



General Certificate of Secondary Education
2024

Centre Number

--	--	--	--	--

Candidate Number

--	--	--	--	--

Biology

Unit 1

Higher Tier



[GBL12]

GBL12

FRIDAY 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

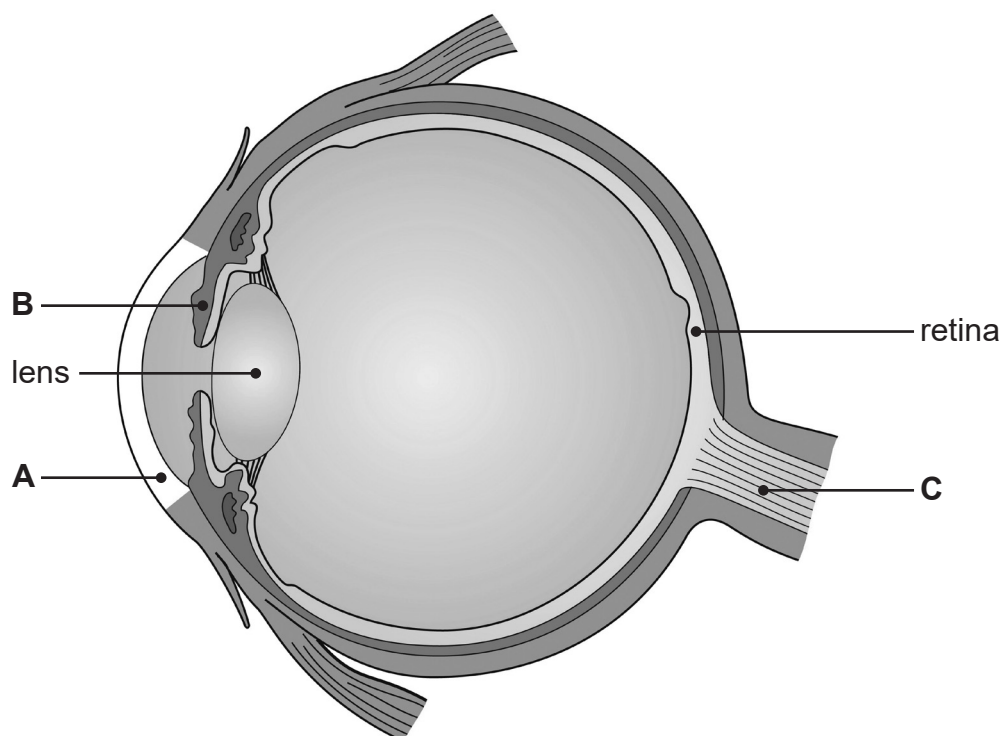
The total mark for this paper is **75**.

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 **8(b)**.



1 The diagram shows a section through an eye.



Source: © Science Photo Library

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

A _____

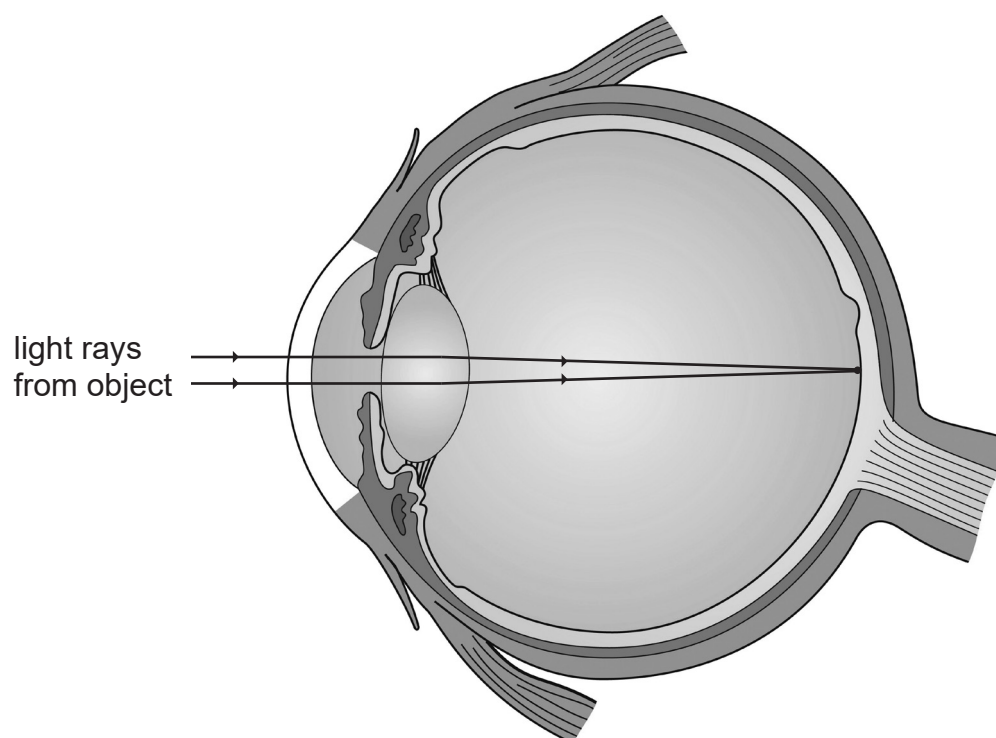
B _____

C _____

[3]



The diagram shows light rays from an object entering the eye through the pupil.



Source: © Science Photo Library

(b) Use the diagram to explain how we see an image of an object.

[4]

[Turn over]

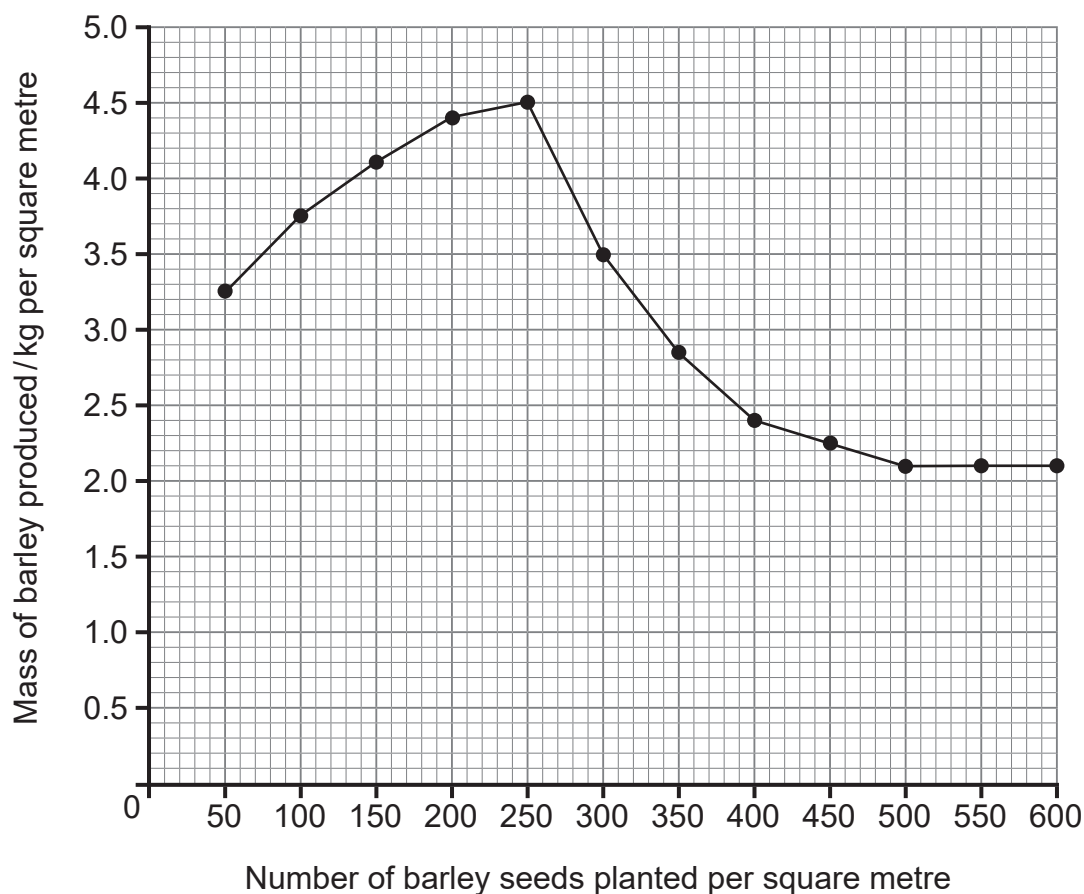


- 2 Scientists carried out an investigation into the mass of barley produced when different numbers of barley seeds were planted in test plots.

The scientists planted different numbers of barley seeds per square metre in these test plots.

They recorded the mass of barley produced in each test plot after six weeks.

The graph shows their results.



Source: Chief Examiner



(a) Describe the trend shown by the results.

Use **data** to support your answer.

[4]

(b) When the number of barley seeds planted per square metre was large, competition between the barley plants increased.

One resource the barley plants compete for is light.

(i) Suggest how competition for light caused the changes shown in the graph when more than 300 barley seeds were planted per square metre.

[2]

(ii) Give **two** other resources the barley plants compete for.

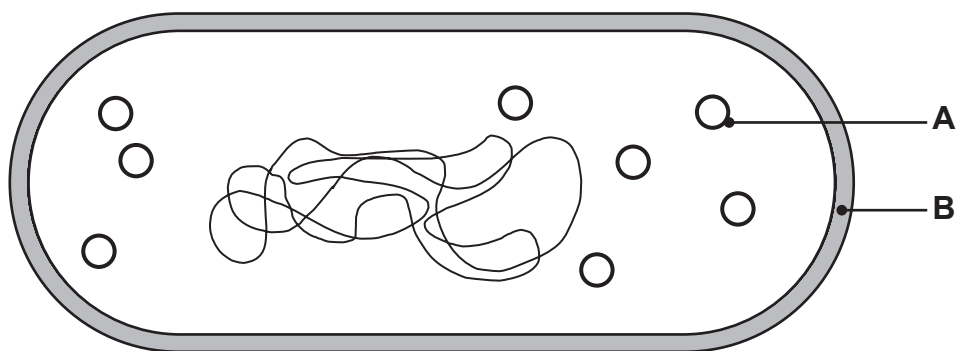
1. _____
2. _____

[2]

[Turn over]



3 The diagram shows a bacterial cell.



Source: Chief Examiner

(a) Name parts **A** and **B**.

A _____

B _____

[2]

(b) Give **two** similarities and **one** difference between a bacterial cell and an **animal** cell.

Similarity 1 _____

Similarity 2 _____

Difference _____

[3]





BLANK PAGE

DO NOT WRITE ON THIS PAGE

(Questions continue overleaf)

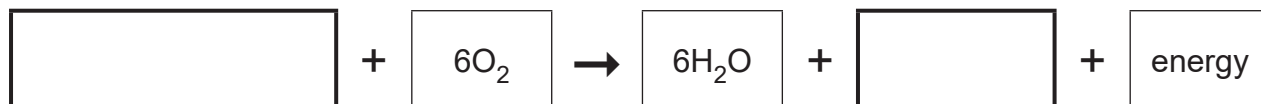


4 (a) Mitochondria are cell structures which carry out aerobic respiration.

(i) Where are mitochondria found in a cell?

[1]

(ii) Complete the balanced chemical equation for aerobic respiration.



[2]

(b) The table shows the average number of mitochondria found in three different types of animal cell.

Type of animal cell	Average number of mitochondria per cell
skin cell	150
surface cell of a villus in the ileum	1650
white blood cell	700

Source: Chief Examiner

The average number of mitochondria in a surface cell of a villus in the ileum is greater than in a skin cell.

(i) Calculate how many times greater.

Show your working.

_____ times [2]



The surface cells of a villus in the ileum absorb some digested food molecules by active transport.

(ii) What is active transport?

[2]

A surface cell of a villus in the ileum is well-adapted to carry out active transport.

(iii) Use evidence from the table to suggest how.

[1]



- 5 (a) The photograph shows the result of one activity which can contribute to global warming.



Source: © Getty Images

- (i) What term is used to describe this activity?

[1]

- (ii) Explain how this activity can contribute to global warming.

[3]



- (b) One effect of global warming is the melting of polar ice caps.

The table shows how the area of ice covering the Arctic Sea has decreased between 1980 and 2020.

Year	Area of ice covering the Arctic Sea /million km ²
1980	15.2
1990	14.7
2000	14.2
2010	13.6
2020	13.3

Source: www.nsid.org/arcticseaicenews

- (i) Calculate the **rate** of decrease in the area of ice covering the Arctic Sea between **1980** and **2020**.

Give your answer to **2 decimal places**.

Show your working.

_____ million km² yr⁻¹ [3]

- (ii) Give **two** environmental effects of this decrease in the area of ice covering the Arctic Sea.

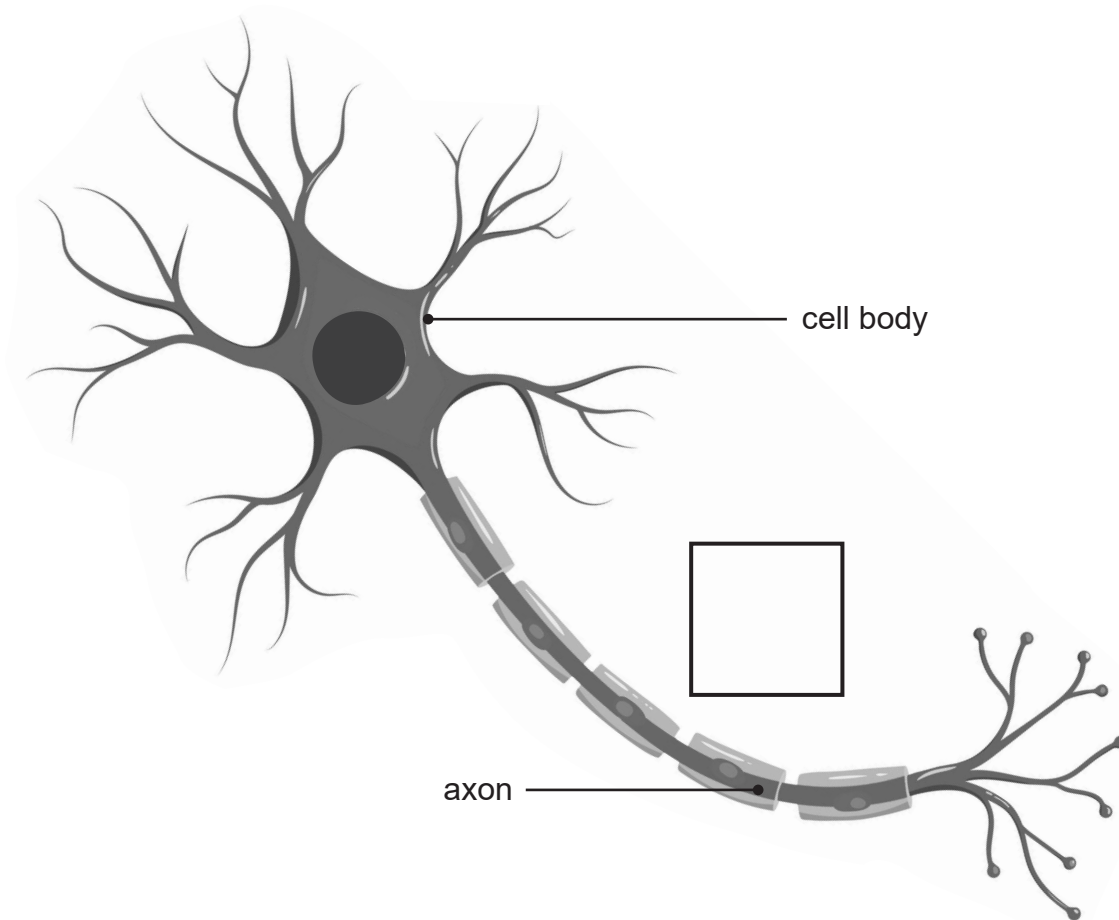
1. _____

2. _____ [2]

[Turn over



6 (a) The diagram shows a motor neurone.



Source: © Getty Images

- (i) Draw an arrow in the box to show the direction of a nerve impulse in this neurone.

[1]

Motor neurones have long axons.

- (ii) Explain how this adapts them to their function.

[1]



(iii) Use evidence from the diagram to describe and explain **two other** ways this neurone is adapted for the transmission of nerve impulses.

1. Description _____

Explanation _____

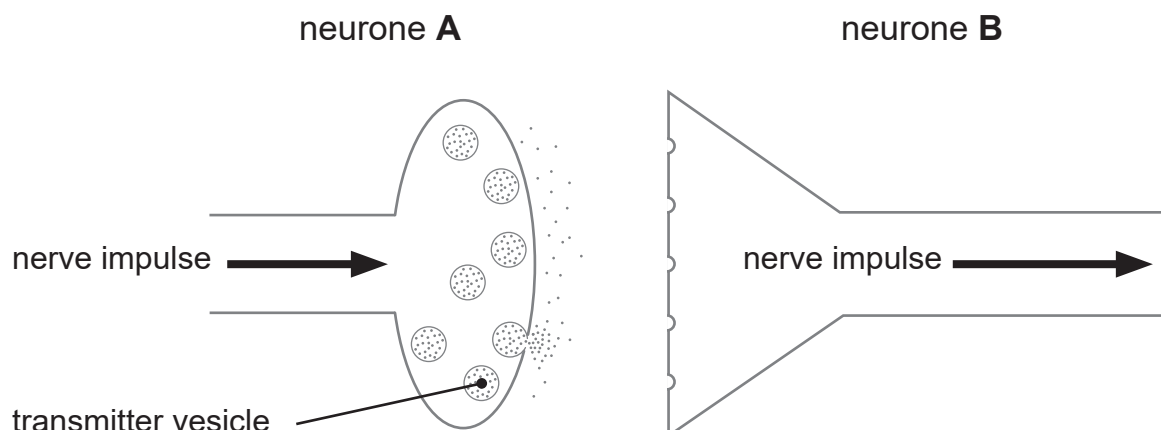
2. Description _____

Explanation _____

_____ [4]



The diagram shows a synapse between two neurones, **A** and **B**.



Source: Chief Examiner

- (b) Use the diagram to help you describe how the release of a chemical from the transmitter vesicles causes a nerve impulse in neurone **B**.

[4]





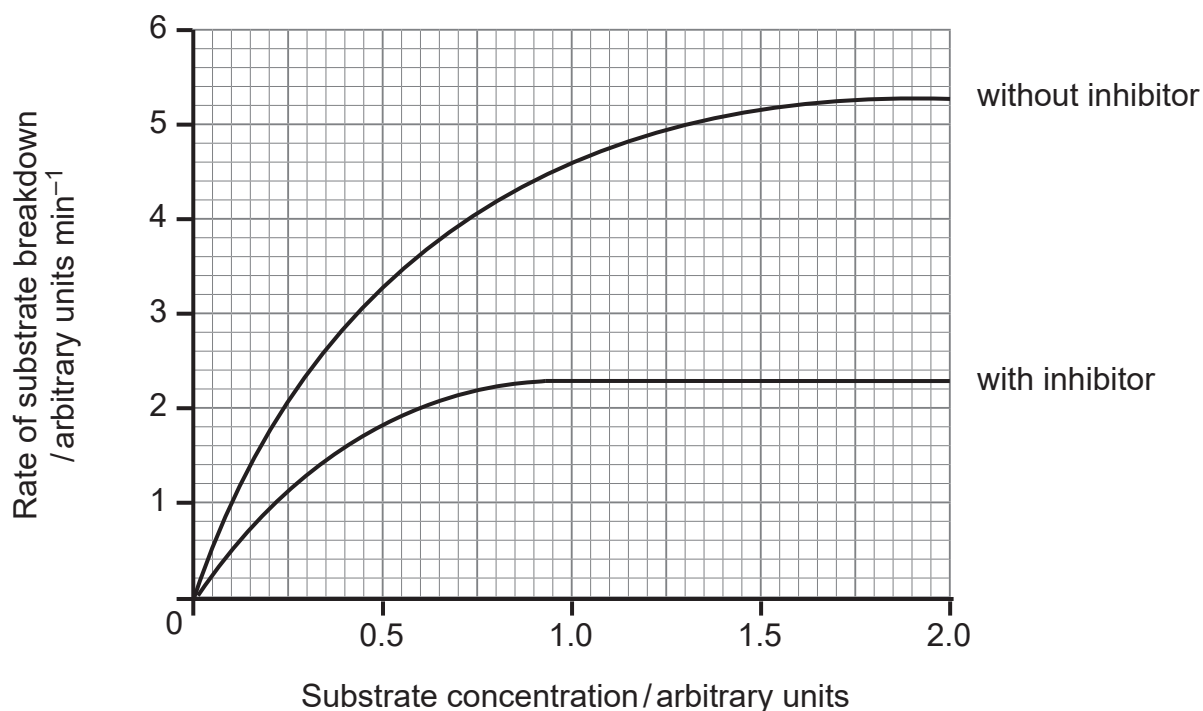
BLANK PAGE

DO NOT WRITE ON THIS PAGE

(Questions continue overleaf)



- 7 (a) The graph shows how increasing the substrate concentration affects the rate at which an enzyme breaks down the substrate with or without an inhibitor present.



- (i) Use the graph to give the rate of substrate breakdown at a substrate concentration of 1.0 arbitrary unit **without an inhibitor**.

_____ arbitrary units min⁻¹ [1]



- (ii) Use your answer in (i) to calculate the **time** it would take to break down 23 arbitrary units of substrate at a substrate concentration of 1.0 arbitrary unit **without an inhibitor**.

Show your working.

_____ min [2]

- (b)** Use the lock and key theory of enzyme action to explain the effect of the inhibitor on the rate of substrate breakdown.

[4]

[Turn over

13841



28GBL1217

- 8 The photographs show the effects of an algal bloom caused by fertiliser entering a river.



Source: © Getty Images



Source: © Getty Images

- (a) Name the process which occurs after excess fertiliser enters a river.

[1]



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

[illegible]

13841



28GBL1219

Government strategies have been introduced to reduce this type of water pollution.

(c) Suggest how each of the following strategies can help reduce water pollution.

Farmers are not allowed to apply fertiliser close to rivers.

Farmers are only allowed to apply fertiliser during the growing season of crops.

[2]





BLANK PAGE

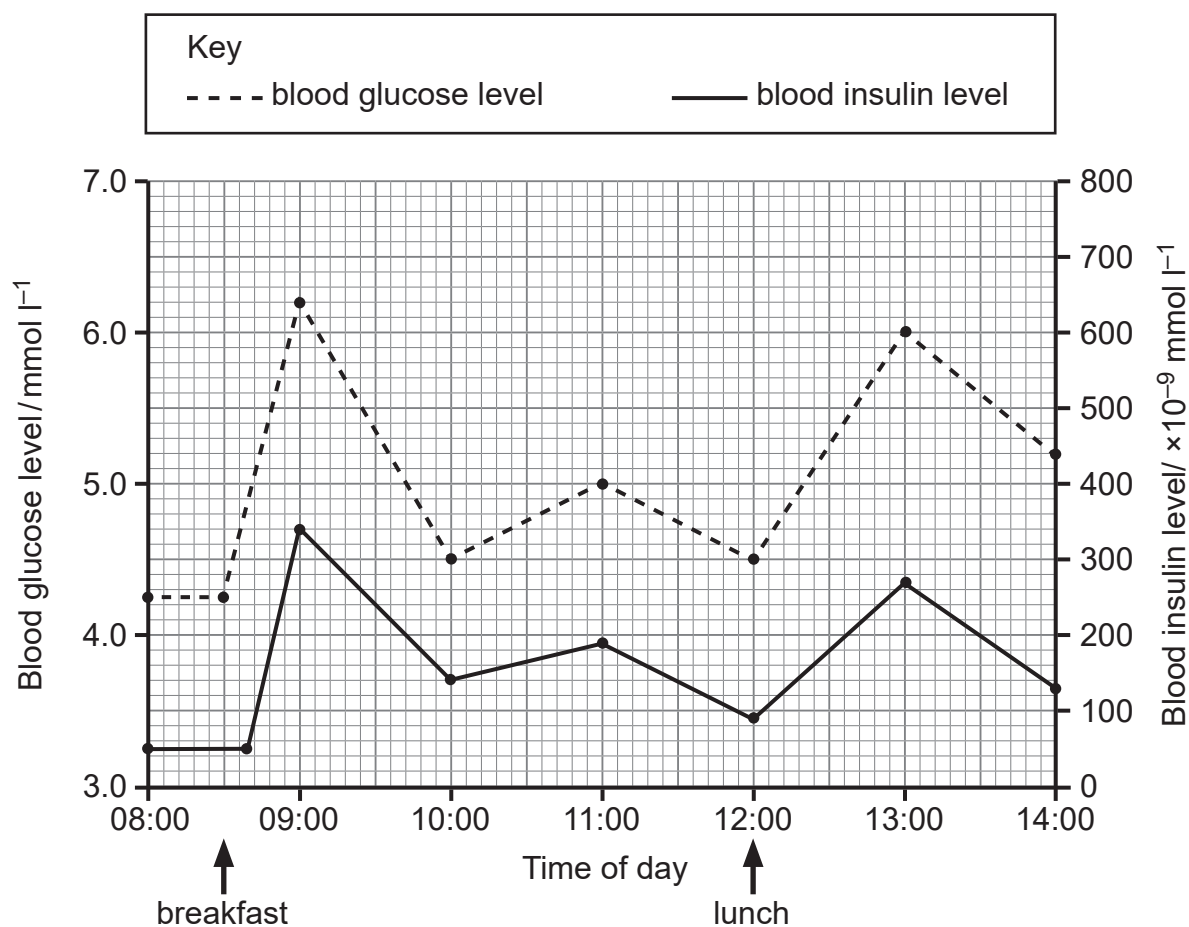
DO NOT WRITE ON THIS PAGE

(Questions continue overleaf)



- 9 The graph shows the blood glucose and blood insulin levels of a man who does not have diabetes.

His blood glucose and blood insulin levels were monitored over six hours.



- (a) Describe and explain the blood **insulin** level at 08:00 hours.

Use **data** to support your answer.

[3]



- (b) (i) Calculate the percentage increase in blood **glucose** level from 12:00 to 13:00.

Show your working.

_____ % [3]

- (ii) The control of blood glucose involves a negative feedback system.

Use the graph to give evidence to support this statement.

No data is required in your answer.

[2]



(c) People who have diabetes are unable to control their blood glucose levels.

There are two types of diabetes, **Type 1** and **Type 2**.

(i) Give the **cause** of each type of diabetes.

Type 1 _____

Type 2 _____

_____ [2]

(ii) Describe how the early stages of each type of diabetes may be treated differently.

_____ [2]

THIS IS THE END OF THE QUESTION PAPER





BLANK PAGE

DO NOT WRITE ON THIS PAGE

13841



28GBL1225

BLANK PAGE
DO NOT WRITE ON THIS PAGE

13841



28GBL1226



BLANK PAGE

DO NOT WRITE ON THIS PAGE

13841



28GBL1227

DO NOT WRITE ON THIS PAGE

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

Total Marks	
-------------	--

Examiner Number

Permission to reproduce all copyright material has been applied for.
In some cases, efforts to contact copyright holders may have been unsuccessful and CCEA
will be happy to rectify any omissions of acknowledgement in future if notified.

