UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

PHYSICS **0625/06**

Paper 6 Alternative to Practical

October/November 2005

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 work you hand in.
Write in dark blue or black pen in the spaces provided on the Question Paper.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.
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.

For Examiner's Use	
1	
2	
3	
4	
5	
Total	

This document consists of **10** printed pages and **2** blank pages.

UNIVERSITY *of* CAMBRIDGE
International Examinations

[Turn over

1 The IGCSE class is investigating the effect of a load on a rule attached to a spring.
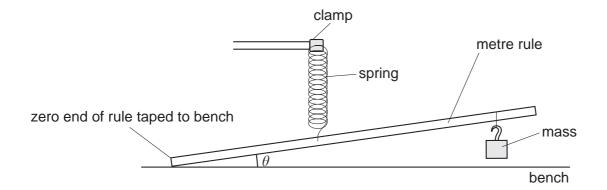
The apparatus used is shown in Fig. 1.1.

Fig. 1.1

The rule has the zero end taped to the bench so that it does not slip. The rule is attached to a spring at the 40.0 cm mark. The students hang masses, starting with a 10 g mass, on the rule at the 90.0 cm mark. For each mass, they measure the angle θ between the rule and the bench.

One student's readings are shown in the table.

$m/$	$\theta/$
0	29
10	28
20	26
30	25
40	22
50	19

(a) Complete the column headings in the table. [1]

(b) A student suggests that θ should be directly proportional to *m*. State, with a reason, whether the readings in the table support this suggestion.

statement ....

reason ....

.... [2]

(c) A student carries out this experiment using the 360 ° protractor shown in Fig. 1.2.
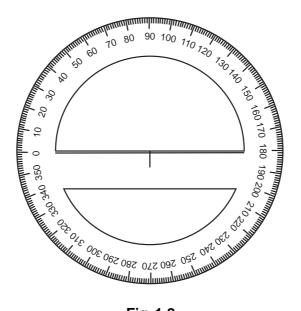

Fig. 1.2

Explain how the student could use this protractor to measure the angle θ between the metre rule and the bench. You may draw a diagram if you wish.

....

.... [2]

(d) The range of angles measured in this experiment may be quite small. Using the same apparatus and with the masses and spring in the same positions, suggest another method of investigating as reliably as possible the extent by which the rule is pulled down by the masses. This method must not use a protractor but an additional rule may be used. You may draw a diagram if you wish.

....

.... [2]

2 An IGCSE student investigates the resistance of resistance wire **ABCD** in three different circuit arrangements.
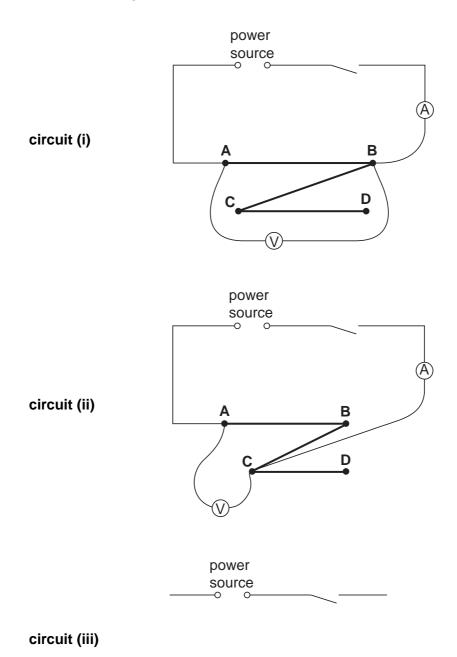
The circuits are shown in Fig. 2.1.

circuit (i)

circuit (ii)

circuit (iii)

Fig. 2.1

(a) Circuit **(iii)** is the same as circuit **(ii)** but with an additional connecting lead between **A** and **D**.

On Fig. 2.1, complete the circuit diagram for circuit **(iii)** using the standard symbol for a resistor to represent each section **AB**, **BC** and **CD** of the resistance wire.   [3]

(b) The student measures and records the current I and the p.d. V in each circuit. The student's readings are shown in the table.

circuit	I /	V /	R /
(i)	0.91	1.80	
(ii)	0.45	1.80	
(iii)	1.37	1.85	

   (i) Complete the column headings for each of the I, V and R columns of the table. [1]

   (ii) Calculate the resistance R for each circuit using the equation

$$R = \frac{V}{I} \ .$$

Record in the table the values of R to an appropriate number of significant figures.
[2]

(c) Look at the resistance values for circuits **(i)** and **(ii)**. The sections of resistance wire **AB**, **BC** and **CD** are all of the same length. Suggest a value for the resistance of the whole wire **ABCD**. Explain briefly how you obtained your value.

value ....

explanation ....

.... [2]

3 The IGCSE class carries out an experiment to investigate the effect of insulation on the rate of cooling of hot water.
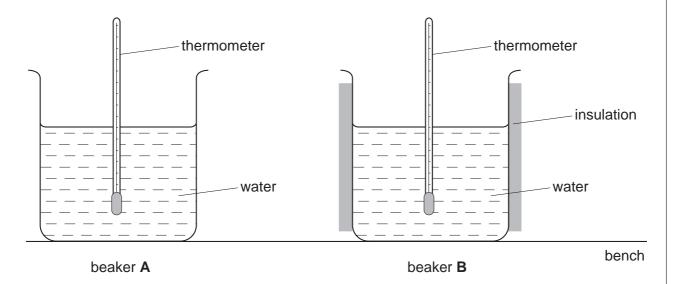
The apparatus is shown in Fig. 3.1.

beaker **A**   beaker **B**

bench

Fig. 3.1

The students each have two glass beakers **A** and **B**. Beaker **B** is insulated. They also have a supply of hot water.

A student pours hot water into beaker **A** until it is approximately two thirds full and then measures the temperature θ of the hot water. He records this temperature in the table at time $t = 0\,\text{s}$. He then starts a stopwatch and records the temperature of the water at $30\,\text{s}$ intervals for a total of four minutes.

He repeats the experiment using beaker **B**. All the readings are shown in the tables below.

beaker **A**

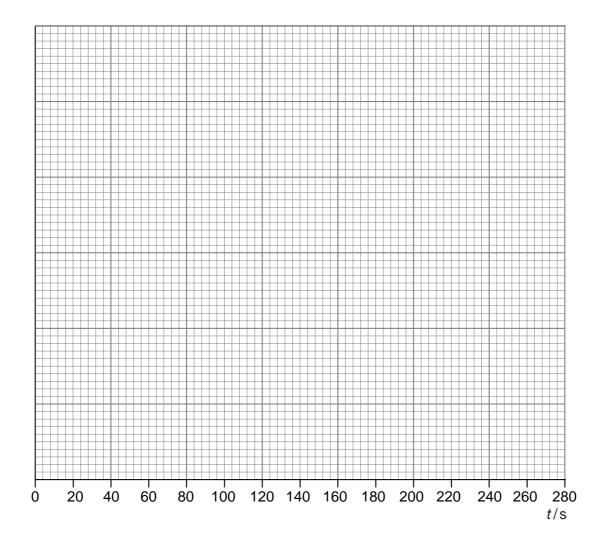| $t/$	$\theta/$
0	80
30	67
60	59
90	54
120	51
150	48
180	47
210	46
240	45

beaker **B**

$t/$	$\theta/$
0	80
30	69
60	62
90	57
120	53
150	50
180	48
210	47
240	46

(a) Complete the column headings in the tables. [1]

(b) Use the readings for beaker **A** to plot a graph of temperature θ (*y*-axis) against time *t* (*x*-axis). Start the temperature scale at 40 °C. Draw the best-fit curve. [4]

0   20   40   60   80   100   120   140   160   180   200   220   240   260   280

t/s

(c) Use the readings for beaker **B** to plot another curve on the same graph axes that you used in part **(b)**. [2]

(d) The experiment you have just done was designed to investigate the effect of insulation on the rate of cooling. Suggest two improvements that could be made to the design of the experiment.

1. ....

....

2. ....

.... [2]

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

M // **M'**

———————————————
A   **B**

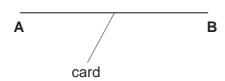   /
      /
   card

Fig. 4.1

On Fig. 4.1, the line **MM'** shows the position of the mirror that is standing on a sheet of paper. The reflecting surface of the mirror is vertical. **AB** is a card that is standing vertically and is parallel to the reflecting surface of the mirror.

(a) Draw a normal to the mirror such that the edge **B** of the card lies on the normal. [1]

(b) Measure the distance x along the normal between the line **MM'** and the edge **B** of the card.

$x =$ .... [1]

(c) Draw a line from the edge **A** of the card to the point where the normal meets the line **MM'**. This represents an incident ray from the edge of the card. [1]

(d) Measure the angle i between the incident ray and the normal.

$i =$ .... [1]

(e) Calculate the ratio $\dfrac{x}{y}$ where $y = 5.0$ cm, the length of the card.

$\dfrac{x}{y}$ = ... [2]

(f) The angle of reflection is to be determined as accurately as possible. On Fig. 4.1, mark with the letters **X**, **Y** and **Z** the points where the student would place three pins in order to plot the reflected ray. [4]

5 **(a)** The IGCSE class carries out an experiment to investigate the rate of cooling from 100 °C of a range of hot liquids. Underline any of the following variables that are likely to have a significant effect on the temperature readings. (You may underline one, two or all three of the suggested variables.)

type and size of container

volume of liquid

temperature of the surroundings [2]

(b) In an experiment to find the resistance of a wire, the students record the current in the wire and the potential difference across it. They then calculate the resistance. Underline any of the following variables that are likely to have a significant effect on the current and/or potential difference readings. (You may underline one, two or all three of the suggested variables.)

atmospheric pressure

temperature of the wire

length of wire [2]

(c) In an experiment, a short pendulum oscillates rapidly. A student is asked to find the period of oscillation T of the pendulum using a stopwatch. The student sets the pendulum swinging and records the time for one oscillation. A technique for improving the accuracy of the value obtained for the period T should be used in this experiment. State, briefly, what this technique is and any calculation involved to obtain the value of T.

....

....

.... [2]

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