Rewarding Learning

Centre Number

| 71 | |
|---|---|

Candidate Number

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General Certificate of Secondary Education
2012–2013

# Double Award Science: Biology

## Unit B1

## Higher Tier

**[GSD12]**

**ML**

**TUESDAY 14 MAY 2013, MORNING**

**TIME**

1 hour, plus your additional time allowance.

**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**

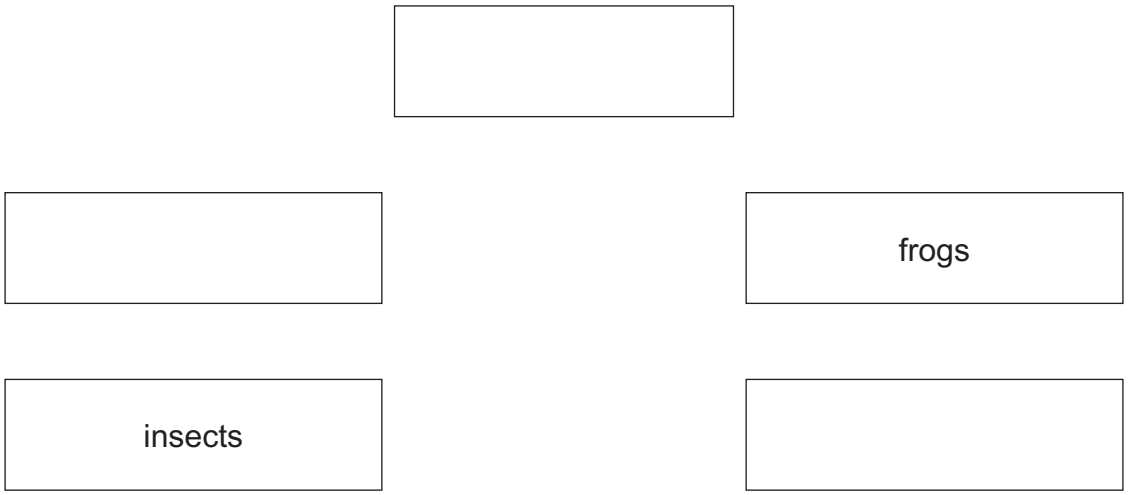
The total mark for this paper is 70.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Questions **4(a)(i)** and **7(a)**.

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

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

**1** **(a)** Complete the food web. Use the information below to do this.

- Earthworms are eaten by frogs and hawks.
- Frogs are eaten by hawks.
- Insects are eaten by spiders which in turn are eaten by hawks.
- Insects eat plants.
- Earthworms eat plants.




[4]

**(b)** Draw a labelled pyramid of numbers for the food chain that contains insects. Use the information from part **(a)** opposite to do this.

[3]

**(c)** **(i)** The energy in the plants is 10 000 kJ.

20% of the energy from one trophic level is transferred to the next trophic level. Calculate how much energy is available to trophic level three.

Show your working out.

_____ kJ [2]

**(ii)** Write down **one** way in which frogs lose energy.

_____ [1]

**(iii)** Explain why the hawk gets more energy by eating earthworms rather than frogs.

_____

_____ [1]

Examiner Only

| Marks | Remark |
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| Marks | Remark |
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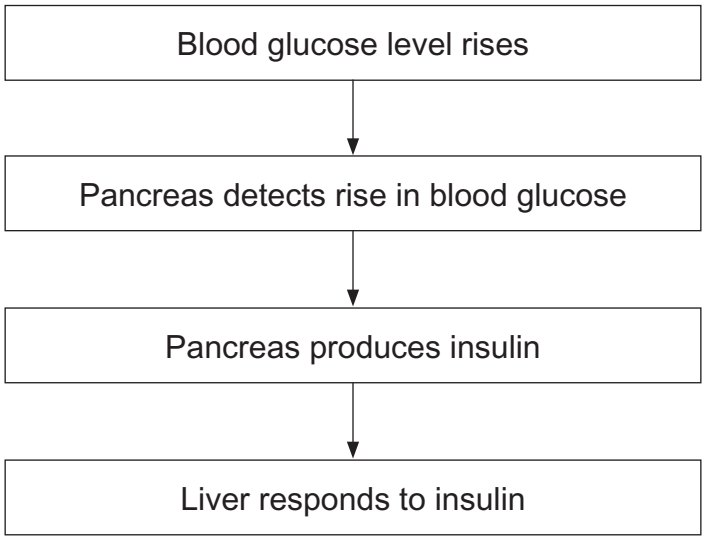
**2** **(a)** The diagram shows some of the stages that control blood glucose levels.




**(i)** How does insulin get from the pancreas to the liver?

_____ [1]

**(ii)** How does insulin affect blood glucose levels?

_____ [1]

**(iii)** Describe **two** ways the liver responds to insulin.

_____

_____

_____ [2]

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

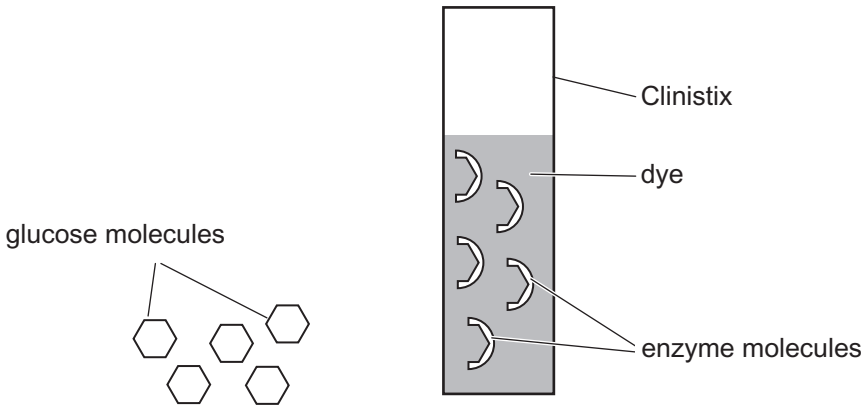
**(b)** If blood glucose levels drop below normal a different hormone is produced. This hormone acts in the opposite way to insulin.

Write down **two** ways the liver responds to this hormone.

_____

_____ [2]

**(c)** One symptom of diabetes is the presence of glucose in the urine. You can use a Clinistix strip to test for glucose in the urine.
A Clinistix strip has large numbers of molecules of an enzyme and a dye in it.
When dipped in urine containing glucose, the dye changes colour. The dye will become darker as more glucose molecules combine with enzyme molecules.




*Source: Principal Examiner*

**(i)** Write down the name of the model that describes the mechanism of enzyme action. Use the diagram and your knowledge to help you answer this question.

_____ [1]

**(ii)** Explain why the Clinistix will only produce a colour change when glucose is present in the urine.

_____ [1]

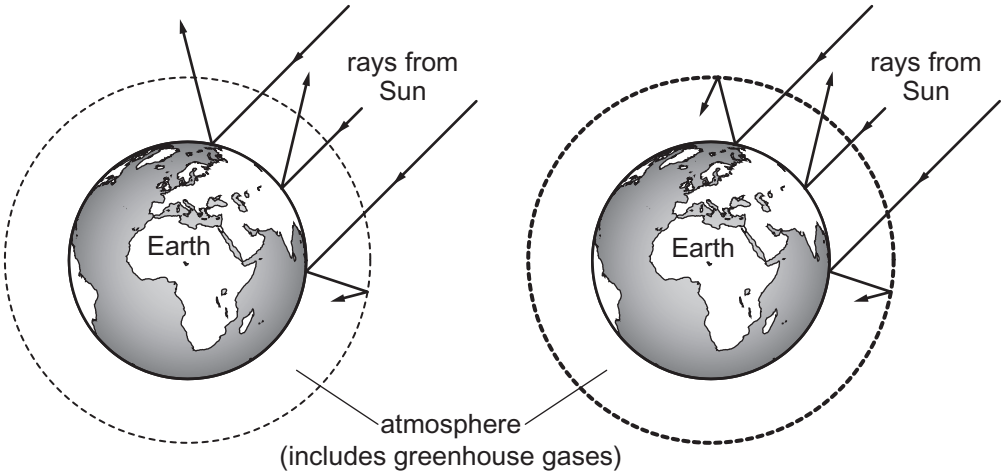
**(iii)** The Clinistix also gives information on the **amount** of glucose in the urine. How does it do this?

_____

_____ [1]

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

**3** The diagram shows what happened to rays of sunlight when they entered the Earth's atmosphere thirty years ago and five years ago.




**thirty years ago** **five years ago**

*Source: Principal Examiner*

**(a) (i)** Explain how global warming occurs. Use the diagram and your knowledge to help you answer this question.

_____

_____

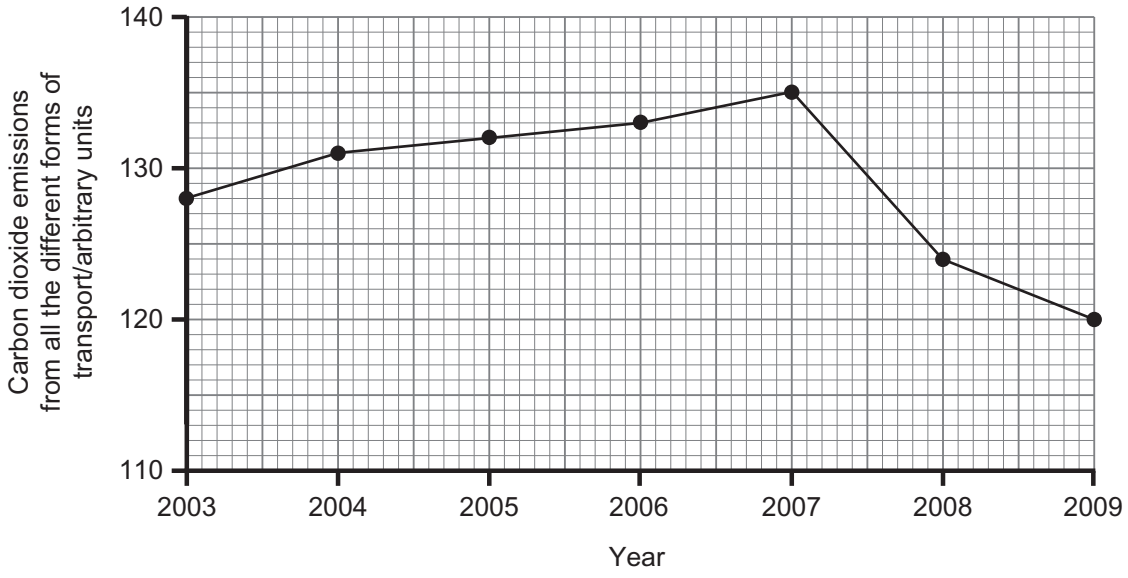
_____

_____ [2]

**(ii)** Write down **one** environmental effect of global warming.

_____ [1]

Look at the graph below. It shows carbon dioxide emissions from all the different forms of transport in the UK during the period 2003–2009.






**(b)** Describe the trend in carbon dioxide emissions from transport between 2003–2009.

Use evidence from the graph to help you answer this question.

_____

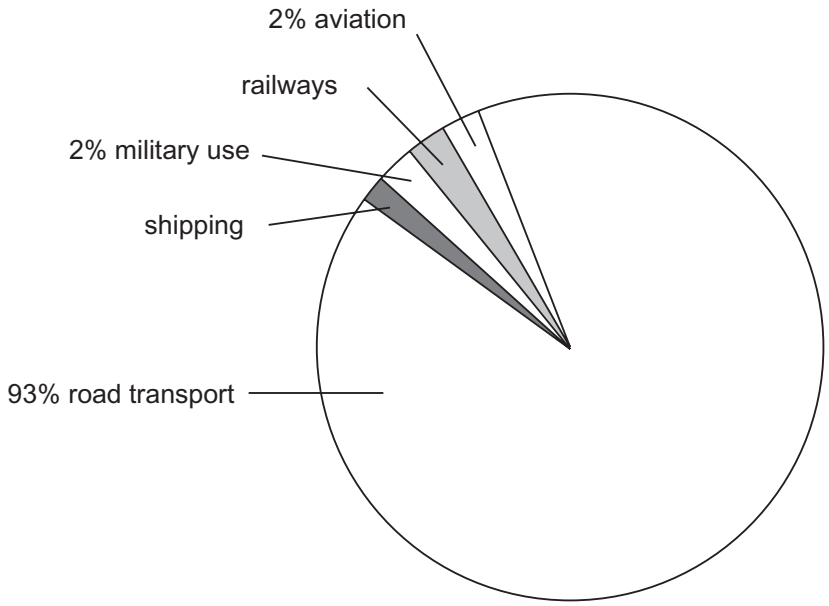
_____

_____ [2]

Examiner Only

| Marks | Remark |
|---|---|
| | |

The pie chart shows the percentage of carbon dioxide emissions from each of the different forms of transport in the UK in 2009.






**(c)** Railways produce twice the amount of carbon dioxide emissions than shipping does.

Use this information and the pie chart to calculate the percentage of carbon dioxide emissions produced by the railways.

Show your working out.

_____ % [3]

**(d)** **(i)** Write down **one** way of reducing the carbon dioxide levels produced by road transport.

_____ [1]

**(ii)** Transport is **one** source of carbon dioxide emissions. Write down another source of carbon dioxide emissions.

_____ [1]

| Examiner Only | |
|---|---|
| Marks | Remark |
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**(Questions continue overleaf)**

| Examiner Only | |
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| Marks | Remark |
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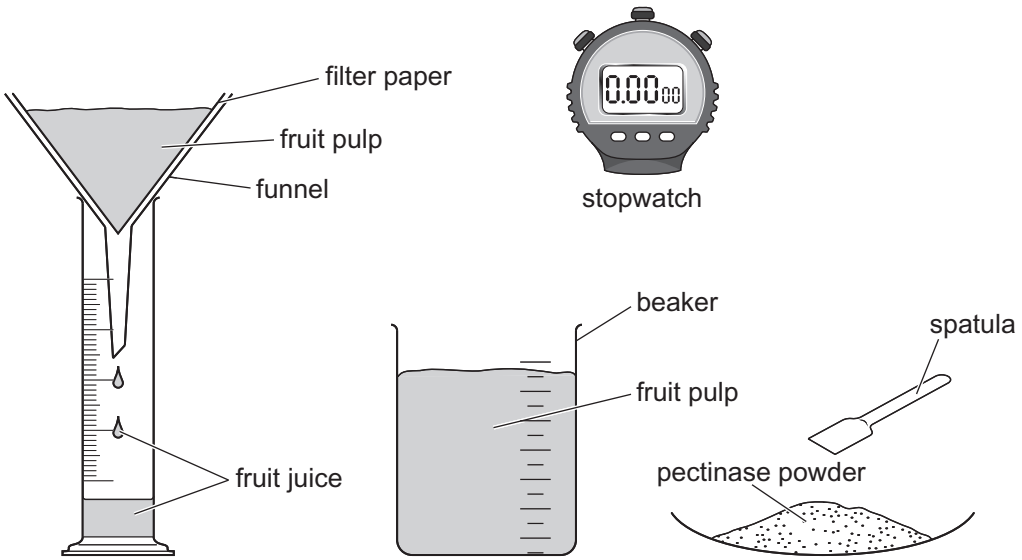
**4** **(a)** You normally get fruit juice from fruit pulp. You get fruit pulp by squeezing the fruit. Then you add the enzyme pectinase. The pectinase breaks down pectin in the walls of fruit cells so that the fruit juice is released more quickly from the cells.

The diagram shows some of the apparatus you might need.




*Source: Principal Examiner*

**(i)** Describe how you would carry out an investigation to compare how quickly fruit juice is released from fruit pulp with **and** without pectinase.

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

[6]

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

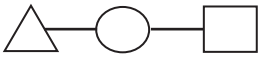
**(ii)** Write down **one** other factor that could be investigated to see if it would cause the release of more fruit juice from the fruit pulp.

_____ [1]

**(iii)** Pectinase is used commercially by fruit juice manufacturers. Write down **one** other commercial use of enzymes.

_____ [1]

**(b) (i)** Enzymes speed up digestion in the body. Complete the diagram below. Write down the name of the appropriate enzyme and **draw** the products produced when this protein molecule is broken down in the digestive system.

| **Protein molecule** | **Name of enzyme** | **Products** | |
|---|---|---|---|
|  | _____ | _____ | [3] |

**(ii)** Where in the digestive system does digestion of proteins take place?

_____ and _____ [2]

**(iii)** Where in the digestive system does absorption of digested food take place?

_____ [1]

**(iv)** Write down **one** way that the digestive system is adapted for absorption.

_____ [1]

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

**5** **(a)** A gardener wanted his lettuces to grow more by increasing the concentration of carbon dioxide in his glasshouse.

However, he read that high concentrations of carbon dioxide might harm humans. He found the two tables below which gave him the information he needed.

The table below shows how different concentrations of carbon dioxide affect the growth of lettuces in a glasshouse at 35 °C.

| Carbon dioxide concentration in glasshouse/ppm | Growth of lettuces/% |
|---|---|
| 700 | 100 |
| 950 | 100 + extra 25 |
| 1250 | 100 + extra 35 |

The table below shows how different concentrations of carbon dioxide could affect the health of humans.

| Carbon dioxide concentration in glasshouse/ppm | Effect on health of humans |
|---|---|
| 700–999 | None |
| 1000–1250 | Possible dizziness and appearance of symptoms for people with asthma or respiratory conditions |

What is the most suitable concentration of carbon dioxide to grow lettuces in the glasshouse? Use the information in both tables to help you answer this question. Explain your answer.

Concentration _____ ppm

Explanation _____

_____ [3]

**(b)** Carbon dioxide is **one** environmental factor that helps the growth of lettuces in a glasshouse. Write down another environmental factor.

_____ [1]

**(c)** Write down **one** economic factor the gardener should think about when growing his lettuces in a glasshouse.

_____ [1]

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

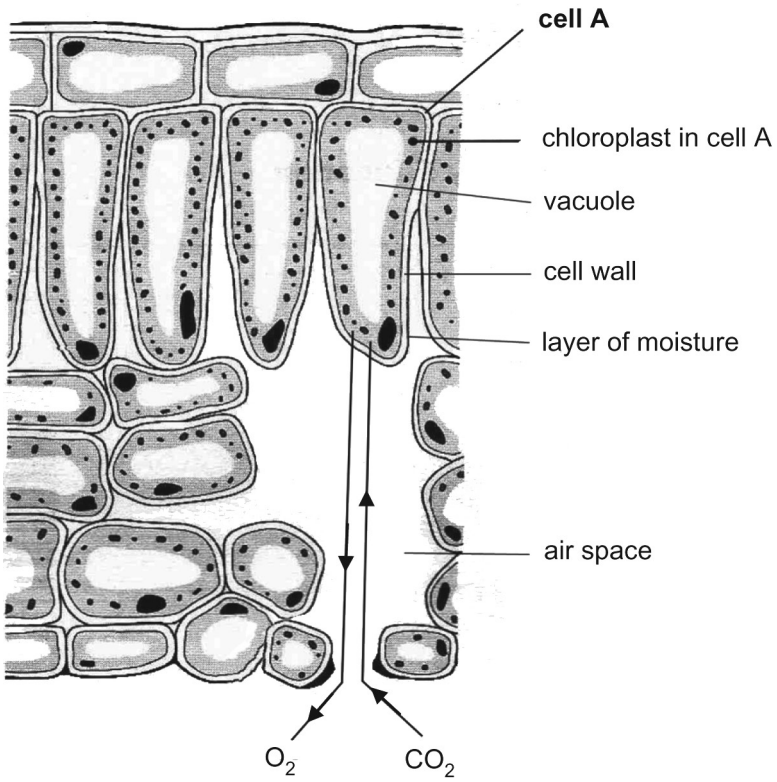
6 **(a)** **(i)** There are respiratory surfaces in animal lungs and plant leaves. Write down **one** way that the respiratory surface in animals is adapted for respiration.

_____ [1]

**(ii)** Explain what causes the oxygen to move quickly across the respiratory surface in the lungs into the blood and the carbon dioxide to move quickly in the reverse direction.

_____ [1]

**(b)** The diagram shows a cross section of part of a leaf.






**(i)** Write down the name of the process that happens in the leaf in **cell A** that uses carbon dioxide and produces oxygen.

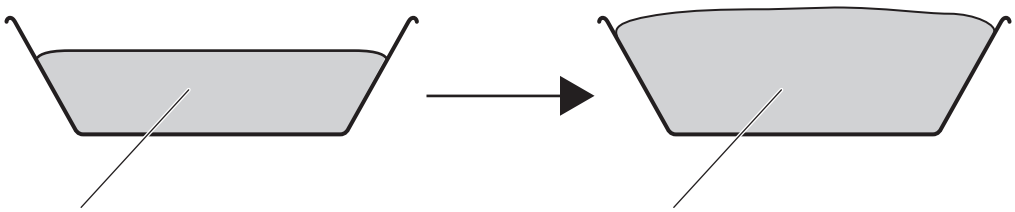
_____ [1]

**(ii)** Write down two ways that **cell A** is adapted for gas exchange.

1. _____

2. _____ [2]

**(c)** Anaerobic respiration happens when yeast is added to dough.

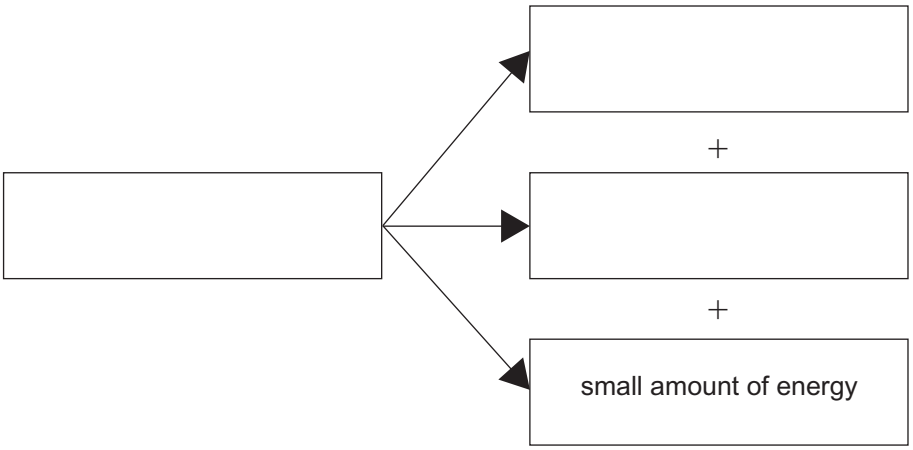


yeast + dough made up of flour, sugar and water

dough that has expanded (risen) after being left at 30 °C for an hour

*Source: Principal Examiner*

**(i)** Complete the equation for anaerobic respiration in yeast.




[2]

**(ii)** Why would the dough expand (rise) faster at 30 °C than 20 °C? Use your completed equation to help you answer this question.

_____

_____ [2]

Examiner Only

| Marks | Remark |
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| Examiner Only | |
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| Marks | Remark |
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**7** Some farmers use crop rotation where they plant barley in a field one year and the following year they plant peas or beans (legumes) in the same field. Peas and beans have swellings on their roots that contain nitrogen-fixing bacteria.

After the crop of peas or beans has been collected the roots and stems of the plants are ploughed back into the soil.

Ploughing increases the amount of air in the soil.

**(a)** Describe and explain the advantages of this crop rotation to the **soil** and the **farmer**. Use the information above and your knowledge of the nitrogen cycle to help you answer this question.

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

[6]

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

**(b)** During the two year period the farmer does not add any fertiliser or manure to the soil in the field.

**(i)** Explain why this would cause less eutrophication in a stream beside the field.

_____ [1]

**(ii)** Explain fully the role of bacteria in eutrophication in a stream.

_____

_____

_____

_____ [3]

**(iii)** What are the effects of eutrophication on aquatic animals?

_____ [1]

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