UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | | | | | |

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PHYSICS **0625/63**

Paper 6 Alternative to Practical **October/November 2013**

1 hour

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

This document consists of **14** printed pages and **2** blank pages.

1 An IGCSE student is measuring the capacity of a drinks cup by three methods.

For Examiner's Use

The capacity of a cup is the maximum volume of liquid that it will hold in normal use. This maximum level is marked on the cup, as shown in Fig. 1.1.

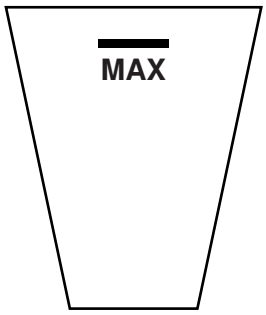

Fig. 1.1

Fig. 1.2

(a) Method 1

In Method 1, the capacity V_1 is determined from the mass of water in the cup.

(i) The cup is filled to the marked level with water. It is then placed on the balance, as shown in Fig. 1.2.

Read and record its mass m.

m = ... [1]

(ii) Calculate a value for the capacity V_1, using your reading from **(a)(i)** and the equation $V_1 = \frac{m}{\rho}$, where $\rho = 1.00\,\text{g/cm}^3$.

V_1 = ... [2]

(b) Method 2

In Method 2, the capacity V_2 is measured directly from the volume of water in the cup.

For Examiner's Use

The cup is filled to the marked level and the water is tipped into a measuring cylinder, as shown in Fig. 1.3.

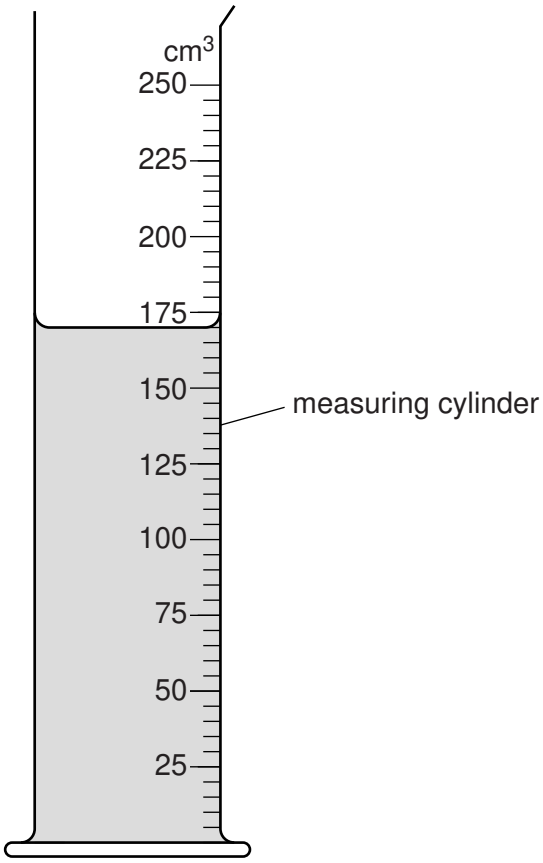

Fig. 1.3

Read and record the volume V_2 of water in the measuring cylinder.

V_2 = ... [1]

(c) Method 3

In Method 3, the capacity V_3 is calculated by considering the cup as a cylinder, using the average diameter of the cup and an approximate equation.

For Examiner's Use

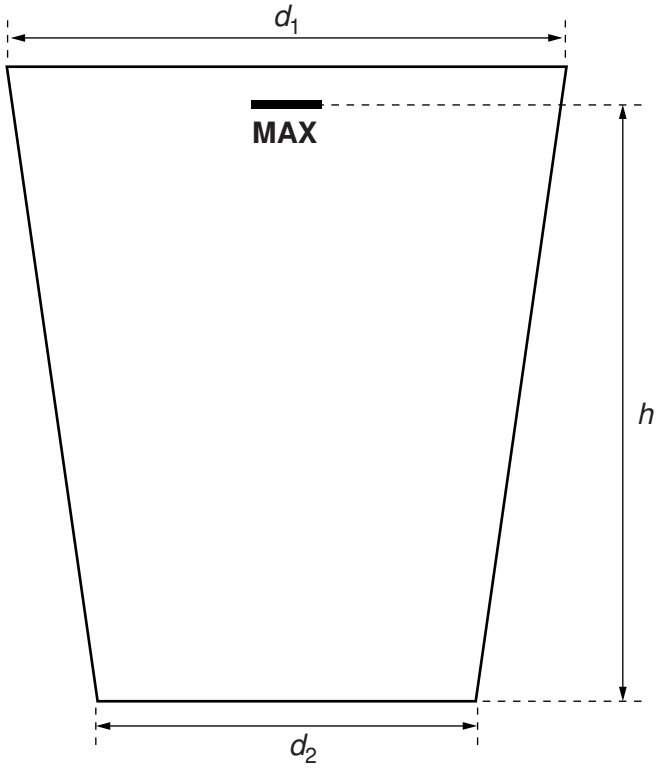

Fig. 1.4

(i) On Fig. 1.4, measure and record the diameter d_1 of the top of the cup.

d_1 = ... cm

(ii) On Fig. 1.4, measure and record the diameter d_2 of the base of the cup.

d_2 = ... cm

(iii) On Fig. 1.4, measure and record the height h from the base to the marked level **MAX**.

h = ... cm
[1]

(iv) Calculate the average diameter D using your readings from **(c)(i)** and **(c)(ii)**, and the equation $D = \frac{(d_1 + d_2)}{2}$.

D = ...

(v) Calculate a value for the capacity V_3, using your results from **(c)(iii)** and **(c)(iv)** and the equation $V_3 = \frac{\pi D^2 h}{4}$.

For Examiner's Use

V_3 = ...
[2]

(d) State a possible practical source of inaccuracy in **Method 2** and a possible practical source of inaccuracy in **Method 3**.

Method 2 .....

.....

Method 3 .....

.....
[2]

(e) State an additional measurement which could be taken to give a more accurate result in **Method 1**.

.....

..... [1]

[Total: 10]

2 An IGCSE student is investigating methods of preventing loss of thermal energy.

For Examiner's Use

The student is using two beakers labelled **A** and **B**, as shown in Fig. 2.1.

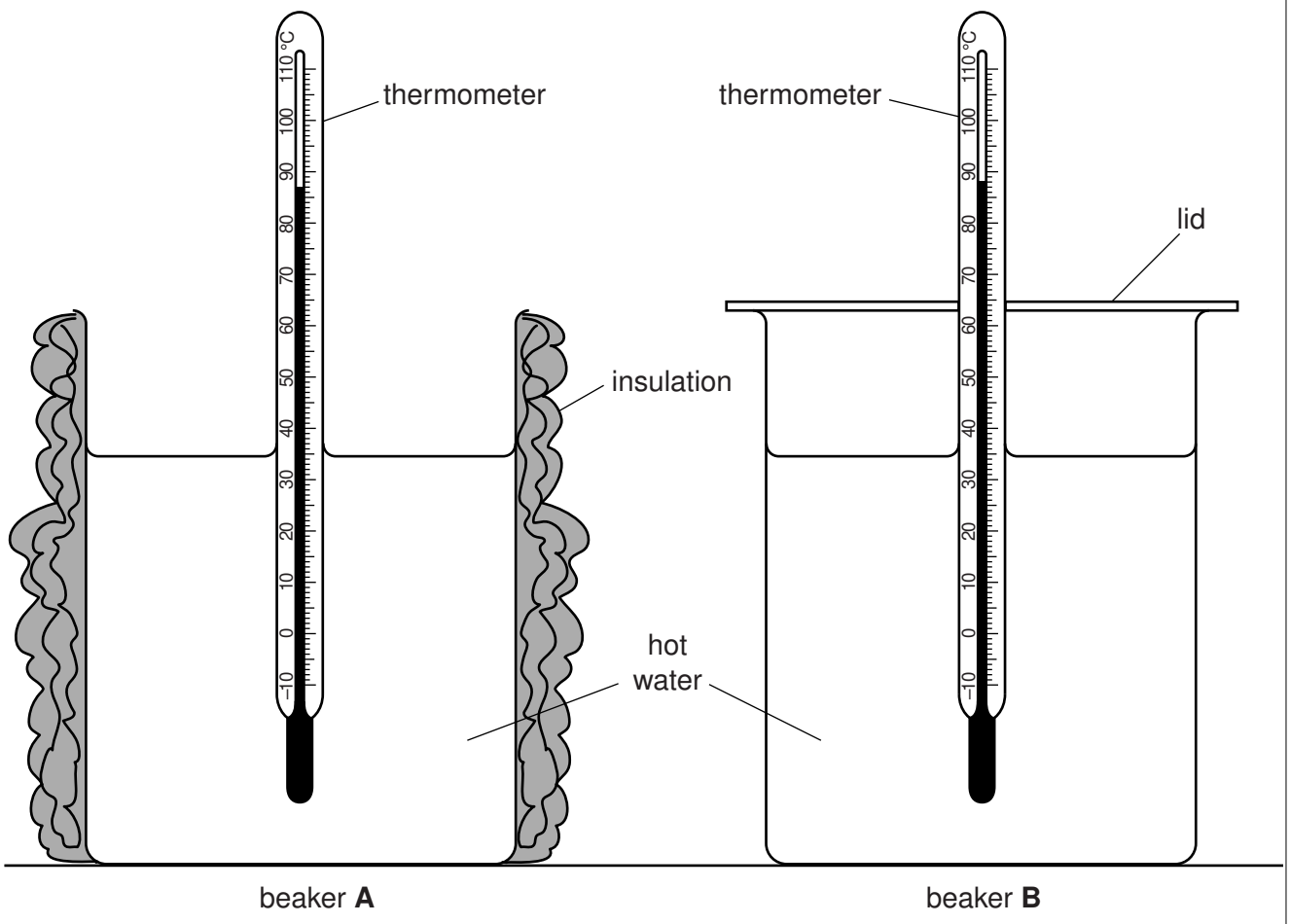

Fig. 2.1

Beaker **A** has a layer of insulation and beaker **B** has a lid but no insulation.

The beakers contain hot water at the start of the experiment. The initial temperatures are as shown in Fig. 2.1.

(a) Read, and record in the first row of Table 2.1, the temperatures of the water in beakers **A** and **B** at time $t = 0$. [1]

(b) The temperatures of the hot water after 30 s, 60 s, 90 s, 120 s, 150 s and 180 s are shown in Table 2.1.

Complete the column headings and enter the values of t in the table.

[2]

Table 2.1

For Examiner's Use

	beaker **A**	beaker **8**
t/	θ/	θ/
	85.0	87.0
	83.5	85.5
	82.0	84.5
	81.0	84.0
	79.5	83.0
	78.5	82.5

(c) State from which beaker, if either, the rate of loss of thermal energy is the greater. Justify your answer by referring to the results.

beaker .....

justification .....

.....

..... [2]

(d) State one condition that should be controlled to ensure that the comparison between beaker **A** and beaker **B** is a fair one.

.....

..... [1]

(e) A student points out that the experiment does not test the effectiveness of insulation in reducing thermal energy loss.

For Examiner's Use

Suggest a change to this experiment which could be made so that the effect of insulation could be investigated. Explain why this change would help.

suggestion .....

.....

explanation .....

.....

.....

[2]

[Total: 8]

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3 IGCSE students are investigating the current and potential difference in an electrical circuit.

For Examiner's Use

The circuit is shown in Fig. 3.1.

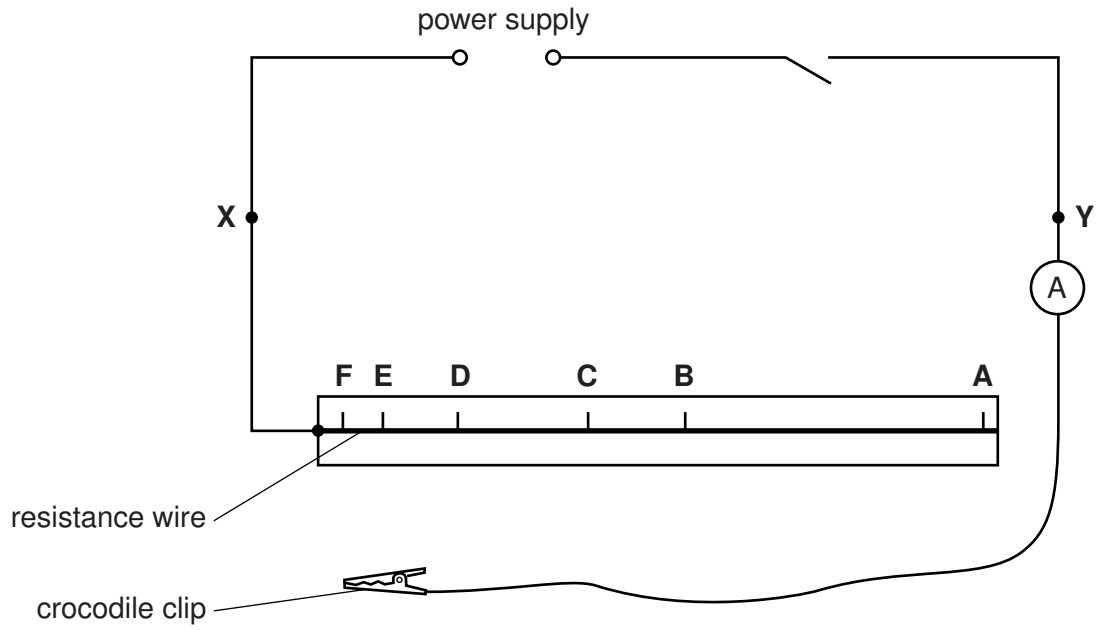


Fig. 3.1

(a) The potential difference across part of the resistance wire, and the current in the circuit are to be measured.

On Fig. 3.1, use an appropriate circuit symbol to draw a voltmeter connected to measure the potential difference between **X** and **Y**.

[1]

(b) The crocodile clip is connected in turn to the resistance wire at points **A**, **B**, **C**, **D**, **E** and **F**.

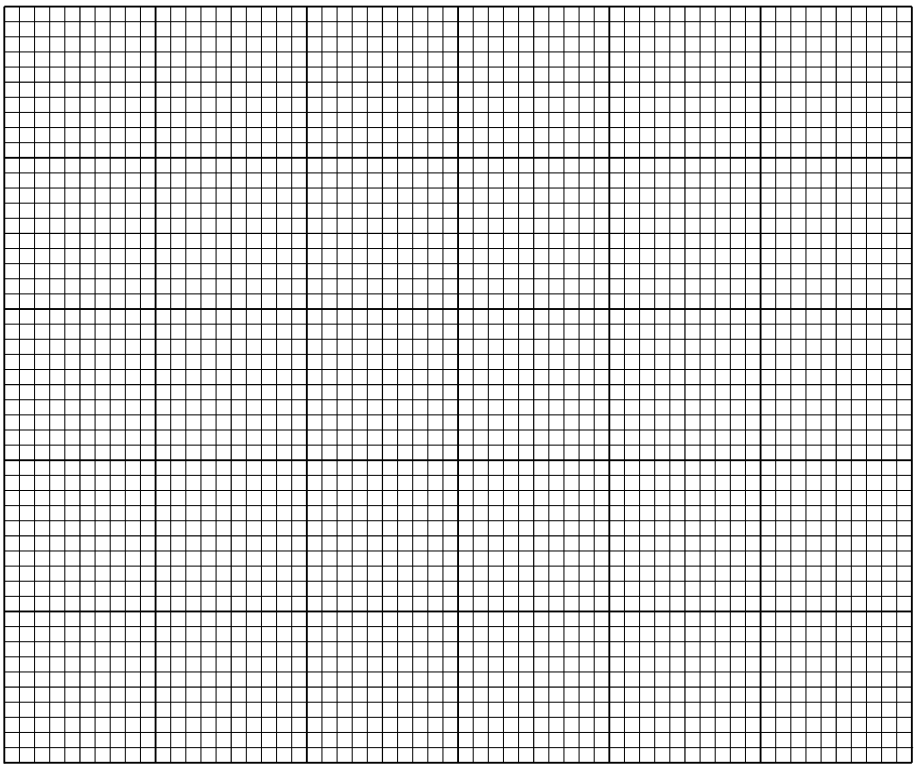
The potential difference *V* and current *I* are measured for each position and recorded in Table 3.1.

Table 3.1

position	*V* / V	*I* / A
A	1.3	0.20
B	1.2	0.35
C	1.1	0.46
D	0.9	0.74
E	0.8	0.87
F	0.6	1.13

(i) Plot a graph of V/V (y-axis) against I/A (x-axis).

For Examiner's Use



[4]

(ii) Determine the gradient M of the graph. Show clearly on the graph how you obtained the necessary information.

M = ... [2]

(iii) The gradient M is numerically equal to the resistance R of the power supply.

Write down the resistance R to a number of significant figures suitable for this experiment.

R = ... [2]

[Total: 9]

[Turn over

4 An IGCSE class is investigating the reflection of light by a plane mirror.

One student's ray-trace sheet is shown in Fig. 4.1.

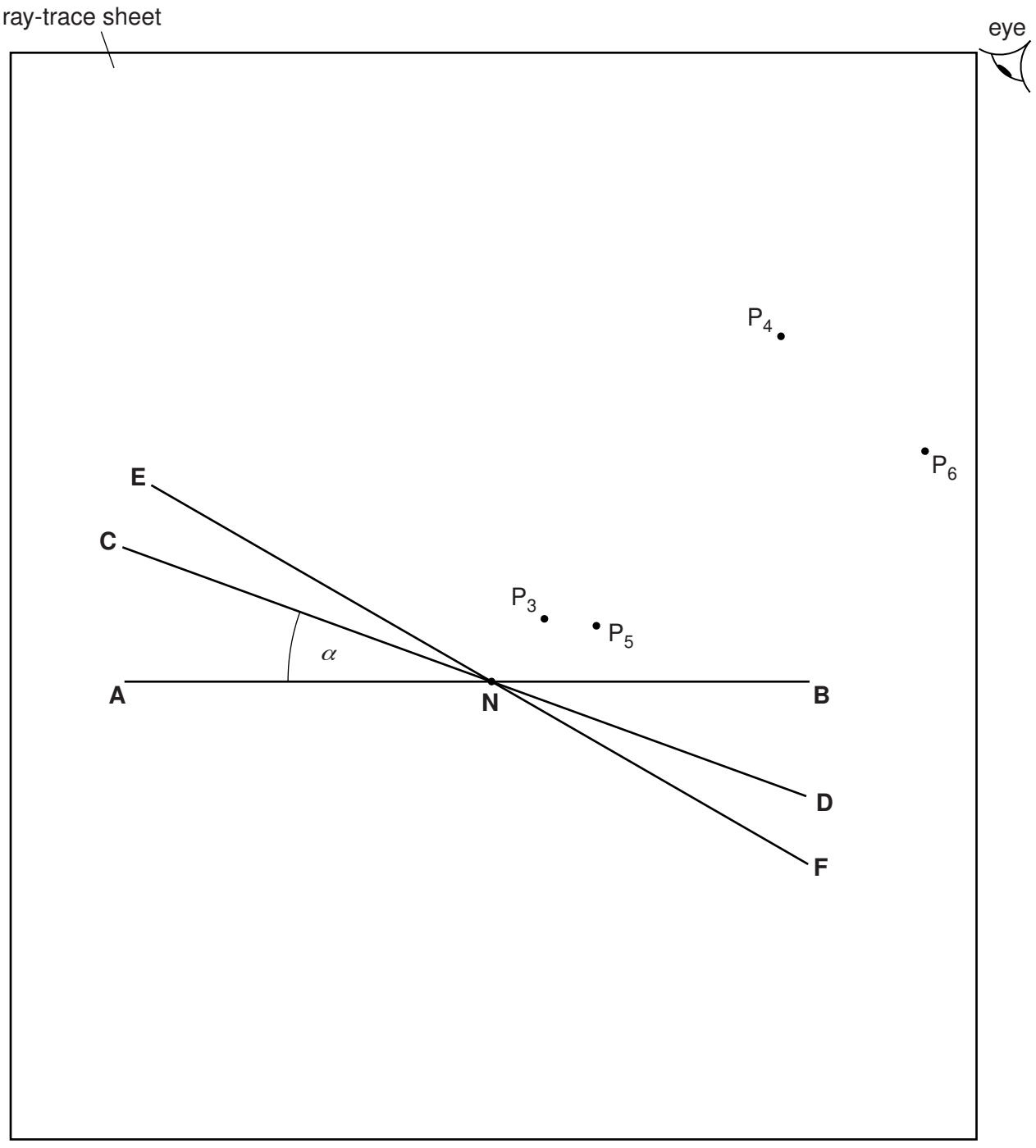


Fig. 4.1

(a) In the first part of the experiment, a plane mirror is to be placed on line **CD**.

(i) Draw a normal to **AB** at point **N**, towards the top of the page. Label the other end of this normal **L**.

(ii) Two pins P_1 and P_2 are placed on line **LN**. Label suitable positions for P_1 and P_2.

[1]

(b) The mirror is placed on line **CD** and the images of P_1 and P_2 are viewed from the direction indicated by the eye in Fig. 4.1.

Two pins P_3 and P_4 are placed so that the images of P_1 and P_2, and the pin P_3 all appear exactly in line with P_4.

(i) Draw a line passing through P_3 and P_4 and reaching **AB**.

(ii) Measure the angle θ between this line and the normal **NL**. Record this value in Table 4.1. [1]

(c) The mirror is then moved to line **EF** and pins P_5 and P_6 are placed in line with the new images.

Repeat steps **(b)(i)** and **(b)(ii)** using the new mirror line and pin positions. [1]

Table 4.1

	α/°	θ/°
mirror on **CD**	20	
mirror on **EF**	30	

[1]

(d) A student suggests that θ should always be equal to 2α.

State whether the experimental results support this idea. Justify your answer with reference to the results.

statement .....

.....

justification .....

.....

.....

[2]

(e) Suggest two precautions that could be taken to ensure accurate results from this experiment.

1. .....

.....

2. .....

.....

[2]

[Total: 8]

5 Two IGCSE students are investigating the melting of ice cubes in water.

For Examiner's Use

They are dropping ice cubes into hot water at different temperatures and measuring the time taken for the cubes to melt.

This is a page from one student's notebook.

temperature 20°C – time 216 seconds

temperature 40 – time 95 sec

temperature 60°C – time 72 seconds

temperature 30 – time 180

temperature 50 – time 108 seconds

(a) In the space below, draw a suitable table. Enter the readings in such a way that it is easier to see a pattern from them.

[2]

(b) It appears that one of the readings does not fit the general pattern.

For Examiner's Use

(i) At which temperature does this occur?

temperature ..... [1]

(ii) Suggest what the student might do next with the data to show more clearly that this reading does not fit the general pattern.

Explain how this would help to make it more clear.

suggestion .....

.....

explanation .....

.....

[2]

[Total: 5]

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