

FOR OFFICIAL USE

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G

KU

PS

Total
Marks

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0500/401

NATIONAL
QUALIFICATIONS
2009

MONDAY, 11 MAY
9.00 AM – 10.30 AM

CHEMISTRY
STANDARD GRADE
General Level

Fill in these boxes and read what is printed below.

Full name of centre

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Town

--

Forename(s)

--

Surname

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Date of birth

Day Month Year

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Scottish candidate number

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Number of seat

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- 1 All questions should be attempted.
- 2 Necessary data will be found in the Data Booklet provided for Chemistry at Standard Grade and Intermediate 2.
- 3 The questions may be answered in any order but all answers are to be written in this answer book, and must be written clearly and legibly in ink.
- 4 Rough work, if any should be necessary, as well as the fair copy, is to be written in this book.
Rough work should be scored through when the fair copy has been written.
- 5 Additional space for answers and rough work will be found at the end of the book.
- 6 The size of the space provided for an answer should not be taken as an indication of how much to write. It is not necessary to use all the space.
- 7 Before leaving the examination room you must give this book to the invigilator. If you do not, you may lose all the marks for this paper.



PART 1

In Questions 1 to 8 of this part of the paper, an answer is given by circling the appropriate letter (or letters) in the answer grid provided.

In some questions, two letters are required for full marks.

If more than the correct number of answers is given, marks will be deducted.

A total of 20 marks is available in this part of the paper.

SAMPLE QUESTION

A	CH_4	B	H_2	C	CO_2
D	CO	E	$\text{C}_2\text{H}_5\text{OH}$	F	C

(a) Identify the hydrocarbon.

Ⓐ	B	C
D	E	F

The one correct answer to part (a) is A. This should be circled.

(b) Identify the **two** elements.

A	Ⓑ	C
D	E	Ⓕ

As indicated in this question, there are **two** correct answers to part (b). These are B and F. Both answers are circled.

If, after you have recorded your answer, you decide that you have made an error and wish to make a change, you should cancel the original answer and circle the answer you now consider to be correct. Thus, in part (a), if you want to change an answer A to an answer D, your answer sheet would look like this:

Ⓐ	B	C
Ⓓ	E	F

If you want to change back to an answer which has already been scored out, you should enter a tick (✓) in the box of the answer of your choice, thus:

✓ Ⓐ	B	C
Ⓓ	E	F

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1. The diagram shows part of the Periodic Table.
The letters do **not** represent the symbols for the elements.

				A	B	
	C					
	D					
F						E

- (a) Identify the element which has the electron arrangement 2, 7.
You may wish to use page 1 of the data booklet to help you.

A	B	C	D	E	F
---	---	---	---	---	---

1

- (b) Identify the unreactive element.

A	B	C	D	E	F
---	---	---	---	---	---

1

- (c) Identify the **two** elements which are in the same group.

A	B	C	D	E	F
---	---	---	---	---	---

1

(3)

[Turn over]

Marks

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2. The grid contains the names of some metals.

A	mercury	B	magnesium	C	copper
D	iron	E	silver	F	sodium

- (a) Identify the metal used as the catalyst in the Haber Process.

A	B	C
D	E	F

1

- (b) Identify the metal with the highest density.

You may wish to use page 2 of the data booklet to help you.

A	B	C
D	E	F

1

- (c) Identify the metal which was discovered after 1790.

You may wish to use page 8 of the data booklet to help you.

A	B	C
D	E	F

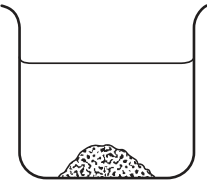
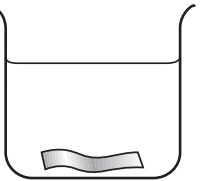
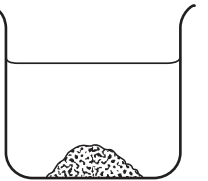
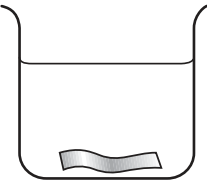
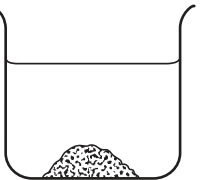
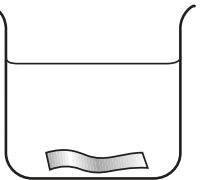
1

(3)

Marks

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3. Two students investigated the reaction between magnesium and dilute hydrochloric acid.

A  powder 2 mol/l 20 °C	B  ribbon 1 mol/l 20 °C	C  powder 1 mol/l 30 °C
D  ribbon 1 mol/l 30 °C	E  powder 2 mol/l 40 °C	F  ribbon 2 mol/l 20 °C

- (a) Identify the **two** experiments which could be used to show the effect of concentration on the speed of reaction.

A	B	C
D	E	F

1

- (b) Identify the experiment with the fastest speed of reaction.

A	B	C
D	E	F

1

(2)

[Turn over]

Marks

KU PS

4. The grid contains the names of some gases.

A	argon	B	hydrogen	C	oxygen
D	nitrogen	E	carbon dioxide	F	ammonia

- (a) Identify the gas which makes up approximately 20% of air.

A	B	C
D	E	F

1

- (b) Identify the gas which burns with a pop.

A	B	C
D	E	F

1

- (c) Identify the gas produced during respiration.

A	B	C
D	E	F

1

- (d) Identify the gas produced when a metal reacts with dilute acid.

A	B	C
D	E	F

1

(4)

Marks

KU PS

5. The grid contains the names of some elements.

A	hydrogen	B	carbon	C	copper
D	zinc	E	nitrogen	F	iron

- (a) Identify the element produced in a blast furnace.

A	B	C
D	E	F

1

- (b) Identify the element used to galvanise steel objects.

A	B	C
D	E	F

1
(2)**[Turn over**

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6. The grid shows the names of some compounds.

A	B
lead sulphate	sodium chloride
C	D
calcium hydroxide	potassium phosphate

(a) Identify the compound which contains only **two** elements.

A	B
C	D

(b) Identify the compound which will neutralise an acid.

A	B
C	D

Marks

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7. A student made some statements about glucose.

A	Glucose is a carbohydrate.
B	Glucose is insoluble in water.
C	Glucose is made during photosynthesis.
D	Iodine solution can be used to test for glucose.
E	Glucose molecules are too large to pass through the gut wall.

Identify the **two** correct statements.

A
B
C
D
E

(2)

[Turn over

Marks

KU PS

8. Silver and gold are used to make jewellery.

Identify the **two** statements which are true for **both** silver and gold.

You may wish to use the data booklet to help you.

A	They are transition metals.
B	They do not conduct electricity.
C	They are more reactive than lead.
D	They react with hydrochloric acid.
E	They are found uncombined in the Earth's crust.

A
B
C
D
E

(2)

A total of 40 marks is available in this part of the paper.

-
- A black and white photograph of a fireplace. The fireplace has a dark, ornate metal grate with vertical bars and decorative finials. Inside the fireplace, there is a large pile of dark, irregularly shaped logs. The background of the fireplace is a light-colored, possibly stone or brick, wall. The overall image is in black and white, with a slightly grainy texture.

- 1

- 1**

- 1**
(3)

[0500/401]

Marks

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10. Magnesium and chlorine are common elements.

(a) Complete the table.

You may wish to use page 8 of the data booklet to help you.

Element	Atomic Number	Metal or non-metal
magnesium		
chlorine		

1

(b) Magnesium and chlorine react together to form magnesium chloride.

(i) Write the formula for magnesium chloride.

1

(ii) Using information from page 6 of the data booklet, enter the melting point and boiling point of magnesium chloride on the diagram below.

gas	_____ °C
liquid	_____ °C
solid	

1

(iii) Circle the correct word to complete the following sentence.

At 1000 °C magnesium chloride is a $\left\{ \begin{array}{l} \text{gas} \\ \text{liquid} \\ \text{solid} \end{array} \right\}$.

1
(4)

Marks

KU PS

11. Plastics have many uses. Perspex is used to make advertising signs. Artificial limbs can be made from PVC. Polythene can be used to make carrier bags and egg cartons can be made from polystyrene.

(a) Present this information as a table with suitable headings.

2

- (b) Scientists have produced a plastic which is biodegradable.
What is meant by the term **biodegradable**?

1

- (c) PVC softens when heated and can be easily reshaped.
What term is used to describe this type of plastic?

1

- (d) Name the monomer which is used to make polystyrene.

1

- (e) Name the type of chemical reaction which is used to make polystyrene.

1

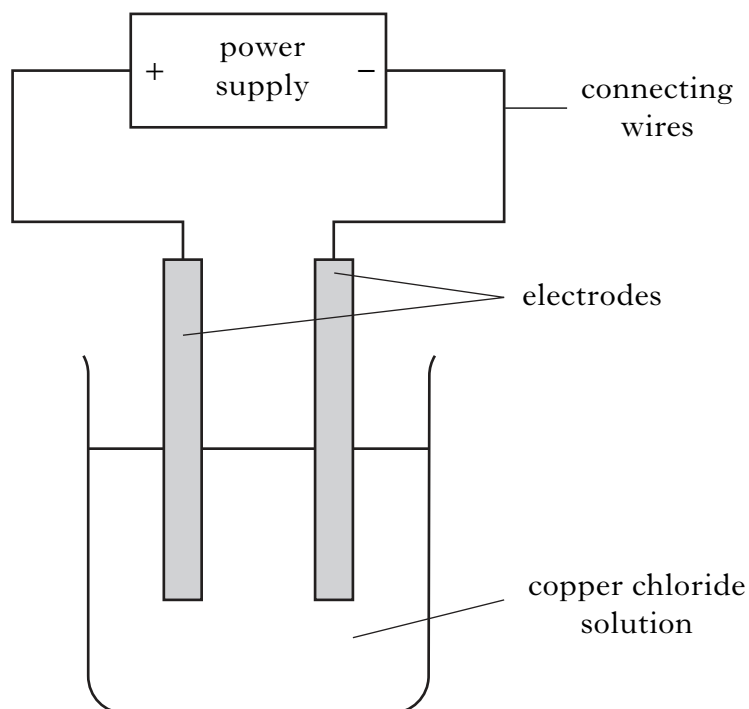
(6)

[Turn over]

Marks

KU PS

12. A student carried out the experiment shown.



(a) Name the product formed at the positive electrode.

1

(b) Name the charged particles that flow through the connecting wires.

1

(c) Name a non-metal element which is suitable for use as the electrodes.

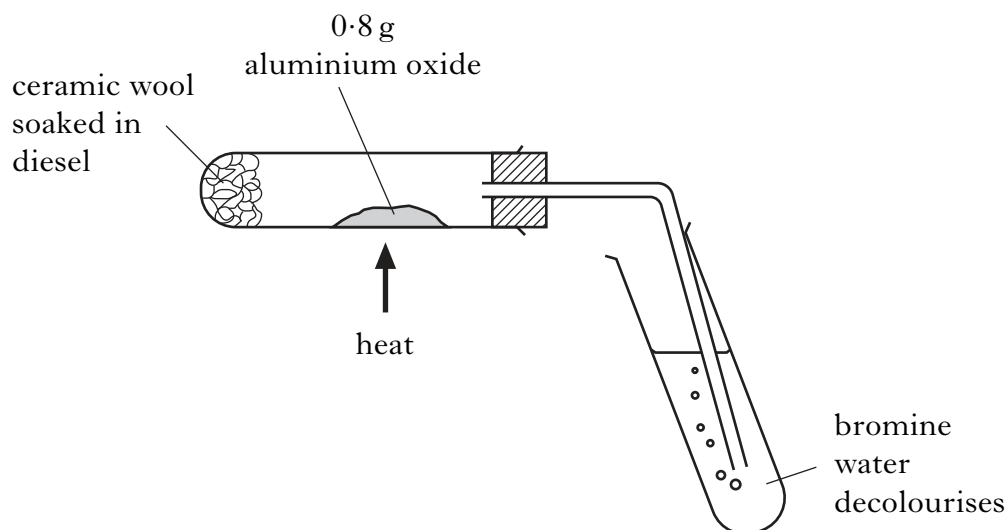
1

(3)

Marks

KU PS

13. Long chain alkanes in diesel can be broken down using aluminium oxide as a catalyst.

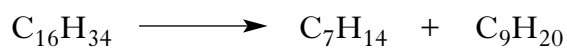


- (a) What mass of aluminium oxide will be present at the end of the experiment?

_____ g

1

- (b) One reaction taking place in the heated test tube is:



- (i) Name this type of chemical reaction.

1

- (ii) On the equation above circle the formula of the product which decolourised the bromine water.

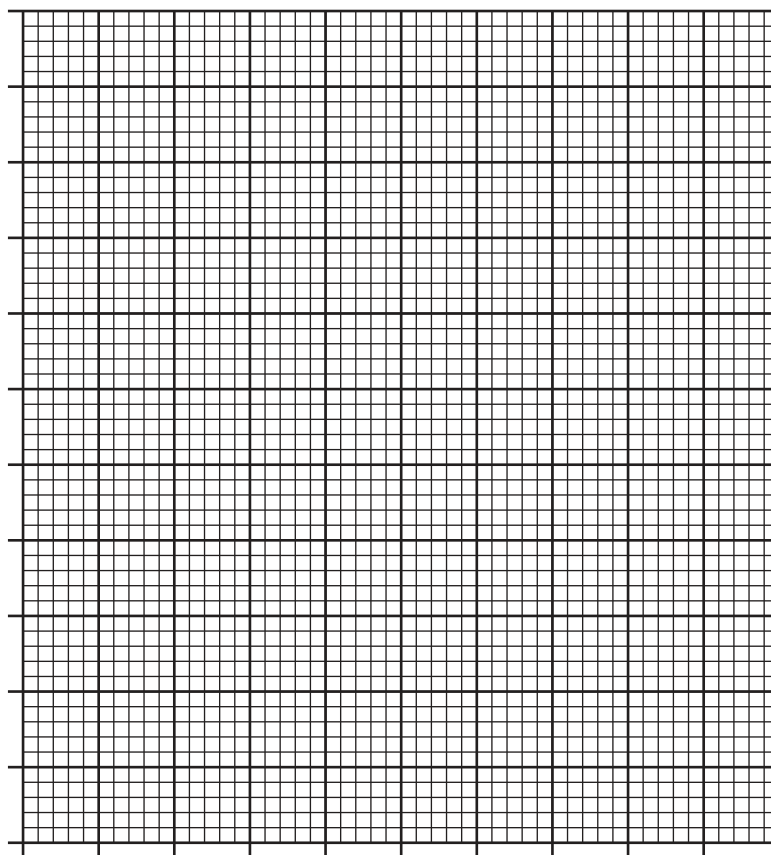
1

(3)

[Turn over]

-
- A pie chart illustrating the distribution of steel uses. The chart is divided into five segments of varying shades of gray. The largest segment, representing 55%, is labeled 'steel making'. The next largest, at 25%, is labeled 'chemicals'. The remaining three segments are each 5%: 'other uses' (10% total for two segments), 'metal cutting', and 'rockets and explosives'. Each segment is connected to its label and percentage by a thin black line.
- | Use Category | Percentage |
|------------------------|------------|
| steel making | 55% |
| chemicals | 25% |
| other uses | 10% |
| metal cutting | 5% |
| rockets and explosives | 5% |

- (Additional graph paper, if required, can be found on page 23.)



Marks

KU PS

14. (continued)

- (b) Oxygen is made up of diatomic molecules.

What is meant by the term **diatomic**?

1

- (c) Steel is a mixture of metals.

What name is given to a mixture of metals such as steel?

1

- (d) Different methods can be used to prevent steel from rusting.

- (i) How does tin-plating prevent rusting?

1

- (ii) Name a metal which can be used to provide sacrificial protection to steel.

1**(6)****[Turn over]**

Marks

KU PS

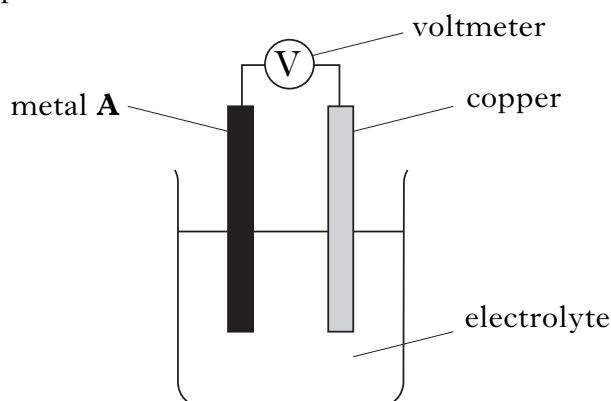
15. Batteries are used in a range of items. A battery is a number of cells joined together.



- (a) Give a **disadvantage** in using a battery rather than mains electricity.

1

- (b) A student investigated how different metals affect the voltage produced by a simple cell.



The results are shown in the table.

Metal A	Voltage/V
magnesium	2.7
tin	0.5

- (i) The student set up another cell using iron and copper.
Suggest the voltage produced by this cell.
You may wish to use page 7 of the data booklet to help you.

_____ V

1

- (ii) Suggest **one** factor which the student would have kept the same to make a fair comparison.

1

(3)

Marks

KU PS

16. (a) Ammonium nitrate is a synthetic fertiliser. It contains nitrogen which is essential for plant growth.

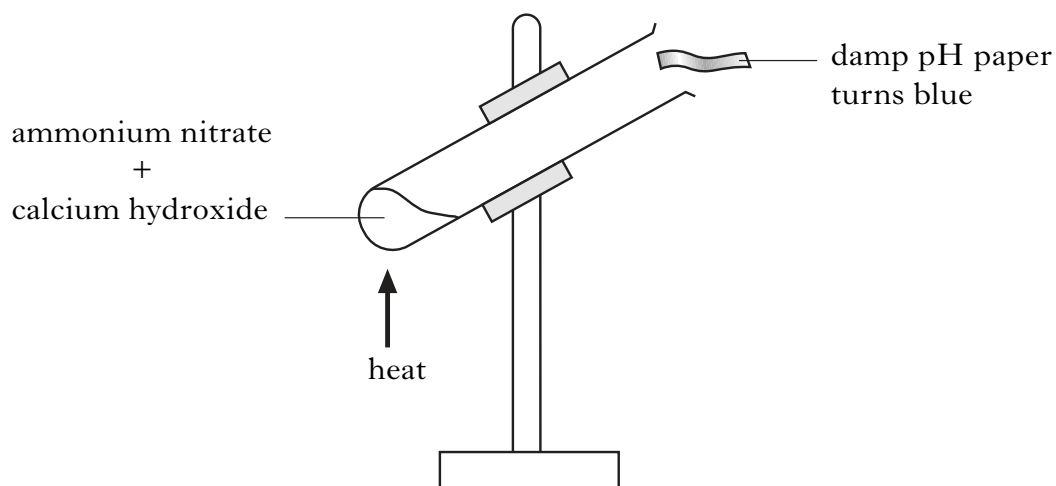
(i) What is meant by the term **synthetic**?

1

(ii) Name another essential element supplied by fertilisers.

1

(b) When ammonium nitrate is heated with calcium hydroxide, a colourless gas is produced. The gas turns damp pH paper blue.



Name the gas produced.

1

(3)

[Turn over]

Marks

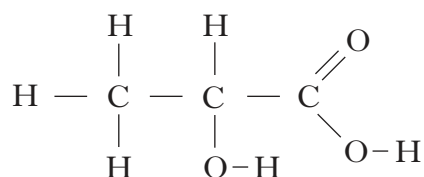
KU PS

17. Yoghurt is made by fermenting fresh milk. Enzymes help to convert lactose in the milk to lactic acid.

(a) What is an enzyme?

1

(b) The diagram shows a molecule of lactic acid.



Write the molecular formula for lactic acid.

1

(c) Sugar can be added to sweeten yoghurt.

Suggest why sugar is added **after** the fermentation stage and not before.

1
(3)

Marks

KU PS

18. A student carried out an experiment to find the pH of various solutions.

Workcard											
Instructions 1. Burn the element in a gas jar of oxygen. 2. Add water to the oxide formed. 3. Add 5 drops of universal indicator and shake the gas jar. 4. 5. Record the pH. Results: <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">Name of oxide</th> <th style="padding: 5px;">pH of solution</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">sulphur dioxide</td> <td style="padding: 5px;">2</td> </tr> <tr> <td style="padding: 5px;">sodium oxide</td> <td style="padding: 5px;">13</td> </tr> <tr> <td style="padding: 5px;">phosphorus oxide</td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;">aluminium oxide</td> <td style="padding: 5px;">could not be measured</td> </tr> </tbody> </table>		Name of oxide	pH of solution	sulphur dioxide	2	sodium oxide	13	phosphorus oxide		aluminium oxide	could not be measured
Name of oxide	pH of solution										
sulphur dioxide	2										
sodium oxide	13										
phosphorus oxide											
aluminium oxide	could not be measured										

- (a) Instruction 4 is missing from the workcard.

What should instruction 4 tell the student to do?

1

- (b) Complete the table showing the result the student would have obtained for phosphorus oxide.

1

- (c) Suggest why the pH of aluminium oxide could not be measured.

You may wish to use page 5 of the data booklet to help you.

1

(3)

[Turn over]

- | Number of carbon atoms | Octane number | |
|------------------------|---------------|--------|
| | alkane | alkene |
| 4 | 94 | 98 |
| 5 | 62 | 93 |
| 6 | 25 | 85 |
| 7 | 0 | 75 |

-

1

1

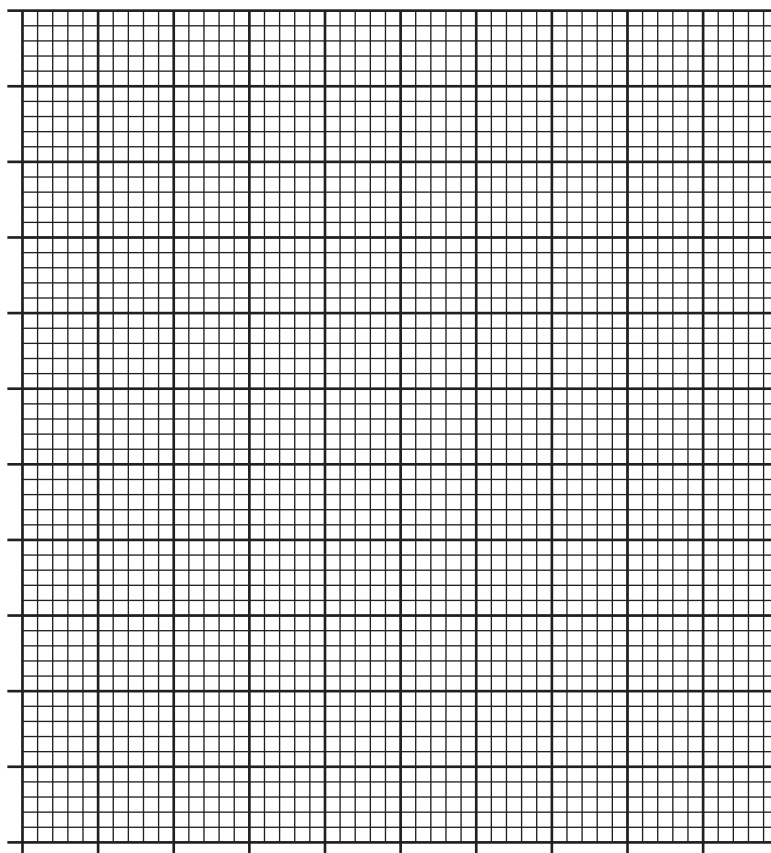
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1

(3)

[0500/401]

ADDITIONAL GRAPH PAPER FOR QUESTION 14(a)



ADDITIONAL SPACE FOR ANSWERS

ADDITIONAL SPACE FOR ANSWERS

ADDITIONAL SPACE FOR ANSWERS

ADDITIONAL SPACE FOR ANSWERS

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