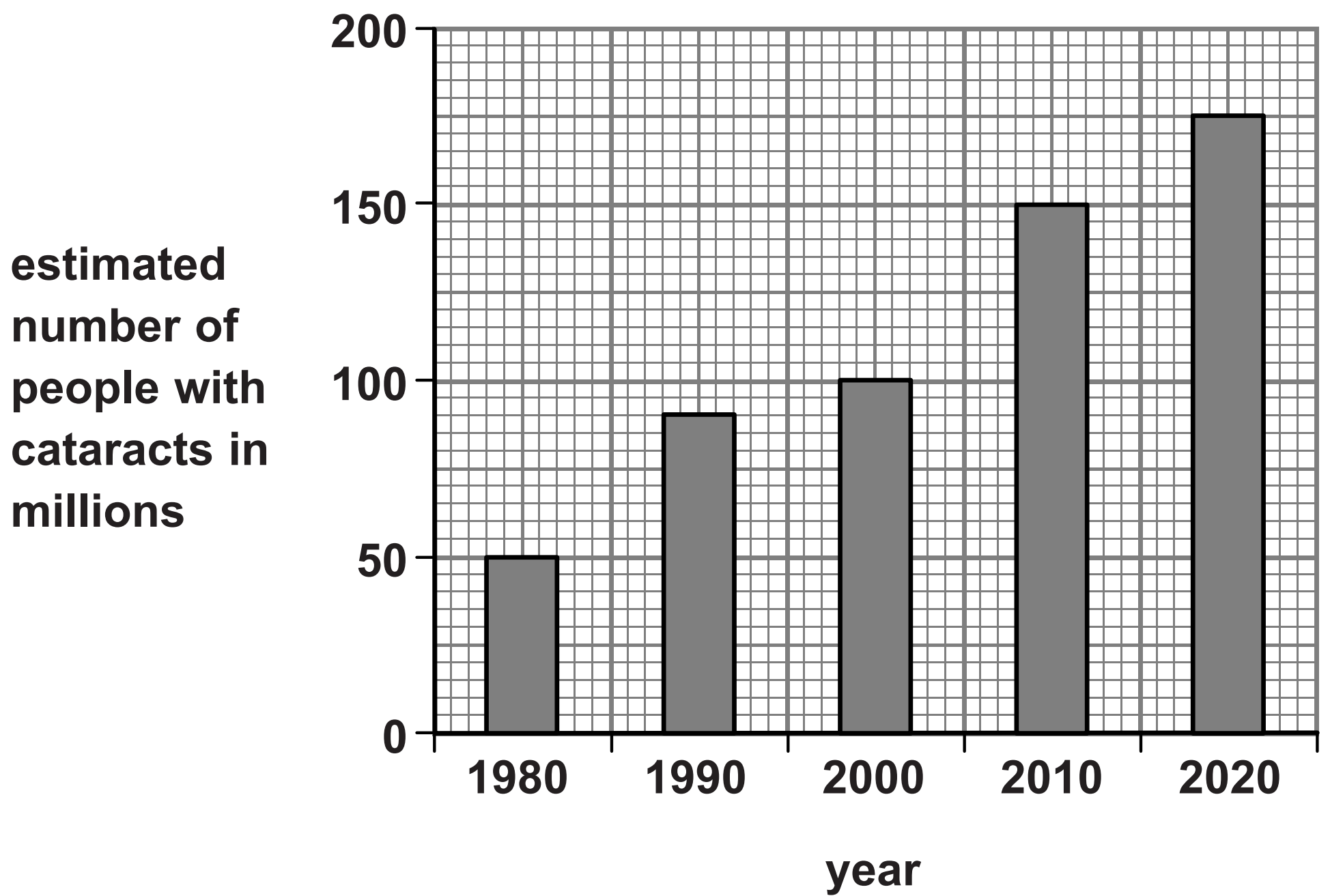
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**(Question continues on next page)**

(b) Figure 5 shows the estimated number of people with cataracts in the world between 1980 and 2020.



**FIGURE 5**

(Question continues on next page)

**Describe the change in the estimated number of people with cataracts between 1980 and 2020. (2 marks)**

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**(Question continues on next page)**

- (c) (i) Explain how cataracts are currently treated.  
(2 marks)**

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**(Question continues on next page)**

- (ii) Scientists are developing a new treatment using eye drops for cataracts.

Describe the advantages of using eye drops to treat cataracts rather than the current treatment. (2 marks)

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(TOTAL FOR QUESTION 4 = 9 MARKS)

(Questions continue on next page)

- 5 A student investigated the effect of enzyme concentration on the mass of product formed in one hour.

Figure 6 shows the results of this investigation.

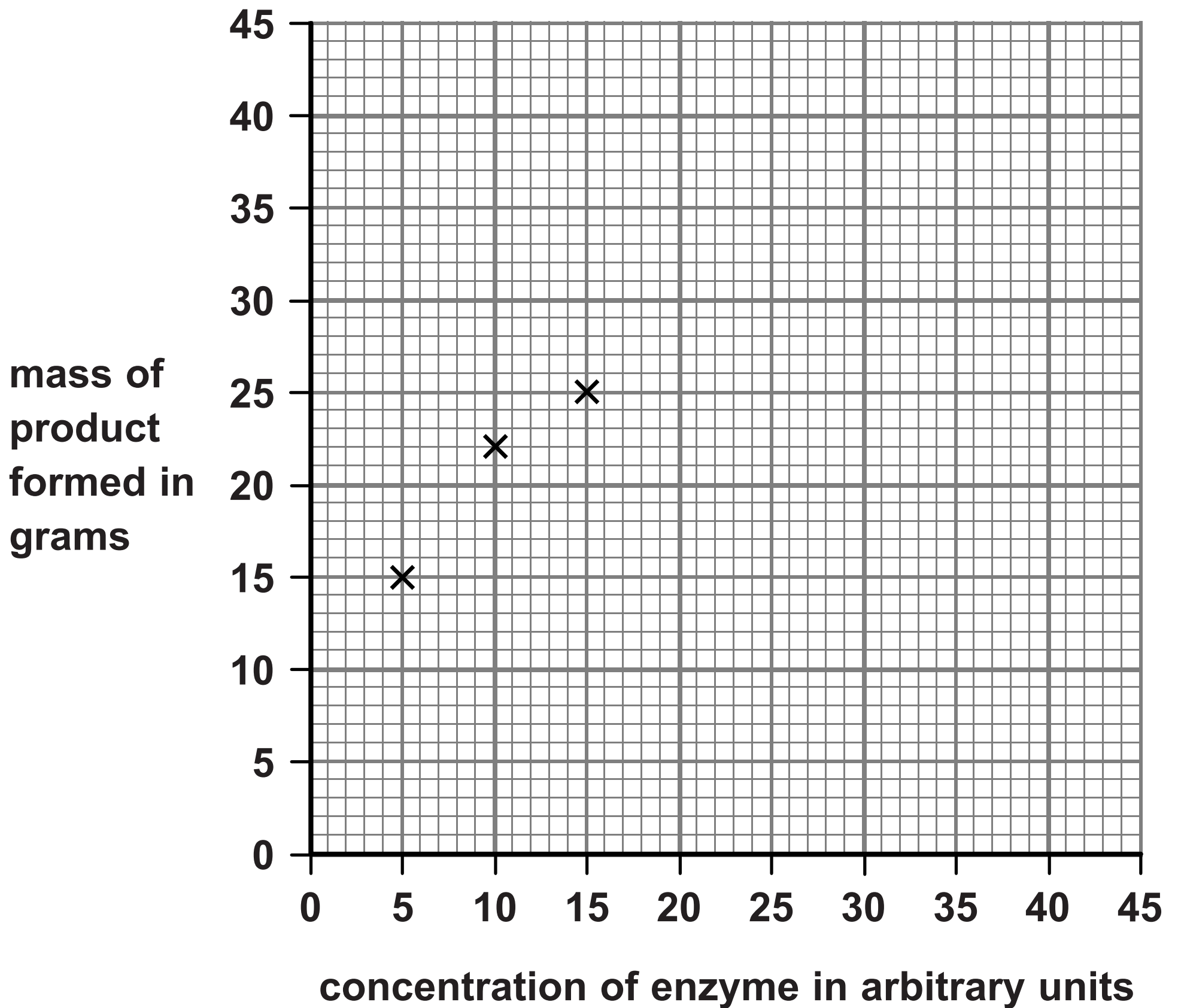
CONCENTRATION OF ENZYME IN ARBITRARY UNITS	MASS OF PRODUCT FORMED IN GRAMS
5	15
10	22
15	25
20	32
25	38
30	40
35	40
40	40

FIGURE 6

(Question continues on next page)

(Turn over)

- (a) Complete the graph by plotting the points and drawing a line to show the trend in the data. The first three points have been plotted for you. (2 marks)



(Question continues on next page)

- (b) Describe the effect that enzyme concentration has on the mass of product formed. (2 marks)**

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- (c) The ratio of enzyme concentration to the mass of product formed, using an enzyme concentration of 40 arbitrary units, is 1:1.**

**Calculate the ratio of enzyme concentration to product formed when the enzyme concentration is 5 arbitrary units. (2 marks)**

ratio\_\_\_\_\_



**(d) The investigation used the enzyme pepsin from the stomach, at a temperature of 37°C and at a pH of 7.**

**(i) Which statement gives one way to increase the mass of product formed in this investigation? (1 mark)**

- ☐ **A    increase the pH**
- ☐ **B    decrease the temperature**
- ☐ **C    decrease the enzyme concentration**
- ☐ **D    increase the substrate concentration**

**(Question continues on next page)**

**(ii) Explain why a temperature of 80°C was not used in this investigation. (3 marks)**

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**(TOTAL FOR QUESTION 5 = 10 MARKS)**

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**(Questions continue on next page)**

**(Turn over)**

- 6 (a) A student cut a piece of onion and placed it on a microscope slide.**

**The student then placed this slide on the stage of a light microscope and looked through the eyepiece.**

**No cells could be seen in the piece of onion.**

**Explain TWO ways this method could be improved to see details of the onion cells. (4 marks)**

**1** \_\_\_\_\_

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**(Continue your answer on next page)**

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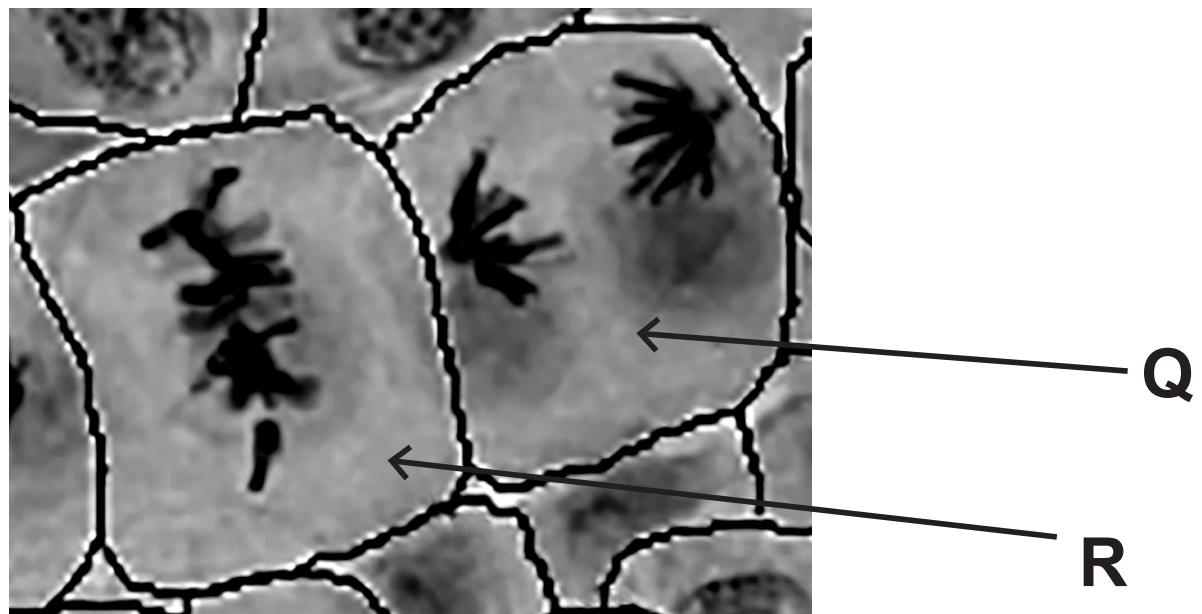
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(Question continues on next page)

(b) Figure 7 shows mitosis occurring in some plant cells.



**FIGURE 7**

(i) The cells in Figure 7 were taken from a rapidly growing part of a plant.

Which part of a plant has rapidly dividing cells? (1 mark)

- ☐ A chloroplast
- ☐ B epithelium
- ☐ C meristem
- ☐ D vacuole

(Question continues on next page)

(Turn over)

**(ii) Which stage of mitosis is shown in cell R?  
(1 mark)**

☐ **A    prophase**

☐ **B    metaphase**

☐ **C    anaphase**

☐ **D    telophase**

**(iii) Describe TWO genetic similarities of the new cells that would be produced by cell Q in Figure 7. (2 marks)**

**1** \_\_\_\_\_

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\_\_\_\_\_

**2** \_\_\_\_\_

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**(Question continues on next page)**

**(Turn over)**

(iv) The cells in Figure 7 were heated in hydrochloric acid.

State TWO safety precautions that should be taken when heating hydrochloric acid. (2 marks)

1 \_\_\_\_\_

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2 \_\_\_\_\_

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(Question continues on next page)

**(c) Explain ONE advantage of using an electron microscope to observe plant cells. (2 marks)**

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**(TOTAL FOR QUESTION 6 = 12 MARKS)**

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**(Questions continue on next page)**



- 7 (a) The human population is increasing, so more food needs to be produced.

Farmers use fertilisers to increase the yield of wheat.

A farmer wants to find out the optimum concentration of fertiliser to use on his wheat plants.

He has a stock solution of concentrated fertiliser which is stated as 100%.

He dilutes the stock solution to make 5%, 10%, 15% and 20% solutions.

He makes  $100\text{ cm}^3$  of each solution.

- (i) Describe how the farmer prepares  $100\text{ cm}^3$  of the 20% solution. (2 marks)

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- (ii) The farmer has 60 wheat plants.  
Each plant is 20 mm in height.**

**Devise a plan to find the optimum percentage solution of fertiliser for the growth of these wheat plants. (3 marks)**

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- (iii) The farmer improves this plan by controlling all the variables.

**State ONE variable that the farmer should control when growing these wheat plants.  
(1 mark)**

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**(Question continues on next page)**

**\*(b) Explain how plants protect themselves from being eaten by pests and against diseases caused by pathogens. (6 marks)**

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**(TOTAL FOR QUESTION 7 = 12 MARKS)**

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**(Questions continue on next page)**

**8 (a) Cirrhosis is a disease caused by prolonged alcohol abuse.**

**(i) Prolonged alcohol abuse causes cirrhosis of the (1 mark)**

☐ **A brain**

☐ **B liver**

☐ **C heart**

☐ **D skin**

**(ii) Give ONE reason why cirrhosis is described as a non-communicable disease. (1 mark)**

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**(Question continues on next page)**

**(Turn over)**

**(b) Obesity increases the risk of a person developing cardiovascular disease.**

**Losing weight can reduce the risk of this disease occurring.**

**Explain why exercise can cause weight loss.  
(2 marks)**

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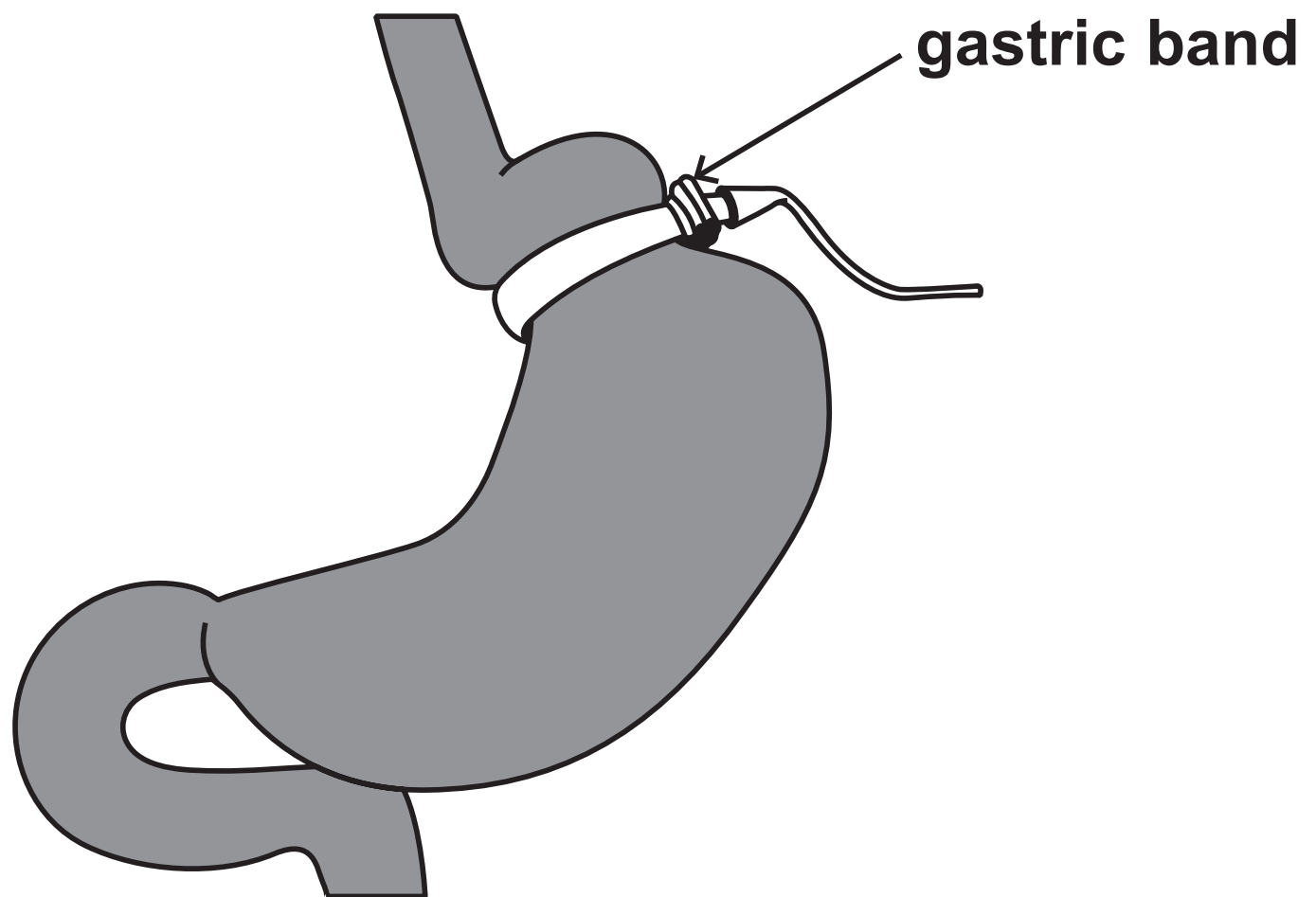
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**(Question continues on next page)**

(c) Figure 8 shows a gastric band fitted to a stomach.



**FIGURE 8**

**Explain how a gastric band helps a person to lose weight. (2 marks)**

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- (d) BMI and waist:hip ratio can be used to find out if a person is obese.

Figure 9 shows some data for two males.

male	BMI	waist:hip ratio
A	27.3	0.85
B	?	0.81

**FIGURE 9**

BMI is calculated using the equation:

$$\text{BMI} = \frac{\text{mass in kilograms}}{(\text{height in metres})^2}$$

(Question continues on next page)

- (i) Male B has a mass of 72 kg and a height of 1.81 m.

Calculate the BMI of male B.

Give the answer to 3 significant figures.  
(3 marks)

BMI = \_\_\_\_\_

(Question continues on next page)

(Turn over)

- (ii) Figure 10 shows the interpretation of BMI values.

BMI range	interpretation
below 18·5	underweight
18·5 – 24·9	normal
25·0 – 29·9	overweight
30·0 and above	obese

**FIGURE 10**

**Males with a waist:hip ratio above 0·90 are defined as abdominally obese.**

**Explain what the BMI and waist:hip ratio for male A shows about his weight distribution.  
(2 marks)**

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**(TOTAL FOR QUESTION 8 = 11 MARKS)**

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**(Questions continue on next page)**

- 9 (a) Figure 11 shows two potato chips.

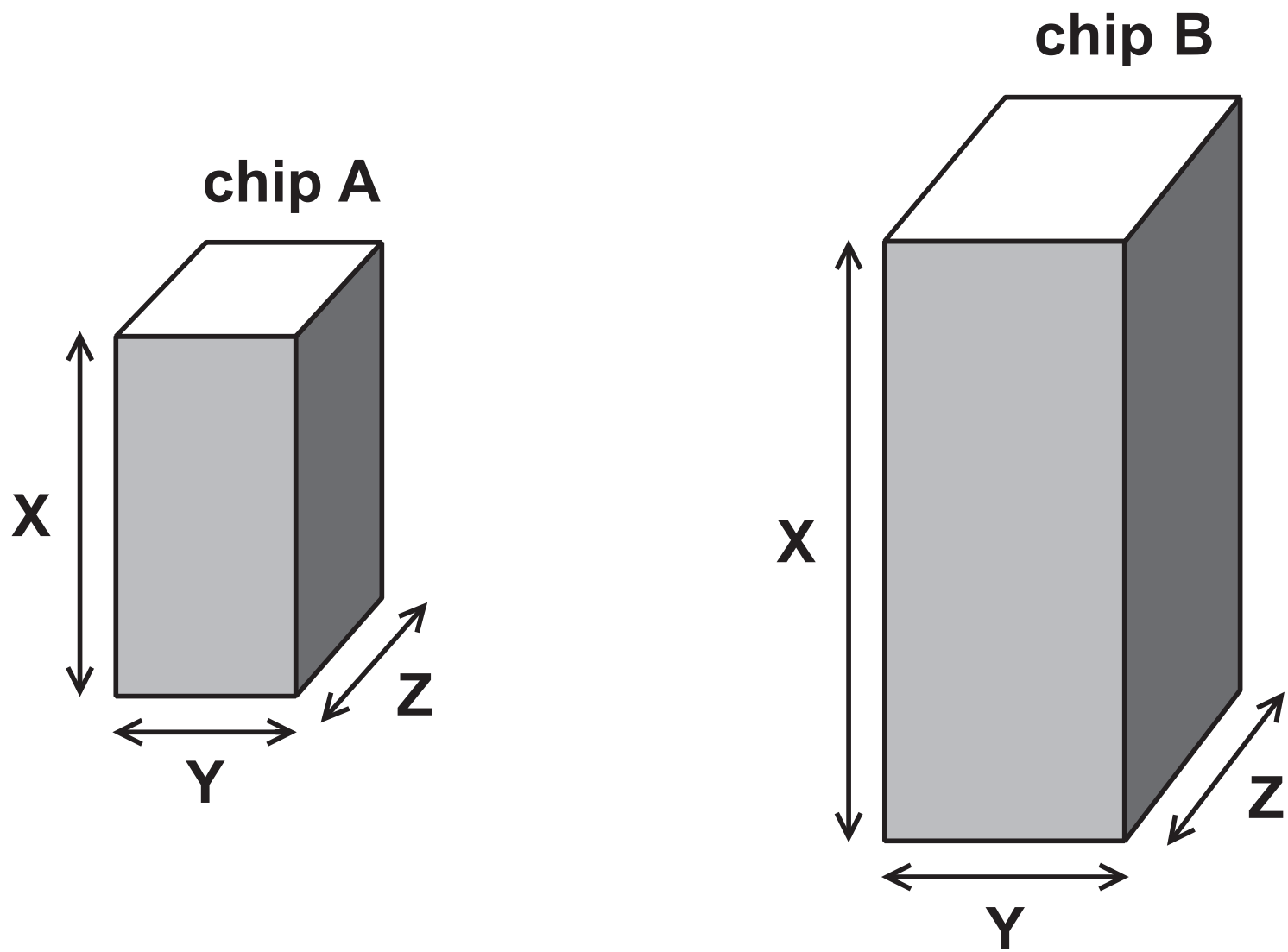


FIGURE 11

(Question continues on next page)

Figure 12 shows some information about each potato chip.

potato chip	length of X in cm	length of Y in cm	length of Z in cm	total surface area of four sides in cm <sup>2</sup>	total surface area of top and bottom in cm <sup>2</sup>	total surface area of chip in cm <sup>2</sup>
A	3.0	1.5	1.5	18.0	4.5	22.5
B	5.0	2.0	2.0	?	?	?

FIGURE 12

(i) Calculate the total surface area of potato chip B using the formula,

Total surface area =  $2XY + 2XZ + 2YZ$  (2 marks)

total surface area = \_\_\_\_\_ cm<sup>2</sup>  
(Question continues on next page) (Turn over)

- (ii) The potato chips were placed in distilled water for 20 minutes.

Figure 13 shows the increase in mass of each potato chip.

POTATO CHIP	INCREASE IN MASS IN GRAMS
A	0.1
B	0.3

**FIGURE 13**

Explain why potato chip B has a greater increase in mass than potato chip A.  
(2 marks)

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(Question continues on next page)

(Turn over)

**(iii) Potato chip A is transferred from the distilled water into a concentrated salt solution.**

**Explain what will happen to the cells in potato chip A. (3 marks)**

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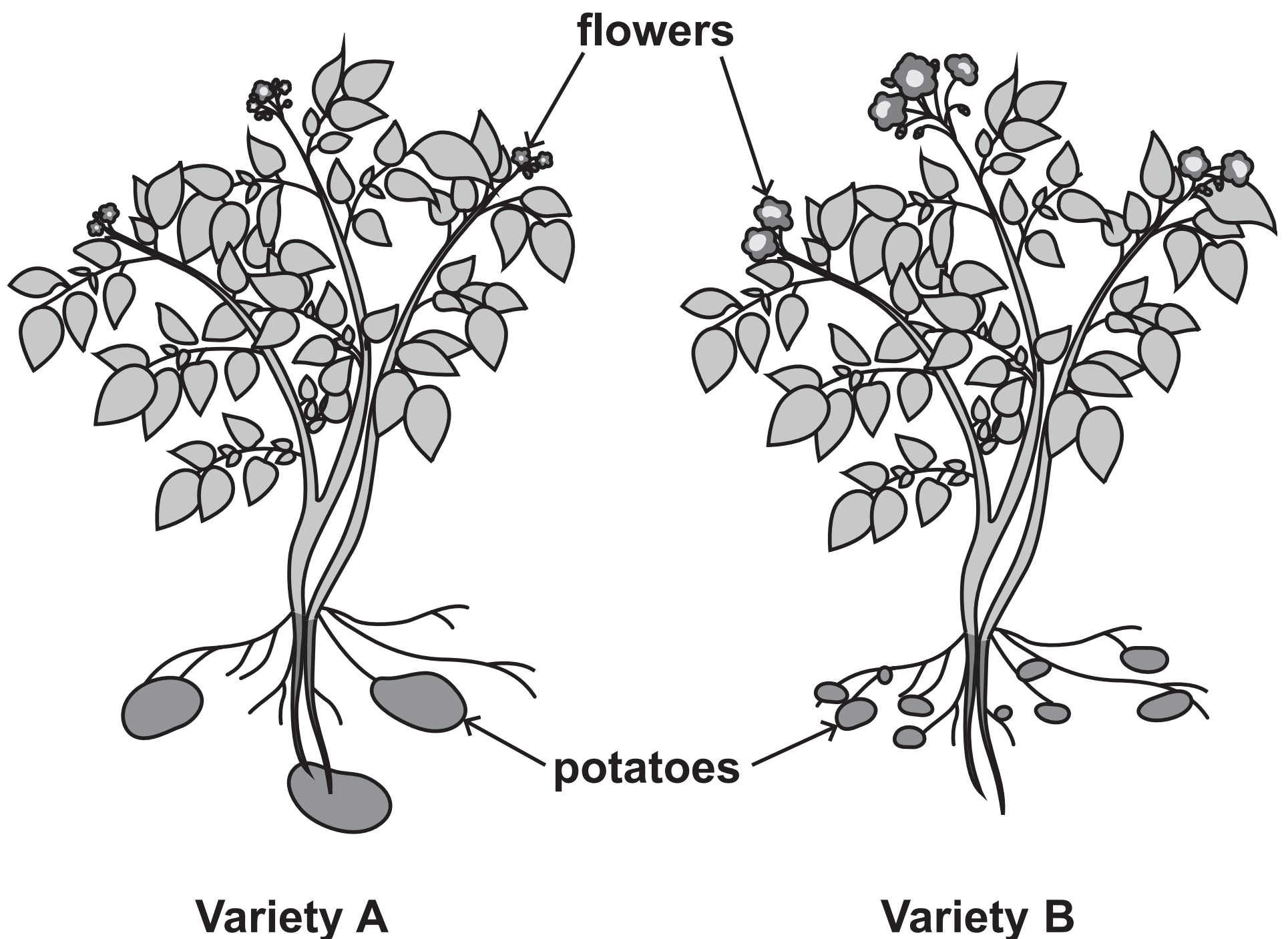
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**(Question continues on next page)**



**\*(b) Figure 14 shows two varieties of potato plant.**



- large potatoes
- few potatoes
- slow growing plant

- small potatoes
- many potatoes
- fast growing plant

**FIGURE 14**

**(Question continues on next page)**

**(Turn over)**

**New varieties of potato plant can be produced by selective breeding.**

**Explain how selective breeding of the two varieties of potato plants can produce new potato plants that are all faster growing and produce many, large potatoes. (6 marks)**

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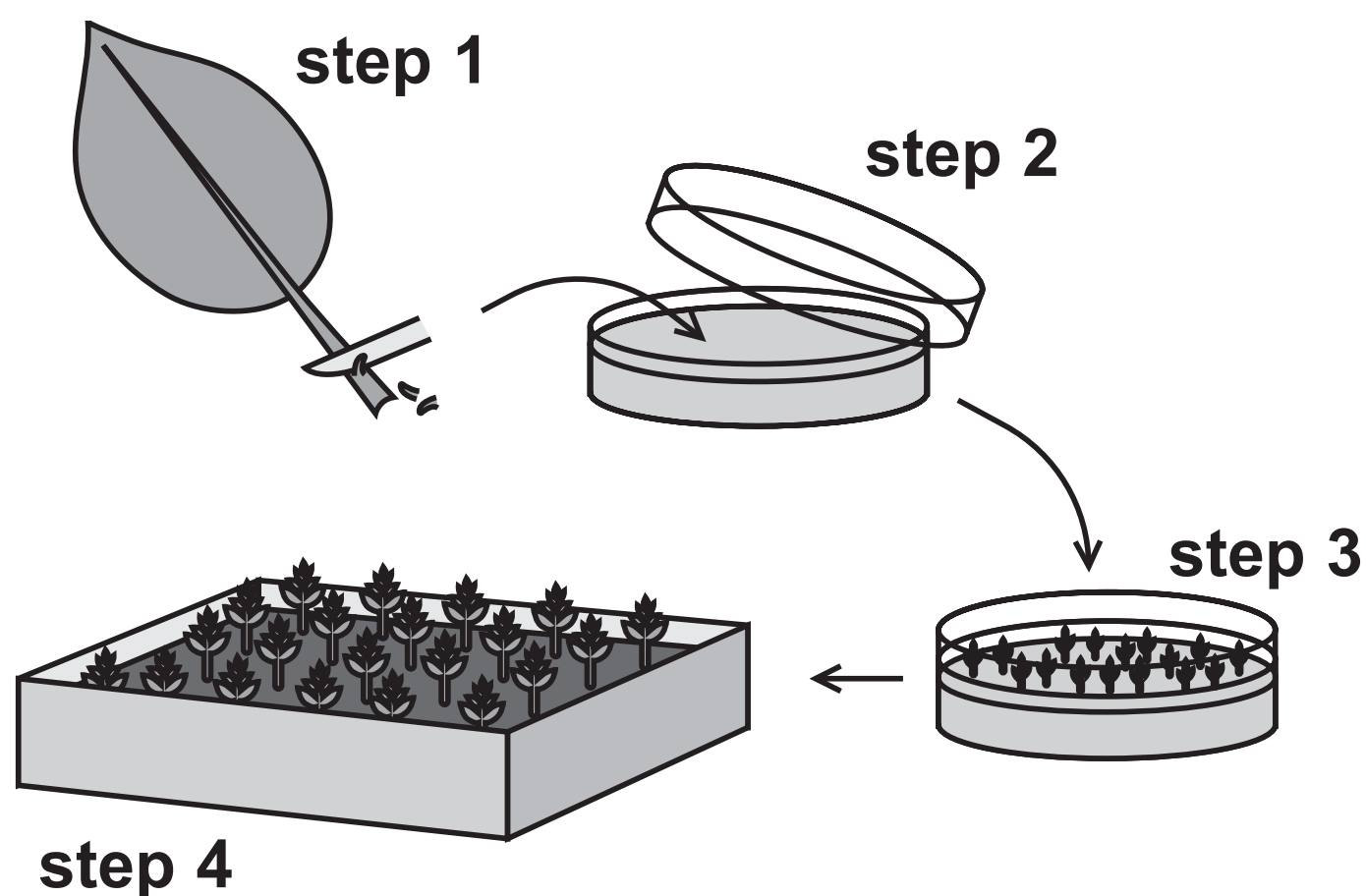
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**(TOTAL FOR QUESTION 9 = 13 MARKS)**

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**(Questions continue on next page)**

10 (a) Figure 15 shows a method of producing plants.



**Step 1. Cells taken from parent plant.**

**Step 2. Cells placed on agar growth medium.**

**Step 3. Cells develop into tiny plantlets.**

**Step 4. Plantlets grown in compost.**

**FIGURE 15**

- (i) Some cells in each plantlet develop into root cells.

Name the process occurring as these cells develop into root cells. (1 mark)

- (ii) Describe the advantages of producing plants by the method shown in Figure 15.  
(2 marks)

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(Question continues on next page)

- (iii) An autoclave is used to prepare the agar growth medium used in Step 2.

Explain why the agar growth medium is autoclaved. (2 marks)

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(Question continues on next page)

(iv) One of the plantlets had different coloured leaves.

Give ONE reason why this plantlet had different coloured leaves. (1 mark)

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(Question continues on next page)

**(b) Crop plants provide a source of energy in the form of carbohydrates such as starch and sugars.**

**(i) Describe the test to identify starch. (2 marks)**

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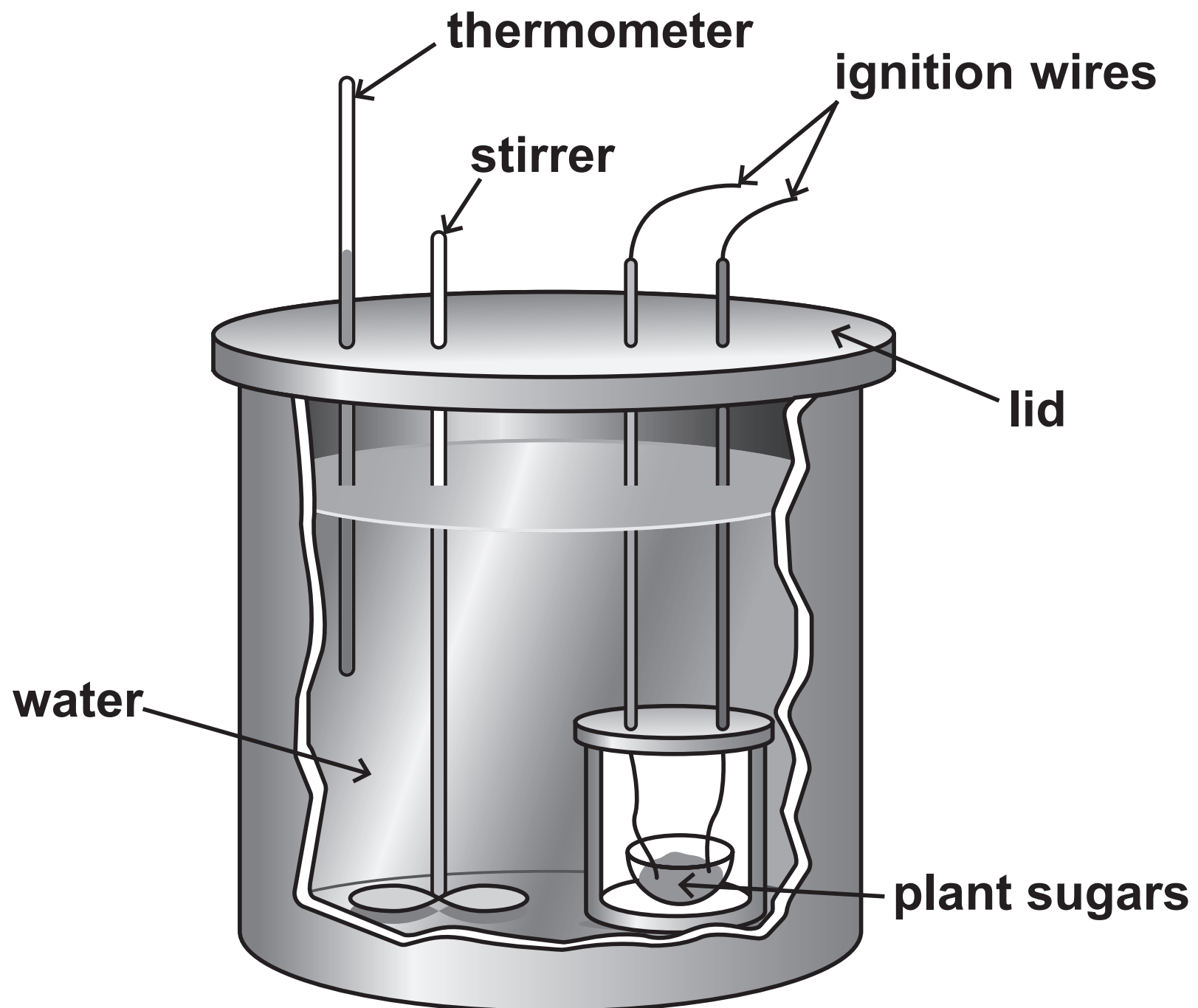
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**(Question continues on next page)**



- (ii) The amount of energy in the sugars extracted from crop plants can be measured using the calorimeter shown in Figure 16.



**FIGURE 16**

(Question continues on next page)

**Explain why the calorimeter has a lid.  
(2 marks)**

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**(Question continues on next page)**

(iii) State why it is important to stir the water in the calorimeter. (1 mark)

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**(TOTAL FOR QUESTION 10 = 11 MARKS)**

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**TOTAL FOR PAPER = 100 MARKS**  
**END**