



Rewarding Learning

General Certificate of Secondary Education  
2013

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Candidate Number

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## Biology

Unit 1

Higher Tier



[GBY12]

\*GBY12\*

WEDNESDAY 5 JUNE, AFTERNOON

### 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 box, around each page or on blank pages.**

Complete in blue or black ink only. **Do not write with a gel pen.**

Answer **all twelve** 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 **4**, **7(c)** and **11(b)**.



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8221



1 (a) Name **two** chemical elements found in all food molecules.

\_\_\_\_\_

[1]

(b) Complete the table about components of the diet.

| Component    | Example | Source   | Function                                  |
|--------------|---------|----------|---|
| Carbohydrate | Lactose |          | Energy                                    |
|              | D       | Milk     | Growth of bones and teeth                 |
| Mineral      |         | Red meat | Needed for haemoglobin in red blood cells |

[1]

[1]

[1]

Examiner Only

Marks

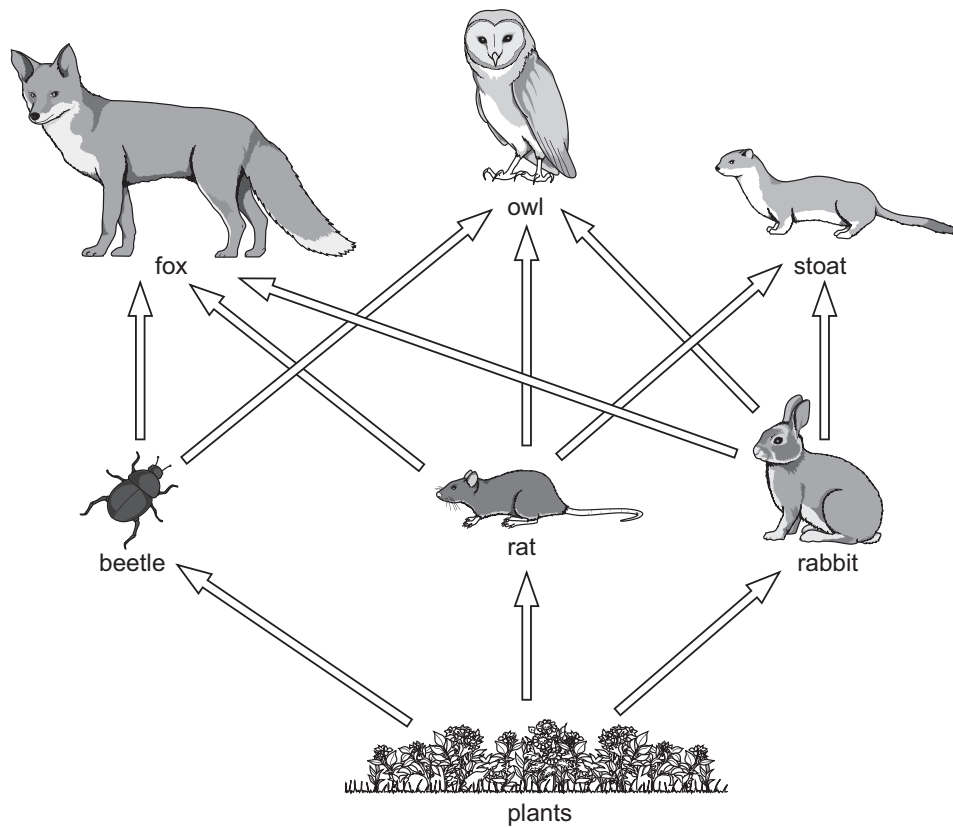
Remark

Total Question 1

[Turn over



2 The diagram shows part of a food web found in a forest ecosystem.



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(a) Why are plants important in a food web?

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[2]

(b) What do the arrows in the food web represent?

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[1]

| Examiner Only |        |
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| Marks         | Remark |
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After a very severe winter a large number of owls died.

(c) Explain how this may affect the number of stoats.

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[2]

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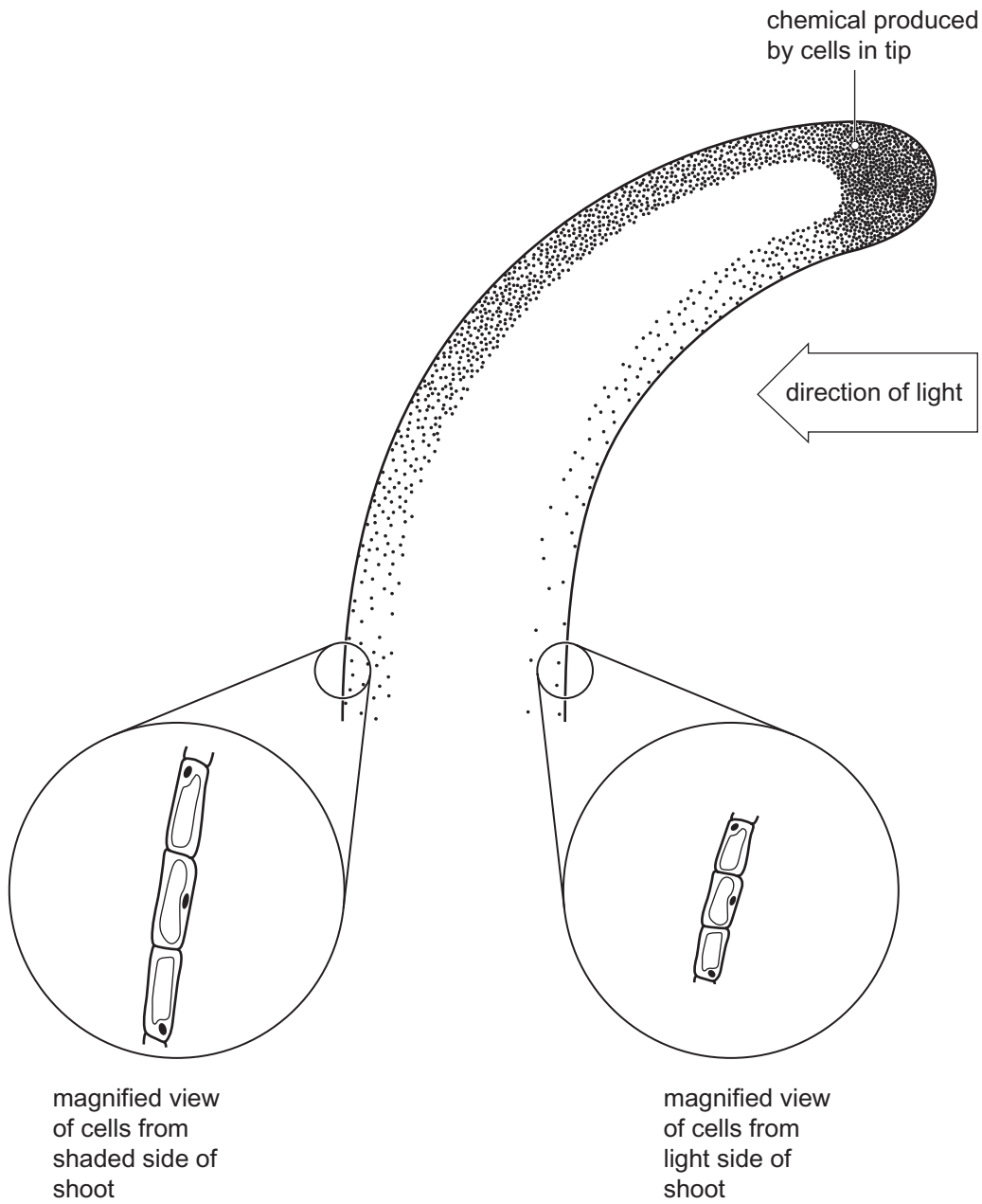
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Total Question 2

[Turn over



3 The diagram shows a section of a shoot growing in one-sided light.



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(a) Name the chemical produced by cells in the tip.

\_\_\_\_\_

[1]

| Examiner Only |        |
|---------------|--------|
| Marks         | Remark |
|               |        |



Use the diagram to answer the following questions.

**(b) (i)** Compare the distribution of the chemical in the light and shaded side of the shoot below the tip.

\_\_\_\_\_ [1]

**(ii)** How has the chemical affected the cells in the shaded side of the shoot?

\_\_\_\_\_ [1]

**(c)** Explain the advantage to the plant of bending towards light.

\_\_\_\_\_ [2]

**Examiner Only**

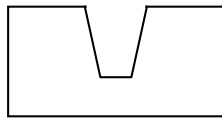
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Total Question 3

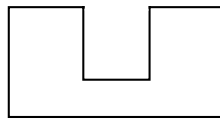
**[Turn over**



- 4 The diagram shows the shape of two enzyme molecules and a substrate molecule.



Enzyme A

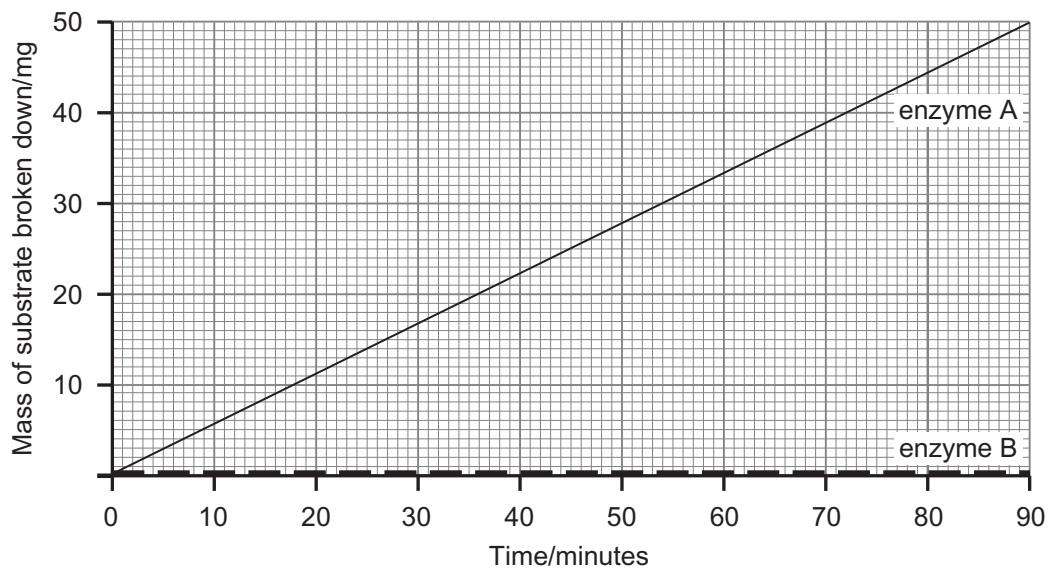


Enzyme B



Substrate

The graph shows the mass of substrate broken down by each enzyme over 90 minutes.



| Examiner Only |        |
|---------------|--------|
| Marks         | Remark |
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Use the information in the diagrams and your knowledge to help explain the shape of the two lines on the graph.

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

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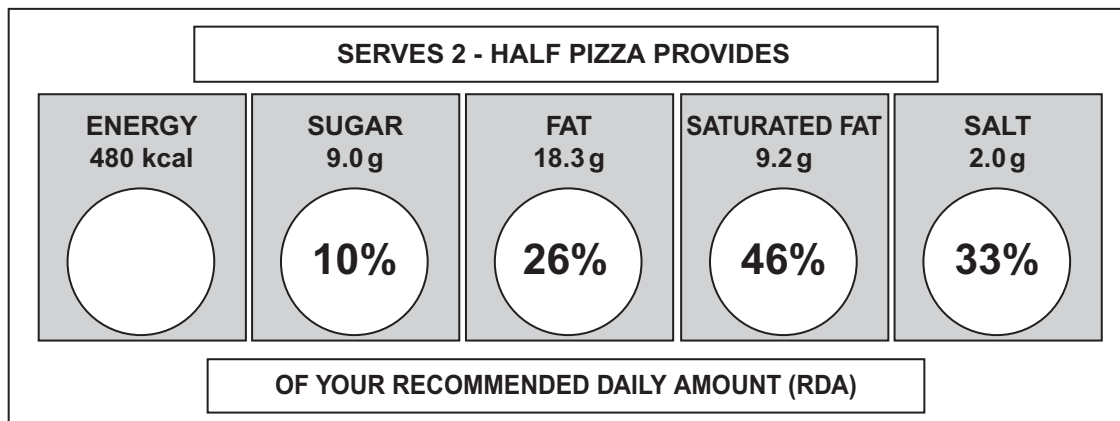
[6]

| Examiner Only    |        |
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| Marks            | Remark |
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| Total Question 4 |        |
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[Turn over



- 5 Food labelling helps people make healthy food choices.  
The label shown below is from a pizza box.



Reproduced by kind permission of the Department of Health, © 2014

The recommended daily amount (RDA) of energy required for a woman is 2000 kcal.

- (a) (i) **Complete the label for energy** by calculating the percentage of a woman's RDA provided by this half pizza.  
Show your working.

[2]

| Examiner Only |        |
|---------------|--------|
| Marks         | Remark |
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The half pizza provides a man with 19% of his RDA for energy.

(ii) Explain why the half pizza provides a man with a lower percentage of his RDA than it does for a woman.

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[2]

(b) Give **two** factors, **other than** age and gender, which would affect the RDA of energy needed by a person.

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[1]

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[1]

(c) Eating a whole pizza may be a risk to health.  
**Use the information in the label** about the saturated fat content to suggest why.

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[2]

Examiner Only

Marks Remark

Total Question 5

[Turn over



6 (a) What is a species?

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[2]

(b) Why are viruses difficult to classify?

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[1]

Classification is used to help identify living organisms.

(c) Give **one other** reason why classification of living organisms is important.

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[1]

| Examiner Only |        |
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The key shows the classification of organisms into five kingdoms.

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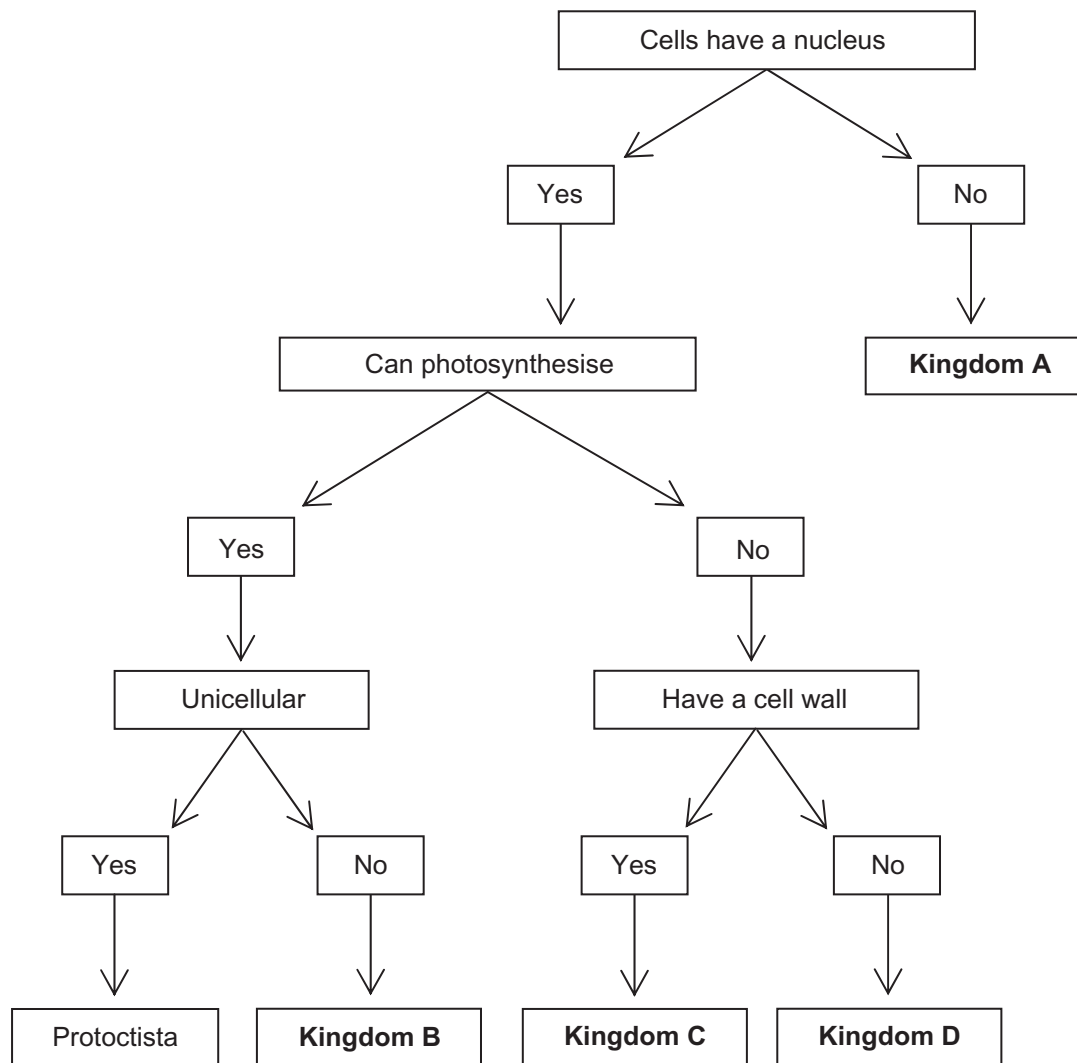
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Total Question 6

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[Turn over



(d) Use the key to identify kingdoms A, B, C and D.

Kingdom A \_\_\_\_\_ [1]

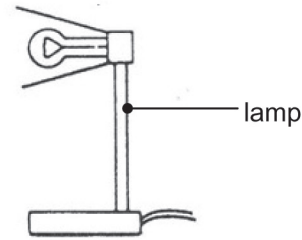
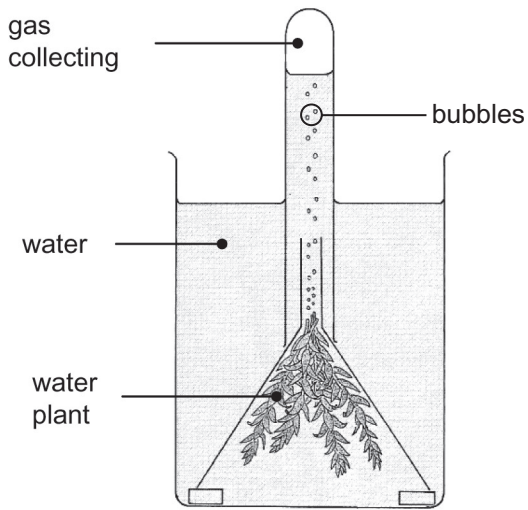
Kingdom B \_\_\_\_\_ [1]

Kingdom C \_\_\_\_\_ [1]

Kingdom D \_\_\_\_\_ [1]



7 (a) The apparatus shown was used by a group of students to investigate how light intensity affects the rate of photosynthesis.



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(i) Name the gas collecting in the test tube.

\_\_\_\_\_ [1]

(ii) Describe how this apparatus can be used to measure the rate of photosynthesis.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_ [2]

(iii) Describe **one** way the students could have increased the light intensity.

\_\_\_\_\_  
 \_\_\_\_\_ [1]

| Examiner Only |        |
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(iv) Give **one** disadvantage of this way of changing the light intensity and describe how it can be overcome.

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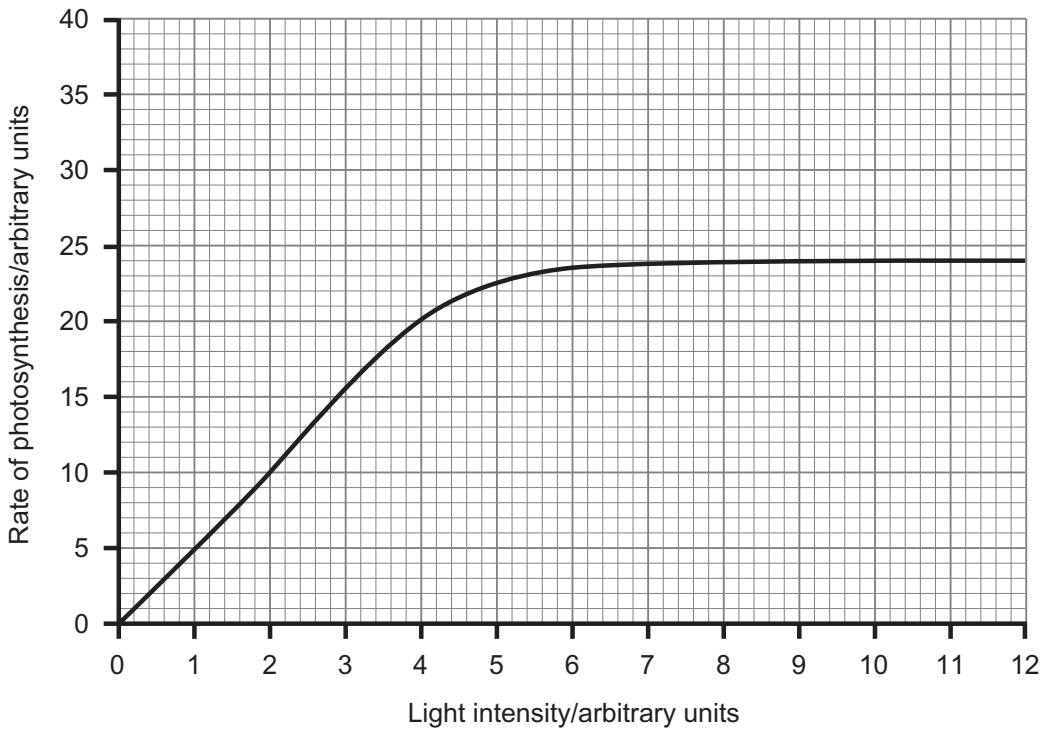
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[2]

(b) The line graph shows the results of this investigation.



The investigation was repeated with sodium hydrogencarbonate added to the water to provide additional carbon dioxide.

(i) **On the graph** sketch a line to show the results of the investigation with additional carbon dioxide provided. [2]

(ii) What is the limiting factor between 0 and 5 arbitrary units of light intensity?

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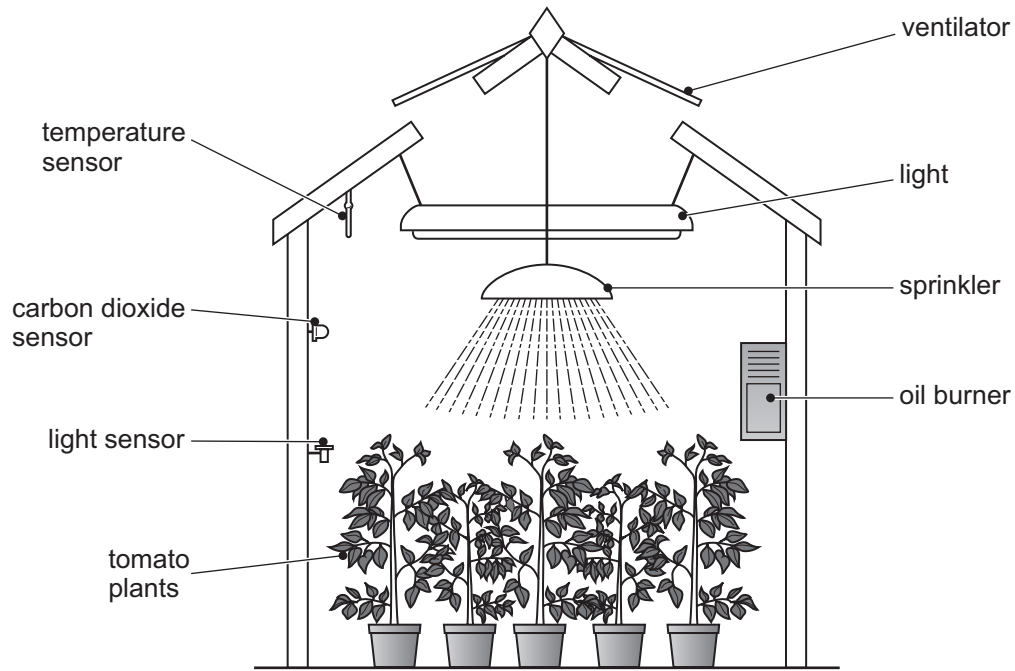
[1]

| Examiner Only |        |
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[Turn over



The diagram shows some of the features of a commercial greenhouse used by a market gardener to grow tomatoes.



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9 (a) Describe how acid rain is formed.

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[3]

In 1999 the Gothenburg Protocol, an international treaty on air pollution was signed.

(b) Explain why such international treaties are necessary.

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[1]

(c) Describe **one other** strategy used to reduce the production of acid rain.

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[1]

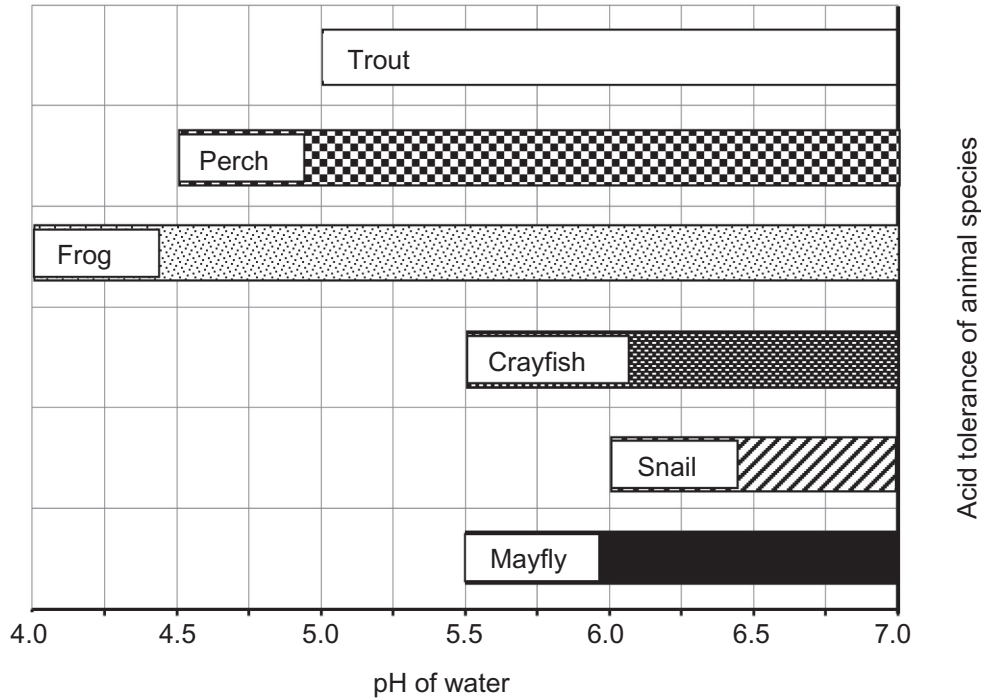
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Acid rain reduces the pH of water in lakes.

Only species tolerant to acid conditions can survive.

The graph shows the range of pH values different animal species can tolerate in a lake.



Source: US Environmental Agency [http://www.epa.gov/acidrain/effects/surface\\_water.html](http://www.epa.gov/acidrain/effects/surface_water.html)

(d) Name the animal species in the lake which is least tolerant of increasing acidity?

\_\_\_\_\_ [1]

(e) Name the animal species which can tolerate pH 5.25 but not pH 4.75.

\_\_\_\_\_ [1]

(f) Describe the effect of increasing acidity on the biodiversity of the lake.

\_\_\_\_\_  
\_\_\_\_\_ [1]

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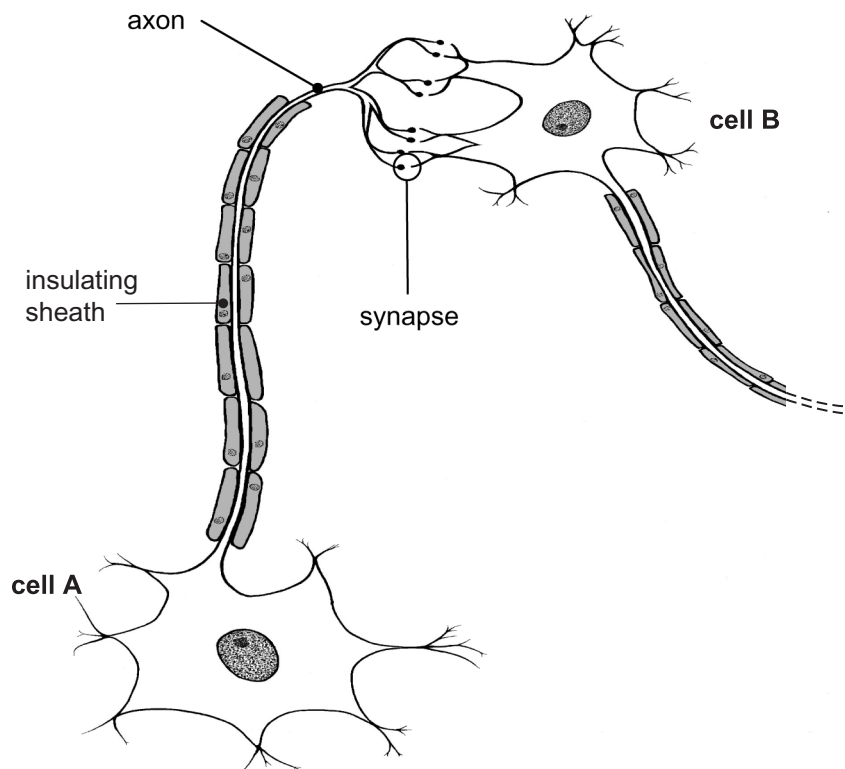
Marks Remark

Total Question 9

[Turn over



10 The diagram shows two specialised cells which carry impulses in the body.



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(a) Name this type of specialised cell.

\_\_\_\_\_

[1]

(b) Draw an arrow on the axon of cell A to show the direction of an impulse.

[1]

Cell A is adapted to its function by being long and having an insulating sheath.

(c) Explain how each of these features adapts cell A to its function.

Long \_\_\_\_\_

[1]

Insulating sheath \_\_\_\_\_

[1]

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| Marks         | Remark |
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The cell body of each of these specialised cells has many branches.

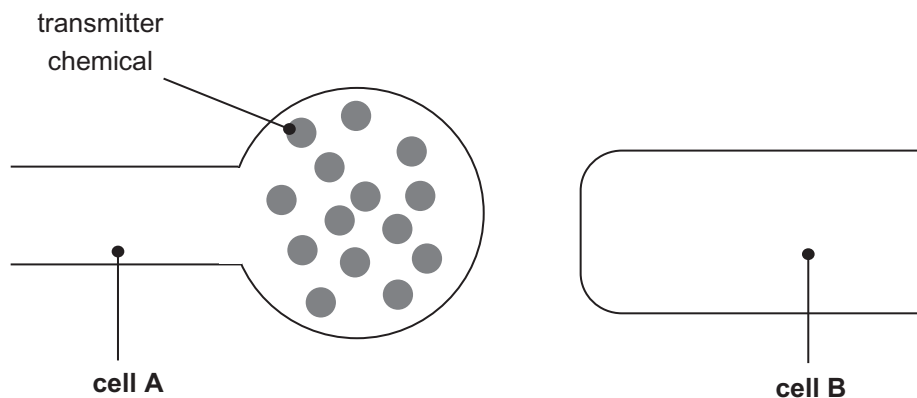
(d) Suggest **one** advantage of having many branches.

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[1]

The diagram shows a magnified synapse.



(e) Use the diagram and your knowledge to describe how a nerve impulse passes from cell A to cell B.

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[5]

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[Turn over



11 An investigation was carried out to find the effect rabbits have on the populations of three plant species growing in an area of grassland.

Twenty quadrats were used to measure the average percentage cover of each plant species at the end of each week over a 12 week period.

After 4 weeks a small population of rabbits was introduced. The rabbits were left in the area for 4 weeks before being recaptured and removed.

(a) Describe what should have been done to ensure that the sampling method was valid.

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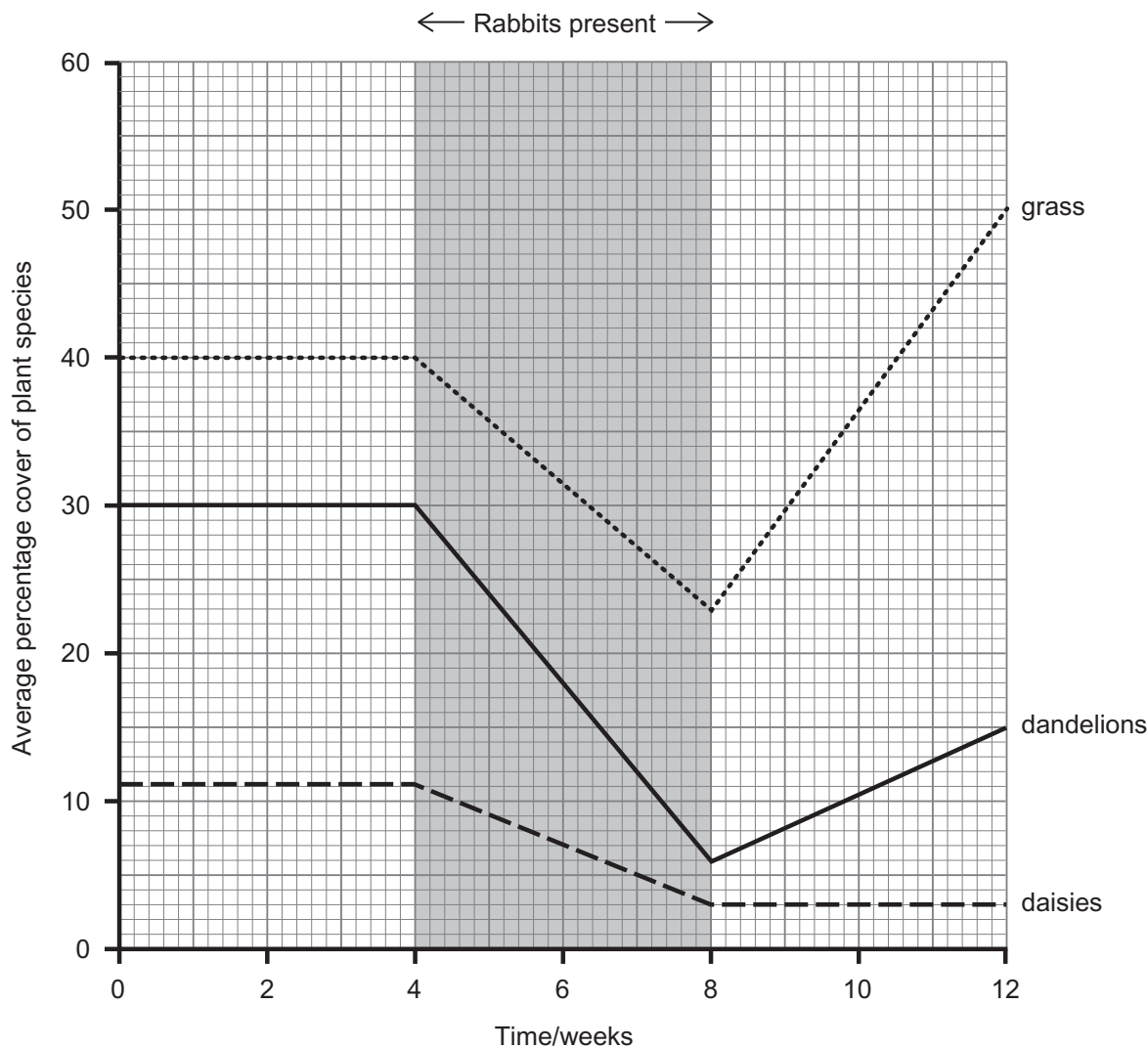


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[1]

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The results of the investigation are shown in the graph.



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Dandelions have large leaves which are held above the ground and deep roots from which new plants can grow.

Daisies have much smaller leaves which grow close to the ground and shallow roots which do not give rise to new plants.

**(b) Use this information and the graph** to help describe and explain the trends in the average percentage cover of dandelions and daisies from the end of week 4 until the end of week 12.

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

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[6]

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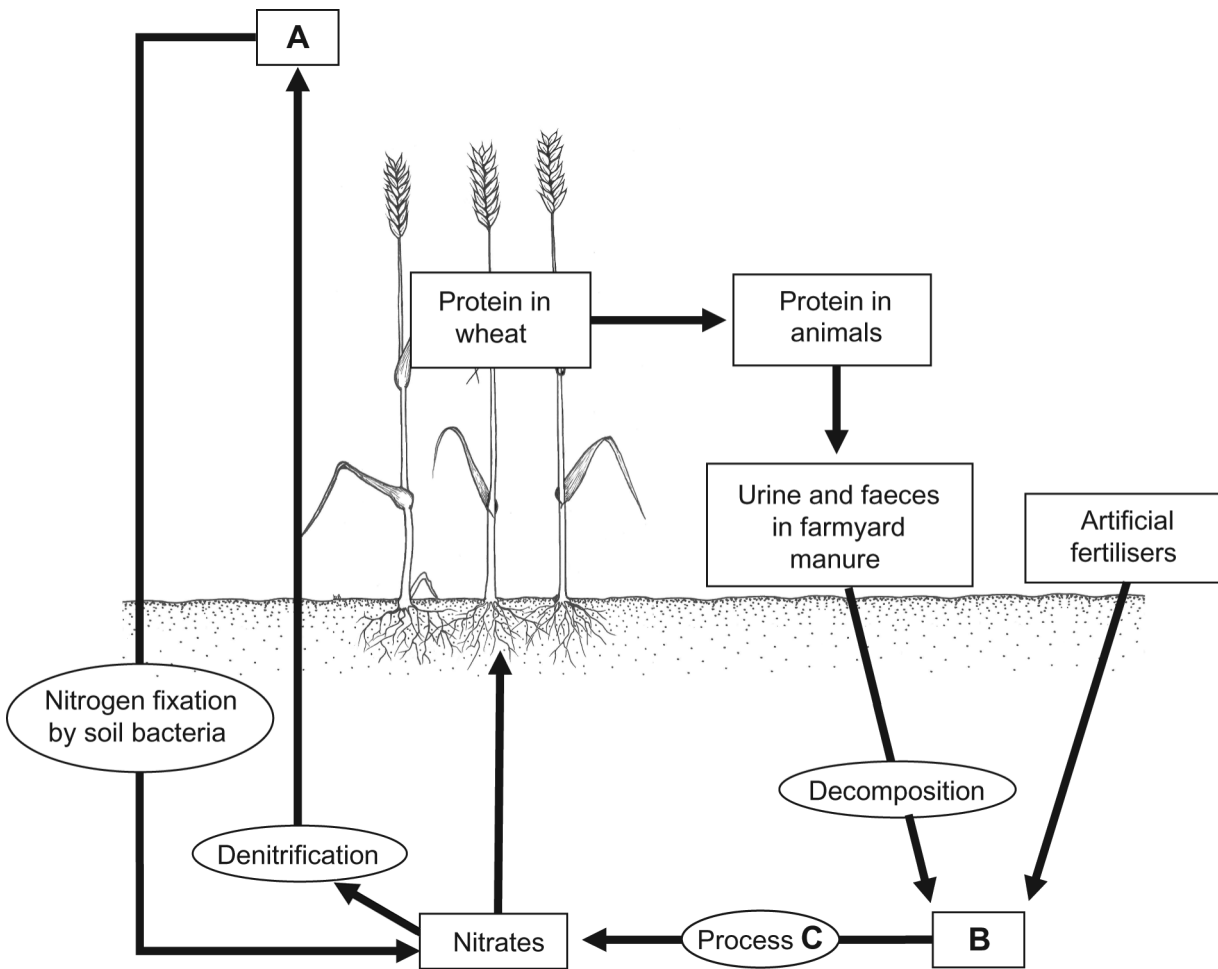


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**[Turn over**



12 The diagram shows part of the nitrogen cycle.



(a) (i) Name substances A and B.

A \_\_\_\_\_ [1]

B \_\_\_\_\_ [1]

(ii) Name process C.

C \_\_\_\_\_ [1]

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(iii) Explain in detail how the wheat absorbs nitrates through its roots.

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[4]

(iv) Use the diagram to help explain why farmyard manure or artificial fertilisers are added to the soil just before planting each crop of wheat in the same field.

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[4]

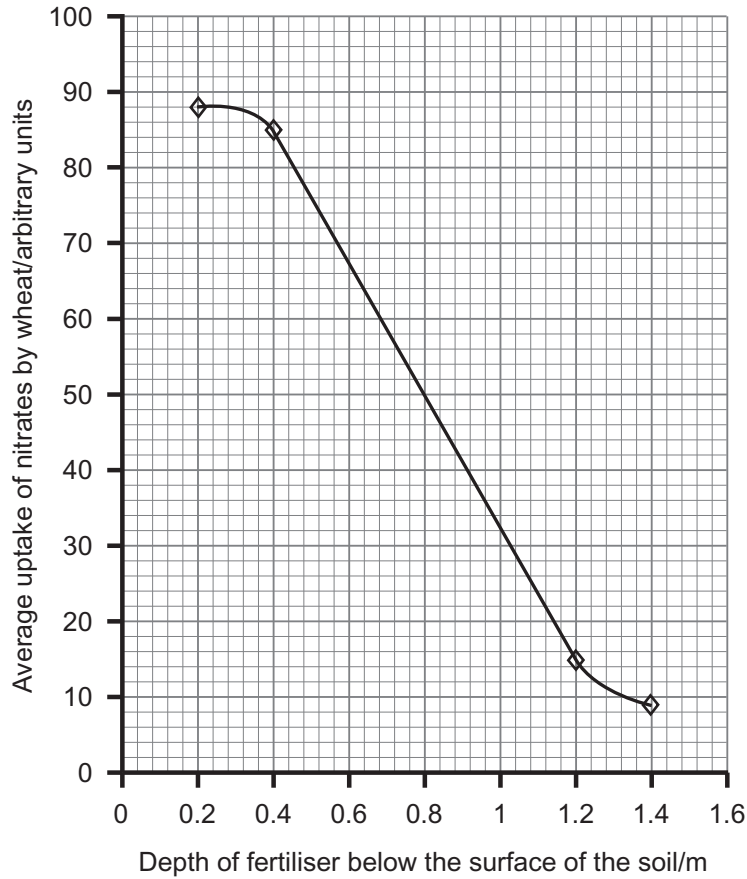
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Marks Remark

[Turn over



- (b) The graph shows the results of an investigation into the amount of nitrates taken up by wheat plants. The plants were grown in containers in a laboratory and the fertiliser was placed at four different depths below the soil surface. The procedure was repeated ten times for each depth and an average was calculated.



Adapted from: P. W. Freeland, *Problems in Theoretical Advanced Level Biology*, Hodder and Stoughton, 1985

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One conclusion suggested from these results was that when growing wheat, fertiliser should be placed just below the surface of the soil.

(i) Give evidence from the graph which

supports this conclusion.

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[2]

suggests why this conclusion may not be justified.

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[1]

(ii) Suggest **one** way of improving this investigation.

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[1]

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Marks Remark

Total Question 12



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