Surname	Centre Number	Candidate Number
First name(s)		0

GCSE

S24-3430U70-1D

MONDAY, 8 JANUARY – FRIDAY, 9 FEBRUARY 2024

SCIENCE (Double Award) – Unit 7 (3430U70)

PRACTICAL ASSESSMENT

INVESTIGATING EXOTHERMIC REACTIONS

SECTION B

1 hour

3430U701D
01

For Examiner's use only		
	Maximum Mark	**Mark Awarded**
Section B	**24**	

ADDITIONAL MATERIALS

A calculator and your Section **A** exam paper.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet. If you run out of space, use the additional page(s) at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

The total number of marks available for this section of the task is 24.

The number of marks is given in brackets at the end of each question or part-question.

This task is in 2 sections, **A** and **B**. You will have completed Section **A** in a previous lesson.

Examiner only

SECTION B

Answer **all** questions.

2. (a) (i) State the independent variable in this experiment. [1]

.....

(ii) State the dependent variable in this experiment. [1]

.....

(iii) Complete the table below by stating **one** controlled variable in this experiment **and** describe how it was controlled. [2]

Controlled variable	How it was controlled

(b) (i) Use your results from Section **A** to draw a graph of temperature (vertical axis) against time (horizontal axis) on the grid opposite.
Include a plot for the start temperature at 0 seconds. [5]

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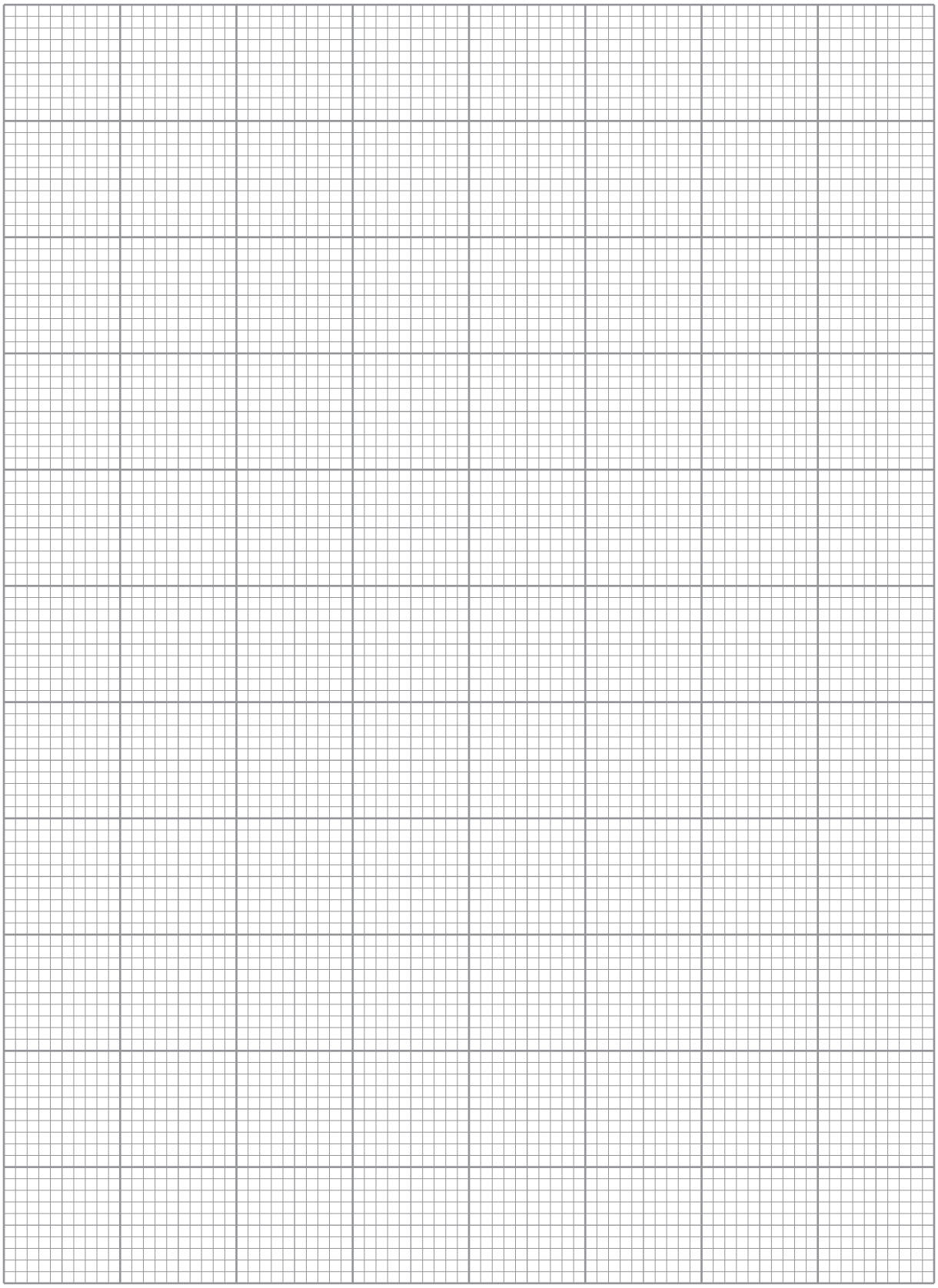

Examiner only

(ii) I. **Use your graph** to find the **maximum temperature** reached in the experiment. [1]

maximum temperature = ... °C

II. Use your answer to part (b)(ii)I and the temperature at the start of the experiment to calculate the maximum temperature change. [1]

maximum temperature change = ... °C

(iii) The energy change for the reaction can be found by using the following equation:

Energy change = $4.2 \times m \times \Delta T$

where: m = mass of copper(II) sulfate solution (assumed to be 25 g)
ΔT = maximum temperature change

Use the equation and your answer to part (b)(ii)II to calculate the energy change in this experiment. [2]

energy change = ... J

Examiner only

(iv) Use your graph to:

I. Describe the relationship between time and temperature in this reaction. [1]

.....

.....

.....

II. Explain the shape of your graph in terms of the reaction taking place. [2]

.....

.....

.....

.....

(v) If the temperature of the reaction mixture continued to be recorded until there was no further change, state the final temperature you would expect.
Give a reason for your answer. [1]

Final temperature ..... °C

Reason .....

.....

(c) Complete the table to give the missing inaccuracy **and** missing improvement in the experiment. [2]

Inaccuracy	Improvement
Heat loss	
	Use a burette / pipette to measure the volume of copper(II) sulfate solution

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(d) A group of students used the same method to investigate the temperature change when different metals reacted with copper(II) sulfate solution.
Their results are given below.

Metal	Maximum temperature rise when added to copper(II) sulfate solution (°C)		
	Trial 1	Trial 2	Trial 3
zinc	20	23	22
magnesium	39	40	42
iron	11	15	19

(i) Use the results to place zinc, magnesium and iron in order of reactivity. [1]

most reactive ⇑

1. .....

2. .....

3. .....

(ii) Comment on the precision of the results of the group. [2]

.....

.....

.....

.....

(iii) One of the students suggests that the first temperature rise for iron (11 °C) must be an anomalous result.
Explain whether you agree. [2]

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END OF PAPER

24

Question number	Additional page, if required. Write the question number(s) in the left-hand margin.

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