



General Certificate of Secondary Education  
2025

Centre Number

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Candidate Number

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## Biology

Unit 1

Higher Tier

**MV24**

[GBL12]

TUESDAY 13 MAY, AFTERNOON

### Time

1 hour 15 minutes, plus your additional time allowance.

### Instructions to Candidates

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

**You must answer the questions in the spaces provided.**

**Do not write on blank pages.**

Complete questions in black ink and use a dark HB pencil for drawings and graphs.

**Do not write with a gel pen.**

Answer **all nine** questions.

## Information for Candidates

The total mark for this paper is **75**.

Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.

You may use a scientific calculator.

Quality of written communication will be assessed in Question **7(c)**.

1 (a) Complete the word equation for aerobic respiration. [3 marks]

energy

+

+

↑

+

oxygen

At rest, human muscles carry out aerobic respiration.

During strenuous exercise, the muscles can also carry out anaerobic respiration.

**(b)** Give **three** differences between aerobic respiration and anaerobic respiration in muscles. [3 marks]

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

Anaerobic respiration also takes place in yeast.

**(c) Give two differences between anaerobic respiration in muscles and in yeast.**

[2 marks]

1. \_\_\_\_\_

2. \_\_\_\_\_

**2** Zoysia grass is found in many gardens in the USA.

It grows rapidly during the spring but does not grow during the winter.

The photographs show the appearance of the same area of Zoysia grass during the spring and winter.

**Spring**



**Winter**



**(a)** Use evidence from the photographs to explain why Zoysia grass does not grow during the winter. [2 marks]

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During the winter, Zoysia grass stores minerals.

Three minerals needed by plants are nitrate, calcium and magnesium.

**(b)** Give the function of each of these minerals in plants. [3 marks]

Nitrate \_\_\_\_\_

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Calcium \_\_\_\_\_

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Magnesium \_\_\_\_\_

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During the winter, Zoysia grass also stores water so it can start growing again the following spring.

**(c)** Describe the change in **two other** abiotic factors which may cause Zoysia grass to start growing. [2 marks]

1. \_\_\_\_\_
2. \_\_\_\_\_

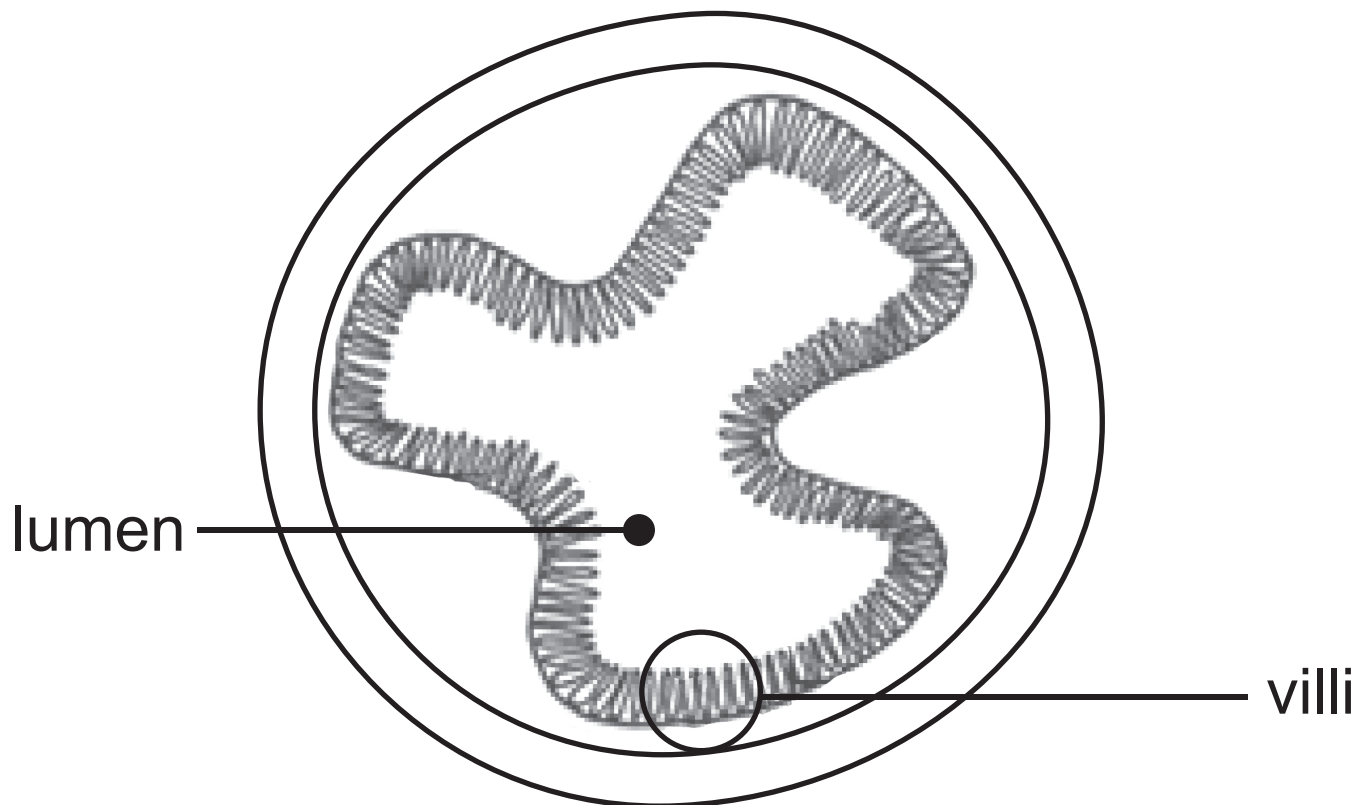
**3** The table shows one cell structure that is present in animal cells, bacterial cells and plant cells.

Complete the table by naming four cell structures that are present or absent in animal cells, bacterial cells and plant cells.  
[4 marks]

✓ = present	x = absent
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Cell structure	Type of cell		
	Animal	Bacterial	Plant
cytoplasm	✓	✓	✓
	x	✓	✓
	x	✓	x
	✓	✓	✓
	✓	x	✓

- 4 (a) The diagram shows a cross section of the ileum.



The villi adapt the ileum for absorption by providing a large surface area.

- (i) Describe **one** other way a large surface area is achieved in the ileum.  
[1 mark]

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(ii) Give **two** ways the **membrane** of a villus adapts the ileum for the absorption of digested food molecules. [2 marks]

1. \_\_\_\_\_
2. \_\_\_\_\_

(b) Describe and explain **two** ways the **membranes** of the structures labelled A adapt the ileum for the absorption of digested food molecules. [4 marks]

1. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
2. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(c) Name **one** digested food molecule absorbed in the ileum. [1 mark]

\_\_\_\_\_

- 5 (a) A scientist investigated how the diameter of the pupil of the eye changed in different light intensities.

The table shows her results.

<b>Light intensity /arbitrary units</b>	<b>Diameter of pupil /mm</b>
0	8.0
20	7.8
40	7.1
60	5.4
80	3.9

- (i) Calculate the percentage decrease in the diameter of the pupil when the light intensity changes from 0 to 80 arbitrary units. [4 marks]

Show your working.

Give your answer to **the nearest whole number**.

\_\_\_\_\_ %

**(ii)** Suggest why it is necessary for the pupil to decrease in size as the light intensity **increases**. [2 marks]

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**(iii)** Name the part of the eye which controls the size of the pupil. [1 mark]

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**(b)** Changes take place in the eye when focusing on near and distant objects.

**(i)** What term is used to describe these changes? [1 mark]

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**(ii)** Describe the changes which take place in the eye when focusing on a **distant** object. [3 marks]

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**6 (a)** The following sentences give information about some feeding relationships in a food web.

Grass is a producer.

Beetles, snails and mice are primary consumers.

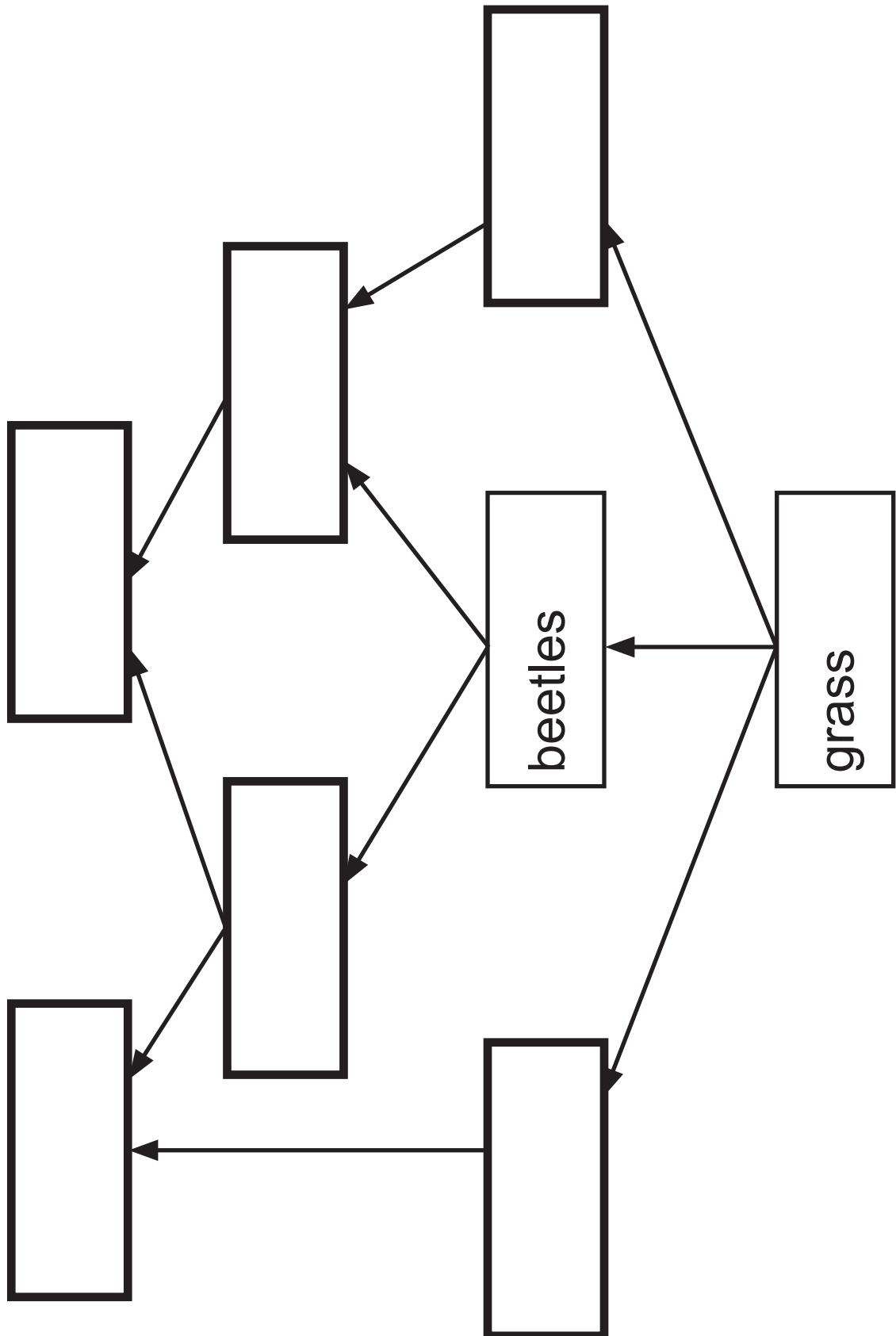
Thrushes and sparrows eat beetles.

Thrushes also eat snails.

Hawks are natural predators of sparrows and thrushes.

Owls prey on sparrows and mice.

- (i) Use the information in the sentences to **complete the food web**.  
[3 marks]






(ii) What term is used to describe the role of the thrushes in this food web?  
[1 mark]

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(b) The diagram shows a food chain from a different food web.



The table shows the numbers of each organism at each trophic level in the food chain.

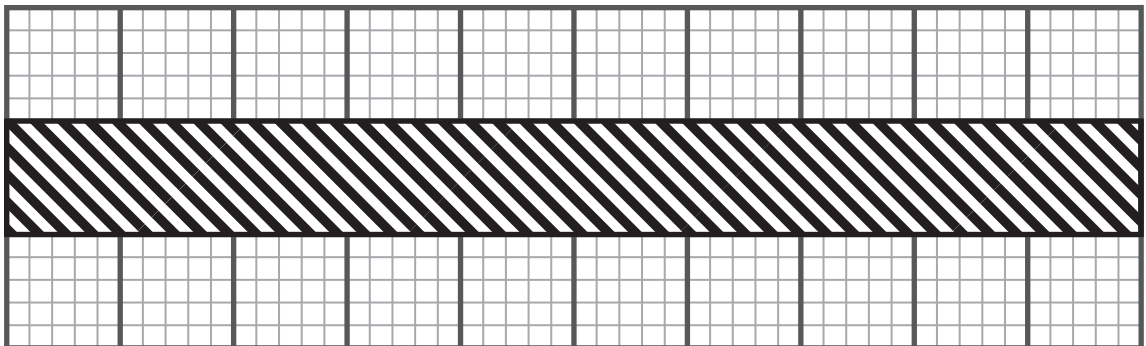
Organism	Number of each organism	Key
rose bush	8	
aphid	100	
ladybird	60	

- (i) Use the information in the table opposite to complete a pyramid of **numbers** for this food chain.  
[3 marks]

One of the trophic levels has been done for you.

Use a scale of **one** small square to represent **two** of each type of organism.

Use the key shown in the table.



A pyramid of **biomass** is a more accurate way of representing this food chain.

(ii) Give **two** disadvantages of using a pyramid of **numbers** rather than a pyramid of biomass to represent this food chain. [2 marks]

1. \_\_\_\_\_

2. \_\_\_\_\_

(iii) Give **one** advantage of using a pyramid of **biomass** to represent this food chain. [1 mark]

\_\_\_\_\_

\_\_\_\_\_

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**(Questions continue overleaf)**

7 The line graph opposite shows the blood glucose concentration of two people with diabetes.

Their blood glucose concentration was monitored over 24 hours.

(a) Give **two** pieces of evidence from the graph which shows that only **person B** has started treatment for diabetes.

[2 marks]

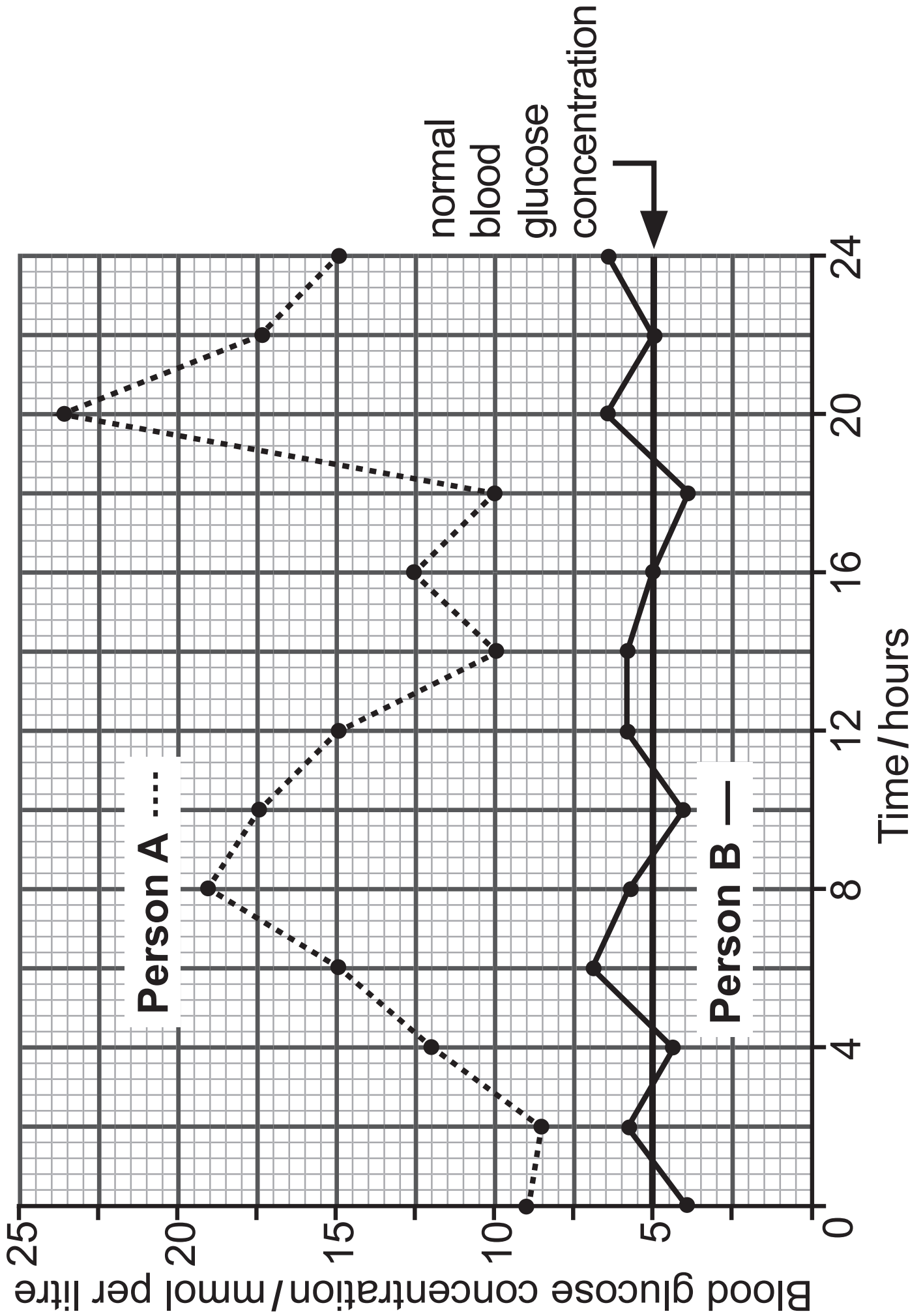
No data is required in your answer.

1. \_\_\_\_\_

2. \_\_\_\_\_

(b) Give **one** long-term effect on the health of **person A** if their diabetes remains untreated. [1 mark]

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- 8 The table shows the effect of temperature on the volume of carbon dioxide produced in respiration and the volume of carbon dioxide used in photosynthesis by a plant.

Temperature / °C	Volume of carbon dioxide / arbitrary units	
	produced in respiration	used in photosynthesis
5	4	3
15	7	7
25	16	26
35	21	24
45	18	20
55	6	7

- (a) Describe and explain the volume of carbon dioxide produced and used at 15°C. [3 marks]

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**(b)** Use the information in the table to suggest the optimum temperatures for respiration and photosynthesis.

[2 marks]

respiration \_\_\_\_\_ °C

photosynthesis \_\_\_\_\_ °C

**(c)** Give the temperature at which **most excess glucose** is produced by this plant.

Explain your answer and suggest what will happen to this excess glucose.

[3 marks]

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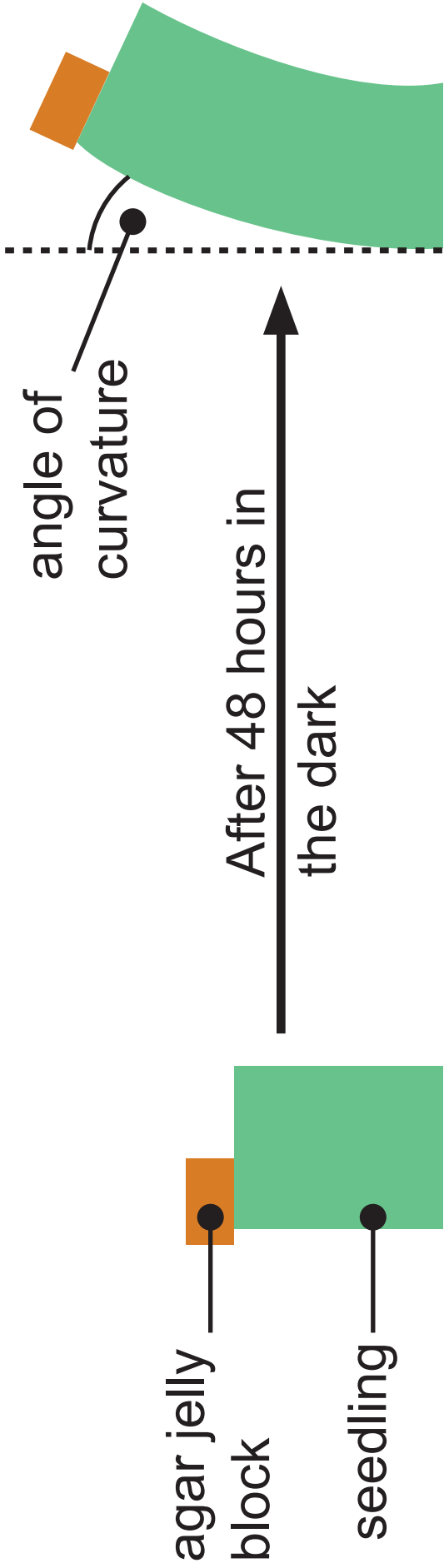
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**9** In an experiment on phototropism, wheat seedlings had their tips removed and agar jelly blocks, containing different concentrations of auxin (0 to 100 mg per litre), were placed on the top of the seedlings.

Auxin can diffuse through agar jelly blocks.

The seedlings with the agar jelly blocks attached were placed in the dark for 48 hours.

After this time, the length and angle of curvature of each seedling were measured.



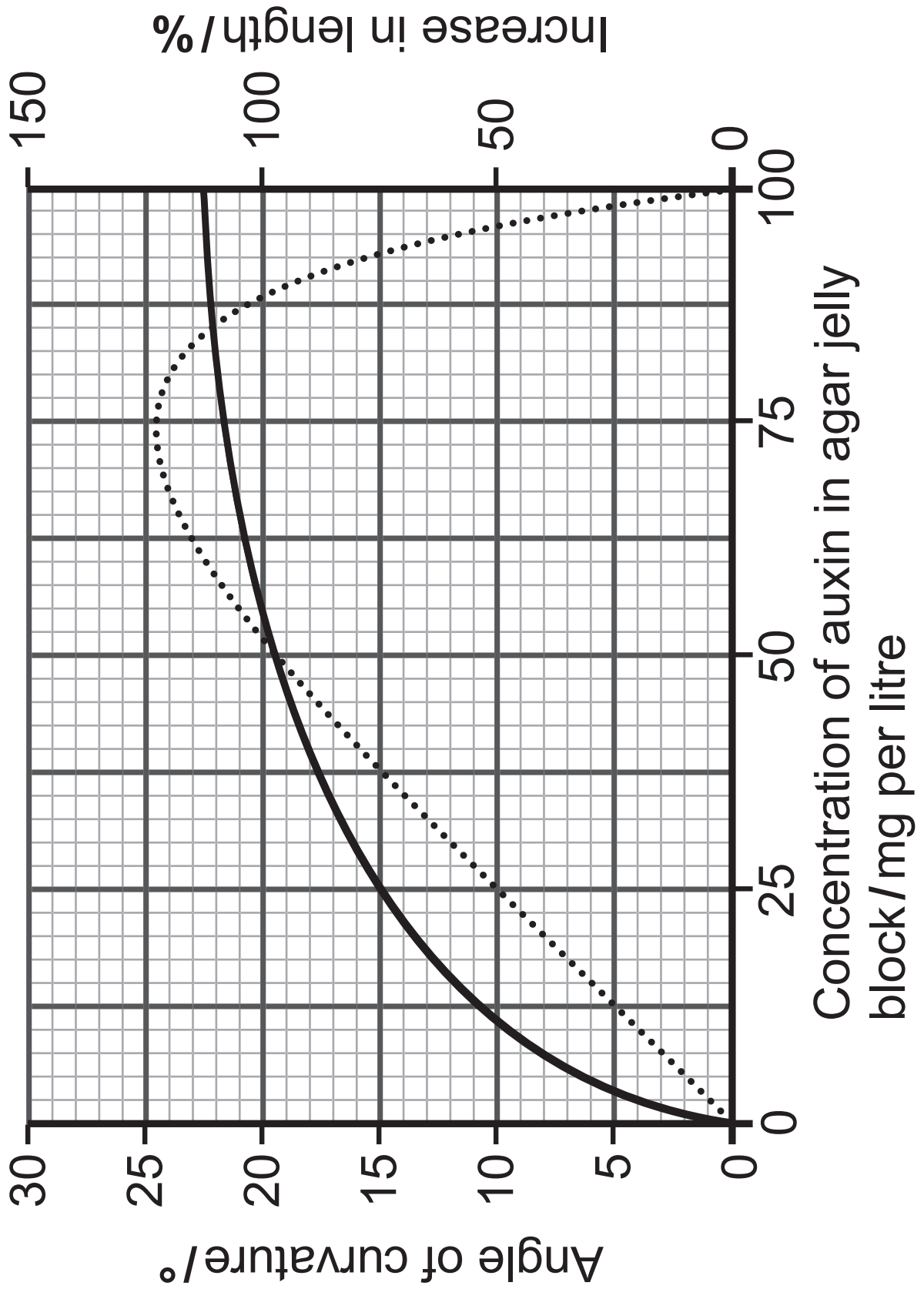
The graph opposite shows the angle of curvature and the percentage increase in length of each seedling after 48 hours, at different concentrations of auxin.

**(a)** Suggest why the seedlings with the agar jelly block attached were placed in the dark for 48 hours. [1 mark]

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**Key:**  
 — angle of curvature  
 ..... percentage increase in length



**(b)** Agar is a permeable material.

**(i)** Suggest why it was important that the block containing the auxin was permeable. [1 mark]

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**(ii)** Describe and explain the results for the angle of curvature of the seedlings with **no auxin** in the agar jelly block. [2 marks]

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**(c) (i)** Use the graph to predict the **final length** and angle of curvature of a 8 mm seedling with an agar block containing an auxin concentration of 50 mg per litre. [3 marks]

Show your working.

Final length \_\_\_\_\_ mm

Angle of curvature \_\_\_\_\_ °

(ii) Explain how the auxin caused these changes in length and angle of curvature. [3 marks]

No data is required in your answer.

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question paper**

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Question Number	Marks
1	
2	
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<b>Total Marks</b>	
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Examiner Number

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