



Rewarding Learning

General Certificate of Secondary Education
2022–2023

Centre Number

--	--	--	--	--

Candidate Number

--	--	--	--	--

Double Award Science: Biology

Unit B1

Higher Tier



[GDW12]

GDW12

WEDNESDAY 22 FEBRUARY 2023, MORNING

TIME

1 hour.

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 70.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

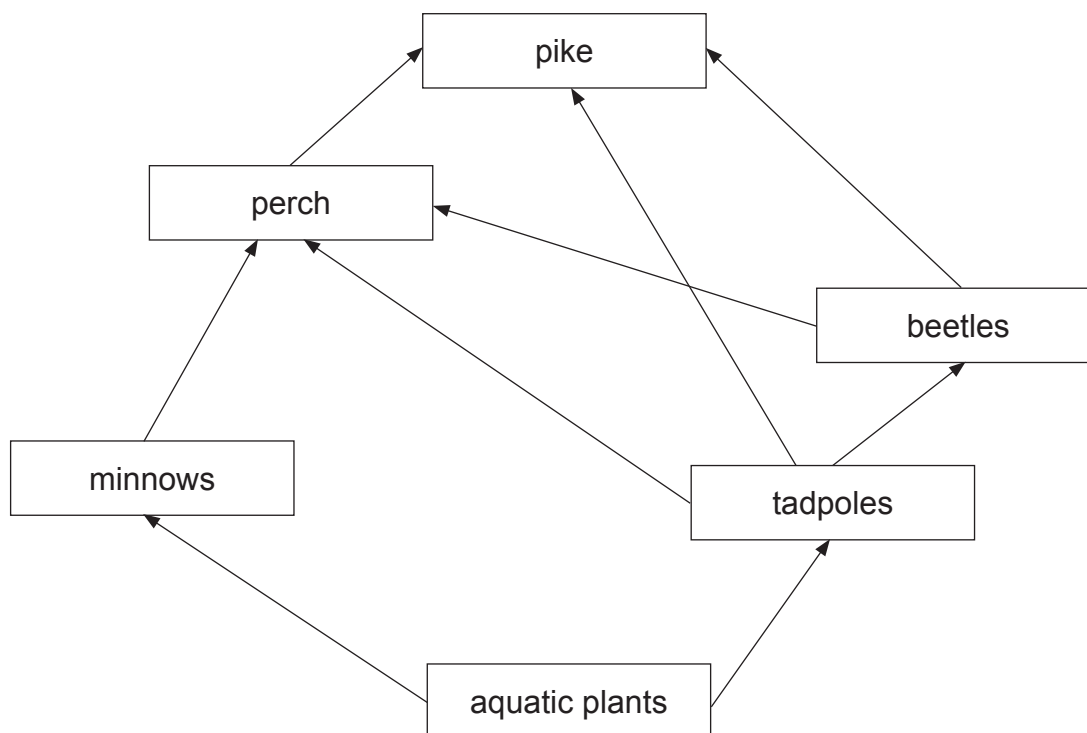
Quality of written communication will be assessed in Question **3(a)**.

13826.06R



24GDW1201

1 The diagram shows a food web from a river.



The table gives the position(s) of two organisms in this food web.

(a) Complete the table by writing a tick (✓) in the correct empty boxes for the other organisms in this food web.

Organism	producer	primary consumer	secondary consumer	tertiary consumer
pike			✓	✓
minnows		✓		
beetles				
tadpoles				
aquatic plants				
perch				

[4]



- (b) The number of tadpoles decreased in this river. This caused an **increase** in the population of minnows. Explain why.

[2]

[Turn over]

13826.06R



24GDW1203

- 2 The kidneys filter blood and produce urine.
The kidneys filter blood at a rate of 0.12 litres per minute.

(a) (i) Calculate how much blood is filtered by the kidneys per **day**.

Show your working.

_____ litres per day [2]

The kidneys produce and pass out 1.5 litres of urine per day.

(ii) Calculate the percentage (%) of the blood filtered by the kidneys per day that is passed out as urine.

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

Show your working.

_____ % [3]

(b) The body loses water as urine, by the evaporation of sweat and by one other process.

(i) Name this other process.

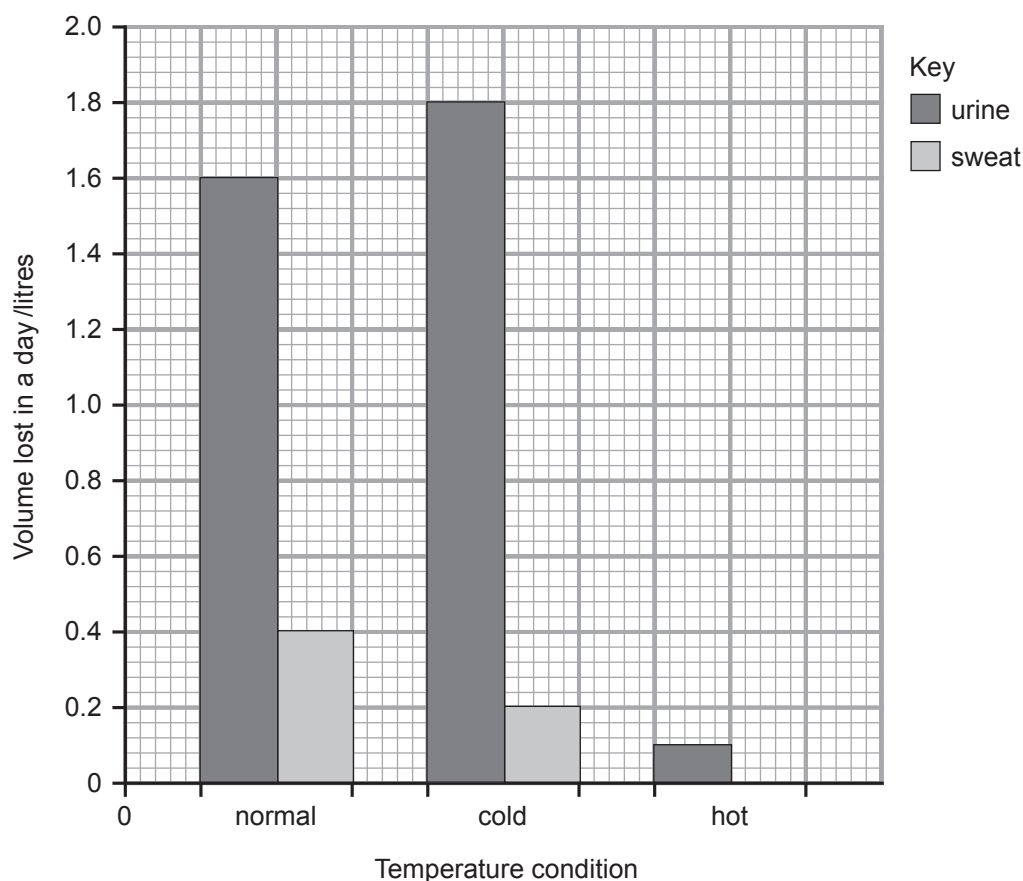
[1]



A study into water loss by a person was carried out at three different temperatures, over three days.

- Each day the temperature was different.
- This person had consumed the same food and drink each day.
- The **total** volume of water lost in urine and sweat by this person was the same each day.

The bar chart shows some of the results of this study.



(ii) Calculate the volume of sweat lost by this person in hot conditions.

Show your working.

_____ litres [3]
[Turn over]



(iii) In what temperature condition is most urine lost?

[1]

(iv) Use the graph to explain why most urine is lost in this temperature condition.

[1]

(c) When blood is filtered, waste products and useful substances move from the blood into the kidneys.

The waste products (such as urea) are passed into the urine.

The useful substances (such as amino acids, salts and glucose) are reabsorbed back into the blood.

(i) Name the **two** main substances found in urine.

_____ and _____

[2]

In a person with untreated diabetes one substance not usually found in urine, may be present in the urine.

(ii) Name this substance.

[1]

(iii) Suggest a reason for the presence of this substance in the urine of a person with untreated diabetes.

[1]





BLANK PAGE

DO NOT WRITE ON THIS PAGE

(Questions continue overleaf)

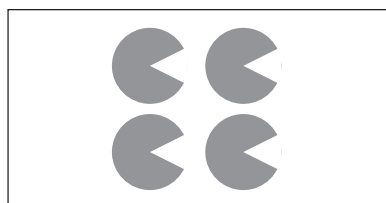
13826.06R

[Turn over

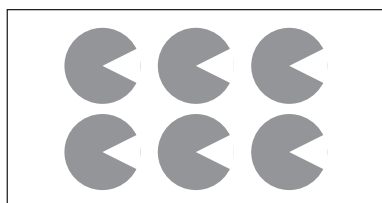


24GDW1207

3 The diagrams represent three enzyme solutions, **A**, **B** and **C**.



solution **A**

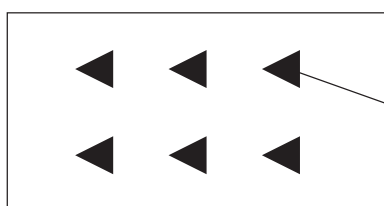


solution **B**



solution **C**

The diagram below shows the number of substrate molecules that may react with the enzymes in each of the three solutions.



one substrate molecule

(a) Describe and explain the rate of reaction in each solution.

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

solution **A**



solution B

solution C

[6]

(b) Describe and explain the effect of **lowering** the temperature on the rate of an enzyme-controlled reaction.

[3]

[Turn over

13826.06R

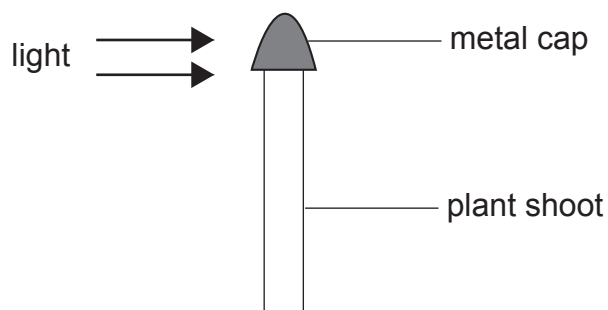


24GDW1209

- 4 A student carried out an investigation into phototropism in plant shoots. The hormone auxin controls the response of a plant shoot to light.

In her first experiment, she used a metal cap to cover the tip of a plant shoot.

The diagram shows the set up of this experiment.



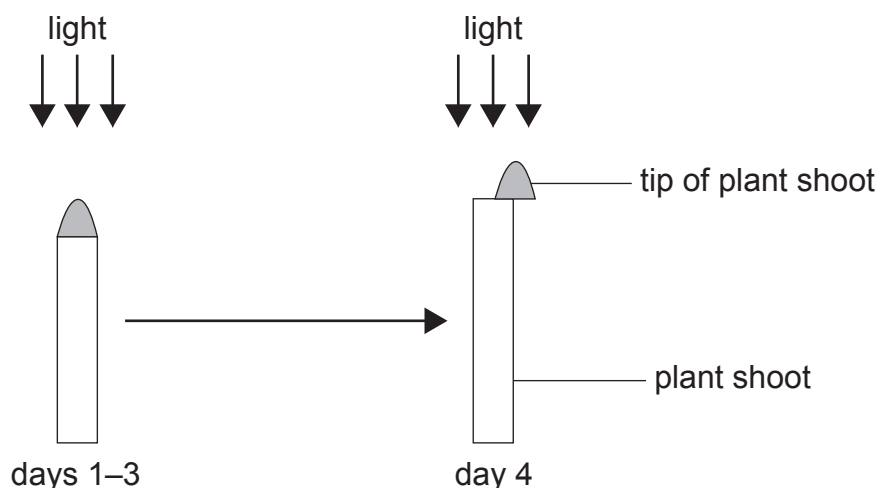
- (a) Explain why this plant shoot would **not** bend towards the light.

[2]



- (b) The student carried out a second experiment with a different plant shoot. She left the plant shoot in light for three days and then cut off the tip of the shoot. She placed the tip back onto the right hand side of the shoot, as shown in the diagram. The student then left the plant shoot in light for another three days.

The diagram shows the set up of the student's second experiment.



- (i) Describe what happened to the **hormone** auxin in the plant shoot from **day 4** onwards.

[2]

- (ii) Describe and explain the effect the hormone auxin had on the growth of the plant shoot from **day 4** onwards.

Description: _____

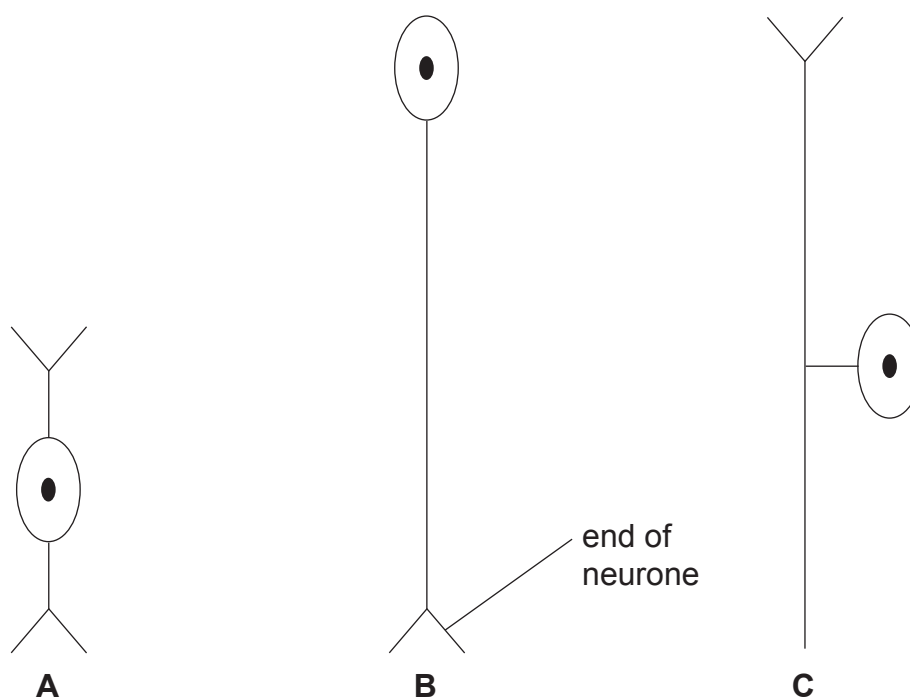
Explanation: _____

[2]

[Turn over



- 5 The diagram represents three different neurones (nerve cells), **A**, **B** and **C** from a reflex arc.



Neurone **A** is the smallest and neurone **C** is a sensory neurone.

- (a) Use the diagram to name **one** structure present in all three neurones.

[1]

- (b) (i) **Where** in a reflex arc would you find neurone **A**?

[1]

- (ii) What structure would the end of neurone **B** connect to?

[1]

- (c) Explain how a **reflex action** protects the body from danger.

[2]





BLANK PAGE

DO NOT WRITE ON THIS PAGE

(Questions continue overleaf)

13826.06R

[Turn over



24GDW1213

6 When fertiliser enters a lake it can cause eutrophication.

(a) Name **one other** substance that can cause eutrophication in a lake.

[1]

The flow chart shows the sequence of events when fertiliser entered a lake.

(b) Complete stages **D**, **E** and **F** by writing the correct word in each box.

A

Fertiliser entered the lake.



B

Aquatic plants **grew** and increased in number.



C

Shading and mineral depletion occurred.



D

Aquatic plants _____.



E

Aquatic plants were _____
by bacteria.



F

Bacteria in the lake used up _____.



G

Fish and aquatic animals died.

[3]



The bacteria at stage **F** in the flow chart are saprophytes.

(c) Describe and explain how these saprophytes gain their nutrients.

[2]

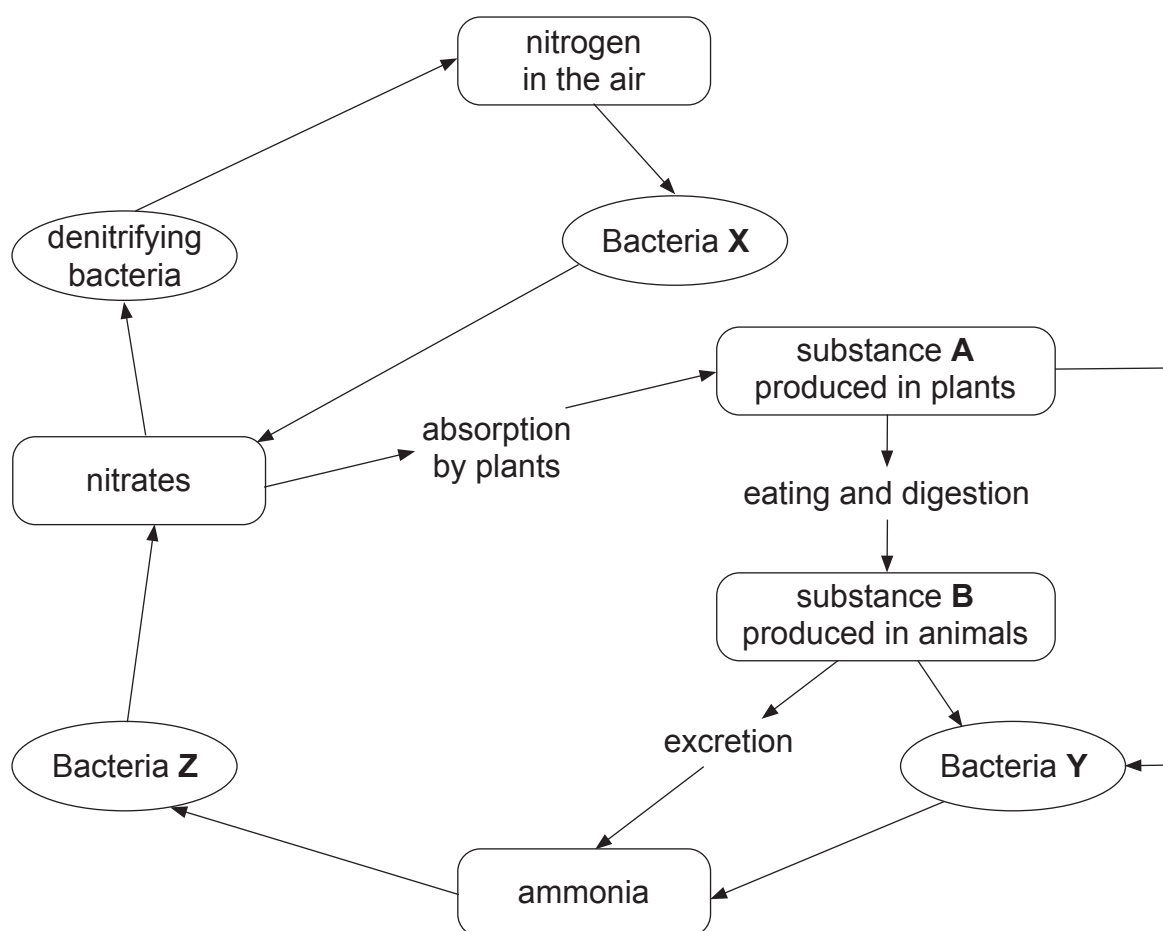
[Turn over

13826.06R



24GDW1215

7 The diagram shows part of the nitrogen cycle.



(a) (i) Name substance **A**, used **for growth**, that plants produce from nitrates.

[1]

(ii) Name substance **B**, produced in animals, when substance **A** is **digested**.

[1]

(b) Name the three types of bacteria **X**, **Y** and **Z**.

X _____

Y _____

Z _____

[3]



- (c) What type of soil condition do denitrifying bacteria survive best in?
Explain your answer.

Soil condition _____

Explanation _____

[2]

[Turn over

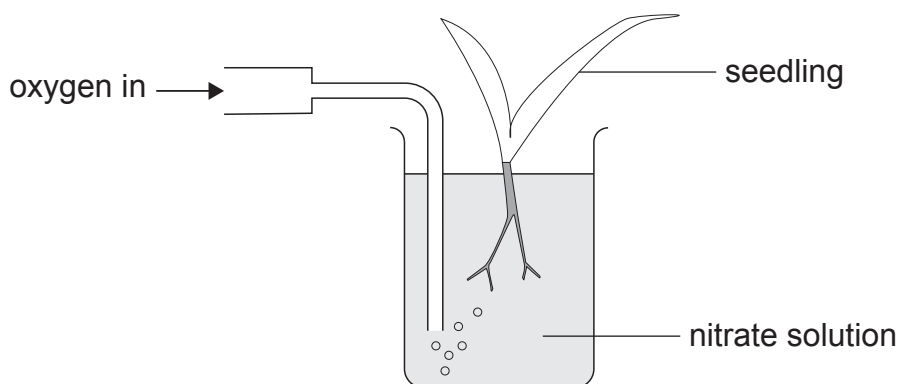
13826.06R



24GDW1217

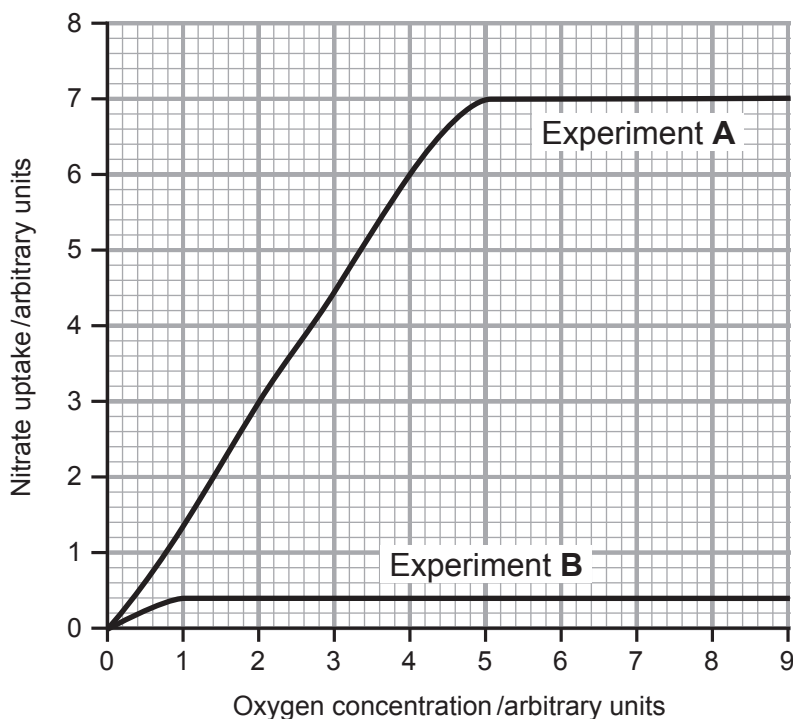
- 8 A scientist investigated the effect of ten oxygen concentrations on the uptake of nitrates in identical plant seedlings.

The diagram shows one set of apparatus the scientist used.



Each beaker contained the same concentration of nitrate solution.
In experiment **A**, the scientist measured the nitrate uptake of each seedling at different oxygen concentrations.

The graph shows the scientist's results.



- (a) (i) Describe the effect of increasing oxygen concentration on the nitrate uptake of the seedlings in experiment **A**.

[2]

- (ii) Suggest **two** reasons for the results in experiment **A** for oxygen concentrations between **5** and **9** arbitrary units.

1.

2.

[2]

- (b) In experiment **B**, the scientist repeated experiment **A** but added the same amount of a chemical to each nitrate solution.
This chemical inhibits respiration.
The results for experiment **B** are shown in the graph opposite.

- (i) Describe the results in experiment **B** for oxygen concentrations between **1** and **9** arbitrary units.

[1]

- (ii) The nitrate uptake in experiment **B** is lower than in experiment **A**.
Explain why.

[3]

[Turn over]

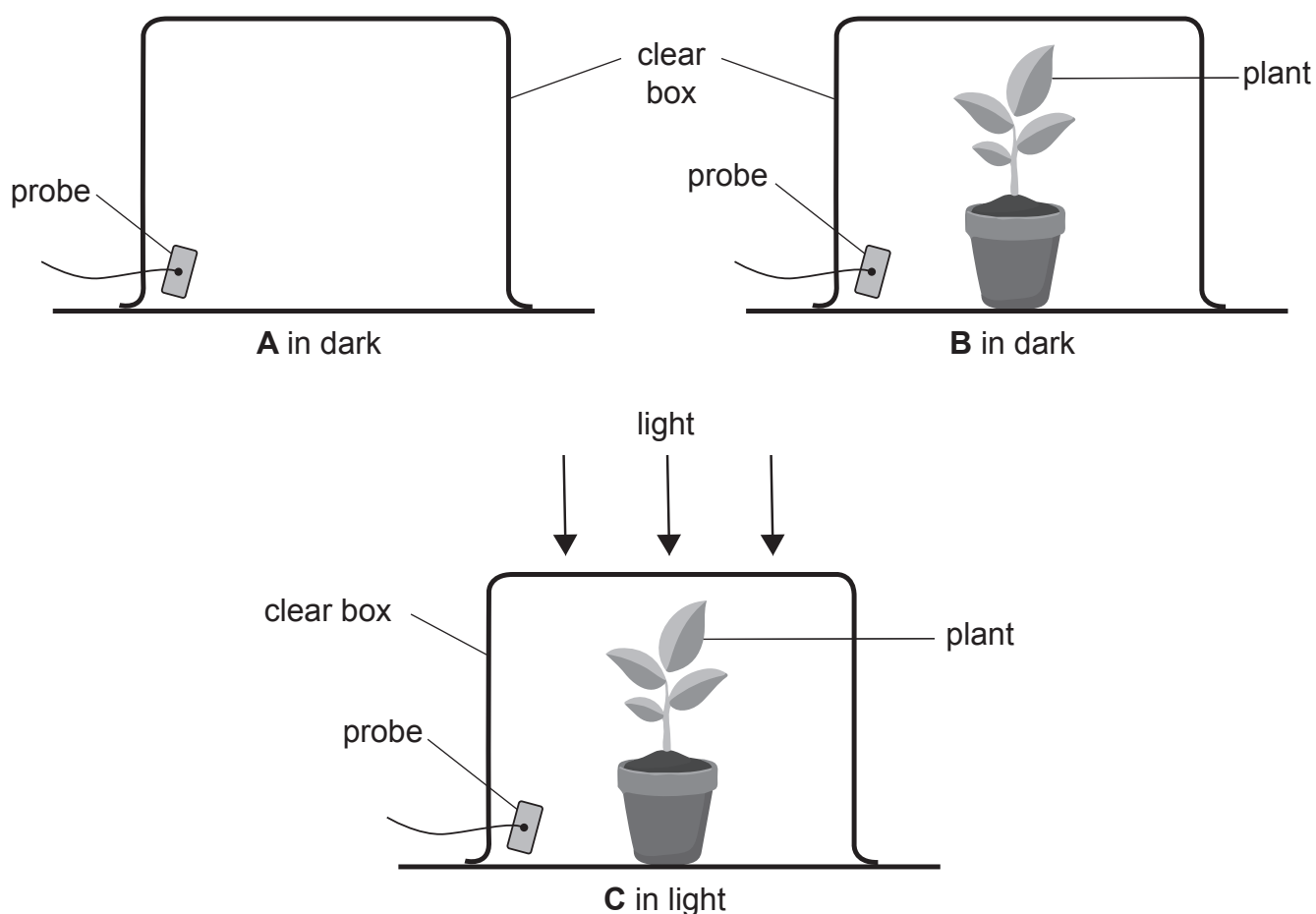


9 A student carried out an investigation into photosynthesis and respiration.

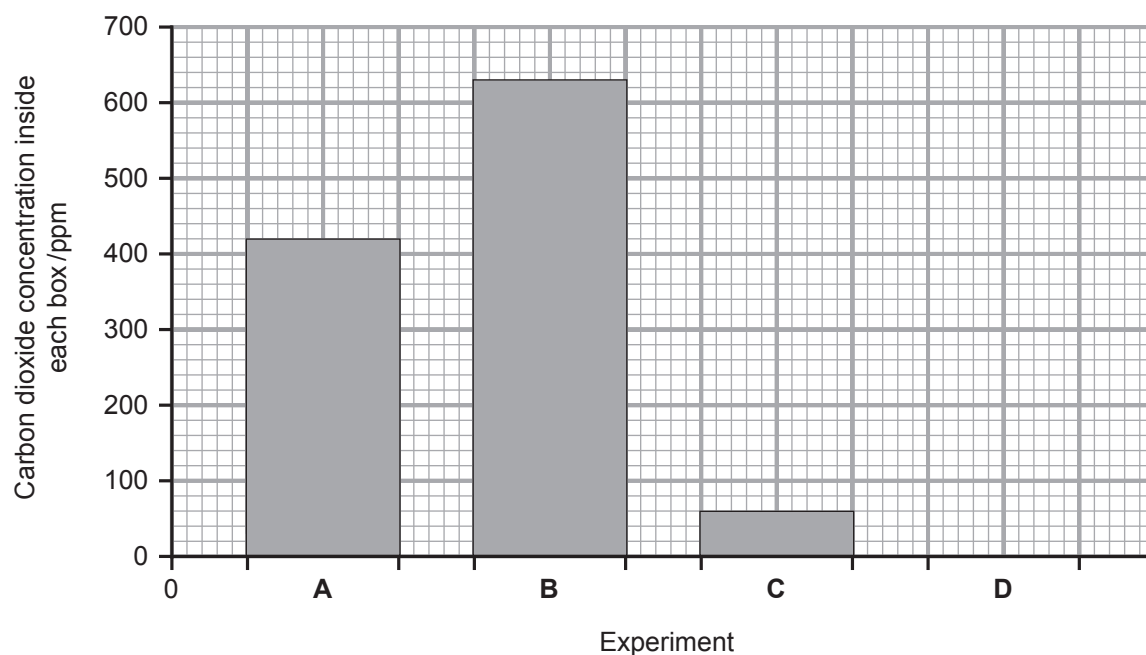
She set up three experiments **A**, **B** and **C** as shown in the diagram below.

After 15 minutes, she measured the carbon dioxide concentration inside each clear box using a probe.

The probe measured the carbon dioxide concentration in parts per million (ppm).



The bar chart shows some of the student's results.



(a) Explain the results for experiment B.

[2]

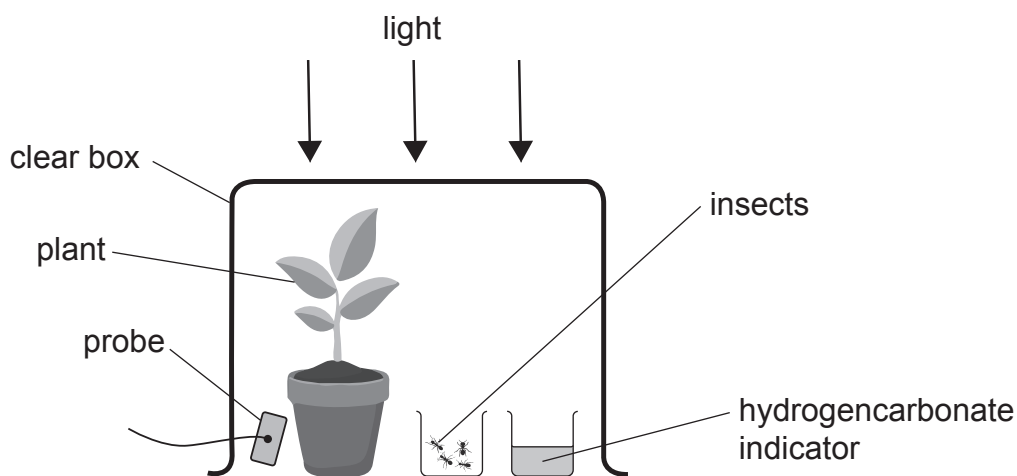
(b) Describe and explain the results for experiment C.

[3]

[Turn over]



- (c) The student then carried out another experiment, experiment **D**.
The diagram shows the set up for experiment **D**.



After 15 minutes the hydrogencarbonate indicator was **red**.

- (i) Add the result for the carbon dioxide concentration for experiment **D** to the bar chart on the previous page. [1]
- (ii) Explain the result for experiment **D**.

[2]

THIS IS THE END OF THE QUESTION PAPER





BLANK PAGE

DO NOT WRITE ON THIS PAGE

13826.06R



24GDW1223

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.

