Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2022

# Biology

Unit 1
Higher Tier

**[GBL12]**

*GBL12*

**TUESDAY 17 MAY, MORNING**

**TIME**

1 hour 15 minutes.

**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 outside the boxed area on each page or on blank pages.**
Complete in black ink only. **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 down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **7**.

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**1** **(a)** Farmers apply fertiliser to soil used to grow crops.

Fertiliser adds minerals to the soil which increase crop yield.

Minerals in the soil are used by plants.

**(i)** Name the cells in a plant which take up minerals from the soil.

_____ [1]

**(ii)** Name the process used by these cells to take up minerals from the soil.

_____ [1]

**(iii)** Give **one** way these cells are adapted to take up minerals from the soil.

_____

_____ [1]

**(b)** A scientist carried out an investigation to find the best mass of fertiliser to apply to a crop.

He sowed the same number of oat seeds in each of six equal-sized plots.

Plot 1 had no fertiliser applied.

Plots 2 to 6 had different masses of the same fertiliser applied.

He recorded the yield of the oat crop in each plot after 6 months.

The table shows his results.

| Plot | Mass of fertiliser applied / kg | Yield of oat crop / kg |
|---|---|---|
| 1 | 0 | 50 |
| 2 | 20 | 120 |
| 3 | 40 | 150 |
| 4 | 60 | 170 |
| 5 | 80 | 180 |
| 6 | 100 | 180 |

Look at the table.

**(i)** Calculate the percentage change in yield of oat crop when the mass of fertiliser applied was increased from 20 to 80 kg.

Show your working.

_____ % [3]

**(ii)** Describe the trend shown in the scientist's results.

_____

_____

_____ [2]

**(iii)** The oat crop was able to grow in plot 1 even though no fertiliser was applied.

Suggest why.

_____

_____ [1]

**(iv)** Fertilisers are expensive.

Explain why a farmer should not apply 100 kg of fertiliser to his oat crop.

_____

_____

_____

_____ [2]

**[Turn over**

**2** **(a)** Dead leaves are decomposed by fungi.

**(i)** What term is used to describe decomposers such as fungi?

_____ [1]

**(ii)** Describe how fungi feed on dead leaves.

_____

_____

_____

_____

_____

_____

_____

_____ [3]

**(b)** A student investigated two conditions needed for the decomposition of dead leaves.

She weighed the leaves and then left them in different conditions for 28 days.

She reweighed the leaves and calculated the percentage mass **remaining**.

The table shows her results.

| Temperature / °C | Water available for decomposers | Percentage mass of leaves remaining |
|---|---|---|
| 10 | low | 82 |
| 10 | high | 62 |
| 30 | low | 76 |
| 30 | high | 38 |
| 60 | low | 86 |
| 60 | high | 86 |

**(i)** Use evidence from the table to give the best conditions for the decomposition of dead leaves.

Explain your choice.

_____

_____

_____

_____

_____

_____ [2]

**(ii)** Suggest an explanation for the results at 60°C.

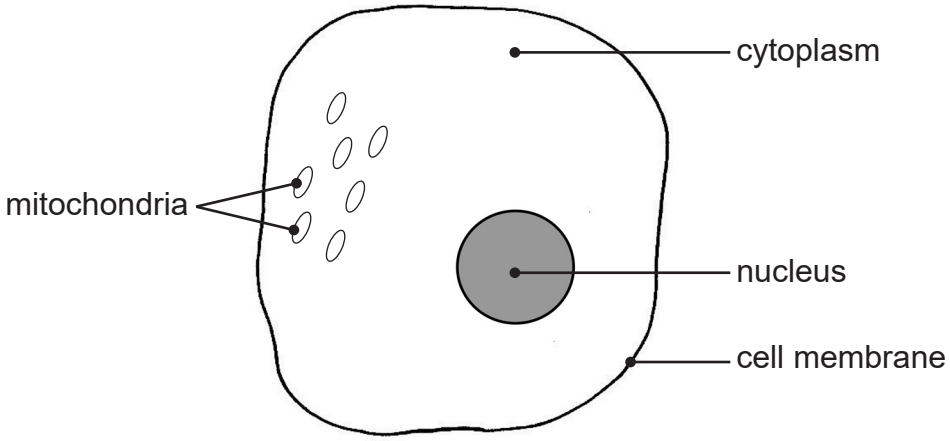
_____

_____ [1]

**[Turn over**



**3** The diagram shows some parts of an animal cell.




**(a)** Give the function of the

mitochondria. _____

_____

cytoplasm. _____

_____

nucleus. _____

_____

cell membrane. _____

_____ [4]

**(b)** Explain how the cell membrane is adapted to carry out its function.

_____

_____

_____ [1]

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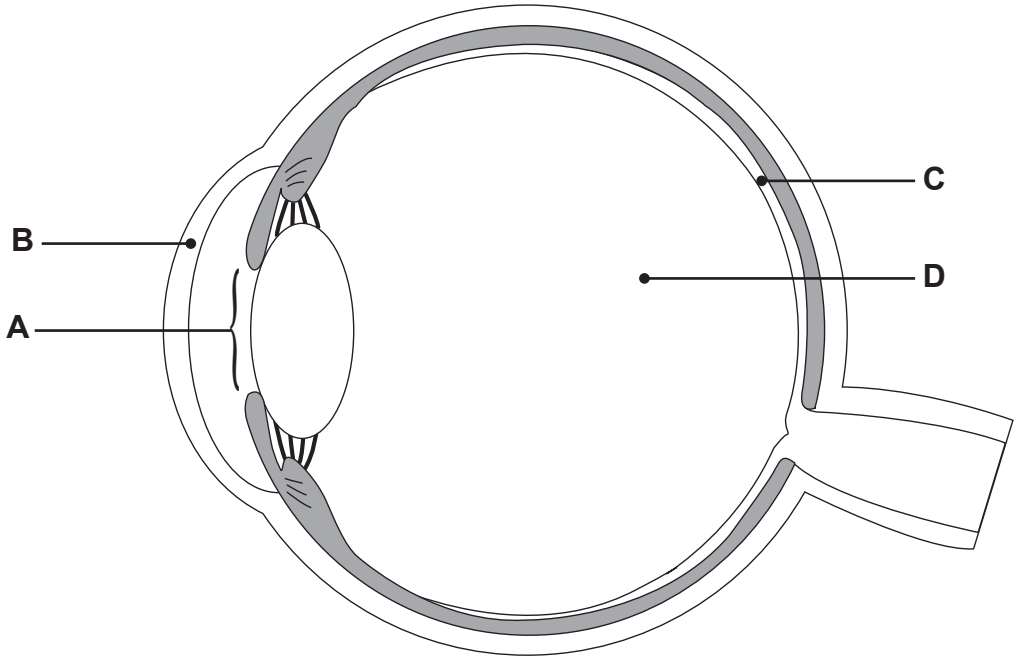
**(Questions continue overleaf)**

**4** **(a)** The diagram shows a section through an eye focusing on a **near** object.






**(i)** Name parts **A**, **B** and **C**.

**A** _____

**B** _____

**C** _____ [3]

**(ii)** Name part **D** and give its function.

**D** _____

Function _____

_____

_____ [2]

**(b)** Changes take place in the eye when focusing on a **distant** object.

**(i)** What term is used to describe these changes?

_____ [1]

**(ii)** Describe the changes that take place in the eye when focusing on a **distant** object.

_____

_____

_____

_____

_____

_____

_____ [3]

**[Turn over**

**5** **(a)** Blood glucose concentration is controlled by a hormone.

**(i)** What is a hormone?

_____

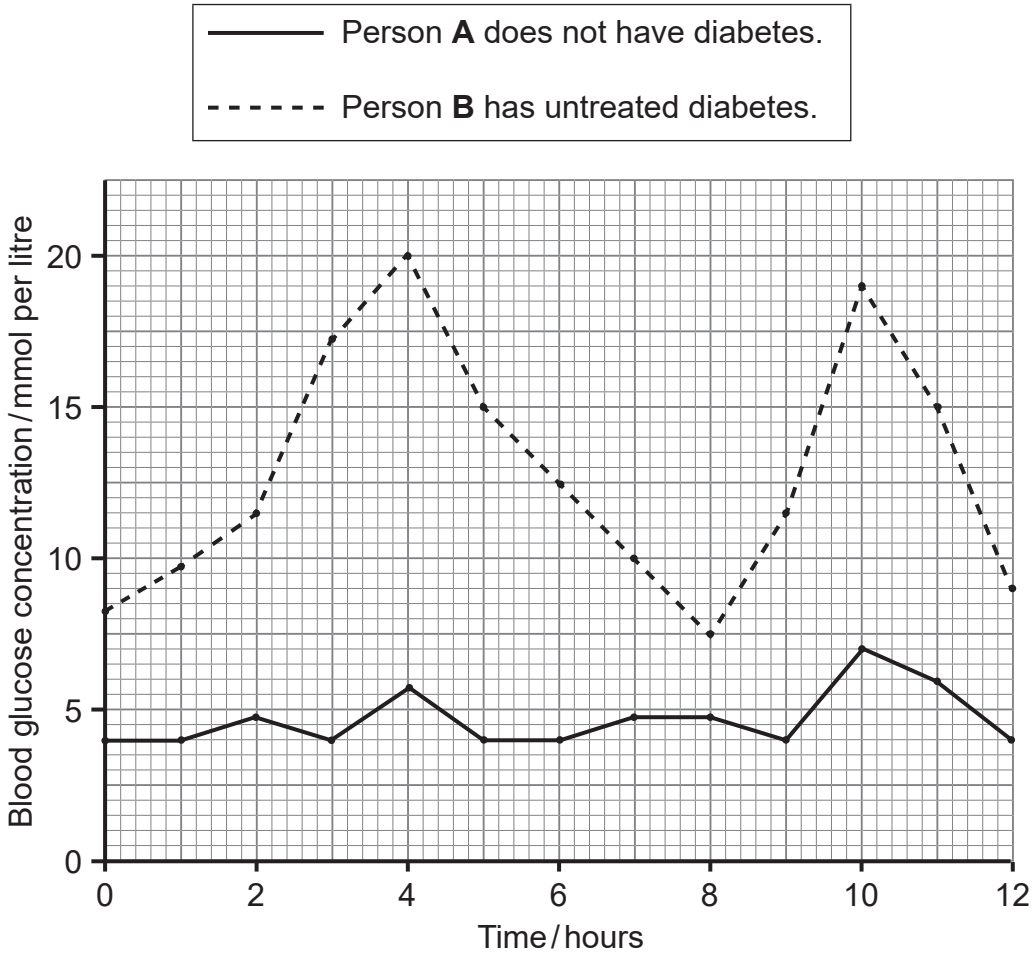
_____

_____ [2]

**(ii)** Name the hormone which controls blood glucose concentration.

_____ [1]

**(b)** The graph shows the blood glucose concentrations of two people, **A** and **B**, over a period of 12 hours.



**(i)** Use the graph to give the **range** for normal blood glucose concentration.

_____ mmol per litre [1]

**(ii)** Give **two** pieces of evidence from the graph which suggests person **B** has untreated diabetes.

1. _____

_____

_____

2. _____

_____

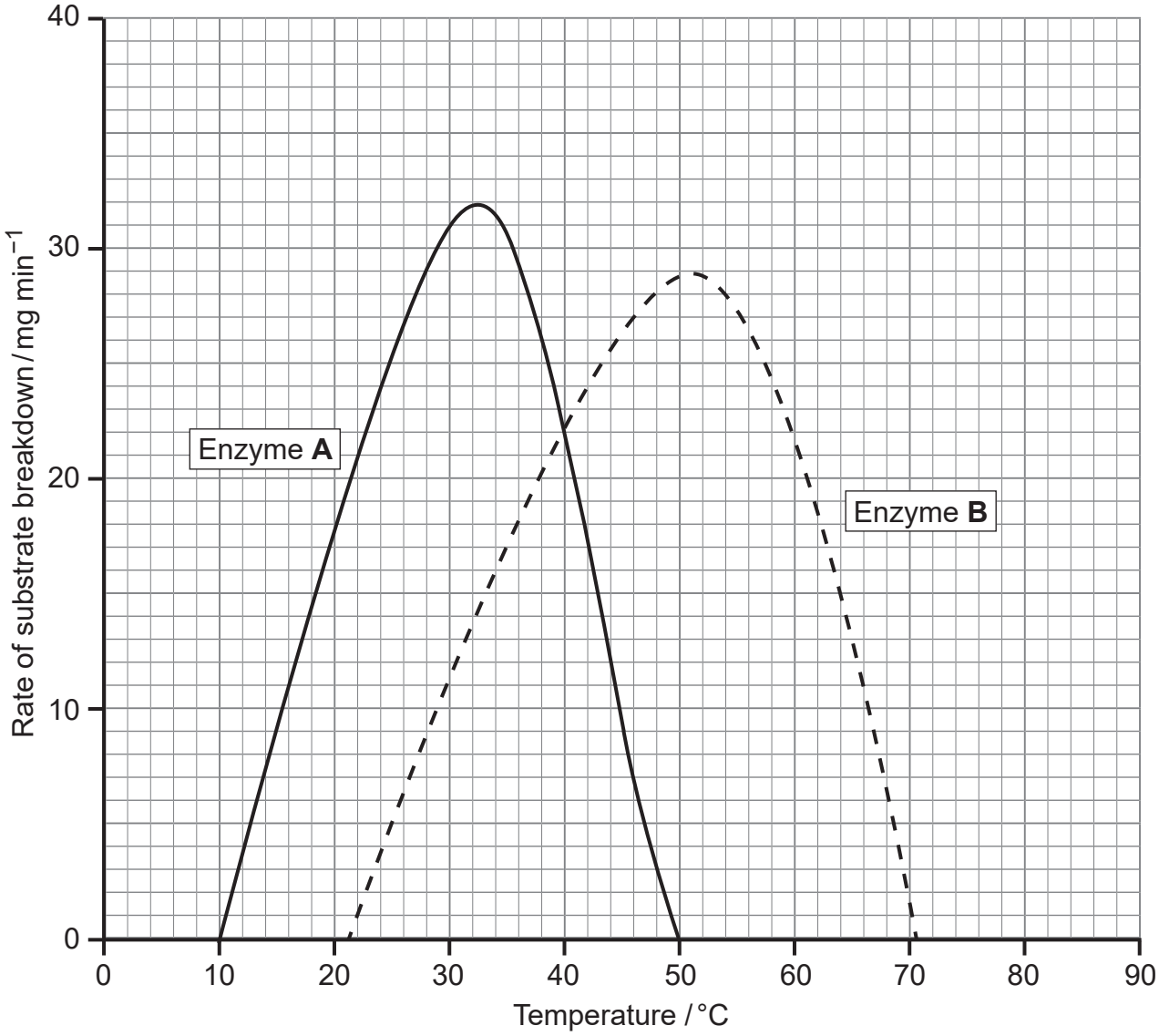
_____ [2]

**(iii)** Give **one** long-term effect of untreated diabetes.

_____ [1]

**[Turn over**

**6** **(a)** The graph shows the effect of temperature on the rate at which two different enzymes found in a biological washing powder break down a substrate.




**(i)** Explain what is meant by the optimum temperature of an enzyme.

_____

_____

_____ [1]

**(ii)** Give the optimum temperature of enzyme **A**.

_____°C [1]

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**(b)** Enzyme **B** takes 84 minutes to break down 420 mg of substrate at 25°C.

**(i)** Use the graph to calculate how long it would take enzyme **A** to break down 420 mg of substrate at 25°C.

Show your working.

_____ minutes [3]

**(ii)** Describe **two other** ways the activity of enzyme **B** differs from the activity of enzyme **A**.

1. _____

_____

_____

2. _____

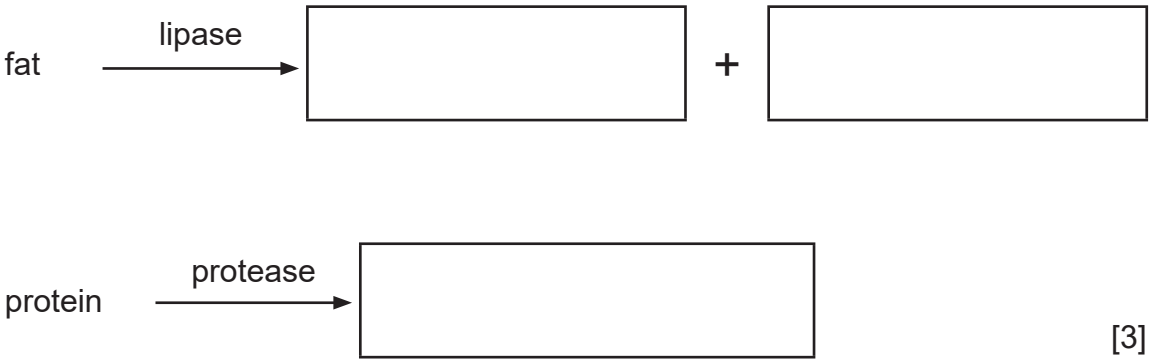
_____

_____ [2]

**[Turn over**

Enzyme **A** is a lipase and enzyme **B** is a protease found in this washing powder.

**(c)** Fill in the boxes to show the products of fat and protein digestion.




[3]

**(d)** Using this washing powder, what is the best temperature to remove a stain containing both fat and protein?

Use evidence from the graph to help explain your answer.

Temperature _____ °C

Explanation _____

_____

_____ [2]

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**(Questions continue overleaf)**

**7** Describe and explain how the structure of the ileum is adapted to its function of absorbing the products of digestion.

**In this question, you will be assessed on your written communication skills, including the use of specialist scientific terms.**

[6]

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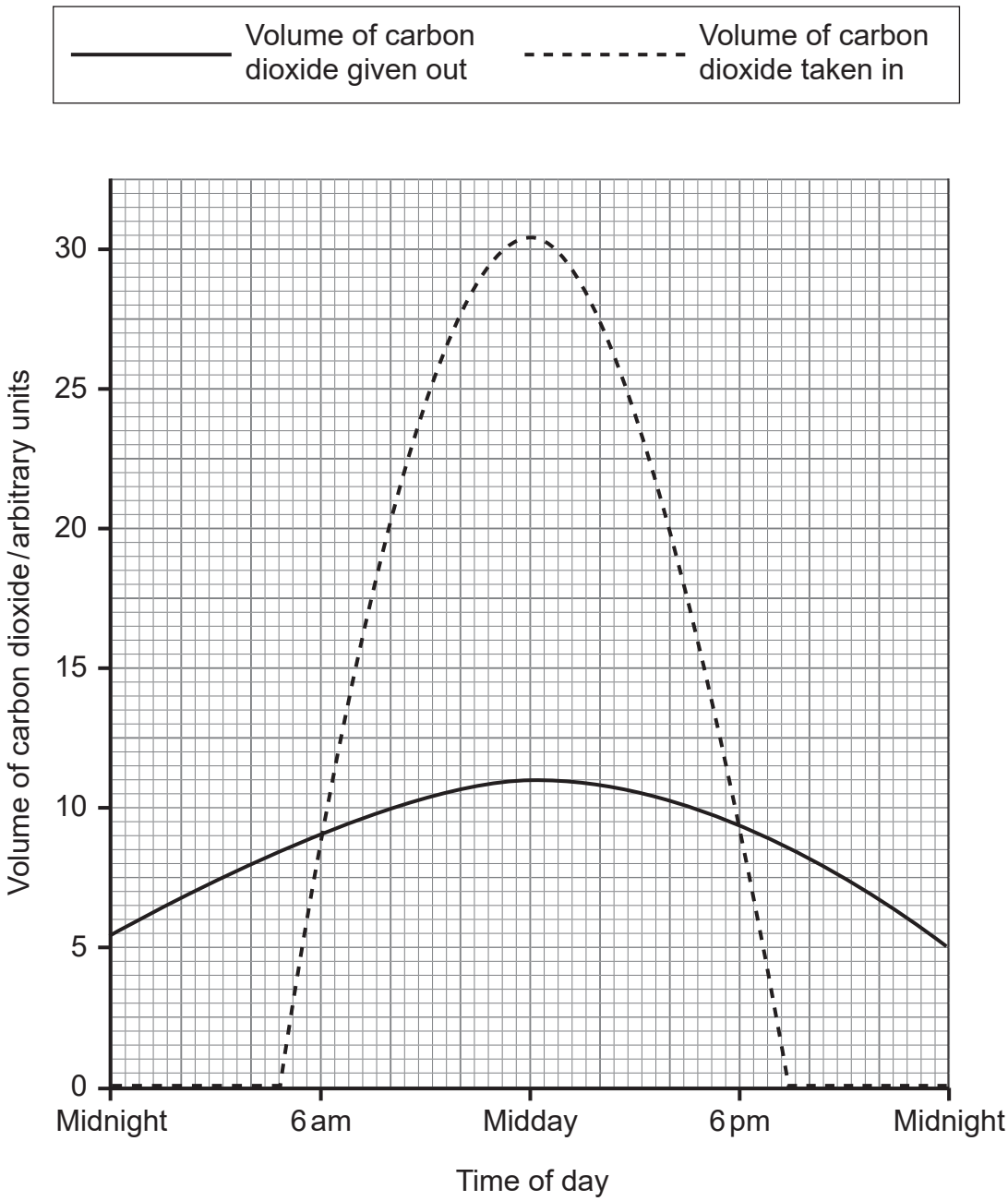
**(Questions continue overleaf)**

**8** The graph shows the volume of carbon dioxide given out and taken in by a plant over a 24-hour period in summer.




*Source: Principal Examiner*

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**(a)** Explain the difference in the volume of carbon dioxide given out and taken in between midnight and 4 am.

_____

_____

_____

_____

_____

_____

_____ [3]

**(b)** Suggest at which time of day the growth rate of the plant would be highest.

Use **data** from the graph to help explain your answer.

Time of day _____

Explanation _____

_____

_____

_____

_____ [3]

**[Turn over**

**(c)** Suggest an explanation for the volumes of carbon dioxide given out **and** taken in at 6 am and 6 pm.

Use **data** from the graph to support your answer.

[4]

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**(Questions continue overleaf)**

**[Turn over**

**9** Scientists investigating phototropism cut the tip of a seedling in two places and placed an agar jelly block into each cut.

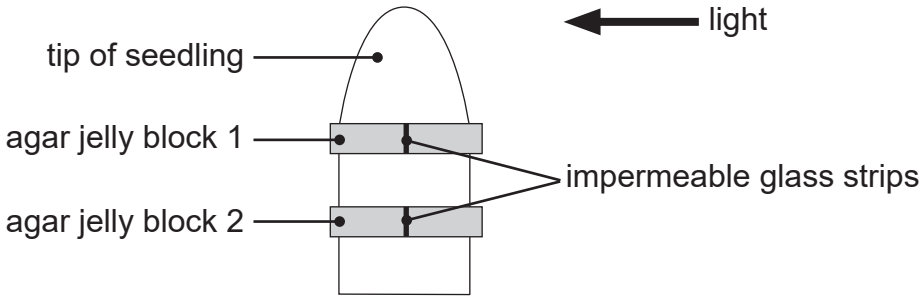
Agar jelly blocks are permeable and allow hormones to move through them.

Each agar jelly block had an impermeable glass strip placed in the middle of the block.

The seedling was then left with a light shining from one side for 24 hours.

Diagram A shows the experimental set-up.

**Diagram A**




**(a)** Name the hormone involved in phototropism.

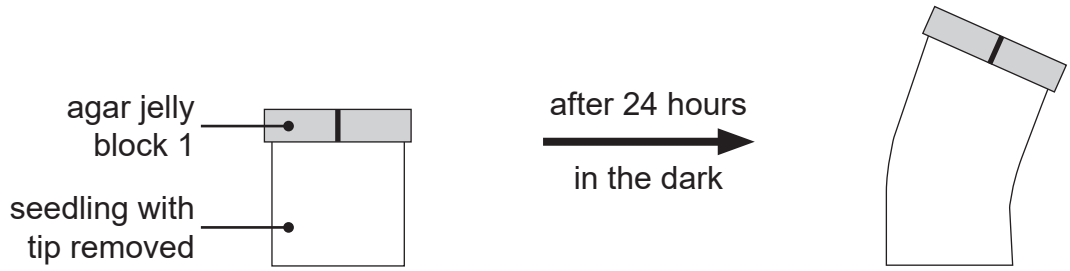
_____ [1]

After 24 hours agar jelly blocks 1 and 2 were removed and placed on **different** seedlings which had their tips removed.

The seedlings were then left in the **dark** for 24 hours.

Diagram B shows the results for the seedling which had agar jelly block 1 placed onto it.

**Diagram B**



**(b)** Explain how the distribution of the hormone in agar jelly block 1 brought about this result after 24 hours.

[4]

**(c)** The scientists compared the results obtained using agar jelly block 2 with those obtained with agar jelly block 1.

They concluded that there was more hormone in agar jelly block 1.

**(i)** Explain why there was more hormone in agar jelly block 1 than in agar jelly block 2.

[2]

The result for the seedling with agar jelly block 1 is shown in diagram B.

**(ii)** Suggest how the result for the seedling with agar jelly block 2 would differ from the result for the seedling with agar jelly block 1.

[1]

Sources: All images © CCEA unless stated otherwise

## THIS IS THE END OF THE QUESTION PAPER

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| For Examiner's use only | |
|---|---|
| Question Number | Marks |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| Total Marks | |

Examiner Number