Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2015–2016

Double Award Science: Biology

Unit B1

Foundation Tier

[GSD11]

GSD11

TUESDAY 17 MAY 2016, AFTERNOON

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 blue or black ink only. **Do not write with a gel pen.**
Answer **all eight** 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 **8(b)**.

10175

1 Diabetes is a condition in which the body cannot control blood glucose levels. Diabetes can have long-term effects.

(a) Choose **two** possible long-term effects of diabetes from the list.

loss of hearing	**kidney failure**	**eye damage**	**thirst**

1. _____

2. _____ [2]

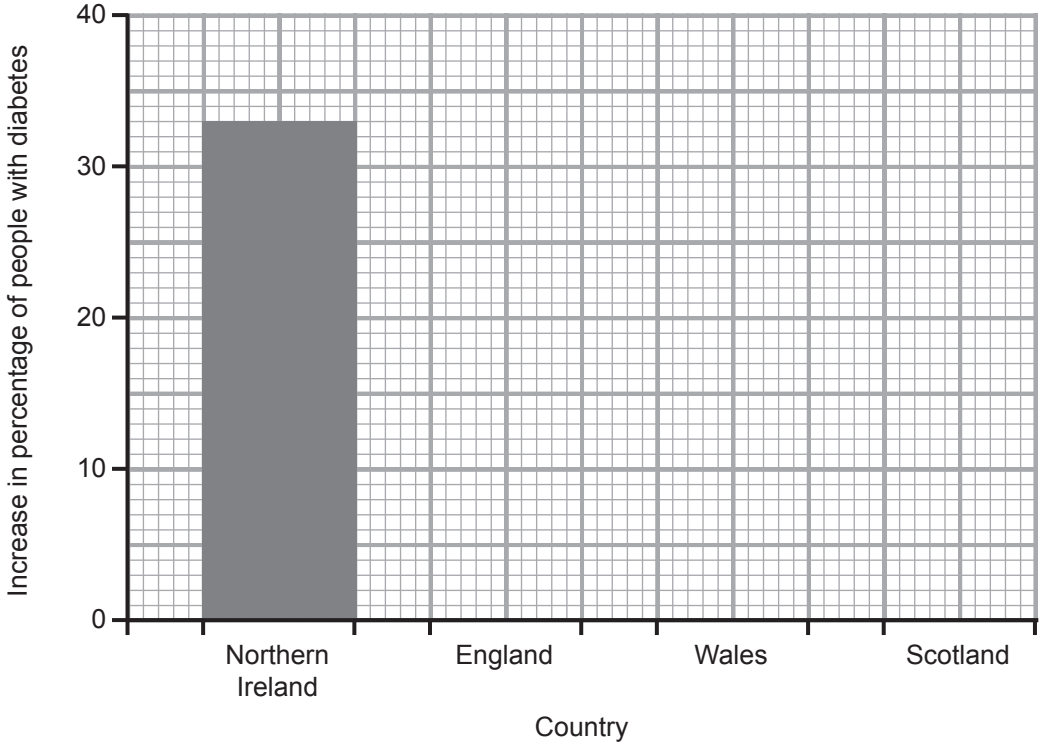
(b) The increase in the percentage of people with diabetes in the countries of the United Kingdom between 2007 and 2012 is given in the table.

Country	Increase in percentage of people with diabetes between 2007 and 2012
Northern Ireland	33
England	25
Wales	20
Scotland	18

Source: Diabetes UK

(i) Use the data in the table opposite to complete the bar chart.

The data for Northern Ireland has been plotted.



[3]

(ii) Suggest **two** reasons for the increase in diabetes in all the countries of the United Kingdom.

1. _____

2. _____ [2]

Glucose is needed in cells for respiration.

(c) Complete the word equation for respiration by writing in the boxes.

glucose	+		→		+		+	energy

[3]

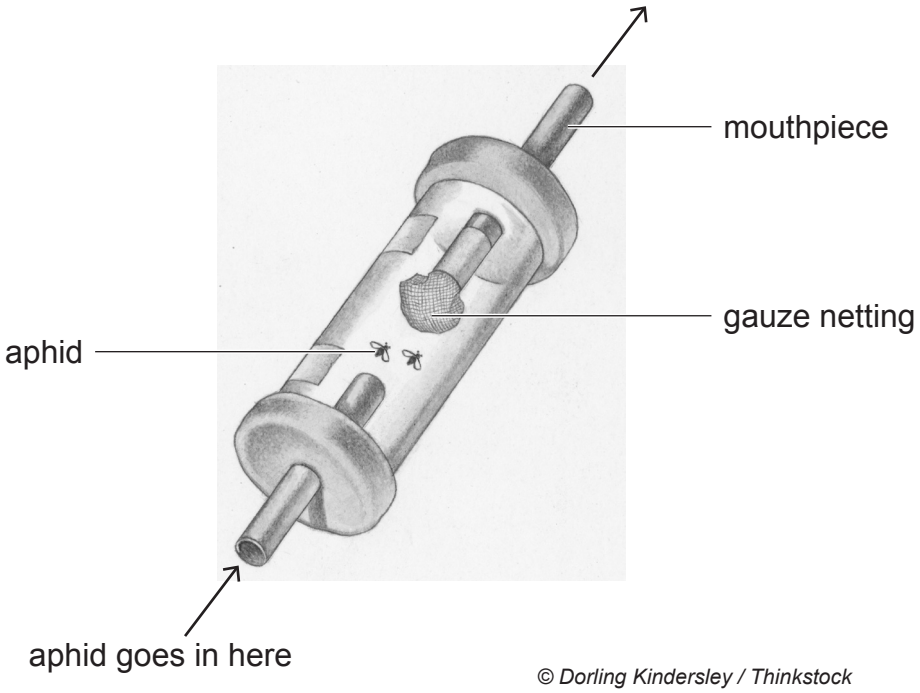
[Turn over

2 **(a)** The table gives information about three animal groups and their features.
Complete the table for the three animal groups.
Use a tick (✓) to show that the feature is present.

	Feature		
Animal Group	Backbone	Chaetae	Exoskeleton
Annelids			
Insects			
Chordates			

[3]

(b) Aphids are small insects.
The diagram shows the apparatus used to collect them.



(i) Name the apparatus shown.

_____ [1]

(ii) What is the function of the piece of gauze netting in the apparatus?

_____

_____ [1]

[Turn over

(iii) Many aphids feed on one tree.
Aphids are eaten by blue tits.
Use the information given to draw a food chain for these three organisms.

[2]

(iv) Draw a pyramid of numbers for the food chain you have drawn in part **(iii)** above.
Label the organisms.

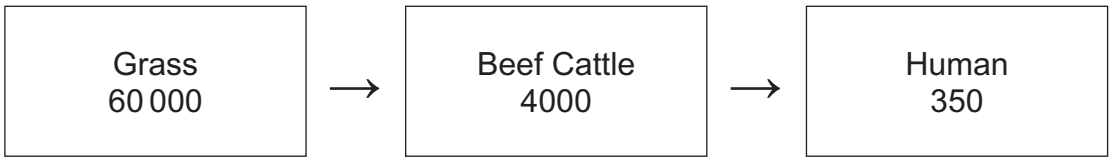
[2]

(v) What would you do to obtain the information needed to draw a pyramid of biomass for a food chain?

_____

_____ [1]

(c) The diagram shows the amount of energy available at three trophic levels in a food chain for a Northern Ireland beef cattle farm.
Figures are in kJ/m^2/year.



Trophic Level 1 Trophic Level 2 Trophic Level 3

(i) What is the source of energy for this food chain?

_____ [1]

(ii) Give **two** reasons why there is less energy at trophic level 3 than at trophic level 2.

1. _____

_____

2. _____

_____ [2]

[Turn over

3 **(a)** Complete the passage about enzymes by writing the correct words in the spaces.
Choose the correct words from the list.

starch	**fat**	**living**
biological	**product**	**protein**

All enzymes are made of _____.

They are _____ catalysts that speed up the rate of

reactions. The enzyme amylase breaks down _____. [3]

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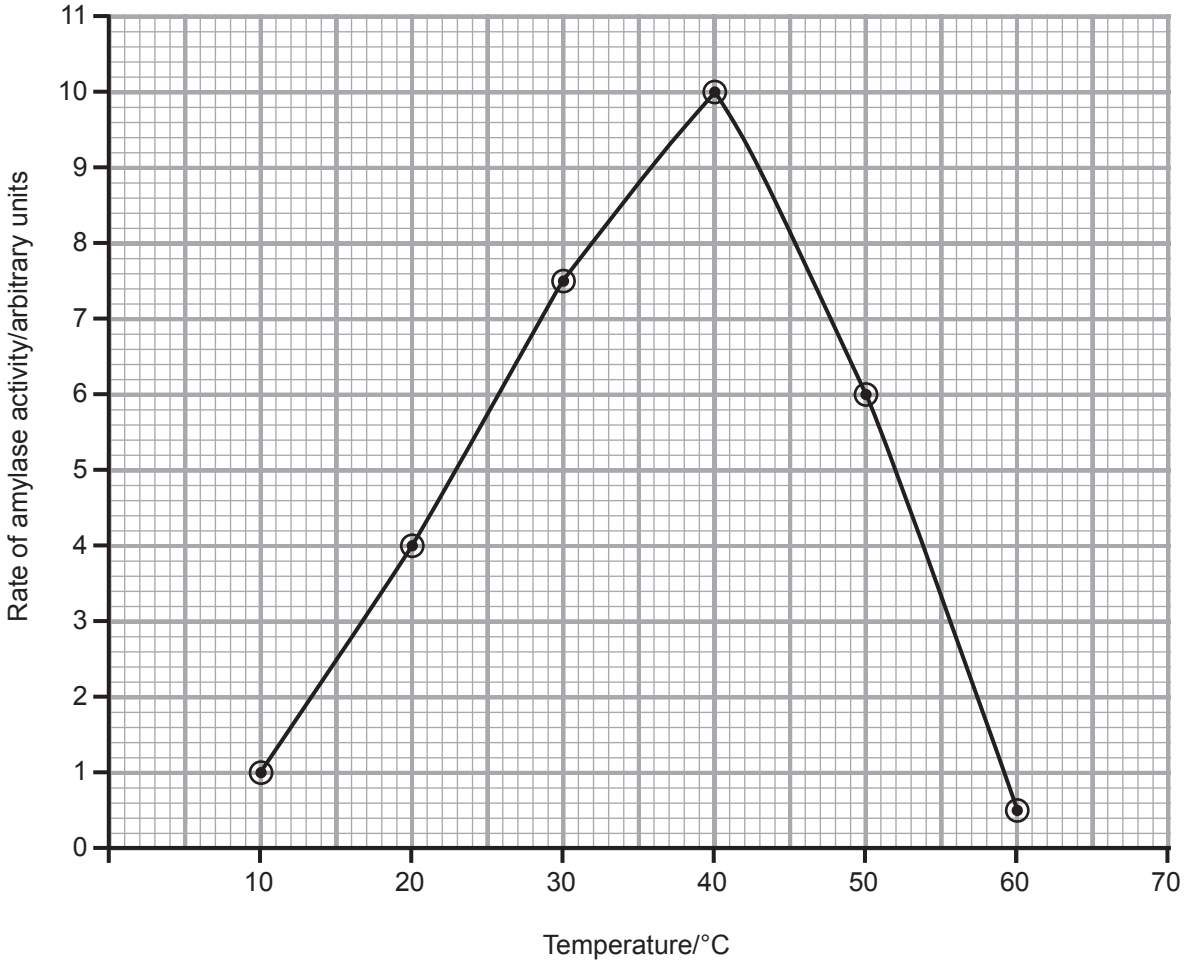
(Questions continue overleaf)

(b) A student carried out an experiment to investigate the effect of temperature on the rate of amylase activity.

The graph shows the results of the student's experiment.



Use the graph and your knowledge to answer the following.

(i) What is the best temperature for amylase activity?

_____ °C [1]

(ii) Describe and explain the rate of amylase activity at 60 °C.

_____

_____

_____

_____

_____

_____

_____

_____ [2]

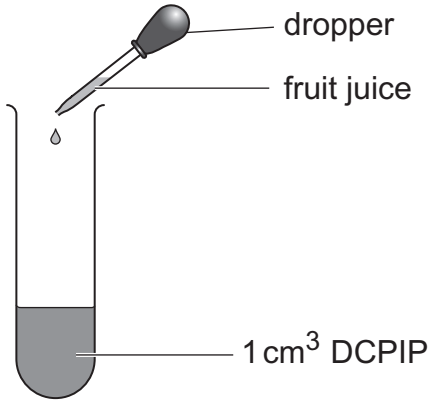
(iii) Name **two** variables that should be controlled in this experiment.

1. _____

2. _____ [2]

[Turn over

4 Jane carried out an experiment to compare the vitamin C content of three fruit juices. The diagram shows the apparatus she used.



Source: Principal Examiner

Jane added one fruit juice, drop by drop, to 1 cm^3 of DCPIP in a test tube and swirled the test tube around to mix the contents.
After several drops of fruit juice were added, the DCPIP changed colour.
She repeated this method for the two other fruit juices.

(a) Describe the colour change that takes place in the DCPIP.

_____ to _____ [1]

(b) Jane counted the number of drops of each fruit juice needed to change the colour of 1 cm^3 of DCPIP.
She repeated this five times for each fruit juice.

The table shows her results.

Fruit juice	Number of drops of fruit juice needed to change the colour of 1 cm^3 of DCPIP					Average number of drops
Orange	3	4	3	5	5	4
Boiled orange	9	7	6	6	7	
Lemon	4	3	3	2	3	3

Use the table opposite and your knowledge to answer the following.

(i) Calculate the average number of drops of boiled orange juice needed to change the colour of the DCPIP.
Write this number in the table opposite.

[1]

(ii) Which fruit juice had the highest vitamin C content?

_____

Explain your answer.

_____

_____ [2]

(iii) How does boiling orange juice affect its vitamin C content?

_____

_____ [1]

(c) Explain why the results of this experiment are reliable.

_____

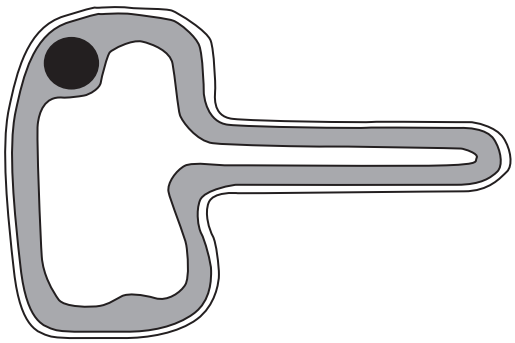
_____ [1]

(d) A different piece of apparatus could be used to accurately measure the volume of fruit juice added to the DCPIP.
Name this piece of apparatus.

_____ [1]

[Turn over

5 **(a)** Plants take up minerals from the soil using specialised cells.
The drawing shows one of these specialised cells.



Source: Principal Examiner

(i) Name this specialised cell.

_____ [1]

(ii) Use the drawing to describe and explain how this cell is adapted for its role in mineral uptake.

_____

_____

_____

_____

_____ [2]

(b) Farmyard manure is a natural fertiliser.
The table shows the mass of three minerals in farmyard manure and in an artificial fertiliser.

	Mass of mineral/kg/tonne		
Fertiliser	**Nitrate**	**Phosphate**	**Potassium**
Farmyard manure	6.0	3.5	8.0
Artificial fertiliser	200.0	100.0	100.0

(i) Plants use nitrates to make a substance needed for growth.
Name this substance.

_____ [1]

(ii) There is an advantage in using artificial fertiliser rather than farmyard manure.
Give **data** from the table that supports this statement.

_____

_____

_____

_____ [1]

(iii) Give **three** advantages of using farmyard manure rather than artificial fertiliser.

1. _____

_____

2. _____

_____

3. _____

_____ [3]

[Turn over

6 **(a)** When coal and oil are burned, they produce air pollutants.
Sulfur dioxide is one of these air pollutants.
Coal and oil are the main fuels burned for heating homes in Belfast.
Natural gas is another fuel that has become recently available for heating homes in Belfast.

The table shows sulfur dioxide levels in Belfast city centre from 1990 to 2010.

Year	Sulfur dioxide level/μg/m^3
1990	65
1995	47
2000	18
2005	7
2010	5

Use the table and the information given to answer the following.

(i) Which **10 year** period showed the greatest decrease in sulfur dioxide levels? Give this decrease.

Show your working.

- 10 year period: _____ to _____
- Decrease: _____ μg/m^3 [2]

(ii) Explain why sulfur dioxide levels have decreased.

_____

_____

_____ [1]

Lichens are small organisms that are found living on rocks, walls and trees.
They are sensitive to air pollution, especially sulfur dioxide.

The photographs show three types of lichen, a crusty, a leafy and a shrubby lichen.

Crusty lichen

© Dr Jeremy Burgess / Science Photo Library

Leafy lichen

© Claude Nuridsany & Marie Perennou / Science Photo Library

Shrubby lichen

© mtreasure / iStock / Thinkstock

- Crusty lichens can survive in levels of sulfur dioxide up to 70 µg/m^3.
- Leafy lichens can survive in levels of sulfur dioxide up to 59 µg/m^3.
- Shrubby lichens only survive in levels of sulfur dioxide below 19 µg/m^3.

(b) Use this information and the table opposite to give the type of lichen that would have been found in Belfast city centre in 1990.

Type of lichen: _____

Reason for choice: _____

_____

_____

_____ [2]

(c) Sulfur dioxide levels in Belfast city centre are now low.
Explain why it is still important to continue monitoring the level of sulfur dioxide.

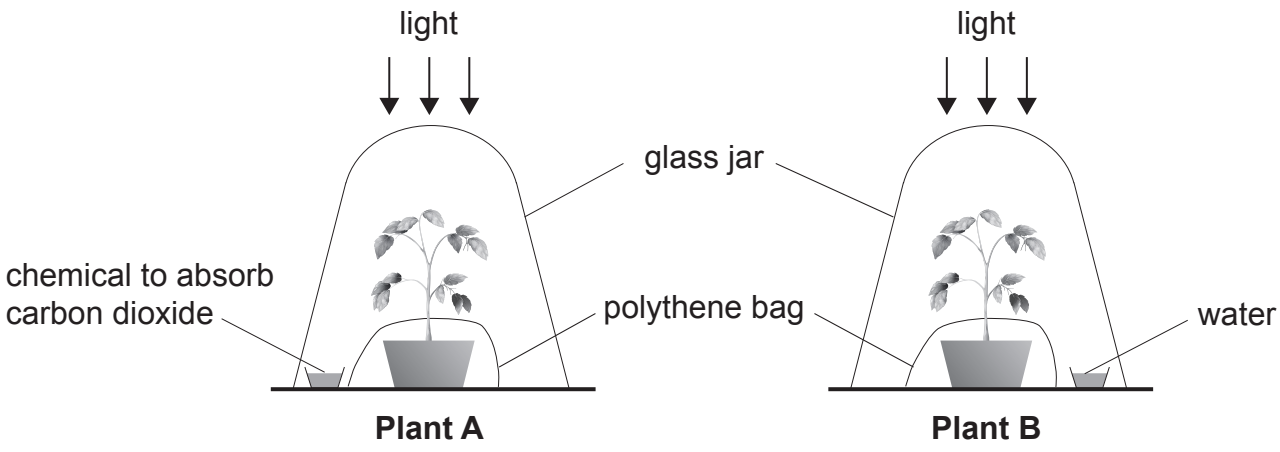
_____

_____

_____ [1]

[Turn over

7 **(a)** The diagram shows an experiment to investigate if carbon dioxide is needed for photosynthesis.



Source: Principal Examiner

Both plants were destarched before the experiment.
They were **then** left in warm, sunny conditions for 24 hours.

(i) How were the plants destarched?

_____

_____

_____ [1]

(ii) Why were the plants destarched?

_____

_____

_____

_____ [1]

(iii) Bacteria are living organisms present in the soil in the plant pots.
Suggest why the plant pots are covered with polythene bags.

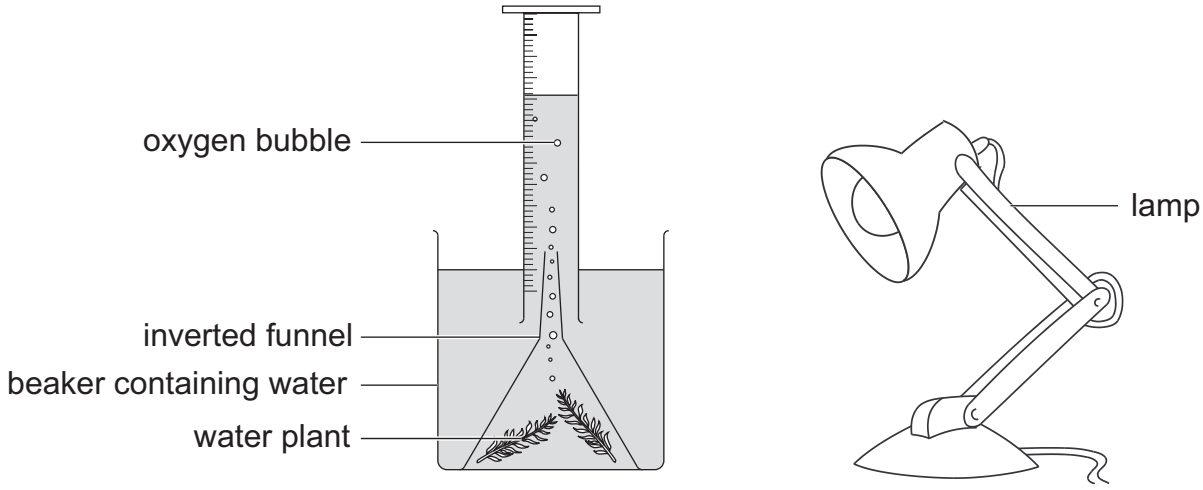
[2]

(iv) After 24 hours in warm, sunny conditions, a leaf from plant **A** and a leaf from plant **B** were tested for starch using iodine solution.
Describe and explain the results you would expect for the leaf from plant **A** and the leaf from plant **B** after testing with iodine solution.

[3]

[Turn over

(b) Jude carried out an experiment to measure the rate of photosynthesis in a water plant at different light intensities.
The diagram shows the apparatus he used.

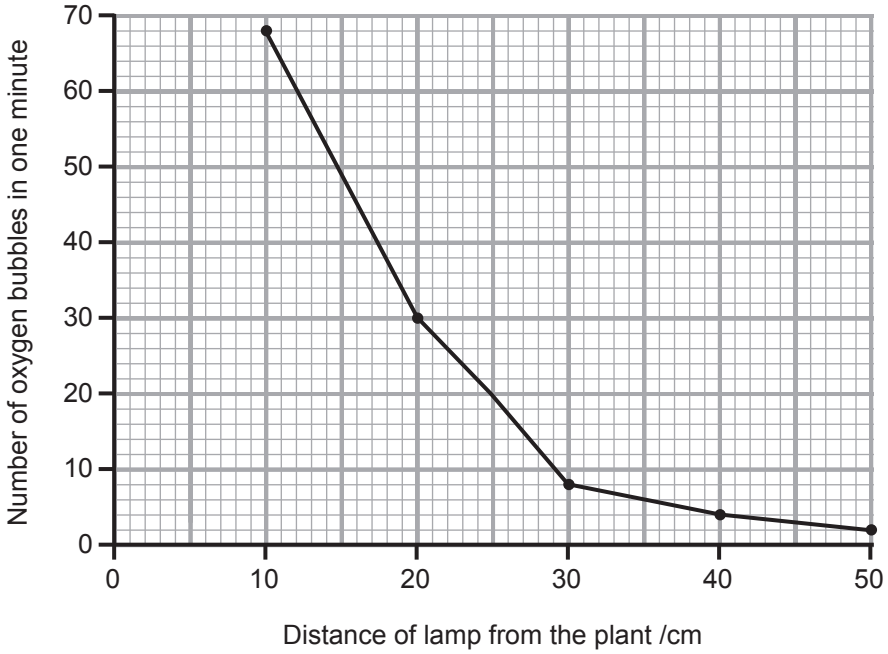


Source: Principal Examiner

The light intensity decreases as the lamp is moved further away from the plant.

Jude counted the number of oxygen bubbles given off by the plant in one minute at different distances of the lamp from the plant.

The graph shows the results of Jude's experiment.



(i) Use the information given opposite and the graph to describe what happens to the number of oxygen bubbles given off by the plant as the light intensity decreases.

_____

_____ [1]

(ii) At what distance of the lamp from the plant did the plant produce **24 oxygen bubbles** in one minute?

_____ cm [1]

(iii) When Jude moved the lamp to a different distance, he waited for two minutes before counting the number of oxygen bubbles.

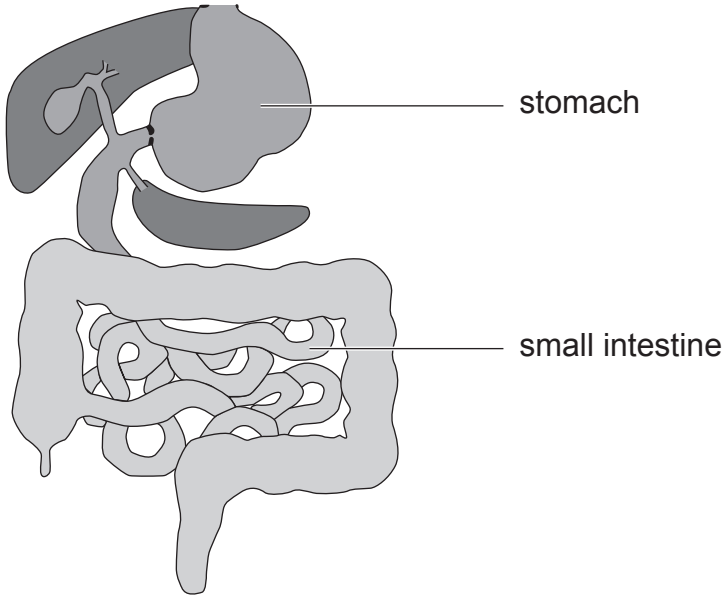
Explain why he did this.

_____

_____ [1]

[Turn over

8 The diagram shows part of the digestive system.



(a) State **two** ways in which the small intestine is adapted for digestion.

1. _____

2. _____ [2]

(b) Meat is a major source of protein in our diet.
Digestion of meat starts in the stomach and is completed in the small intestine.

As George got older, he produced less hydrochloric acid in his stomach.
After eating any meal containing a lot of meat, George felt his stomach remaining full for longer, compared to when he was younger.

- Describe and explain the effect of reduced acid production on digestion of meat in the stomach of an older person like George.
- Describe the digestion of meat in the **small intestine**.
- Describe what happens to the products of digestion of meat in the small intestine.

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	
3	
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7	
8	
Total Marks	

Examiner Number