Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2015–2016

Double Award Science: Biology

Unit B1
Higher Tier

MV18

[GSD12]

WEDNESDAY 24 FEBRUARY 2016, MORNING

Time

1 hour, 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.
Write your answers in the spaces provided in this question paper.
Answer **all eight** questions.

Information for Candidates

The total mark for this paper is 70.
Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **4(a)**.

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1 Rebecca tested each of three solutions, **A**, **B** and **C**, with Benedict's reagent, Biuret reagent and iodine solution.

One solution contained only starch, one contained only protein and one contained only glucose.

She recorded positive results with a tick ✓.
She recorded negative results with a cross ✗.

The table shows her results.

Solution	Benedict's test result	Biuret test result	Iodine test result	Name of substance present
A	✓	✗	✗	
B	✗	✗	✓	
C	✗	✓	✗	

(a) Complete the table by writing in the name of the substance present in each solution. [3 marks]

(b) (i) Describe how Rebecca carried out the Benedict's test. [2 marks]

_____

_____

_____

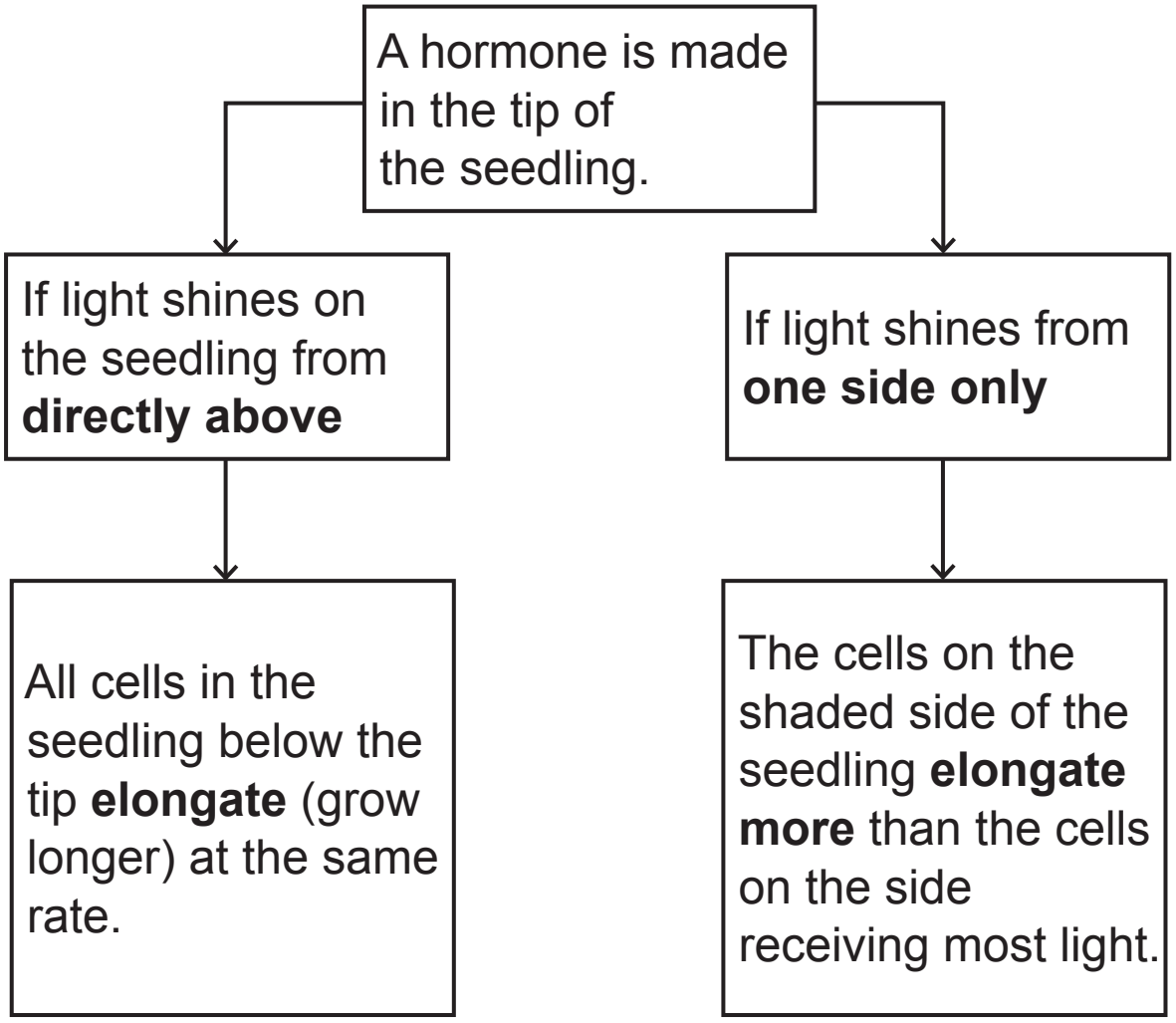
_____

(ii) Give the colour change that shows a positive result for the Benedict's test. [1 mark]

_____ to _____

2 The growth of a seedling is affected by the direction from which light shines on it.

The flow diagram describes a seedling's growth response to light.



(a) (i) Name the seedling's growth response to light. [1 mark]

_____

(ii) Name the plant hormone that causes this growth response in the seedling. [1 mark]

_____

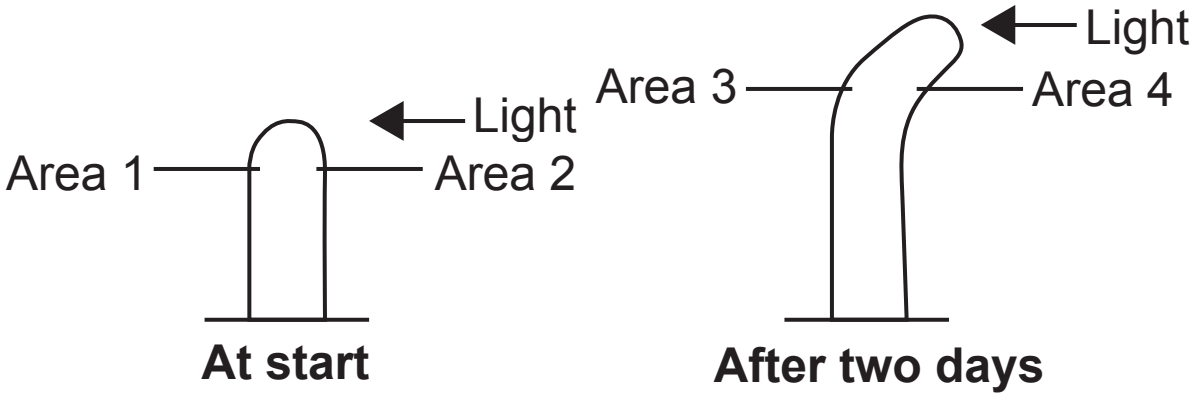
(iii) Explain the advantage to the seedling of this growth response to light. [2 marks]

_____

_____

_____

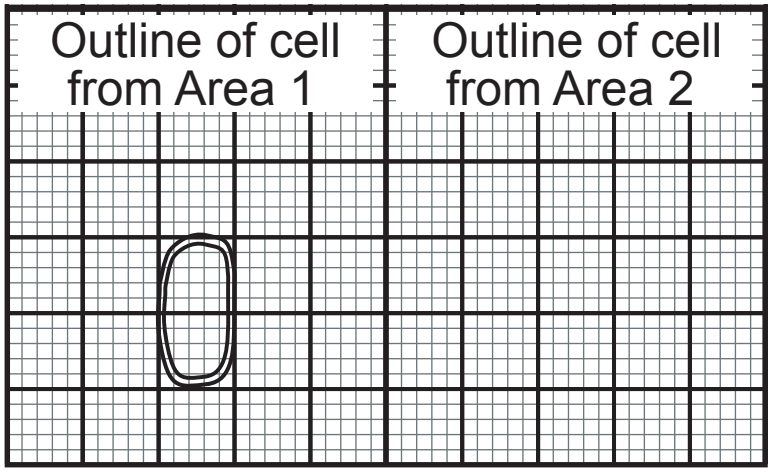
(b) The diagram shows how shining a light from **one side only** affects the growth of a seedling.



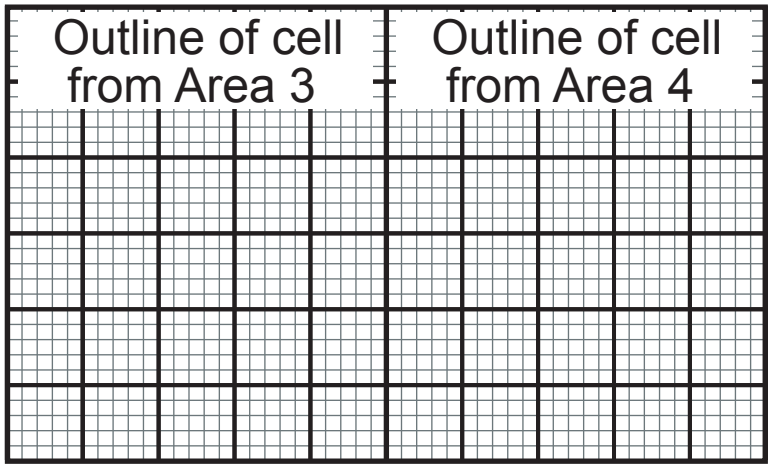
The outline of a cell from Area 1 has been drawn below.

Use the flow diagram on page 4 and the diagram above to help draw the outlines of cells from Areas 2, 3 and 4 on the grids. [3 marks]

At start



After two days



3 **(a)** **(i)** What is an enzyme? [2 marks]

Protease is an enzyme found in the digestive system.
It breaks down protein in the stomach.

(ii) Name another organ of the digestive system where protease is produced. [1 mark]

(b) Why is digestion necessary? [2 marks]

(c) **Diagram 1** below shows the shape of a stomach protease molecule in acid and in alkali.

The shape of albumin which is a protein molecule is also shown.

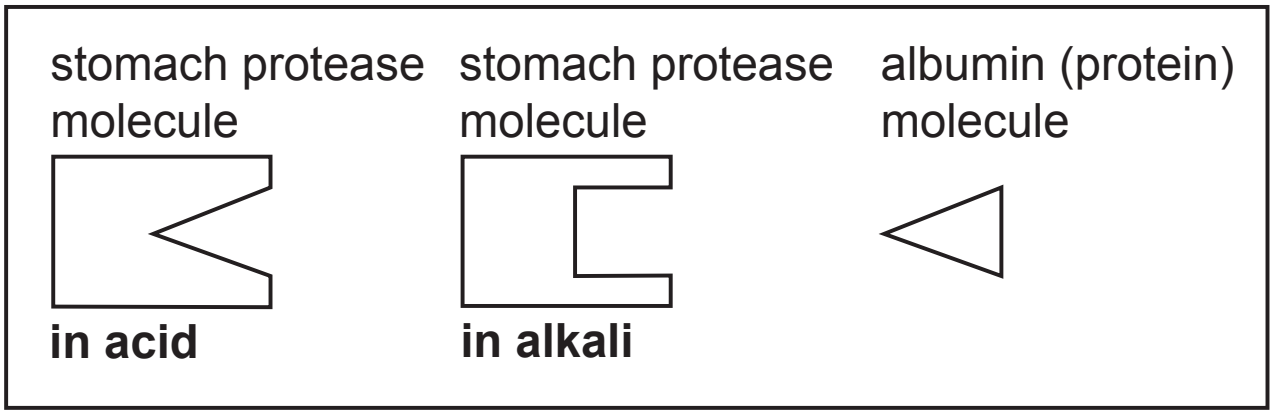


Diagram 1

When albumin is added to water it makes a cloudy solution. If the albumin in the solution is broken down by stomach protease, the cloudy solution goes clear.

David tested the effect of adding stomach protease to albumin in **acid** and in **alkali**.

Diagram 2 below shows the results of his experiment.

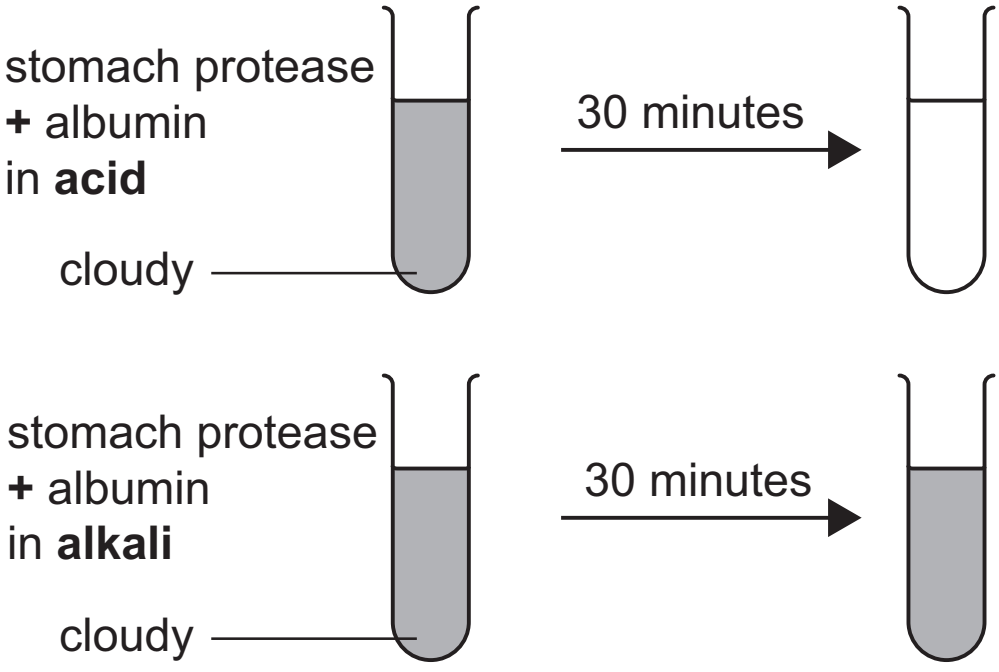


Diagram 2

(i) Use the information in **Diagram 2** to describe the results of David's experiment. [1 mark]

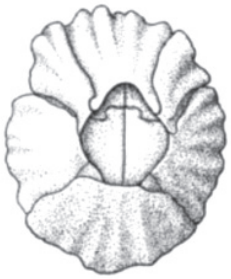
(ii) Use the information in **Diagrams 1 and 2** and your knowledge of enzyme action to explain the results of David's experiment in **acidic** conditions. [2 marks]

(iii) Use the information in **Diagrams 1 and 2** and your knowledge of enzyme action to explain the results of David's experiment in **alkaline** conditions. [2 marks]

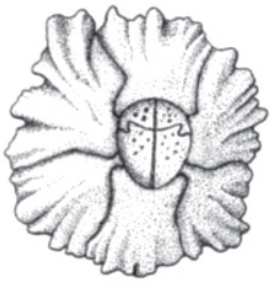
4 Barnacles are small animals that live inside shells attached to rocks on shores.

A scientist investigated the distribution of two different species of barnacle, **A** and **B**, on a rocky shore.

The drawings show the two species of barnacle.
The photograph shows the rocky shore he sampled.



Species **A**

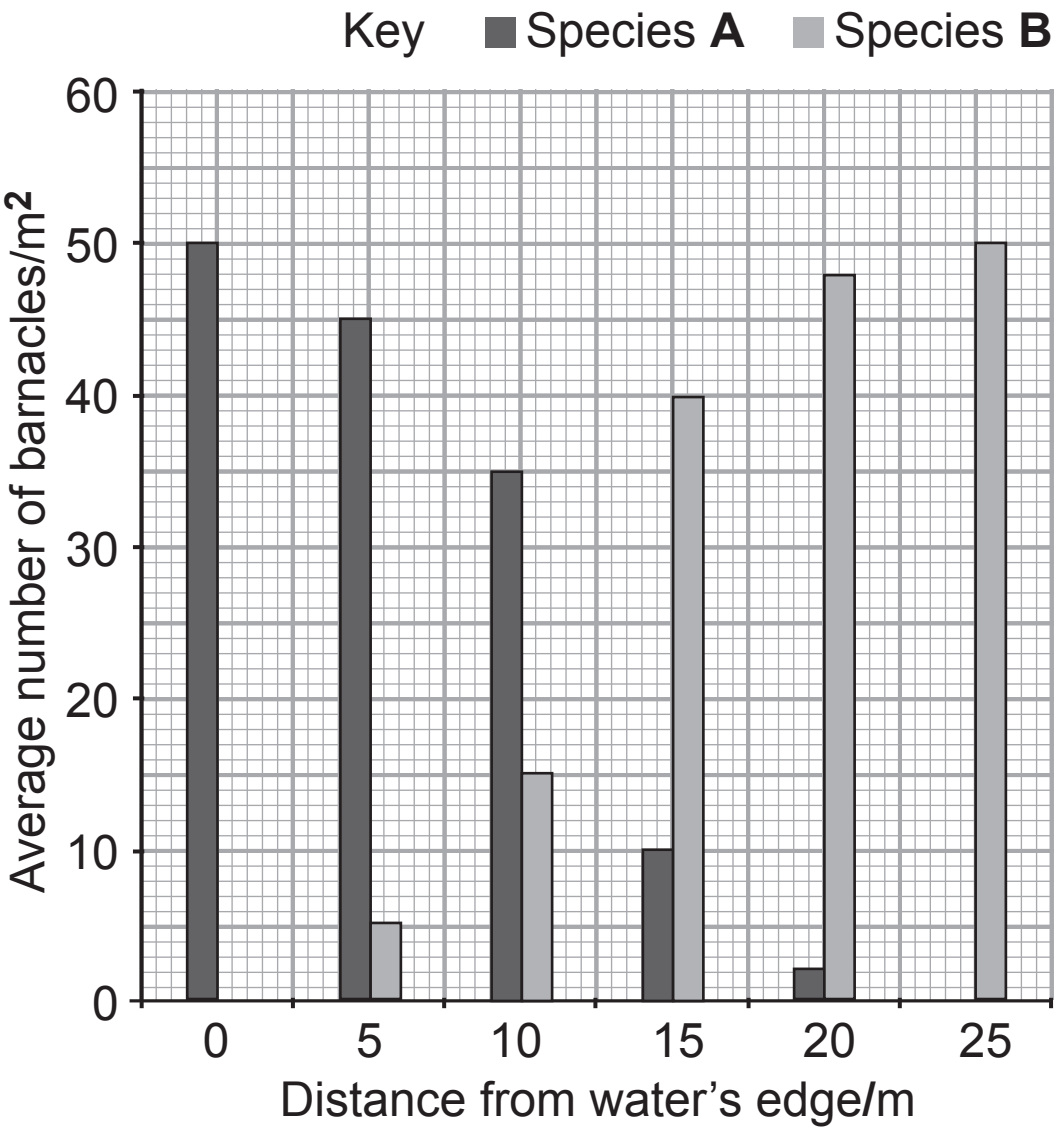


Species **B**

(a) Describe how the scientist sampled the rocky shore. [6 marks]

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

(b) The bar chart shows his results.



(i) The scientist had predicted that the numbers of species **A** would decrease with increasing distance from the water's edge.

Give **two** pieces of data from the bar chart that support this prediction. [2 marks]

Using the data from his bar chart, the scientist calculated the **percentage** of barnacles belonging to each species at each distance from the water's edge.

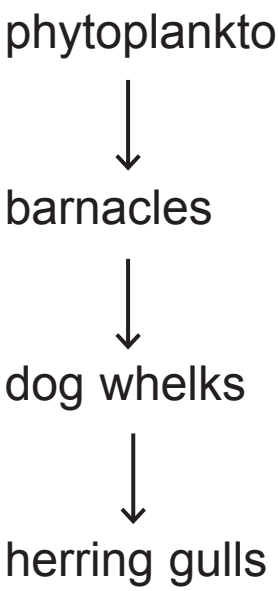
The table shows these percentages.

Distance from water's edge/m	**Percentage of barnacles present**	
	Species A/%	**Species B/%**
0	100	0
5	90	10
10	70	30
15	20	80
20		
25	0	100

(ii) Complete the table by using data from the bar chart to calculate the **percentage** of barnacles of species **A** and species **B** at 20 metres from the water's edge. [3 marks]

Show your working.

(c) A food chain containing barnacles is shown.



(i) What do the arrows in the food chain represent? [1 mark]

_____

(ii) Explain why more energy would be available to herring gulls if they fed on barnacles rather than dog whelks. [2 marks]

_____

_____

_____

_____

(d) Chicken farmers can use intensive farming methods or free range farming methods.

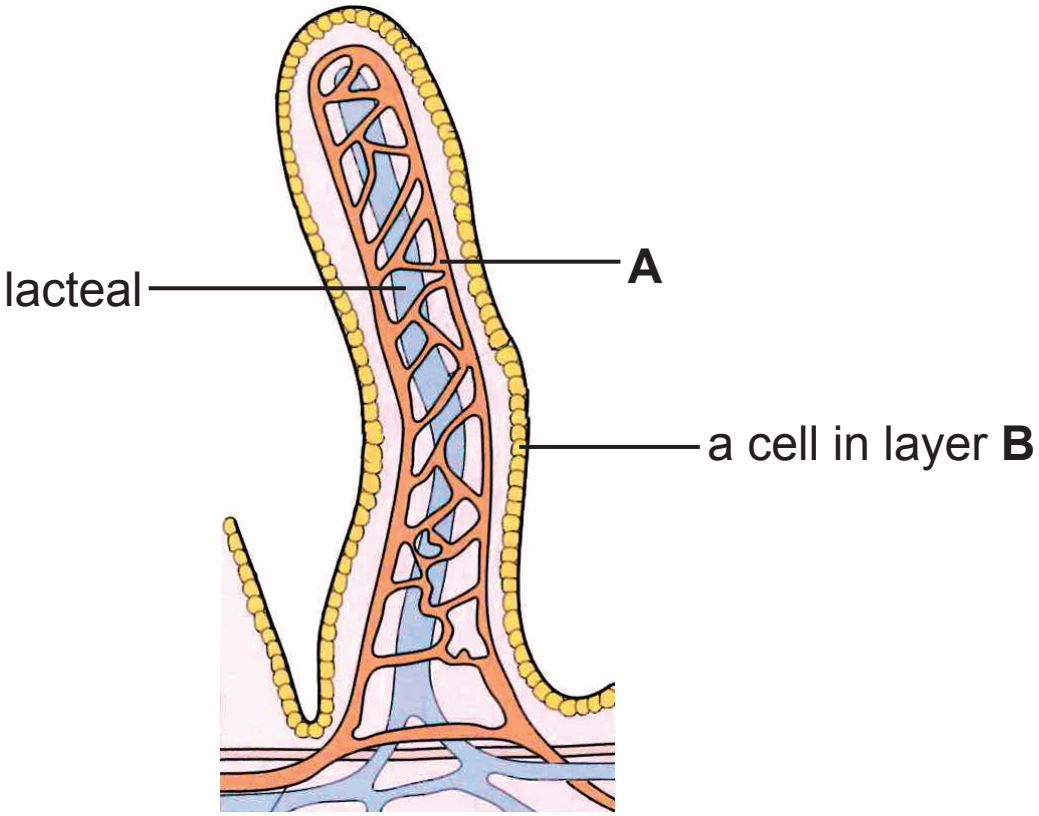
The photographs show both types of farming.

Intensive chicken farming

Free range chicken farming

Use the photographs and your knowledge to suggest why a chicken farmer might decide to use the intensive farming method rather than the free range farming method. [3 marks]

5 The diagram shows a structure found in the small intestine.



(a) (i) Name the structure shown in the diagram. [1 mark]

_____

(ii) Name part **A**. [1 mark]

_____

(iii) Name **one** product of digestion that is transported in part **A**. [1 mark]

_____

(iv) Name **one** product of digestion that is transported in the lacteal. [1 mark]

_____

(b) Give **one** way layer **B** in the diagram is adapted for the efficient absorption of digested food molecules.
[1 mark]

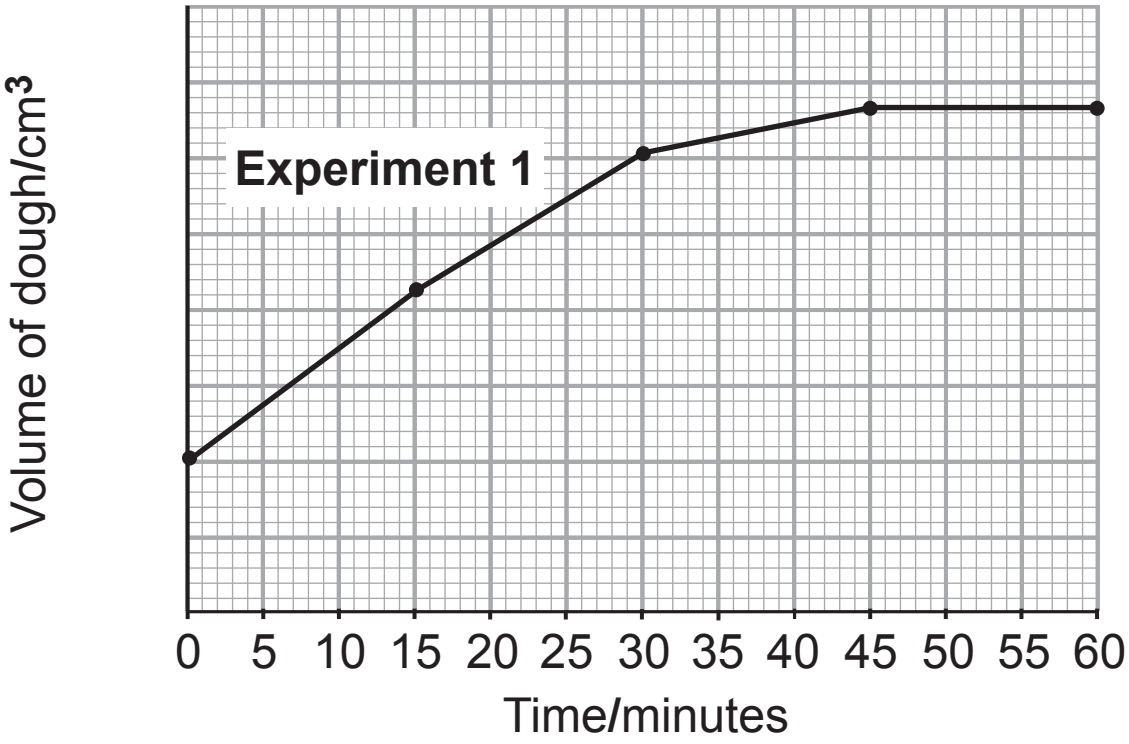
6 Bread dough is made by mixing wheat flour with water and yeast.
The dough rises because bubbles of gas are produced and trapped in the dough.

Louise carried out an investigation into the effect of adding glucose to the dough.
She added 1 gram of glucose to 20 cm^3 of dough, and kept it at a temperature of 20 °C. The volume of the dough was measured every 15 minutes for one hour (**Experiment 1**).
She repeated the experiment with a second sample of 20 cm^3 of dough to which glucose had **not** been added (**Experiment 2**).

The table shows the results of the two experiments.

Time/minutes	**Volume of dough/cm^3**	
	Experiment 1 with glucose	**Experiment 2 without glucose**
0	20	20
15	42	28
30	60	36
45	66	40
60	66	40

(a) (i) The results for Experiment 1 have been plotted to produce the graph shown on the grid below.
Add the scale on the y axis.
Draw a graph for Experiment 2 on the grid.
[4 marks]



(ii) Use data from the graph to calculate the **percentage increase** in the volume of the dough in **Experiment 1** from 0 to 30 minutes. [3 marks]

Show your working.

_____ **%**

(iii) Describe and explain the effect that adding glucose has had on the dough mixture. [3 marks]

Describe _____

_____

Explain _____

_____

_____

_____

(iv) The wheat flour used in both experiments contained starch.
Louise repeated **Experiment 2**. She added 1 gram of amylase to the dough mixture.

What effect did the amylase have on the starch in the wheat flour? [1 mark]

_____

_____

(b) When muscle cells of mammals respire aerobically, they use oxygen. When they respire anaerobically, they do not use oxygen.

Give **two other** differences between aerobic and anaerobic respiration in muscle cells of mammals.
[2 marks]

1. _____

_____

_____

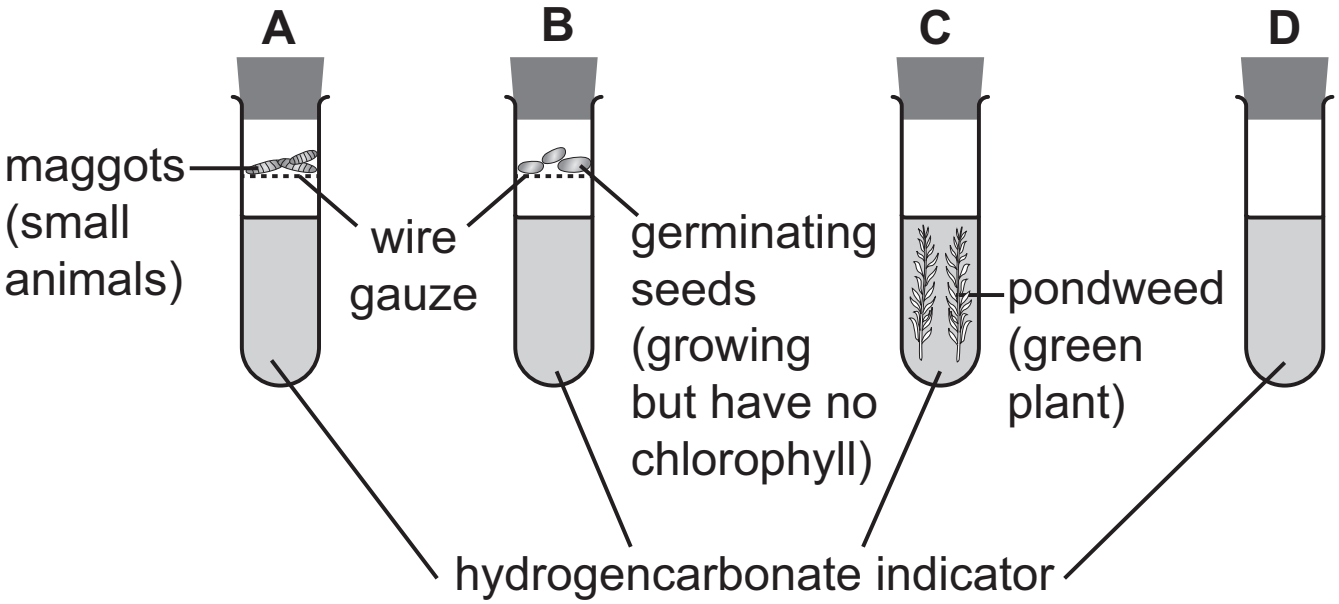
2. _____

_____

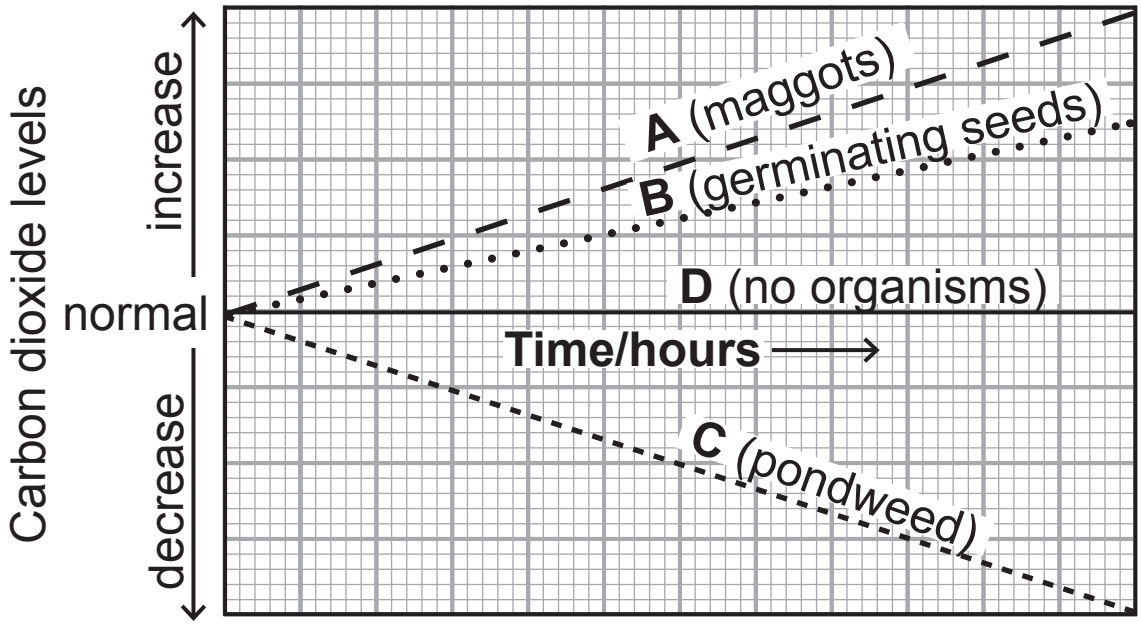
_____

7 Andy investigated the changes in hydrogencarbonate indicator caused by different organisms.

The diagram shows how Andy set up his investigation.



The graph shows how the carbon dioxide levels changed in each of the test tubes A, B, C and D over 12 hours in bright light.



(a) Use the information from the graph and your knowledge to complete the table. [3 marks]

Test tube	Colour of hydrogencarbonate indicator after 12 hours in bright light
A	
B	
C	
D	Red

(b) Germinating seeds are growing but have no chlorophyll. Pondweed contains chlorophyll.

Explain the difference in the colour of the hydrogencarbonate indicator for the germinating seeds and the pondweed after 12 hours in bright light.
[3 marks]

(c) What does the result for test tube **D** suggest about any colour changes which may have occurred in the other three test tubes? [1 mark]

8 Carbon compounds are present in all living organisms. Fossil fuels contain carbon and the atmosphere contains carbon dioxide. The way in which carbon is recycled in nature is known as the carbon cycle.

Describe the various processes involved in the carbon cycle. Start your answer with carbon dioxide in the atmosphere. [5 marks]

THIS IS THE END OF THE QUESTION PAPER

Sources:

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Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
Total Marks	