



General Certificate of Secondary Education
January 2019

Centre Number

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Candidate Number

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Biology

Unit 1
Higher Tier



[GBY12]

GBY12

MONDAY 14 JANUARY, MORNING

TIME

1 hour 30 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 eleven** questions.

INFORMATION FOR CANDIDATES

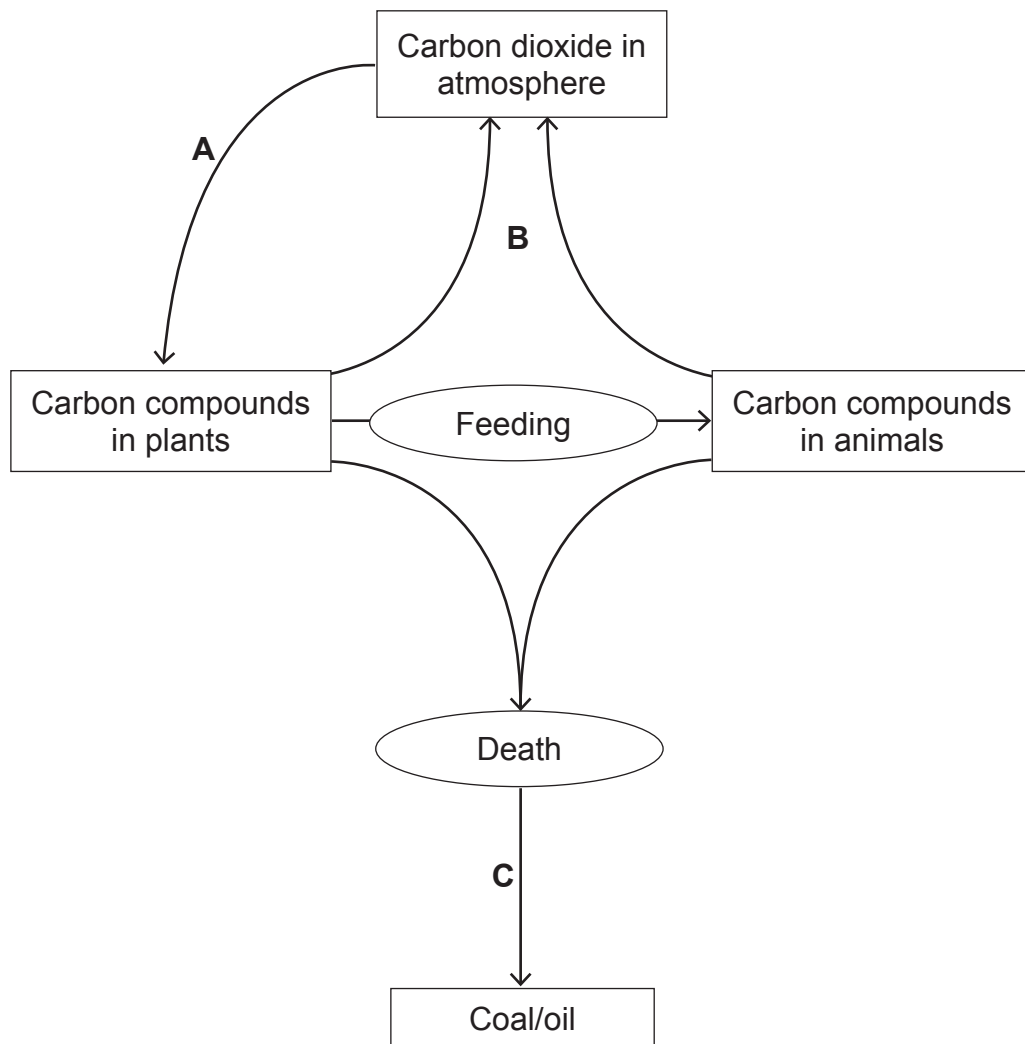
The total mark for this paper is 100.

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 Questions **3** and **11(b)(ii)**.



1 The diagram shows part of the carbon cycle.



Source: Principal Examiner

Look at the diagram.

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

A _____ [1]

B _____ [1]

C _____ [1]



- (b) The graph shows how the temperature of the Earth and the carbon dioxide concentration in the atmosphere have changed over a five-hundred-year period.

Image removed due to copyright.

Look at the graph.

- (i) Explain how, after 1910, the graph provides evidence to suggest that carbon dioxide is a major cause of global warming.

[1]

- (ii) Suggest **one** reason for the change in carbon dioxide concentration from 1910 to 2000.

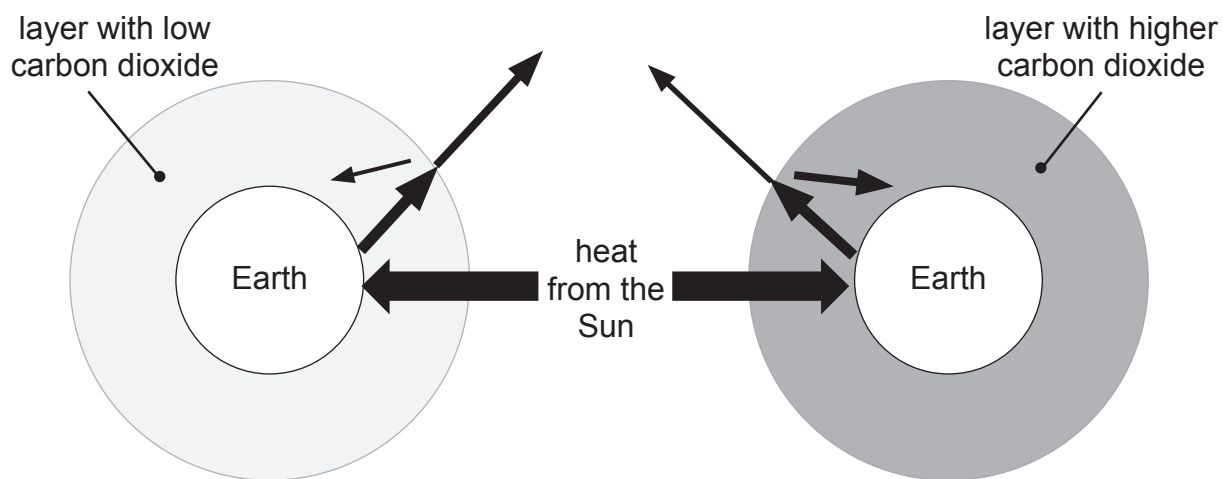
[1]

[Turn over



Carbon dioxide acts as a greenhouse gas.

The diagram shows how carbon dioxide acts as a greenhouse gas.



Source: Principal Examiner

(c) Use the diagram to help explain how a build-up of carbon dioxide in the atmosphere affects the temperature of the Earth.

[3]





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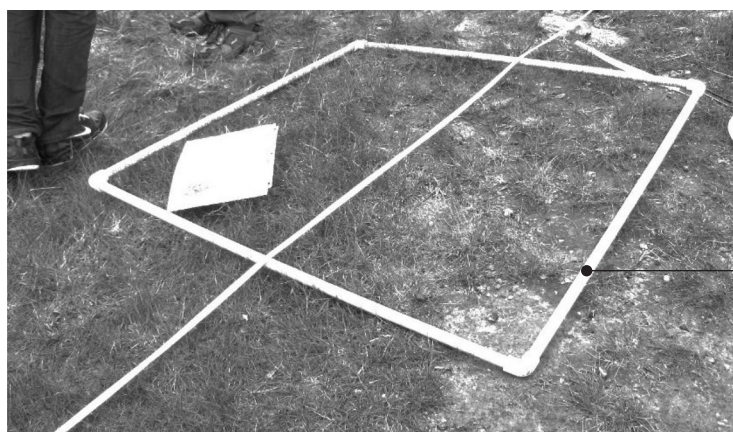
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(Questions continue overleaf)

[Turn over



- 2 The photograph shows apparatus used by a group of students to study the biodiversity of two forests.



apparatus X

Source: Principal Examiner

Look at the photograph.

- (a) Name apparatus X.

[1]

The students estimated the percentage cover of a number of plant species in the two forests.

Table 1 shows their results.

Table 1

Plant species	Percentage cover	
	Forest A	Forest B
Wild garlic	4	43
Ivy	2	39
Bluebells	50	0
Moss	6	0
Buttercups	15	20
Wood Anemone	40	0



Look at Table 1.

The students concluded that forest **A** had greater biodiversity.

(b) Use evidence from Table 1 to explain how they reached this conclusion.

[2]

The students also measured three abiotic factors in the two forests.

Table 2 shows their measurements.

Table 2

Abiotic factor	Forest A	Forest B
Light intensity / arbitrary units	77	11
Soil pH	5.5	5.5
Temperature / °C	15	12

Look at Table 2.

(c) Use evidence from Table 2 to explain **why** forest **A** had greater biodiversity than forest **B**.

[3]

[Turn over





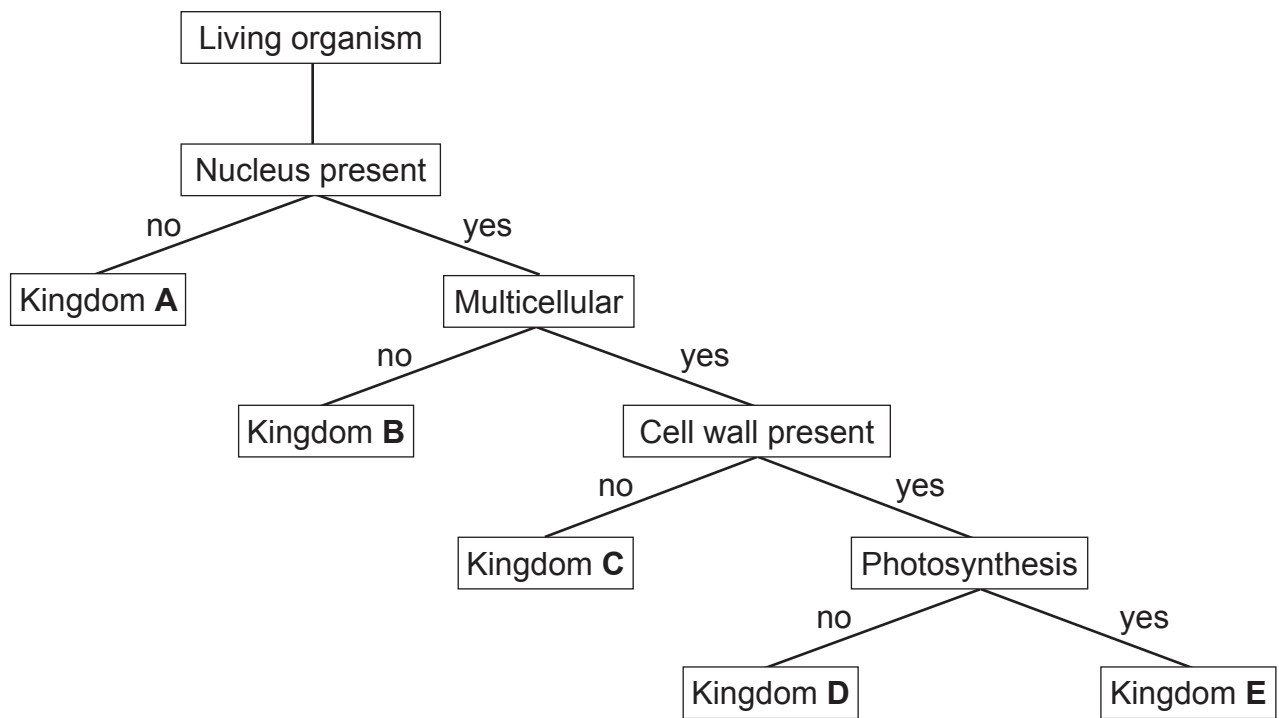
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4 The key shows how living organisms can be classified into five kingdoms.



Source: Principal Examiner

(a) Use the key to identify kingdoms **A**, **B** and **C**.

A _____ [1]

B _____ [1]

C _____ [1]

(b) Use information from the key to give **two** features kingdoms **C** and **D** have in common.

1. _____ [1]

2. _____ [1]



(c) Explain why viruses are difficult to classify.

[1]

Classification is used to identify organisms.

(d) Give **one other** reason why classification is needed.

[1]

[Turn over



5 Insulin is a hormone which helps control blood glucose level.

(a) What is a hormone?

[3]

(b) Where is insulin produced?

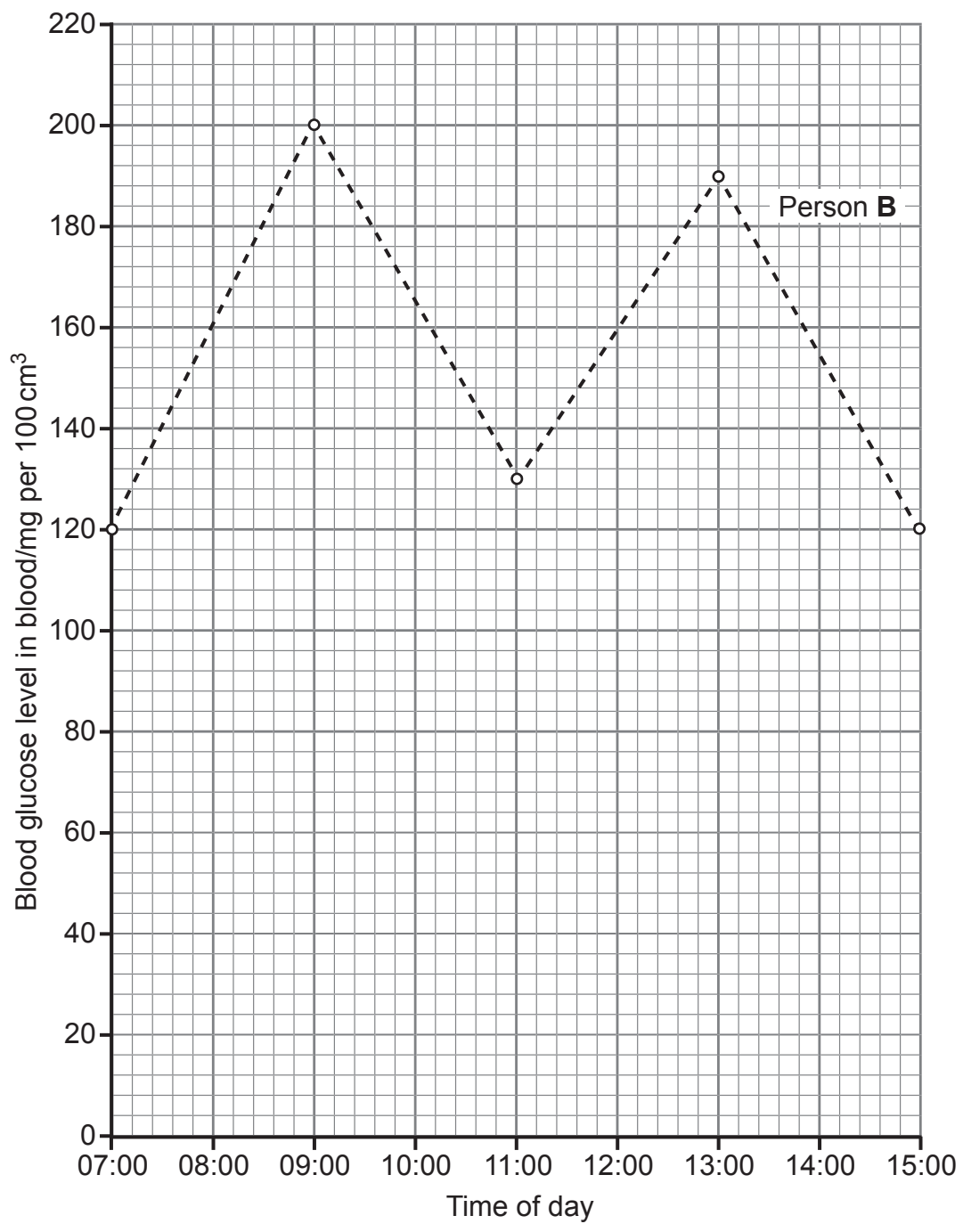
[1]

(c) The table shows blood glucose levels of two people, **A** and **B**, between 07:00 in the morning and 15:00 in the afternoon.

Time of day	Blood glucose level/mg per 100 cm ³	
	Person A	Person B
07:00	90	120
09:00	120	200
11:00	88	130
13:00	110	190
15:00	100	120

(i) Complete the graph by plotting the data for person **A**. [3]





Person B



(ii) Person **A** ate breakfast at 06:45.

Describe the processes which occurred to cause their blood glucose level to rise between 07:00 and 09:00 in the morning.

[3]

(iii) Give evidence from the graph which suggests person **B** has diabetes.

[2]

(d) (i) Name the hormone produced in response to low blood glucose levels.

[1]

(ii) Name the organ in which this hormone acts.

[1]





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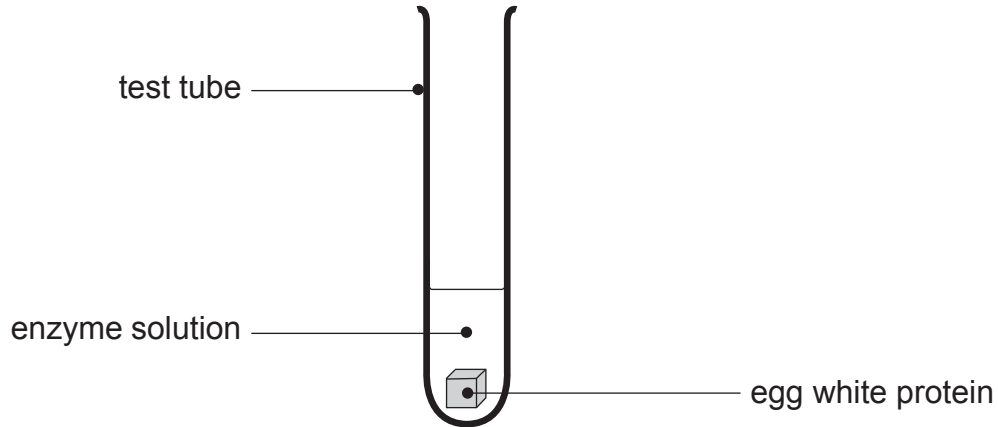
(Questions continue overleaf)



- 6 A student set up an experiment to investigate the effect of temperature on the digestion of egg white.

Egg white is a protein.

The diagram shows one test tube she used.



The student carried out the experiment at six different temperatures.

She recorded the time taken to break down the egg white protein in each test tube at each temperature.

The table shows her results.

Temperature/ $^{\circ}\text{C}$	Time taken to break down egg white protein /minutes
10	20
20	12
30	6
40	4
50	8
60	30

- (a) Give **two** variables that should be controlled in this experiment.

1. _____

[1]

2. _____

[1]



(b) (i) Name the type of enzyme used by the student in the experiment.

[1]

(ii) Name the products when egg white protein is broken down.

[1]

(c) (i) Describe and explain the results of the experiment from 10°C to 40°C.

Description _____

Explanation _____

_____ [3]

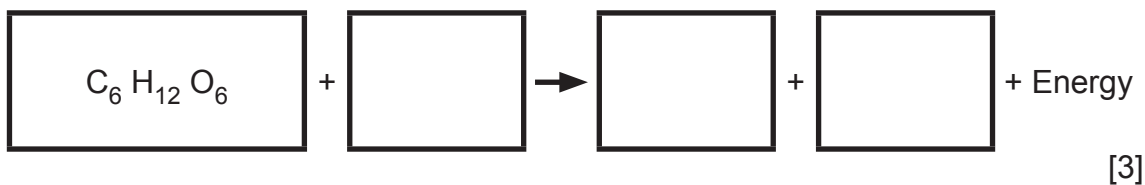
(ii) Explain the results of the experiment at 60°C.

_____ [2]

[Turn over



7 (a) Complete the balanced chemical equation for aerobic respiration of glucose.



[3]

(b) Muscle cells can respire aerobically and anaerobically.

(i) What is meant by the term anaerobic?

_____ [1]

(ii) Compare the amount of energy released by **anaerobic** respiration with that released by aerobic respiration.

_____ [1]

(c) Give **two** differences in the substances produced by **anaerobic** respiration in human muscle cells and yeast cells.

1. _____

_____ [1]

2. _____

_____ [1]



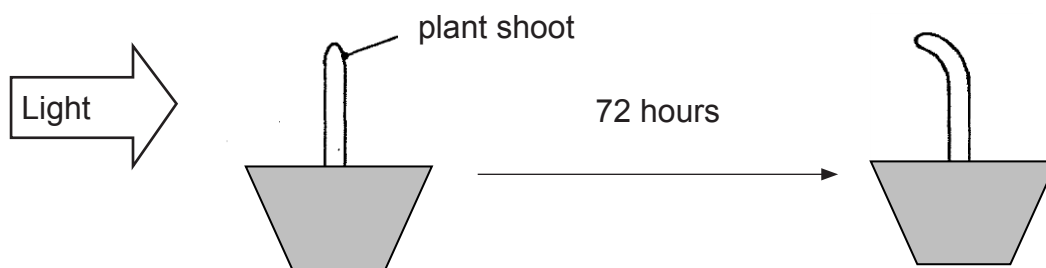
8 A scientist investigated the response of plant shoots to light from one side. These responses are caused by the chemical auxin.

(a) What type of chemical is auxin?

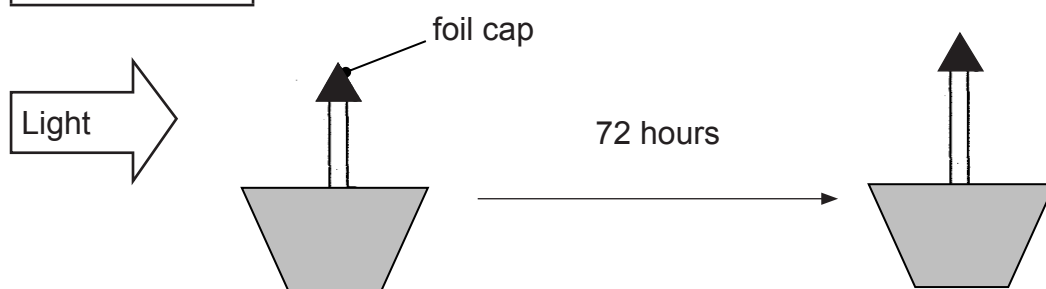
[1]

The diagram shows two of his experiments.

Experiment 1



Experiment 2



(b) Use the results from experiments 1 and 2 to explain which part of the plant shoot is sensitive to light.

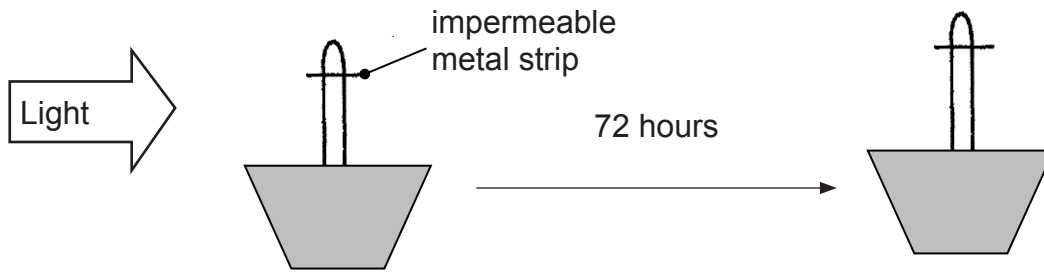
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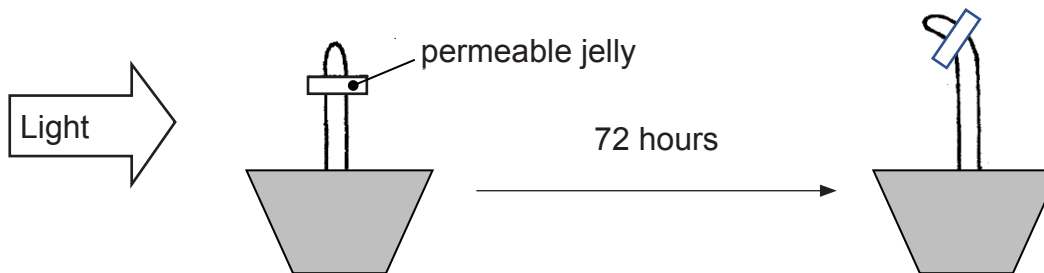


The diagram shows another two experiments he carried out.

Experiment 3



Experiment 4



(c) Describe and explain the difference in the responses shown by the plant shoots in experiments 3 and 4.

Description _____
_____ [1]

Explanation _____

_____ [4]



(d) The table shows three commercial uses of chemicals similar to auxin.

(i) Complete the table.

Commercial use	How the chemical works
	Causes some plants to die by excessive growth
Rooting powder	
	Causes a callus of cells to develop into a stem and roots

[3]

(ii) Give **one other** commercial use of chemicals that are similar to auxin.

_____ [1]



- 9 The table shows the average daily energy requirements for a man at different ages, who has low activity levels.

Age/years	Average daily energy requirement /kcal
19–49	2550
50–59	2450
60–69	2380
70–79	2330

- (a) Describe how the man's average daily energy requirement changes with age.

[1]

The man matched his daily food intake to his average daily energy requirements until the age of 49.

He continued the same daily intake for the next ten years.

- (b) Describe and explain what you expect to happen to the man's body mass during this ten-year period.

[2]



Basal Metabolic Rate (BMR) is the energy the body uses while at **complete rest** (kcal day^{-1}).

The equation below is used to calculate a man's BMR.

$$\text{BMR} = 88 + [13.4 \times \text{mass in kg}] + [5 \times \text{height in cm}] - [6 \times \text{age in years}]$$

- (c) (i) Use the equation to calculate the BMR for a 50-year-old male who is 180 cm tall and weighs 100 kg.

Show your working.

_____ kcal day^{-1} [3]

- (ii) Compare this man's **BMR** with the **average daily requirement** for the 50-year-old man given in the table.

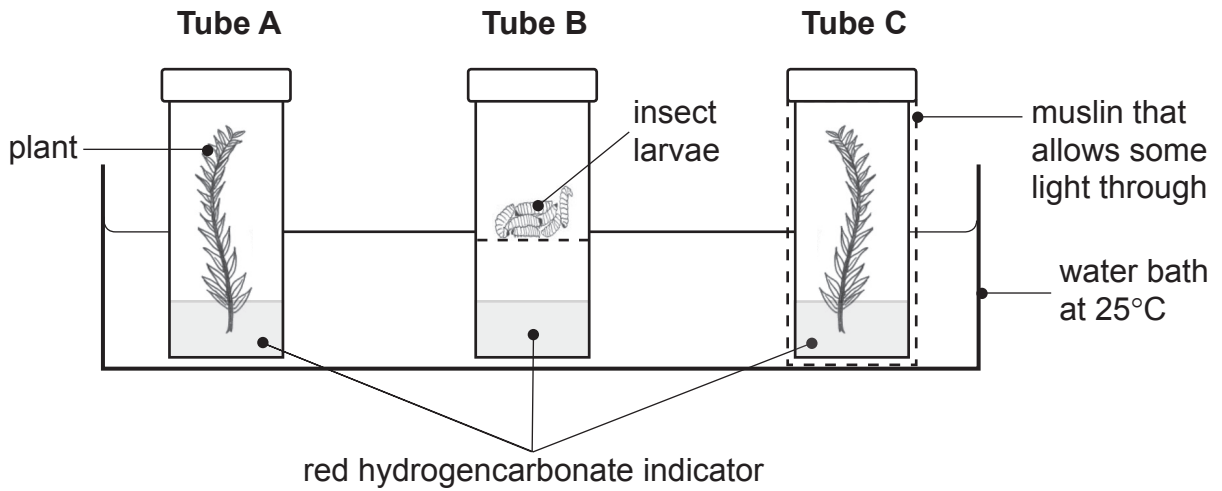
Suggest a reason for the difference.

[2]

[Turn over

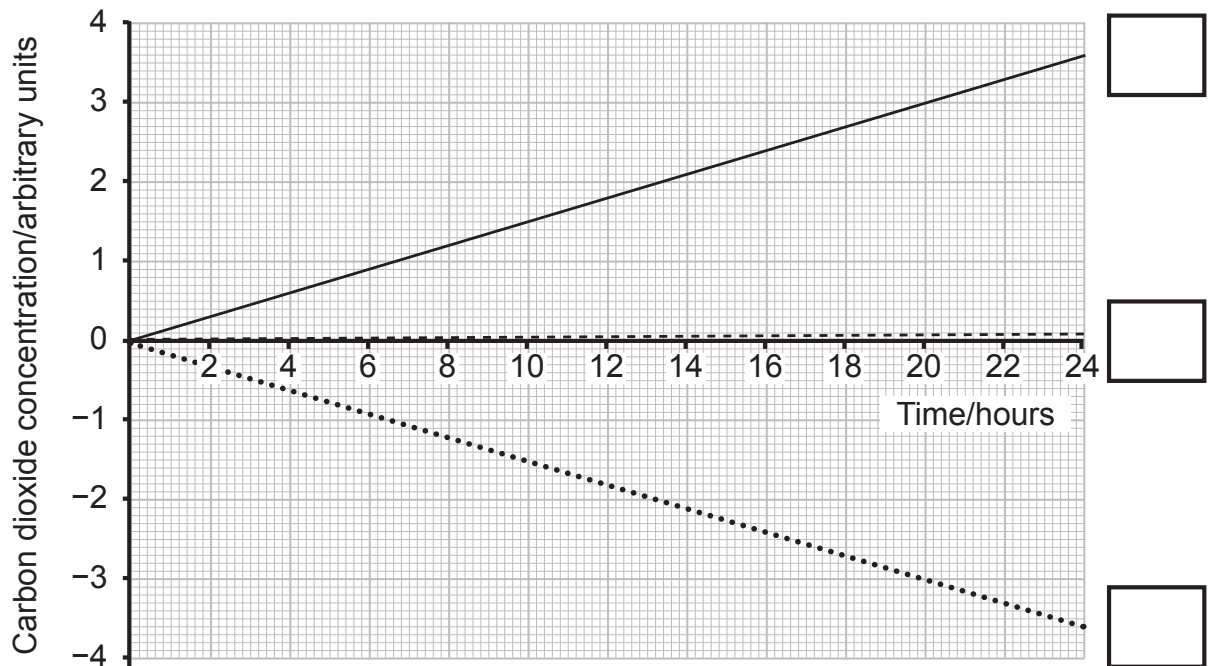


10 The diagram shows an experiment to investigate gas exchange.



The three tubes were placed in a water bath in a well-lit place for 24 hours.

The graph shows the results for the carbon dioxide concentration in each tube over the 24 hours.



(a) In the boxes write the letter **A**, **B** or **C** to match each result line to the tube it represents.

[2]



(b) Complete the table to show the colour of the hydrogencarbonate indicator in each tube after 24 hours.

Tube	Colour of hydrogencarbonate indicator after 24 hours
A	
B	
C	red

[2]

(c) Use evidence from the graph and the table to explain the result for tube C.

[3]

(d) Describe and explain how decreasing the temperature to 15°C would change the result in tube B.

[3]

[Turn over



11 The table shows some of the processes in the nitrogen cycle.

(a) Complete the table by filling in the empty boxes.

Process	Chemical reaction	
	From	To
nitrification		nitrates
		nitrogen gas
nitrogen fixation		
	protein	ammonium compounds

[6]

(b) Spreading excessive nitrate fertilisers on fields can lead to eutrophication.

(i) Give **one** way the nitrate from fertilisers spread on fields can reach waterways.

[1]





(ii) Explain how nitrates entering a lake can cause eutrophication.

Describe how eutrophication affects the aquatic animals.

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

[6]



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For Examiner's use only	
Question Number	Marks
1	
2	
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Total Marks	
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Examiner Number

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