



Centre Number

71

Candidate Number

General Certificate of Secondary Education  
2012–2013

## Double Award Science: Biology

Unit B1

Higher Tier

[GSD12]



MONDAY 25 FEBRUARY 2013, MORNING

### 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 **2(b)** and **7(b)**.

For Examiner's  
use only

Question Number	Marks
1	
2	
3	
4	
5	
6	
7	

Total  
Marks



1 The response of plants to light is controlled by a hormone produced in the shoot tip.

The diagram shows the results of three experiments, A, B and C in an investigation into the response of plants to light.

EXPERIMENT	TREATMENT	RESPONSE OF SHOOT AFTER 1 WEEK
A		
B		
C		

Source: R McIlwaine / CCEA

(a) Name the plant response in experiment C.

\_\_\_\_\_

[1]

(b) Name the hormone involved.

\_\_\_\_\_

[1]

Examiner Only	
Marks	Remark

(c) Describe and explain the results in

(i) experiment B.

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[2]

(ii) experiment C.

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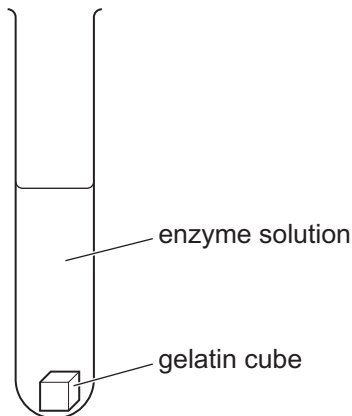
[4]

Examiner Only	
Marks	Remark

- 2 (a) The diagram shows one test tube from an investigation into enzyme action on a cube of gelatin. The enzyme used is found in the stomach.

The investigation was carried out at seven different temperatures.

The enzyme breaks down the gelatin into amino acids.



The table shows the amount of amino acids present after three hours at each temperature.

Temperature/°C	5	15	25	35	45	55	65
Amount of amino acid produced after three hours/arbitrary units	45	53	110	260	220	100	62

- (i) Use the information given to state what type of substance gelatin is.

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

- (ii) Name the enzyme used in this experiment.

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

- (iii) Give two variables that need to be controlled in this investigation.

1. \_\_\_\_\_

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

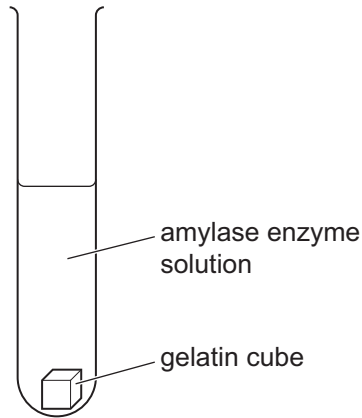
Examiner Only

Marks Remark

(b) The investigation was repeated using another enzyme, **amylase**, at 35 °C as shown in the diagram.

Using your knowledge of enzymes and their structure, describe and explain the results you would expect after 3 hours.

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



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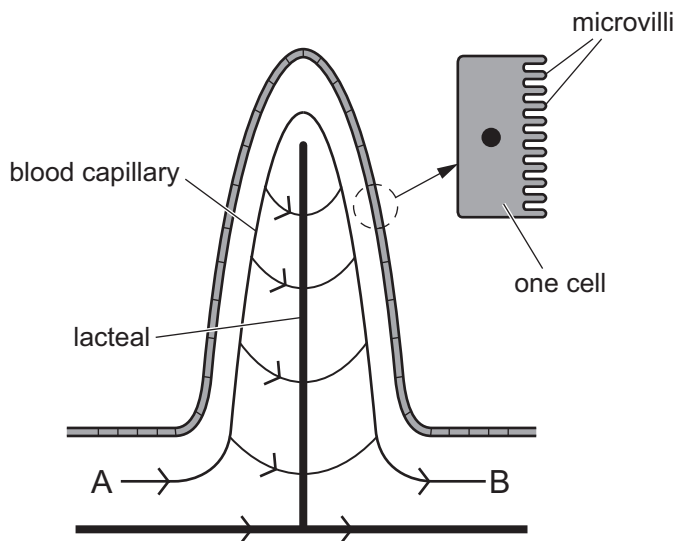
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[6]

Examiner Only	
Marks	Remark

- (c) Absorption of digested foods takes place in the small intestine. One adaptation of the small intestine is the presence of villi.

The diagram shows a villus from the small intestine and one enlarged cell from the layer lining the villus.



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Use the diagram and your knowledge to answer the following questions.

- (i) Describe and explain how the cells lining the villus are adapted for absorption.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [3]

- (ii) What substances are absorbed in the lacteal?

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

- (iii) Give two ways in which the blood in **B** would be different to the blood in **A**.

1. \_\_\_\_\_

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

Examiner Only	
Marks	Remark

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**(Questions continue overleaf)**

3 (a) Pupils collected animal samples from an area near their school during a fieldwork investigation.

(i) Name **one type** of animal they could have collected in a pitfall trap.

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

(ii) Describe how the pupils would have used pitfall traps to collect animals.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [3]

(b) Earthworms burrow in damp soil. They feed on dead matter in the soil, partly digest it and pass most of it out as waste. This waste is then broken down by bacteria and fungi which increases the mineral content of the soil.

The earthworms' burrows help drainage and aeration in the soil and so improve soil structure.

(i) What process do bacteria and fungi in the soil carry out on the earthworms' waste?

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

(ii) Earthworms belong to a group of animals called annelids.

Name two characteristic features of annelids.

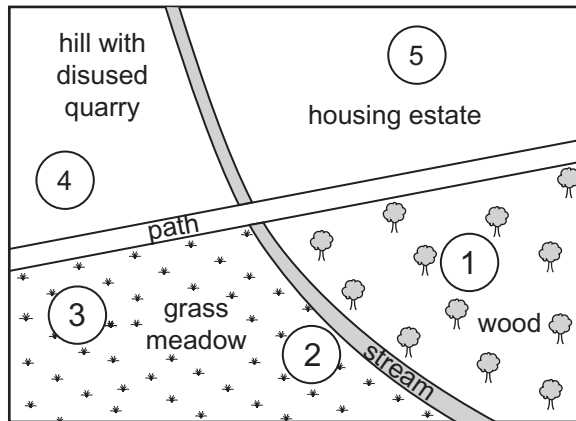
1. \_\_\_\_\_  
2. \_\_\_\_\_ [2]

Examiner Only	
Marks	Remark



- (c) During their fieldwork investigation the pupils sampled earthworms in five locations around the school. The locations are marked 1–5 on the diagram below.

They encouraged the earthworms to move up out of their burrows to the surface by spraying washing up liquid on the ground in each area. This enabled the earthworms to be easily counted.



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The table shows their results.

Location	Number of earthworms counted/m <sup>2</sup>
1	23
2	26
3	14
4	4
5	6

- (i) Name the apparatus the pupils used to sample earthworms.

\_\_\_\_\_

[1]

- (ii) Locations 2 and 3 are in the grass meadow area. Use the information in the table to work out the average number of earthworms sampled in the grass meadow.

\_\_\_\_\_ /m<sup>2</sup> [1]

- (iii) How does the average number of earthworms sampled in the grass meadow compare with the number of earthworms sampled in the quarry?

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

Examiner Only

Marks Remark

(iv) Using the information about earthworms given in part (b) on page 8 of this question, suggest a reason for the difference in the numbers of earthworms sampled from the grass meadow and the quarry.

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

(v) How could the pupils have increased the reliability of their results?

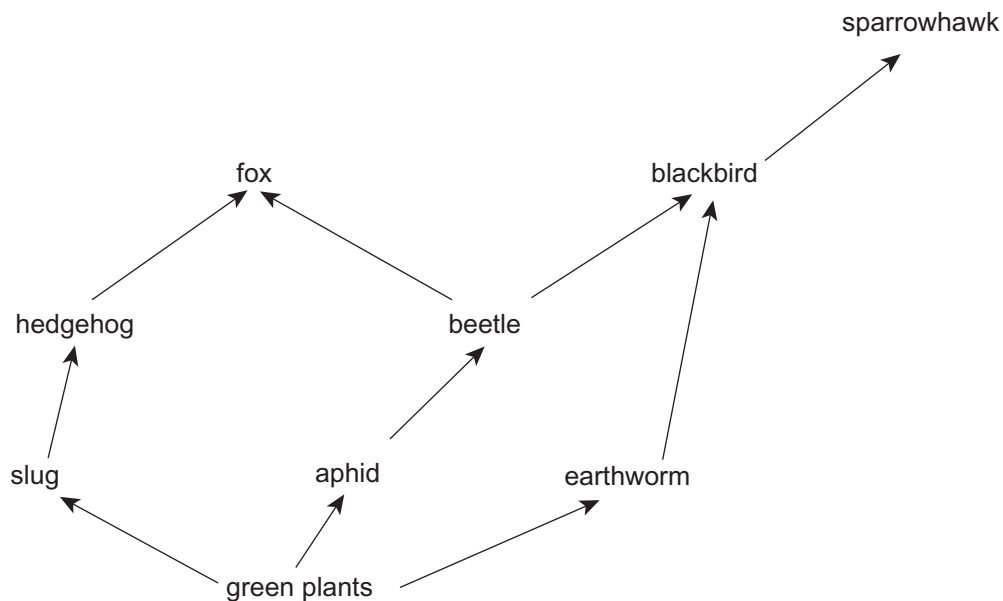
\_\_\_\_\_ [1]

(vi) Give **one** reason why the actual number of earthworms in all the locations is likely to be greater than the numbers the pupils counted.

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

Examiner Only	
Marks	Remark

4 (a) The diagram below shows a food web from a woodland area.



Use this diagram and your knowledge to answer the following questions.

(i) Name the animal that is feeding at two trophic levels in this food web.

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

(ii) If the number of beetles decreased in the woodland area what effect would this have on the number of earthworms in this area? Explain your answer.

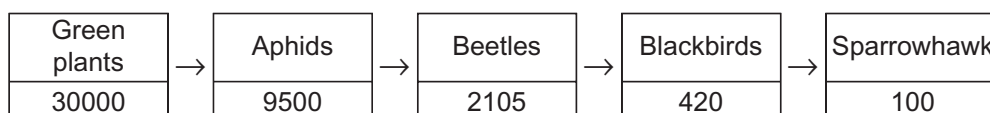
\_\_\_\_\_  
 \_\_\_\_\_ [2]

(iii) Draw a labelled pyramid of numbers diagram for the food chain containing the earthworm.

[2]

Examiner Only	
Marks	Remark

(b) The diagram shows the amount of energy (kJ/m<sup>2</sup>/year) available at each trophic level in one of the food chains.



(i) Give two ways in which beetles can lose energy.

1. \_\_\_\_\_

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

(ii) What percentage of energy is **not** transferred from beetles to blackbirds?

Show your working.

\_\_\_\_\_ % [3]

(iii) Why are shorter food chains more efficient?

\_\_\_\_\_

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

Examiner Only	
Marks	Remark

5 Diabetes is a condition in which the body cannot control blood glucose levels. There are two types of diabetes.

Type 1 diabetes, also known as insulin dependent diabetes, is caused by the inability of cells in the pancreas to produce sufficient insulin. It usually develops at an early age.

Type 2 diabetes, also known as non-insulin dependent diabetes, usually develops much later in life, especially in people who are overweight. In this type of diabetes, the cells in the pancreas produce insulin but only some liver cells respond to the insulin.

(a) (i) Describe the effect of insulin on blood glucose levels.

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

(ii) Explain how the liver responds to insulin.

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

(b) (i) One difference between Type 1 and Type 2 diabetes is the age at which it usually develops.

Using the information above, give **another** difference between Type 1 and Type 2 diabetes.

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

(ii) A man with Type 2 diabetes has been advised by his doctor to increase his exercise level.

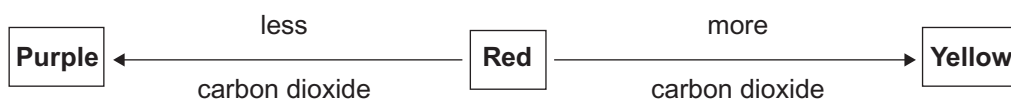
Explain how increasing his exercise level would help in the control of his diabetes.

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

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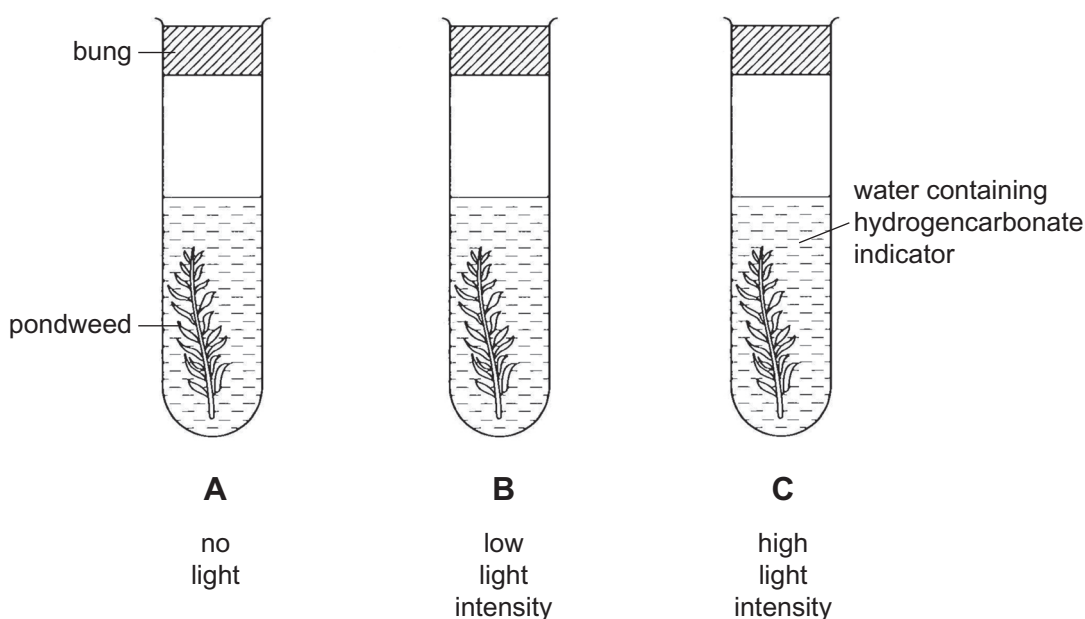
Marks Remark

- 6 Hydrogencarbonate indicator can be used to show levels of carbon dioxide concentration. The diagram shows how the colour changes with different carbon dioxide concentrations.



A student investigated the changes in carbon dioxide concentration in water containing pondweed under different light intensities for two hours using hydrogencarbonate indicator.

The diagram below shows the experiment she set up.



Source: R McIlwaine / CCEA

The result for test tube B is shown in the table.

Test tube	A	B	C
Colour of hydrogencarbonate indicator		Red	

- (a) Complete the table to give the colour of the indicator in test tubes A and C at the end of the experiment. [2]

- (b) Explain the result for test tube B.

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[2]

Examiner Only

Marks Remark

(c) Explain why the student could have included one more test tube containing only hydrogencarbonate indicator in the investigation.

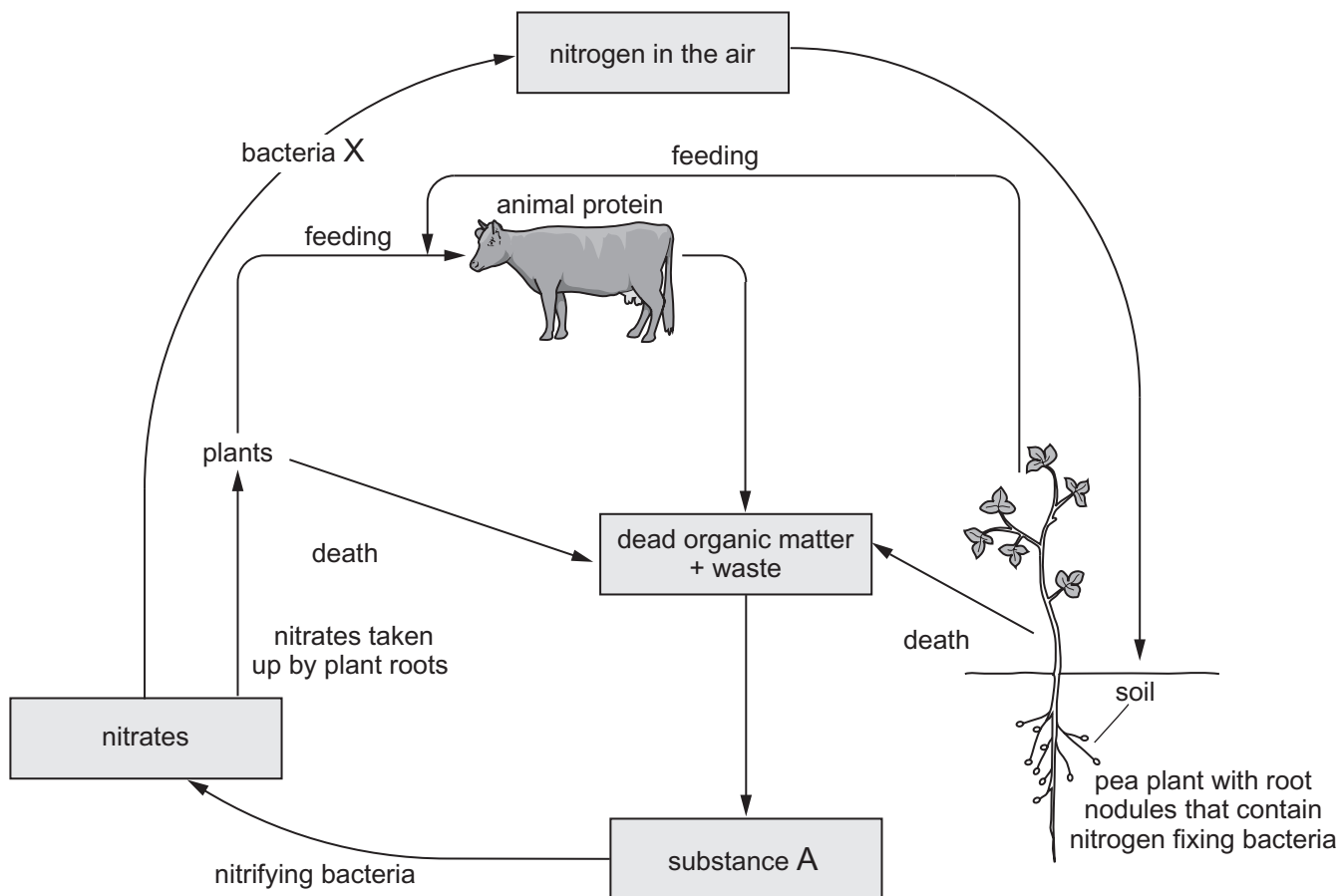
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[1]

Examiner Only	
Marks	Remark

7 (a) The diagram shows a nitrogen cycle.



Source: R McIlwaine / CCEA

Use the diagram and your knowledge to answer the following questions.

(i) Name substance A.

\_\_\_\_\_

[1]

(ii) Name bacteria X.

\_\_\_\_\_

[1]

(iii) Name the process that occurs in plant roots to absorb minerals from the soil.

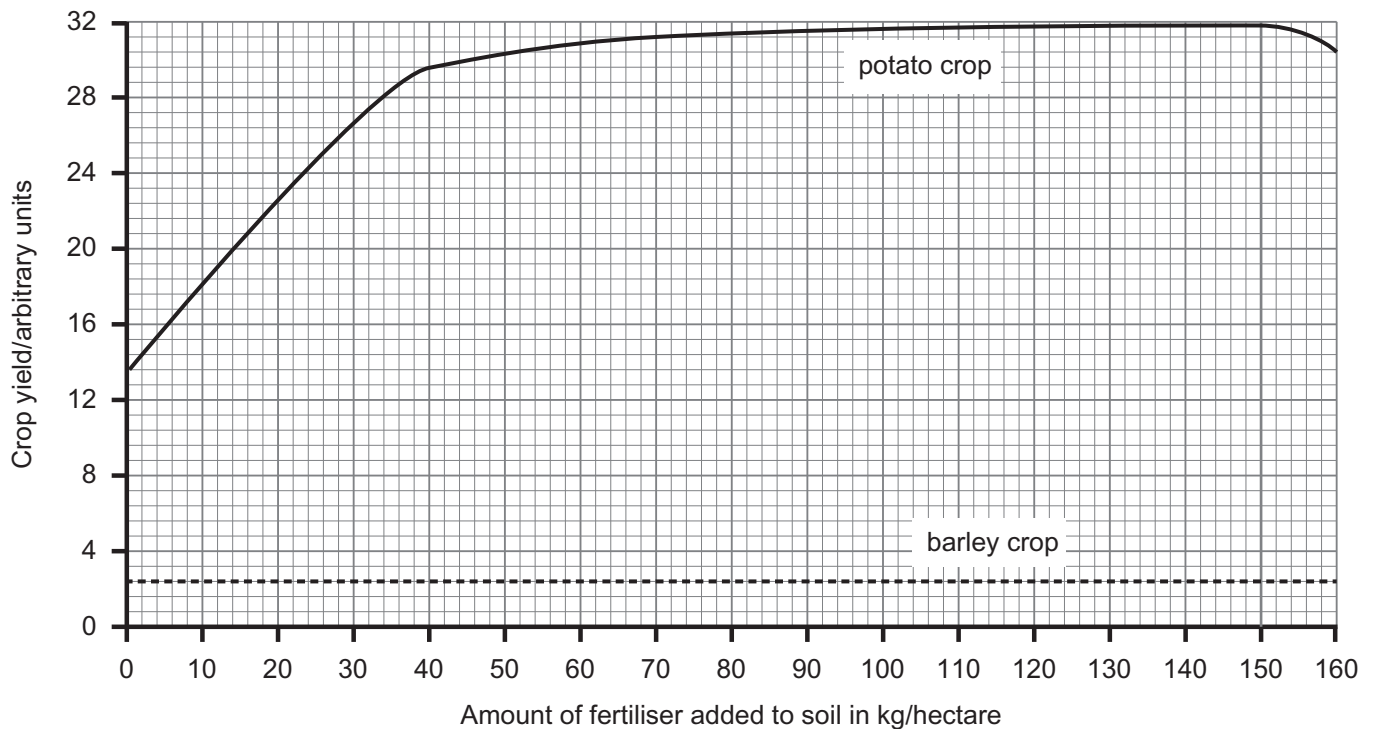
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[1]

Examiner Only	
Marks	Remark



(b) An investigation was carried out to show the yield of potatoes when a particular fertiliser was added at different levels to the soil in which potatoes were grown. The graph shows the results obtained. The graph also shows the yield of barley when the same fertiliser was added at the same levels to the soil in which barley was grown.



Source: R McIlwaine / CCEA

Use the data in the graph and your knowledge to describe and explain the advice you would give to a farmer about the application of this fertiliser when growing potatoes and barley.

**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	
Marks	Remark

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**THIS IS THE END OF THE QUESTION PAPER**

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