Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2013–2014

Double Award Science: Biology

Unit B1

Higher Tier

[GSD12]

GSD12

WEDNESDAY 13 NOVEMBER 2013, AFTERNOON

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

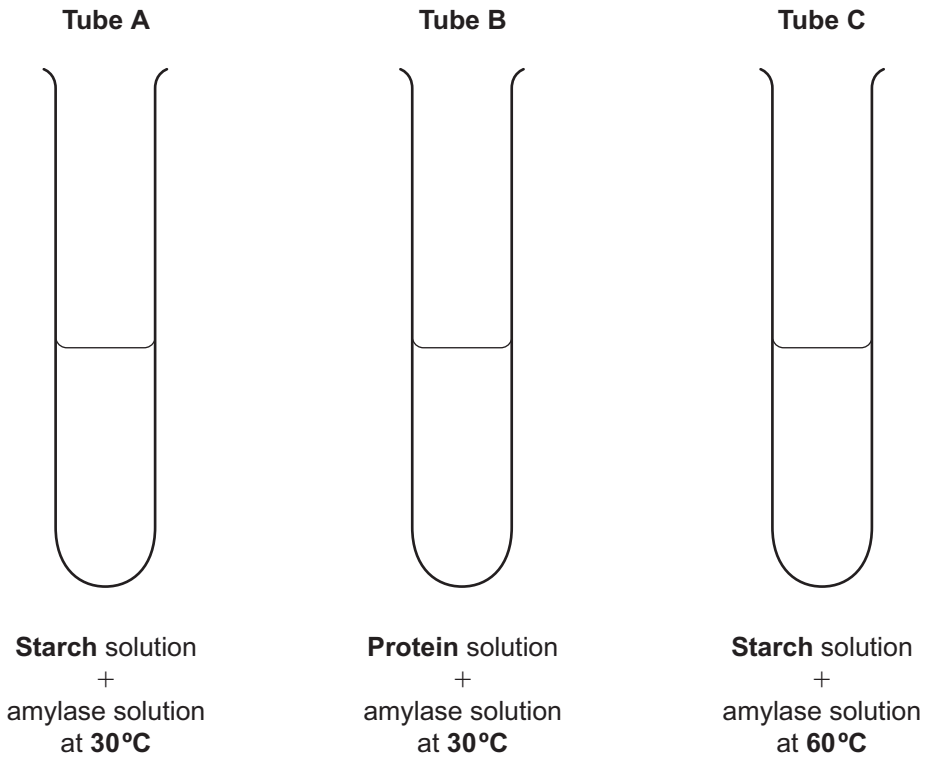
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all seven** questions.

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 Questions **3** and **6(c)**.

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

1 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]

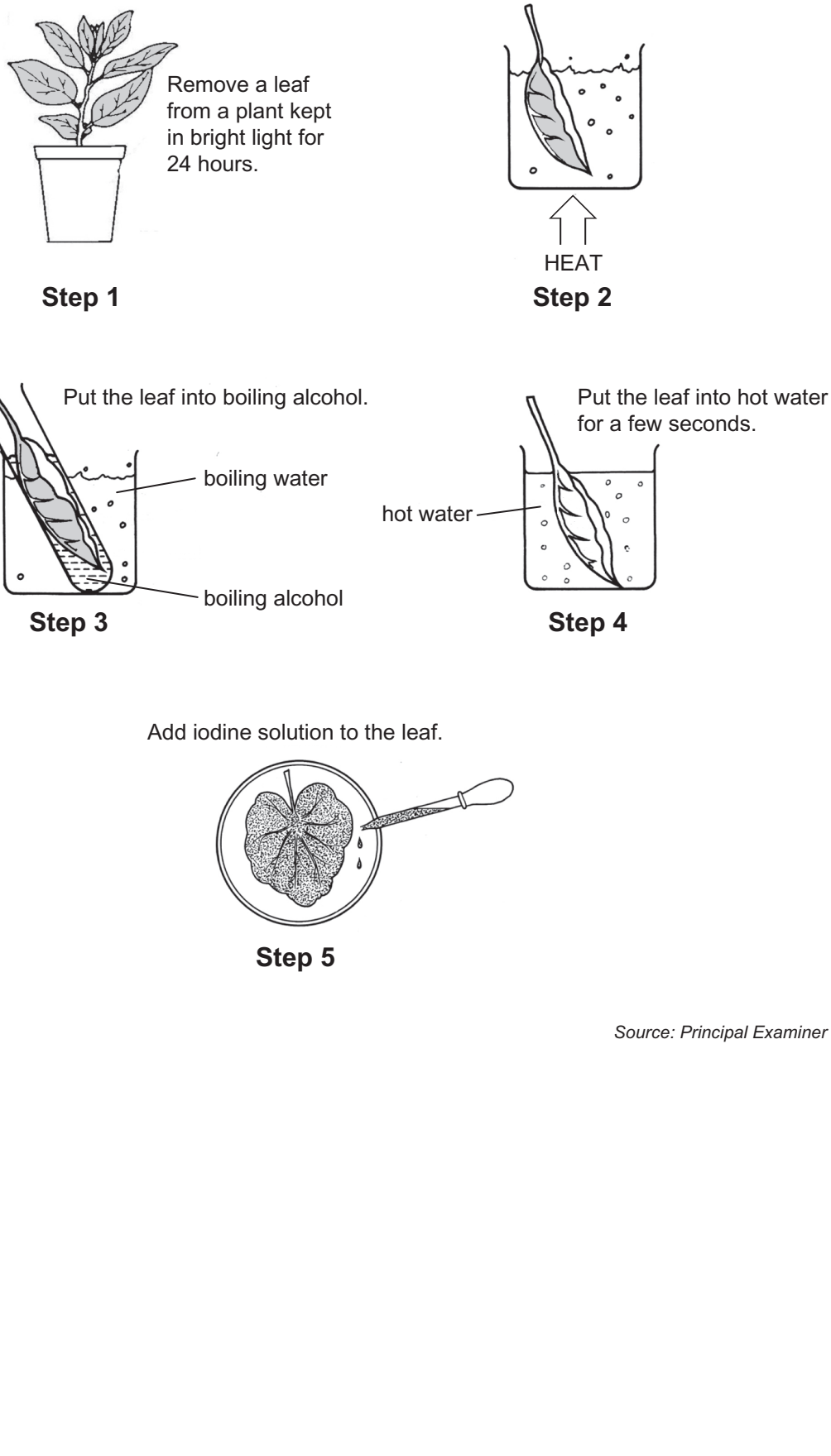
(c) Name the model that explains how enzymes work.

_____ [1]

Examiner Only

Marks	Remark

2 **(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**.

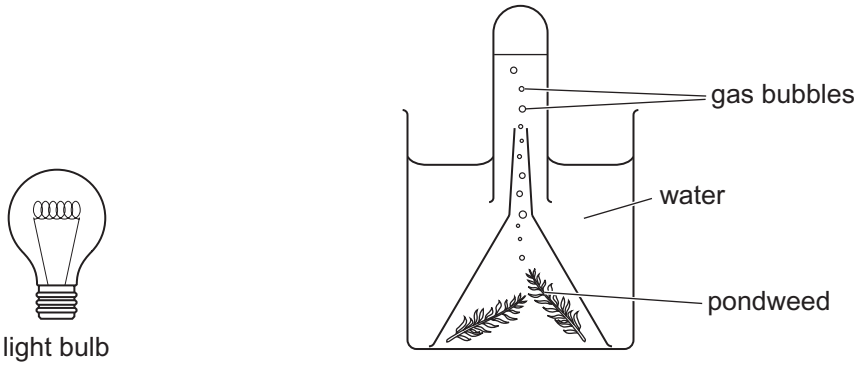
_____ [1]

(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

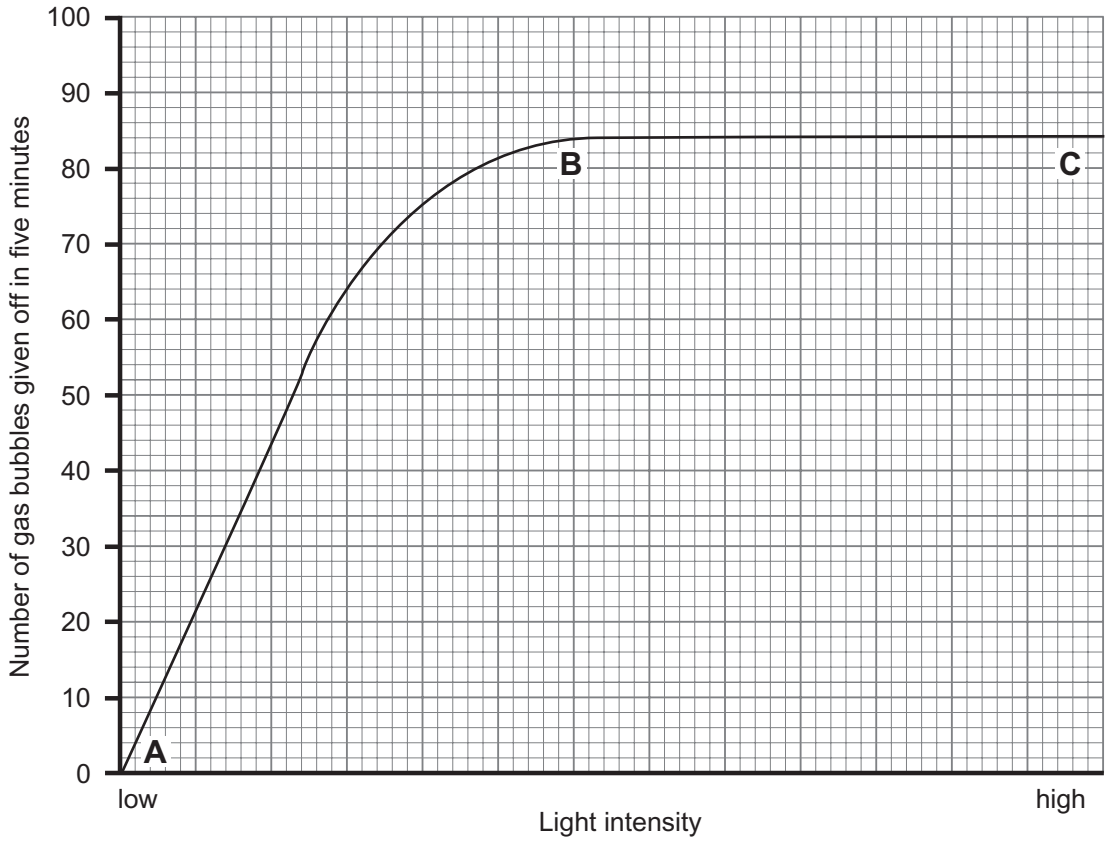
(b) The diagram below shows how a pupil set up an experiment to investigate the effect of light intensity on the rate of photosynthesis in pondweed.



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]

(c) Tomato plants can be grown in a glasshouse. Air can enter through small gaps around the windows and closed doors of a glasshouse.

A grower noticed that tomato plants near the edge of his glasshouse grew better than those in the centre.

Using the information given and your knowledge, suggest why the tomato plants near the edge of the glasshouse grew better than those in the centre.

_____

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

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

© Gustoimages / Science Photo Library

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]

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(Questions continue overleaf)

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

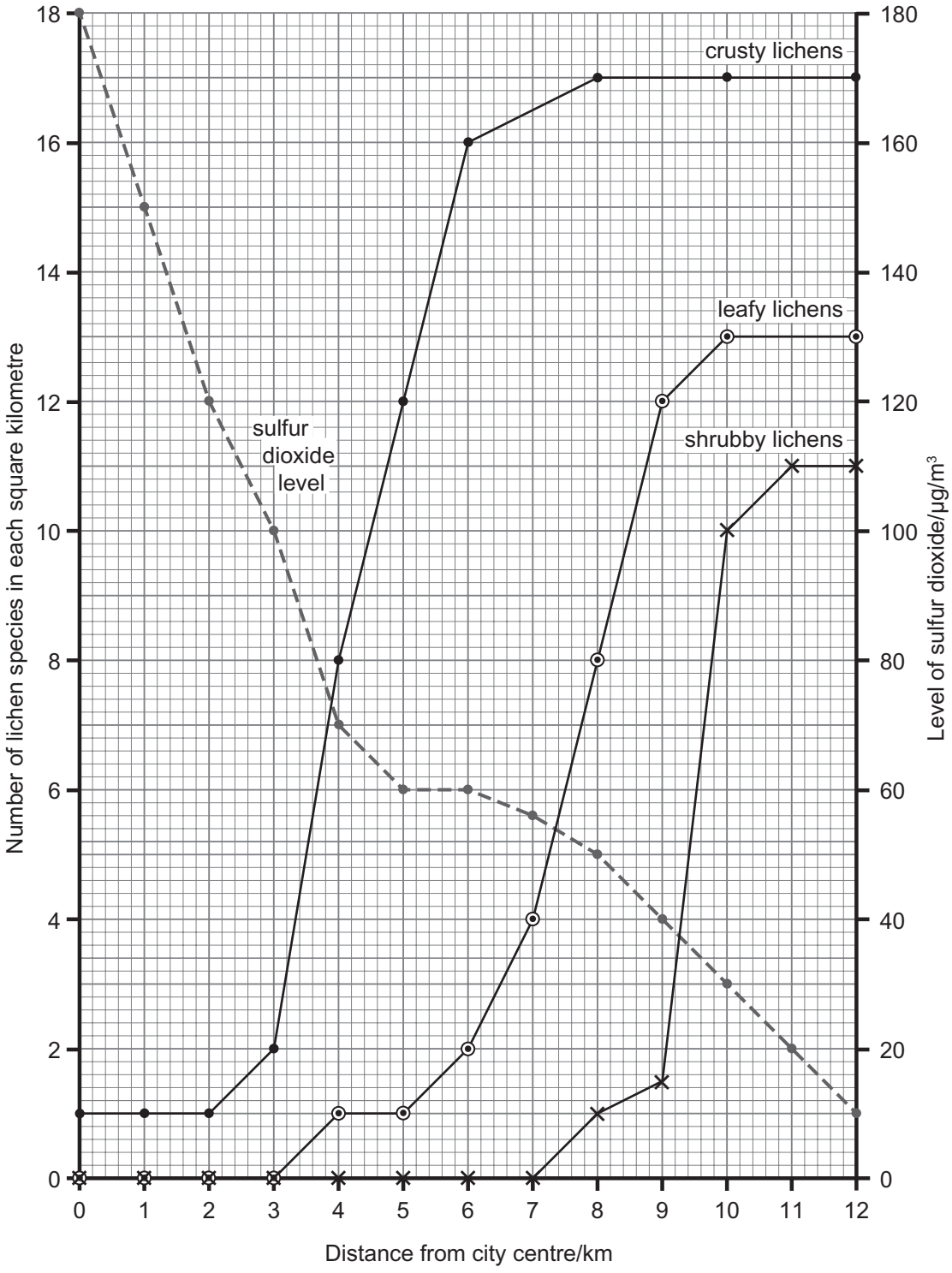
They are used as indicator species for air pollution.

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.

The graph also shows the level of sulfur dioxide recorded at different distances from the city centre.



(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) Using the graph, give the level of sulfur dioxide where shrubby lichens are first found growing.

_____ $\mu g/m^3$ [1]

(c) 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]

(d) The lichen *Xanthoria* was the only lichen found growing between 1 and 2 kilometres from the city centre.

Using the graph, state whether *Xanthoria* is a **crusty**, **shrubby** or **leafy** lichen.

_____ [1]

Examiner Only	
Marks	Remark

(e) 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]

(f) Lichen is the name given to an association between an algae (plant) and a fungus.

The chlorophyll in the lichen is destroyed by high concentrations of sulfur dioxide.

Using this information and your knowledge, suggest how high concentrations of sulfur dioxide in the air result in the death of lichens.

_____

_____

_____ [2]

(g) Suggest **one** reason why it is necessary to monitor the level of sulfur dioxide in the air.

_____ [1]

(h) Suggest **one** advantage of using indicator species like lichens to monitor environmental changes.

_____ [1]

Examiner Only	
Marks	Remark

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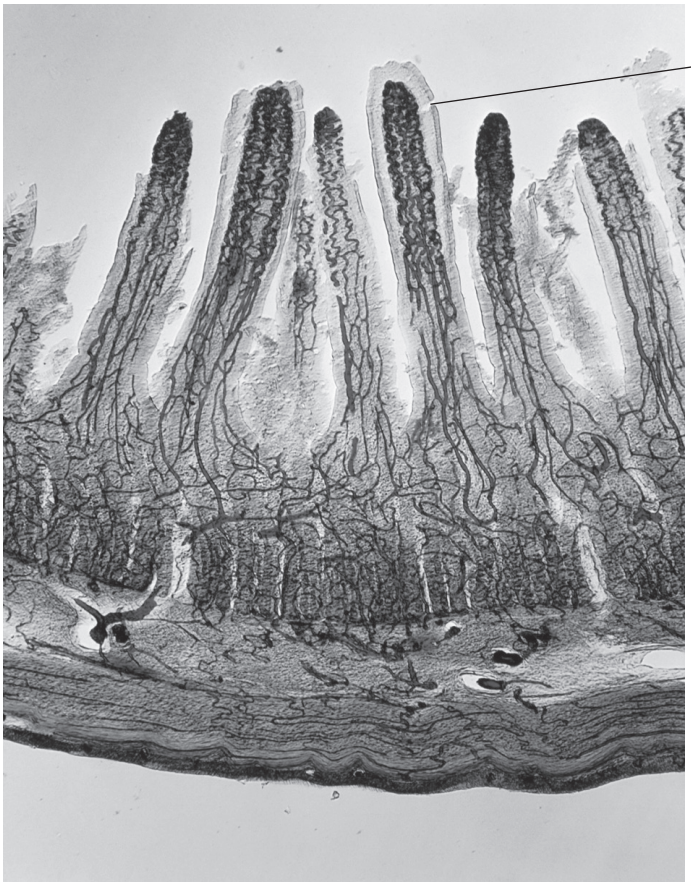
(Questions continue overleaf)

5 The photograph shows some villi found in the digestive system.



© Biophoto Associates / Science Photo Library

(a) Name the region of the digestive system where villi are found.

_____ [1]

(b) Using the photograph and your knowledge, give three ways villi are adapted for the absorption of digested food molecules.

1. _____

2. _____

3. _____ [3]

Examiner Only

Marks	Remark

(c) After eating a meal, the glucose level of the blood rises.

Describe how insulin brings the blood glucose level back to normal.

_____

_____

_____ [2]

(d) When oxygen is in short supply, muscles respire anaerobically.

Complete the word equation below for **anaerobic** respiration in muscle.

[2]

Examiner Only

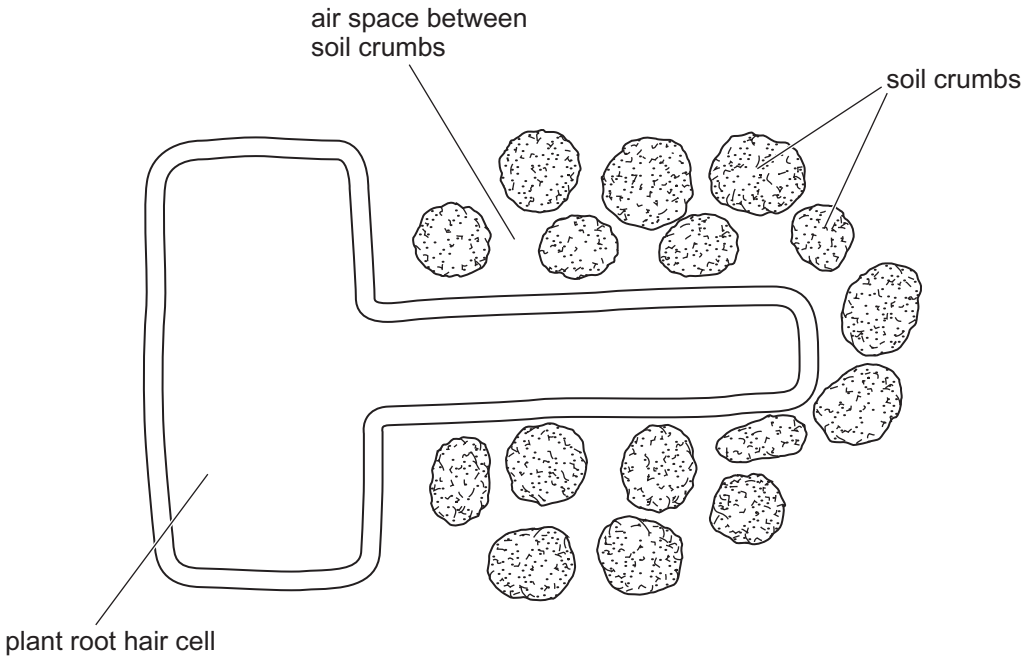
Marks	Remark

Examiner Only	
Marks	Remark

6 **(a)** Farmyard manure improves soil fertility and structure.

It acts as a glue, so that the soil particles, sand, silt and clay, are held together in structures called soil crumbs. This creates larger air spaces in the soil.

The diagram below shows soil crumbs around a plant root hair cell.



(i) Using the information given, explain how the addition of farmyard manure can lead to increased active uptake in plants.

_____

_____

_____

_____

_____

_____ [3]

(ii) Apart from improving soil fertility and structure, give two advantages to a farmer of using farmyard manure rather than artificial fertilisers.

1. _____

_____

2. _____

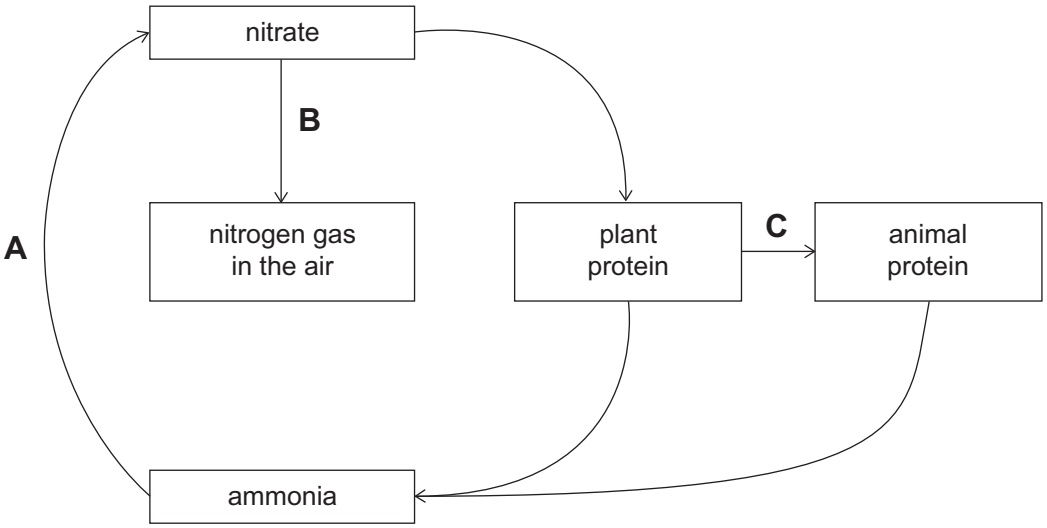
_____ [2]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

(b) The diagram below shows a simplified nitrogen cycle.

The bacteria that carry out process **A** are aerobic and the bacteria that carry out process **B** are anaerobic.



Using the diagram and your knowledge, answer the following questions.

(i) Name processes **A** and **C**.

A _____

C _____ [2]

When a soil becomes waterlogged, the spaces between the soil crumbs fill with water and the soil contains less air (anaerobic conditions).

(ii) Using the diagram and your knowledge explain why a waterlogged soil has reduced nitrate levels.

_____

_____

_____ [2]

(c) If excess nitrates enter a lake, they cause eutrophication.

Describe the stages of this process and the effect it has on the biodiversity of a lake.

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

[6]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

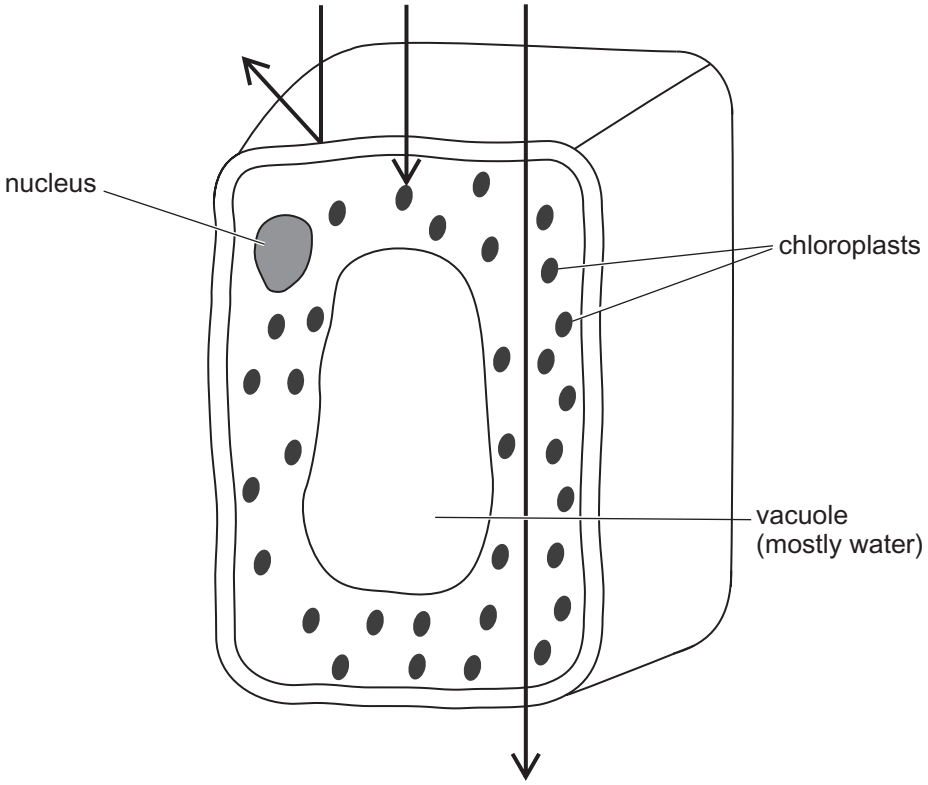
7 **(a)** What is meant by the term ecosystem?

_____

_____ [2]

(b) In an ecosystem, plants convert only a small percentage of sunlight into chemical energy.

The diagram below shows a cell from a leaf. The arrows show light rays from the Sun.



Using the information in the diagram, suggest two reasons why such a small percentage of sunlight is trapped by leaf cells.

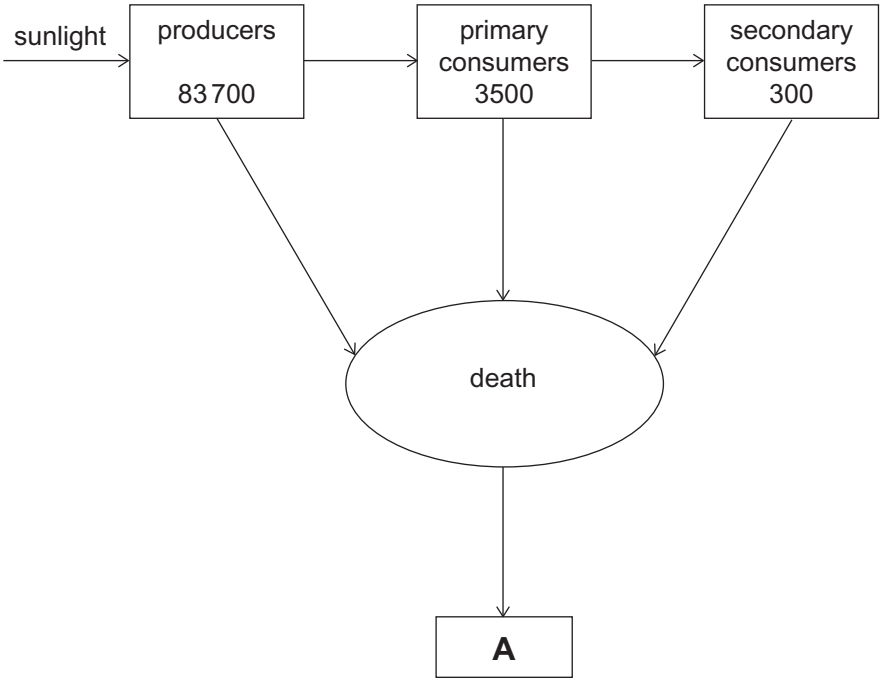
1. _____

2. _____ [2]

Examiner Only	
Marks	Remark

(c) The diagram below shows the flow of energy through an ecosystem.

The figures in the boxes are kJ/m^2/year.



(i) Name the group of organisms represented by box **A**.

_____ [1]

(ii) Calculate the percentage of energy **lost** between primary consumers and secondary consumers.

Show your working.

_____ % [3]

(iii) Apart from death of the primary consumers, give two reasons why there is less energy available at the secondary consumer level compared to the primary consumer level.

1. _____

2. _____ [2]

THIS IS THE END OF THE QUESTION PAPER

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