Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2012–2013

Double Award Science: Biology

Unit B1

Higher Tier

[GSD12]

GSD12

TUESDAY 14 MAY 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

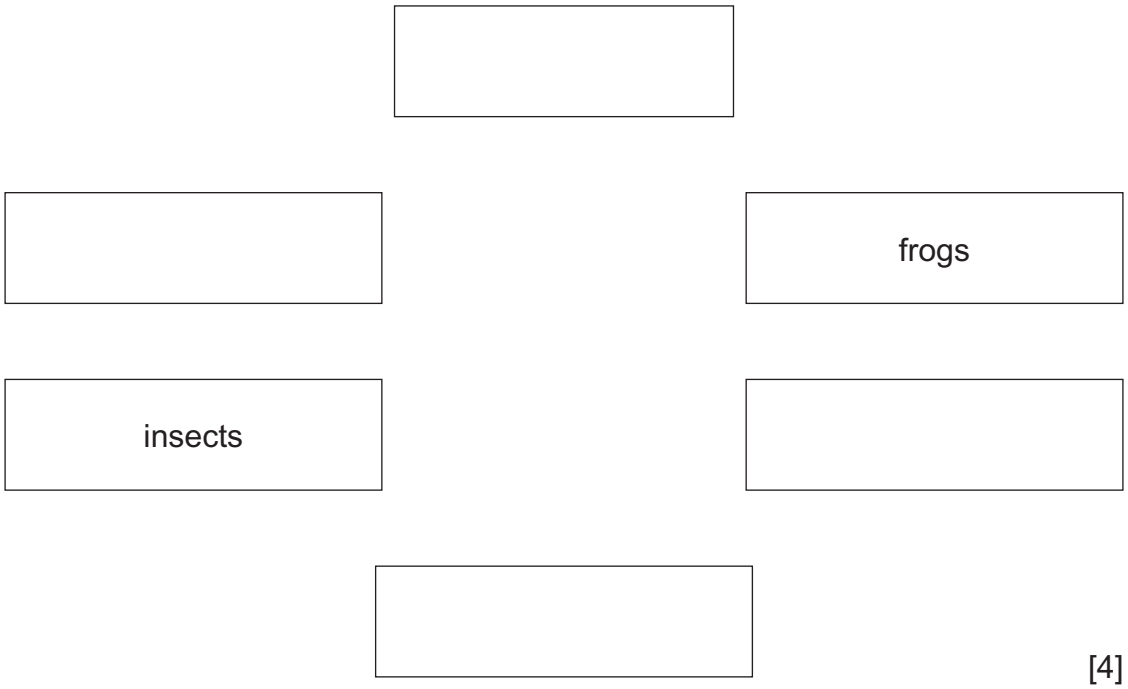
The total mark for this paper is 70.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Questions **4(a)(i)** and **7(a)**.

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

Examiner Only	
Marks	Remark

1 **(a)** Using the information below, complete the food web.

- 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) Using the information in part **(a)** opposite, draw a labelled pyramid of numbers for the food chain that contains insects.

[3]

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

If 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.

_____ kJ [2]

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

_____ [1]

(iii) Explain why there is more energy available to the hawk by eating earthworms rather than frogs.

_____

_____ [1]

Examiner Only

Marks	Remark

Examiner Only	
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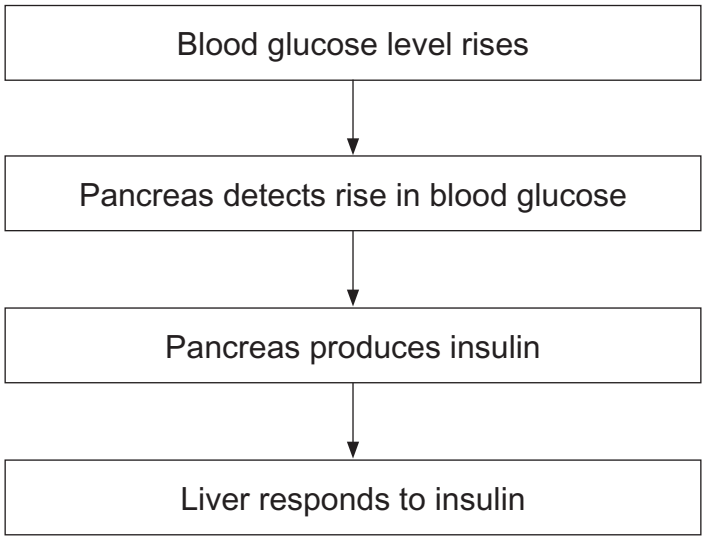
2 **(a)** The diagram shows some of the stages involved in the control of blood glucose levels.



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

_____ [1]

(ii) How does insulin affect blood glucose levels?

_____ [1]

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

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

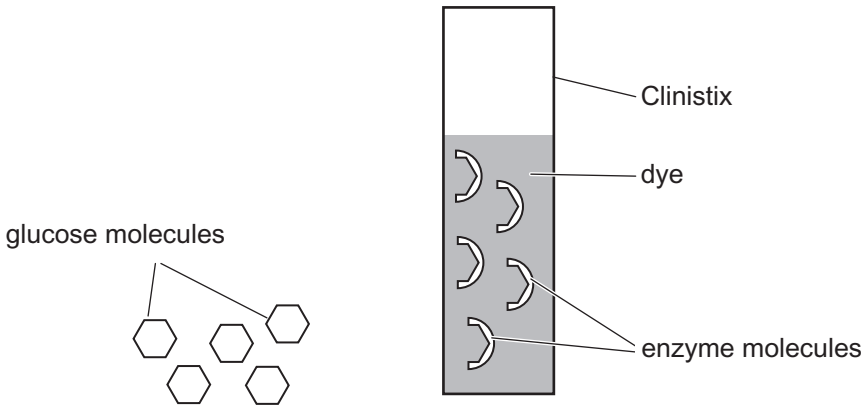
(b) If blood glucose levels drop below normal a different hormone is produced. This hormone acts in the opposite way to insulin.

Suggest **two** ways in which the liver responds to this hormone.

_____

_____ [2]

(c) One symptom of diabetes is the presence of glucose in the urine.
Using a Clinistix strip is a method of testing for glucose in the urine.
A Clinistix strip has large numbers of molecules of an enzyme and a dye embedded 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) Using the diagram and your knowledge, name the model that describes the mechanism of enzyme action.

_____ [1]

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

_____ [1]

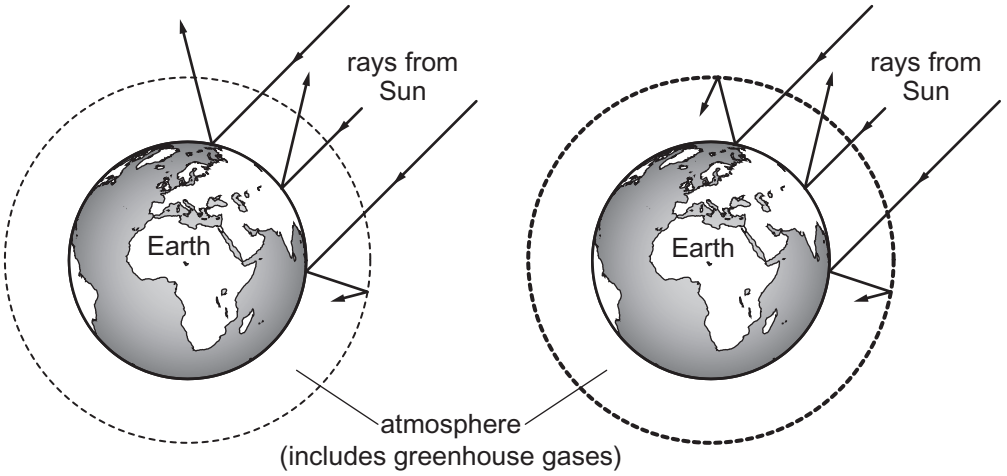
(iii) The Clinistix also provides information on the **amount** of glucose in the urine. How does it do this?

_____

_____ [1]

Examiner Only	
Marks	Remark

3 The diagram represents 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) Use the diagram, and your knowledge, to explain how global warming occurs.

_____

_____

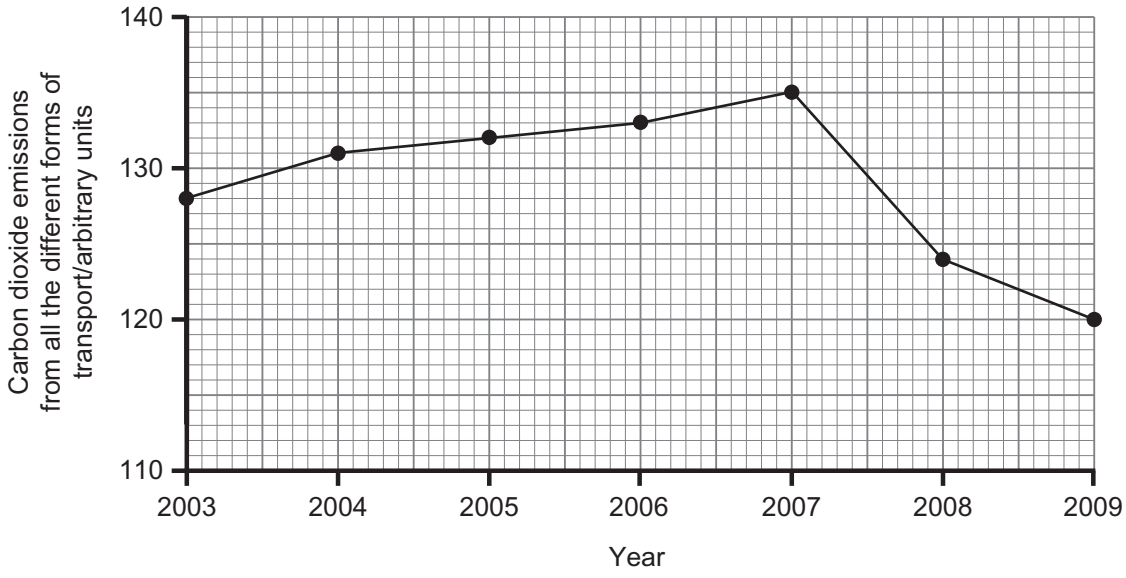
_____

_____ [2]

(ii) Give **one** environmental consequence of global warming.

_____ [1]

The graph 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 support your answer.

_____

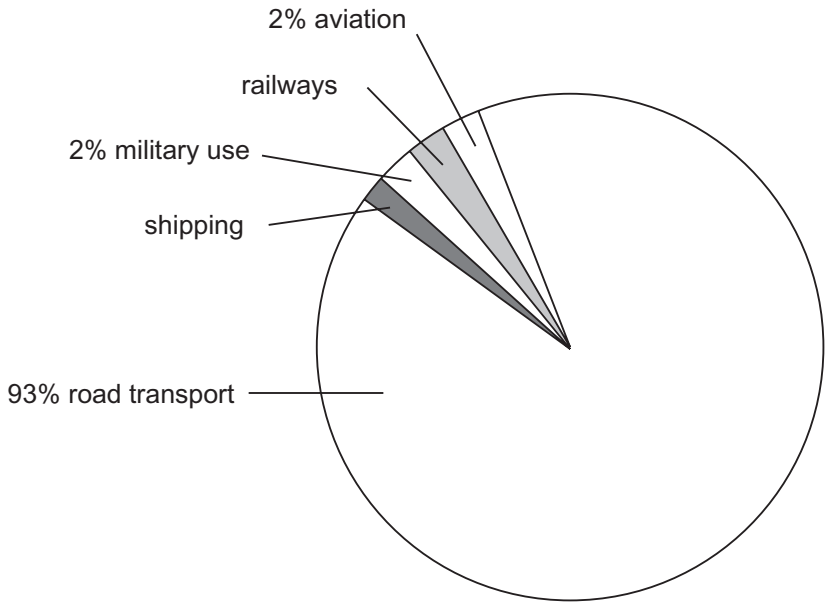
_____

_____ [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.

_____ % [3]

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

_____ [1]

(ii) Give **one** other source of carbon dioxide emissions apart from those produced by transport.

_____ [1]

Examiner Only

Marks	Remark

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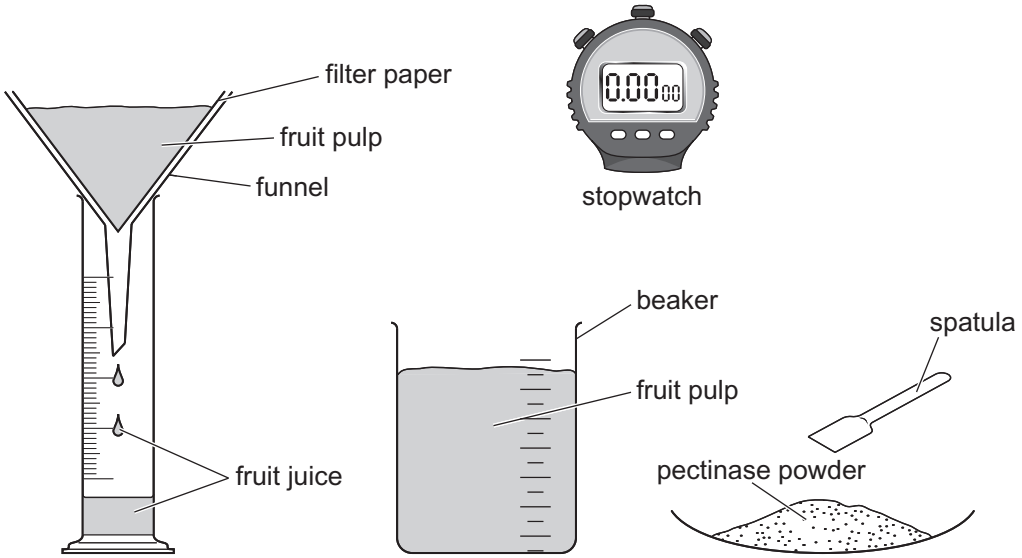
(Questions continue overleaf)

Examiner Only	
Marks	Remark

4 **(a)** Fruit juice is normally obtained from fruit pulp. Fruit pulp is obtained by squeezing the fruit. The pulp is then treated by adding the enzyme pectinase, which breaks down pectin in the walls of fruit cells. This allows the fruit juice to be released more quickly from the cells.

The diagram shows some of the apparatus you may 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]

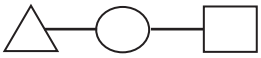
(ii) Give **one** other factor that could be investigated to see if it would cause the release of more fruit juice from the fruit pulp.

_____ [1]

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

_____ [1]

(b) (i) Enzymes speed up digestion in the body. Complete the diagram with 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) State **one** way that the digestive system is adapted for absorption.

_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

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

However, he had read that high concentrations of carbon dioxide may harm humans. He researched this and found the two tables below which gave him the information he required.

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

Carbon dioxide concentration in glasshouse/ppm	**Yield 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

Using the information in both tables, give the most suitable concentration of carbon dioxide to grow lettuces in the glasshouse. Explain your choice.

Concentration _____ ppm

Explanation _____

_____ [3]

(b) Suggest **one** environmental factor, other than carbon dioxide, that helps the growth of lettuces in a glasshouse.

_____ [1]

(c) Give **one** economic factor the market gardener should consider when growing his lettuces in a glasshouse.

_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

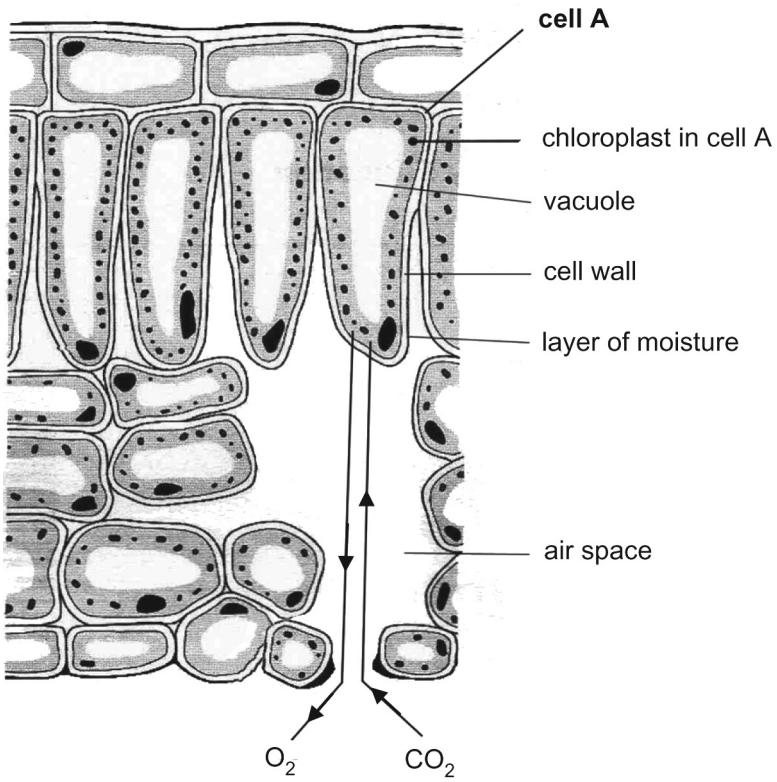
6 **(a)** **(i)** Respiratory surfaces occur in animal lungs and plant leaves. Give **one** way in which the respiratory surface in animals is adapted for respiration.

_____ [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) Name the process occurring in the leaf in **cell A** that uses carbon dioxide and produces oxygen.

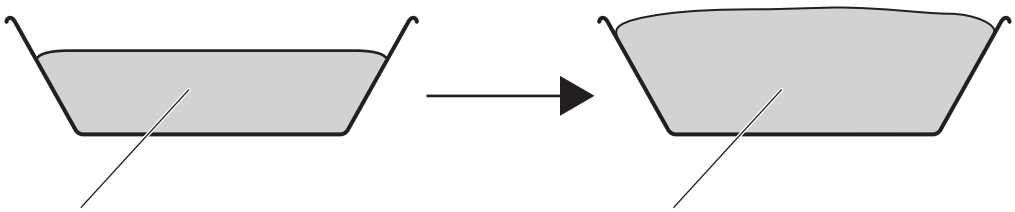
_____ [1]

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

1. _____

2. _____ [2]

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

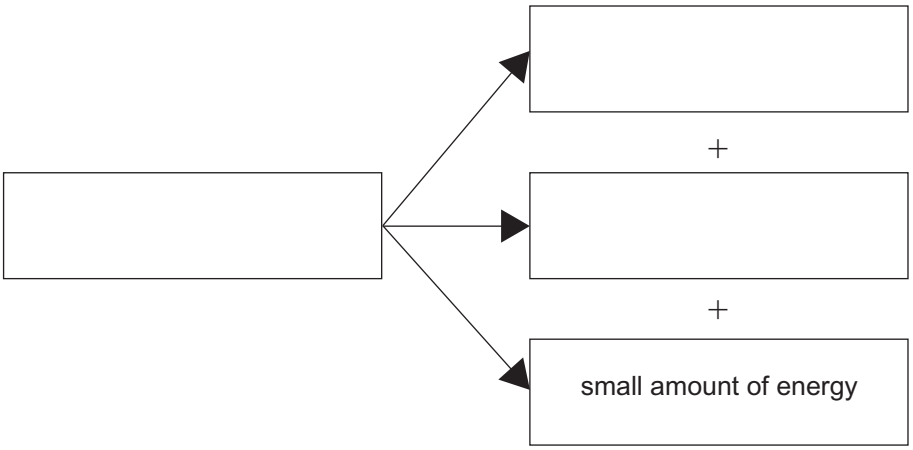


yeast + dough made up of flour, sugar and water

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) Using your completed equation, suggest why the dough would expand (rise) faster at 30 °C than 20 °C.

_____

_____ [2]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

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 gathered the roots and stems of the plants are ploughed back into the soil.

Ploughing increases the amount of air in the soil.

(a) Using this information and your knowledge of the nitrogen cycle, describe and explain the advantages of this crop rotation to the **soil** and the **farmer**.

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

[6]

(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 result in less eutrophication in a stream adjacent to the field.

_____ [1]

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

_____

_____

_____

_____ [3]

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

_____ [1]

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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