Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2013–2014

Double Award Science: Biology

Unit B1

Foundation Tier

[GSD11]

GSD11

WEDNESDAY 13 NOVEMBER 2013, AFTERNOON

TIME

1 hour.

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 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 **7(a)**.

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

Examiner Only	
Marks	Remark

1 **(a)** Diabetes is a condition leading to blood glucose (sugar) levels becoming too high. The table below shows the percentage of the population by age group that has diabetes in Northern Ireland.

Age group/years	Percentage of population that has diabetes
16–24	0.5
25–34	2.8
35–44	5.6
45–54	12.4
55–64	22.6
65–74	30.0

Source: www.diabetes.org.uk/Documents/Reports/Diabetes-in-the-UK-2012.pdf

(i) In which age group is diabetes most common?

_____ years [1]

(ii) Suggest a reason for diabetes being most common in this age group.

_____ [1]

(b) Some people with diabetes have to inject a hormone into their blood to lower their blood glucose levels.

(i) Name this hormone.

_____ [1]

(ii) This hormone is a protein and must be injected into the blood.

Explain why this hormone would not work if swallowed.

_____

_____ [2]

(iii) Give **one** way that this hormone lowers blood glucose levels.

_____ [1]

(iv) Two long-term effects and two symptoms of diabetes are given in the list below.

glucose in the urine : kidney failure : stroke : thirst

Complete the table below by writing in the two **long-term effects** of diabetes from the list above.

Long-term effects of diabetes

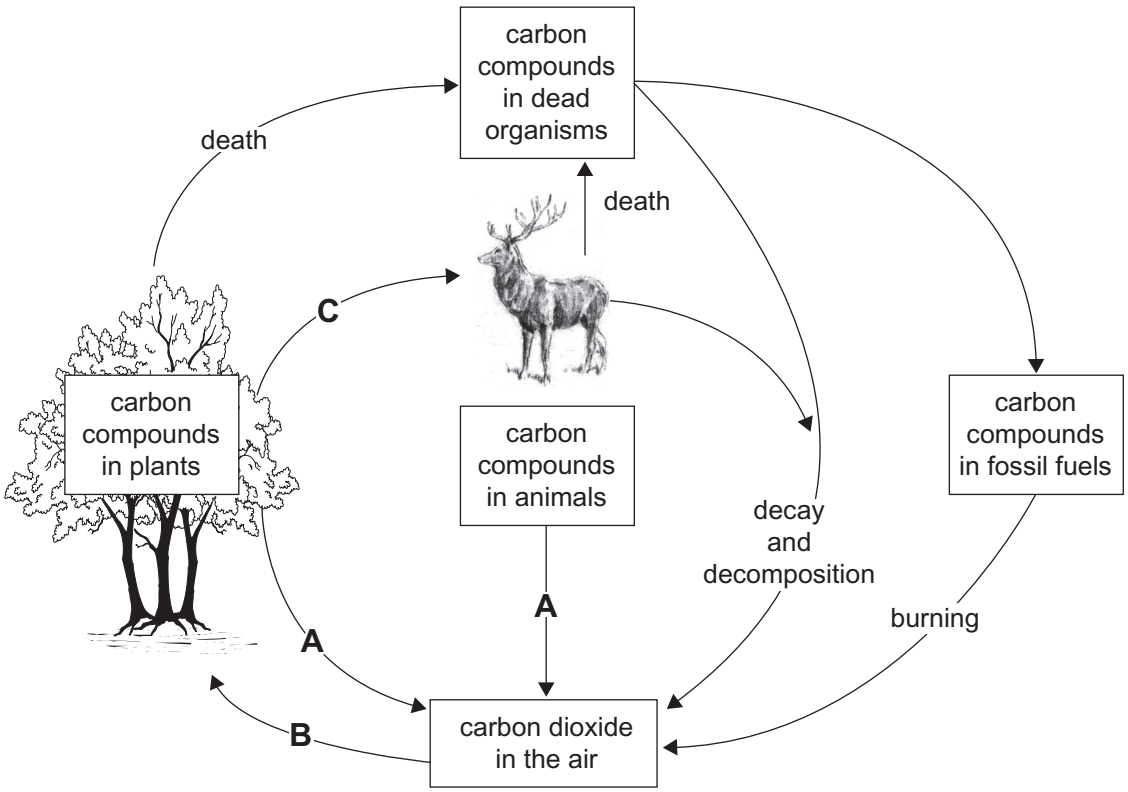
[2]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

2 The diagram below shows the carbon cycle.



Source: CCEA

(a) Name the processes labelled **A**, **B** and **C** in the diagram.

A _____

B _____

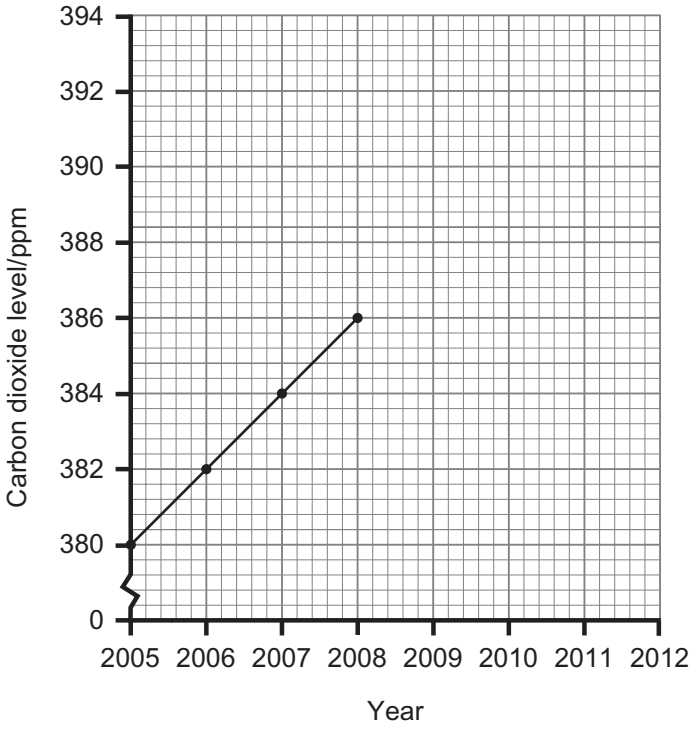
C _____ [3]

(b) The table below gives information on the levels of carbon dioxide in the air between 2005 and 2012.

Year	Carbon dioxide level in parts per million/ppm
2005	380
2006	382
2007	384
2008	386
2009	388
2010	390
2011	392
2012	394

Examiner Only	
Marks	Remark

(i) Complete the line graph on the grid below, by plotting the data in the table for the years 2009 to 2012.



[2]

(ii) Describe the trend shown in the graph.

_____

_____ [1]

(iii) Suggest **one** reason to explain the trend shown in the graph.

_____ [1]

(c) Increased levels of carbon dioxide can lead to global warming.

Explain how global warming may lead to flooding in some low-lying countries like Bangladesh.

_____

_____

_____

_____ [2]

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Examiner Only	
Marks	Remark

3 **(a)** Respiratory surfaces have adaptations for efficient gas exchange.

(i) Give three adaptations of respiratory surfaces in animals.

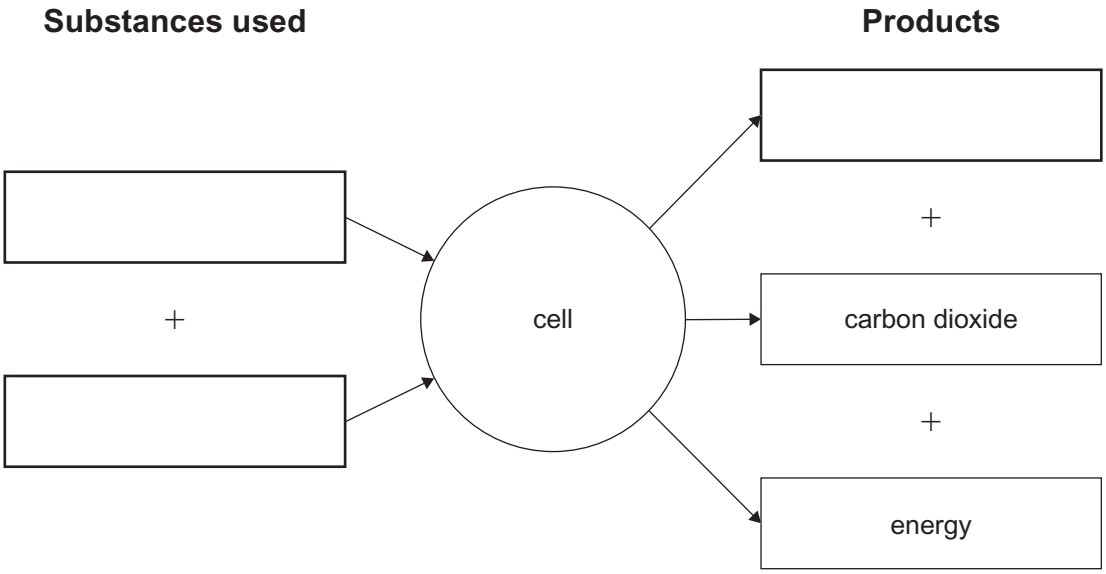
1. _____

2. _____

3. _____ [3]

(ii) The purpose of aerobic respiration is to release energy in cells.

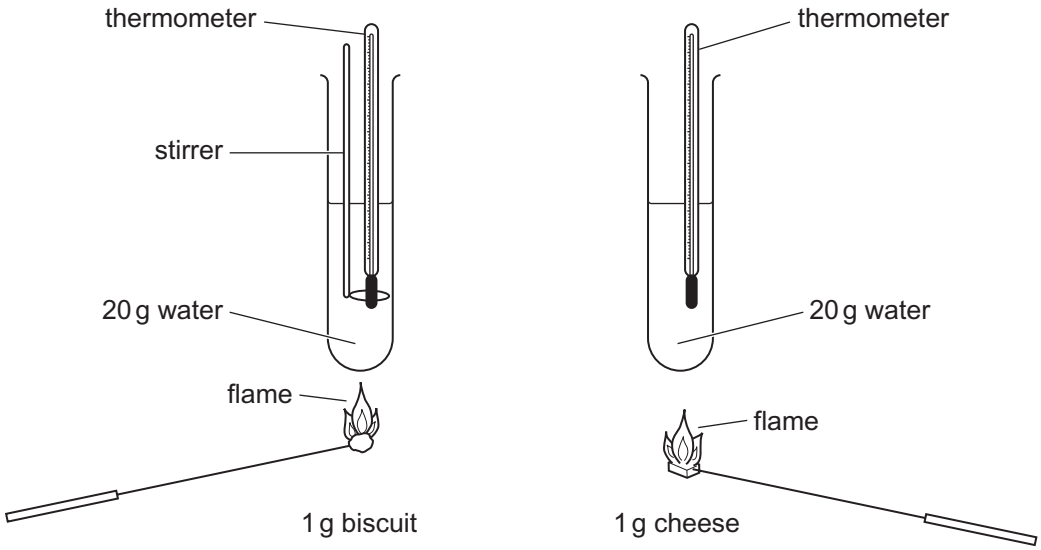
Complete the diagram below to show the substances used and the missing product in aerobic respiration.



[3]

Examiner Only	
Marks	Remark

(b) Paula, a Year 11 student, carried out an experiment to compare the amount of energy released when one gram (g) of biscuit and one gram (g) of cheese were burned, as shown in the diagram below.



(i) Using only the information in the diagram, give two reasons why Paula's experiment was not a fair test.

1. _____

_____

2. _____

_____ [2]

The heat energy released from the burning food raised the temperature of the water in the test tubes.

The amount of energy released when one gram of food is burned is calculated using the following equation:

Energy released in joules/J	=	Mass of water/g	×	Rise in temperature of water/°C	× 4.2

(ii) When the biscuit was completely burned, the temperature of the water increased by 20 °C.
Using the equation above, calculate the amount of energy released by burning the biscuit.
Show your working.

_____ J [2]

(iii) Paula used a biscuit containing only carbohydrate.
She read in a textbook that one gram of carbohydrate contains 17 000 J of energy.

Suggest **one** reason why the energy value Paula obtained for her biscuit was less than 17 000 J.

_____ [1]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

4 The photographs show two types of squirrel, red and grey, found in the United Kingdom (UK).

Red squirrel
© Simon Fraser / Science Photo Library

Grey squirrel
© David Aubrey / Science Photo Library

(a) Squirrels are chordates. Give **one** characteristic of all chordates.

_____ [1]

Read the following passage carefully.

Line

Red squirrels were once found over much of the UK, but their numbers have gone down rapidly during the past 50 years. Reasons for this include disease and loss of habitat. However, the most important reason is that they find it difficult to compete with the introduced American grey squirrel.

The red squirrel's food includes hazelnuts, acorns and pine cones. These are collected in the summer and autumn and stored under the soil surface for later use. While the nuts and other food is being carried in the squirrel's mouth, chemicals from scent glands in its cheeks are transferred to the food.

While the red squirrel numbers in Ireland and England have gone down in recent years, the numbers in Scotland have gone up slightly. This is probably due to more trees having been planted. It is estimated that there are 120 000 red squirrels in Scotland, which is 75% of the total number in the UK.

Using the information in the passage and your knowledge, answer the following questions.

Examiner Only	
Marks	Remark

(b) What is the habitat of the red squirrel?

_____ [1]

(c) Give three reasons why the numbers of red squirrels have gone down.

1. _____

2. _____

3. _____ [3]

(d) *Read lines 6–8.*
Suggest at what time of the year the stored hazelnuts, acorns and pine cones are used by the squirrels.

_____ [1]

(e) *Read lines 8–10.*
Suggest a reason why chemicals from a red squirrel's scent glands need to be transferred to the food.

_____ [1]

(f) *Read lines 13–15.*
Calculate the estimated number of red squirrels in the UK.
Show your working.

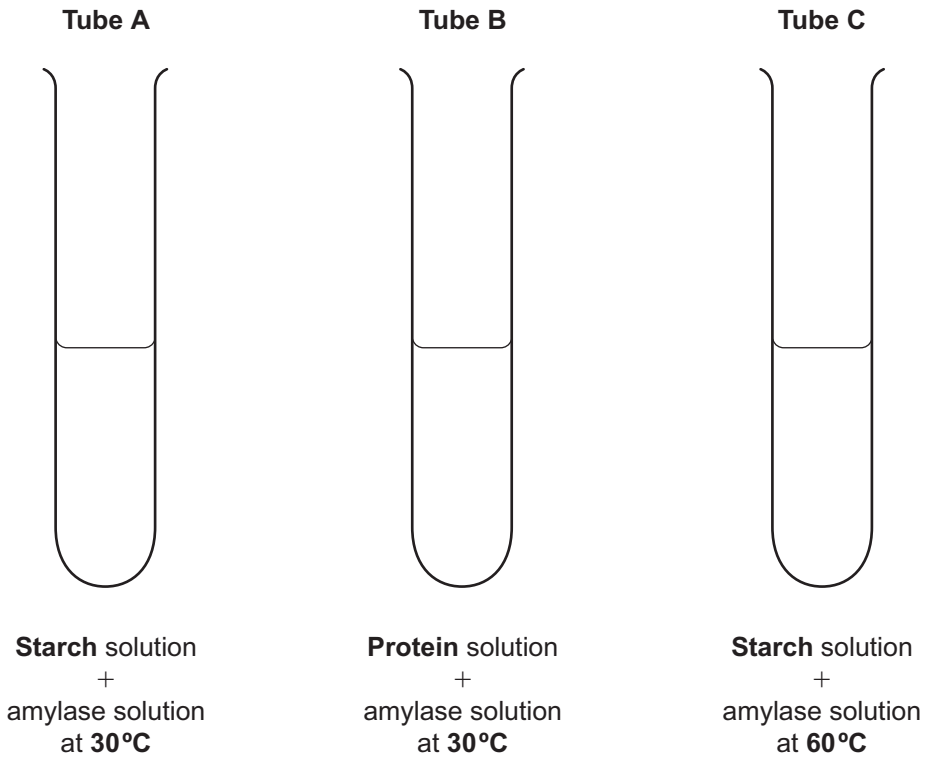
_____ [2]

(g) Birds of prey, e.g. hawks, feed on red squirrels.

Using this information and the information in the passage, draw a food chain which includes the red squirrel.

[2]

5 The diagram below shows an investigation into the action of the enzyme amylase.



Samples were taken from the tubes at the start of the experiment and again after 60 minutes. The samples were tested with iodine solution.

Iodine solution is yellow-brown. It changes to blue-black in the presence of starch.

The table below shows the results of the tests on the samples.

Tube	Colour of tube contents	
	At start	After 60 minutes
A	Blue-black	Yellow-brown
B	Yellow-brown	Yellow-brown
C	Blue-black	Blue-black

(a) Explain why the iodine solution remained yellow-brown when added to tube **B** at the start.

_____ [1]

(b) Explain the difference between the results for tube **A** and tube **C** after 60 minutes.

_____

_____

_____

_____

_____

_____ [4]

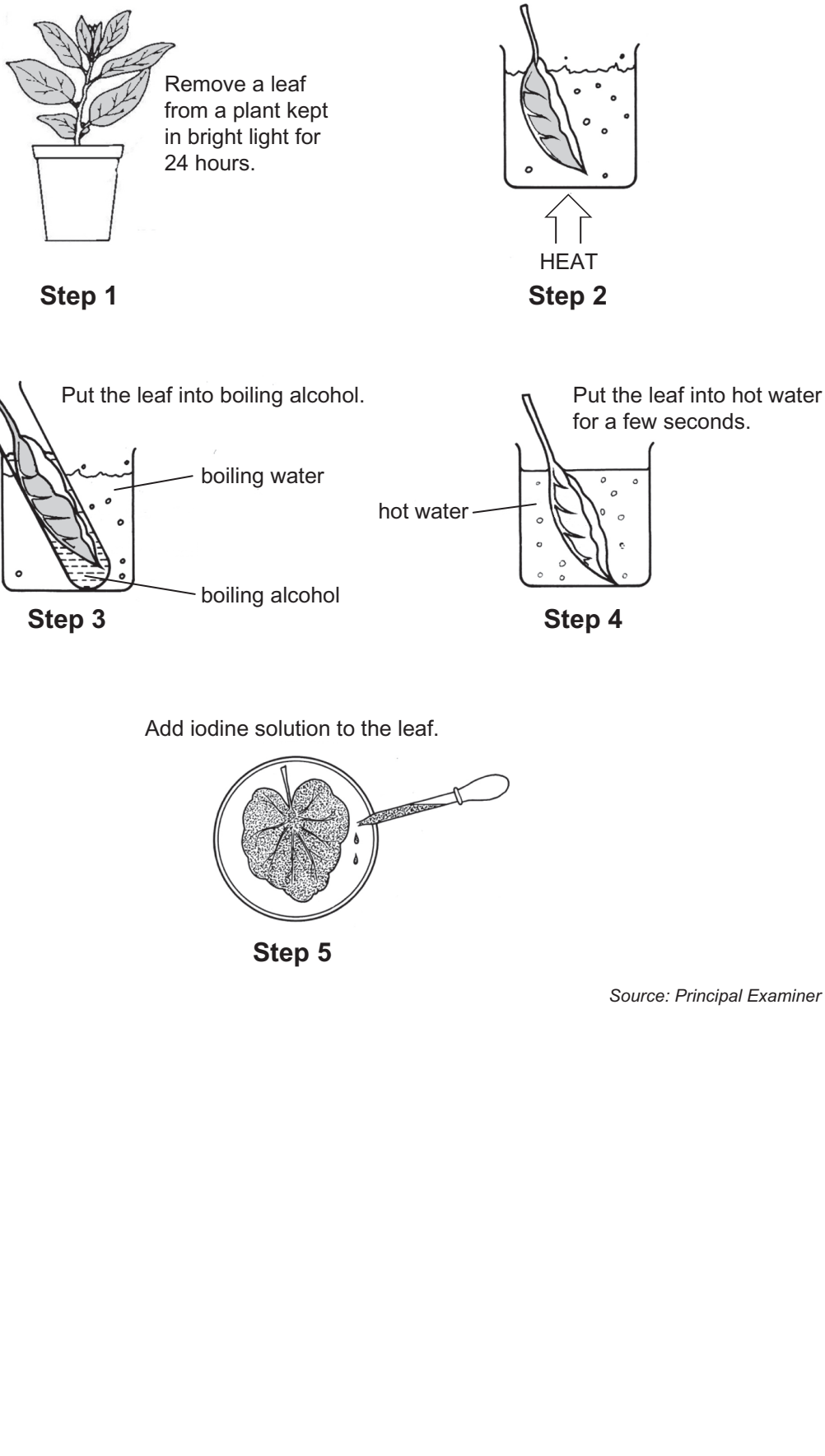
(c) Name the model that explains how enzymes work.

_____ [1]

Examiner Only

Marks	Remark

6 **(a)** The diagram shows the instructions for carrying out a starch test on a leaf.



Source: Principal Examiner

(i) Describe and explain what is happening at **Step 2**.

_____

_____ [2]

(ii) Give a reason for **Step 3**.

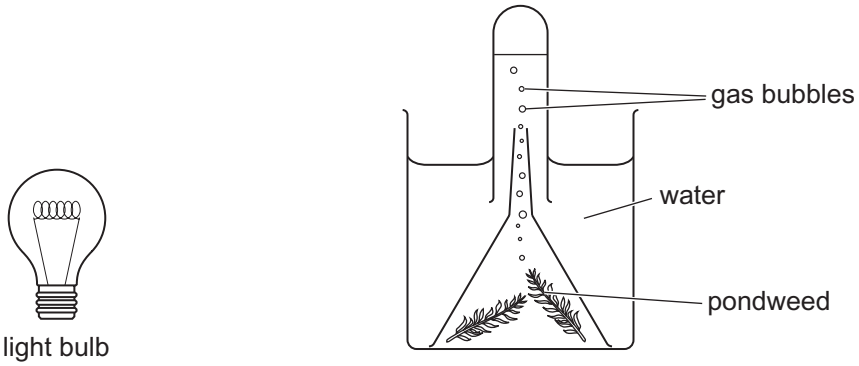
_____ [1]

(iii) When iodine solution was added at **Step 5**, the leaf turned blue-black, showing that starch was present.
Using the information in the diagram, explain why starch was present in the leaf.

_____ [1]

Examiner Only	
Marks	Remark

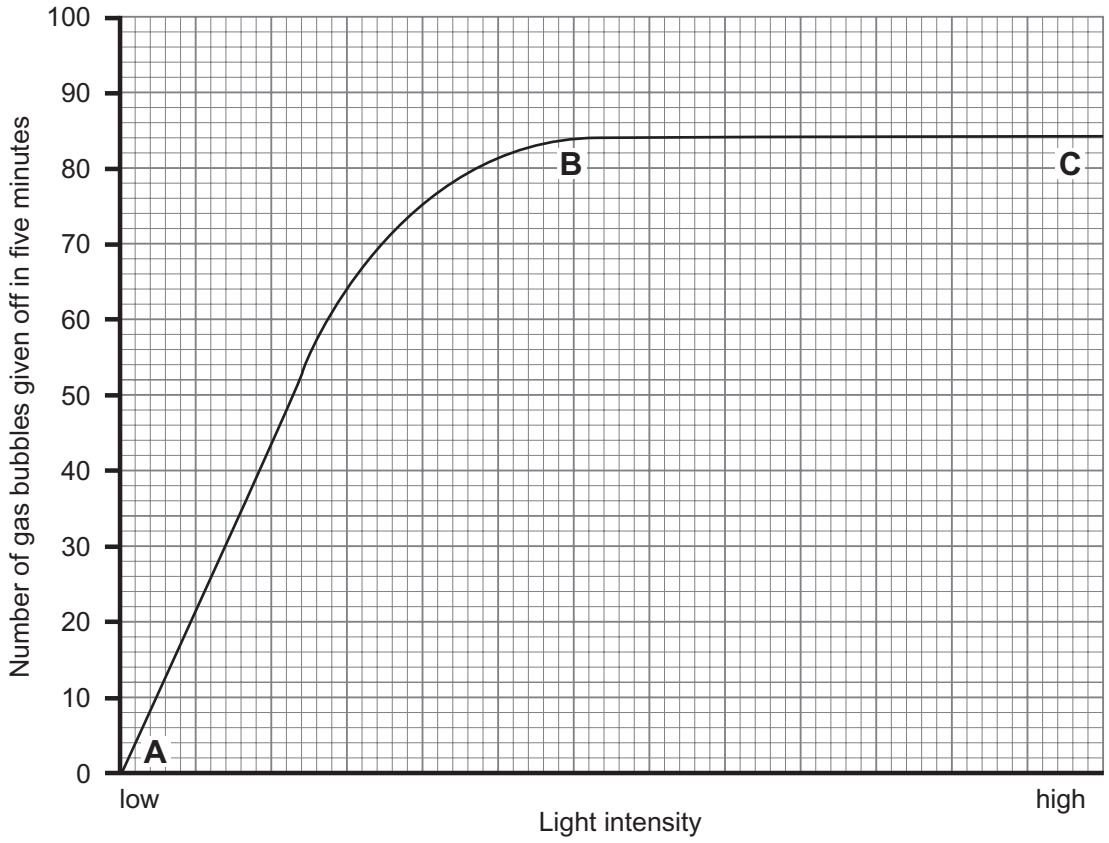
(b) The diagram below shows how a pupil set up an experiment to investigate the effect of light intensity on the rate of photosynthesis in pondweed.



Light intensity was changed by moving the light bulb closer to or further away from the pondweed.

The rate of photosynthesis was measured by counting the number of gas bubbles given off by the pondweed in a five minute period.

The results of the experiment are shown in the graph below.



(i) Name the gas given off by the pondweed.

_____ [1]

(ii) The number of gas bubbles given off did not increase between light intensities **B** and **C**. Explain why.

_____

_____

_____ [2]

(iii) How would the pupil have ensured that the results of this experiment were reliable?

_____ [1]

(iv) Suggest why, each time the position of the light bulb was changed, the pupil waited for two minutes before counting the number of gas bubbles.

_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

7 The photograph shows an area of grassland with many plant species present.

© Gustoimages / Science Photo Library

(a) Describe how you would sample this grassland to find the **average number** of plant species per square metre.

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

[6]

(b) Grasslands like the one shown in the photograph often have large numbers of butterflies.

Name the apparatus that is used to capture butterflies.

[1]

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(Questions continue overleaf)

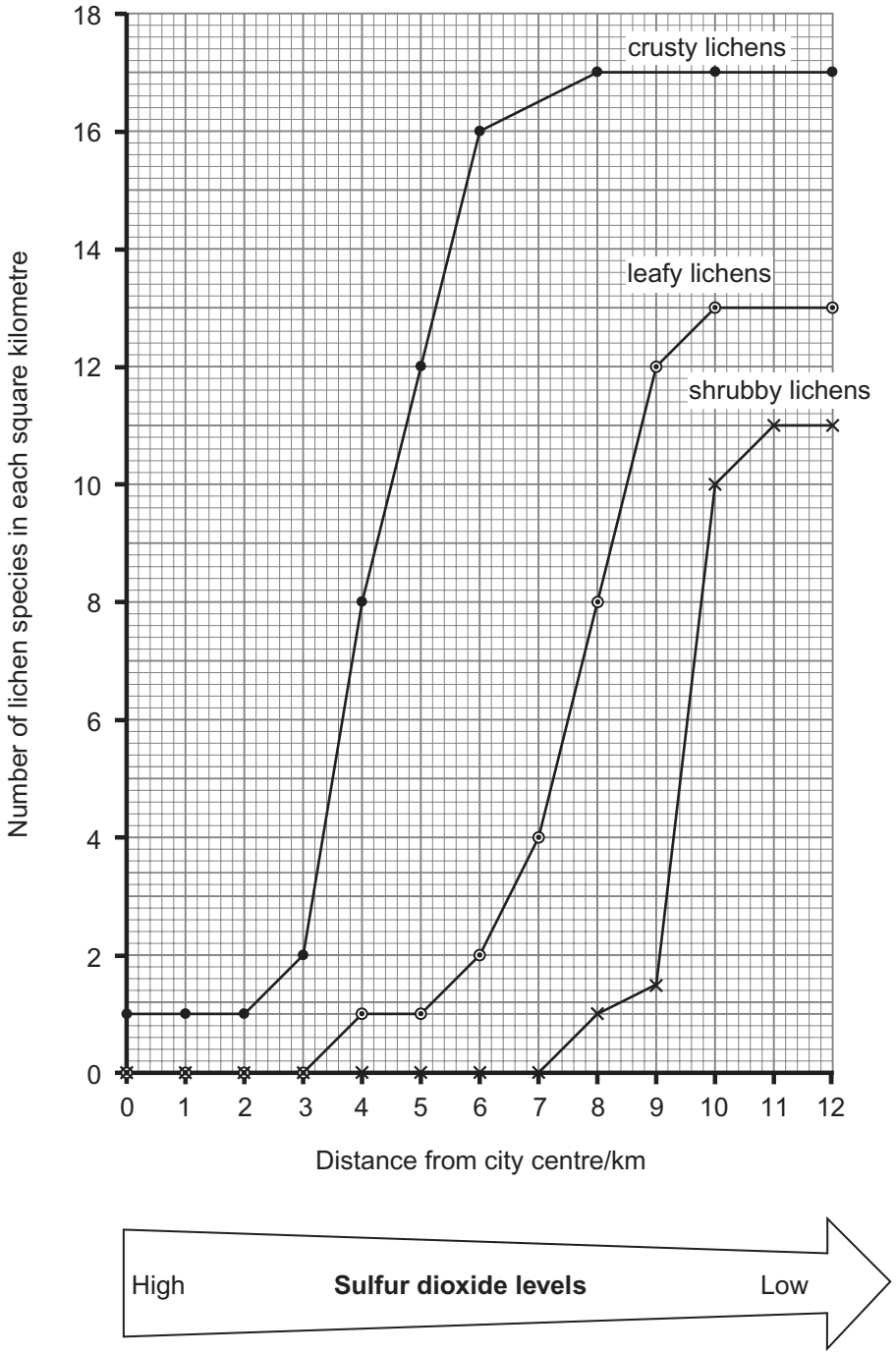
8 Lichens are organisms that are sensitive to the amount of sulfur dioxide (air pollution) in the air.

They are used as indicator species for air pollution.

Air pollution is generally higher in city centres than in the countryside.

Lichen species can be classified into three types, **crusty**, **leafy** or **shrubby**.

The graph shows the number of crusty, leafy and shrubby lichen species at different distances from a city centre.



Examiner Only	
Marks	Remark

(a) **(i)** Using the graph, state how many **leafy** lichen species are present 8 km from the city centre.

_____ [1]

(ii) Using **data** from the graph, describe fully the trend for the **leafy** lichens.

_____

_____

_____

_____ [3]

(b) Sulfur dioxide levels are highest in the city centre.

Using this information and the graph, state and explain which one of the three types of lichen is **least** able to survive sulfur dioxide pollution.

Type _____

Explanation _____

_____ [2]

(c) Sulfur dioxide is released into the air when some fuels are burned.

Since the 1970s, sulfur dioxide levels have been falling in UK city centres.

(i) Suggest **one** reason why sulfur dioxide levels have gone down since the 1970s.

_____ [1]

(ii) Suggest why some types of lichen are still not found in the city centres.

_____ [1]

(d) Name an indicator species that can be used to monitor **water pollution**.

_____ [1]

THIS IS THE END OF THE QUESTION PAPER