Centre Number		Candidate Number	Name	

CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

PHYSICS **0625/06**

Paper 6 Alternative to Practical

October/November 2003

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 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.

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

For Examiner's Use	
1	
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Total	

UNIVERSITY *of* CAMBRIDGE
Local Examinations Syndicate

[Turn over

1 (a) A student was asked to make some measurements of the test-tube shown in Fig. 1.1. He was given a 1 m length of thin string and a metre rule and instructed to determine **as accurately as possible** the circumference of the tube. The student used the rule to measure the diameter d of the tube and then calculated the circumference c using the equation

$$c = \pi d.$$

Describe how the student could have obtained a more accurate result with the apparatus given. You may draw on Fig. 1.1.

Fig. 1.1

....

....

.... [2]

(b) (i) On Fig. 1.2, show where you would place two small rectangular blocks of wood to help you make an accurate measurement of the overall length of the test-tube.

Fig. 1.2

(ii) The test-tube is shown actual size in Fig. 1.2. Use your rule to measure the length l of the test-tube.

$l =$ ....

[2]

2   Fig. 2.1 shows a ray tracing sheet obtained by a student carrying out a reflection of light experiment using pins and a plane mirror.

mirror

M // M'

B•   •C   •E

D•

A•   F•
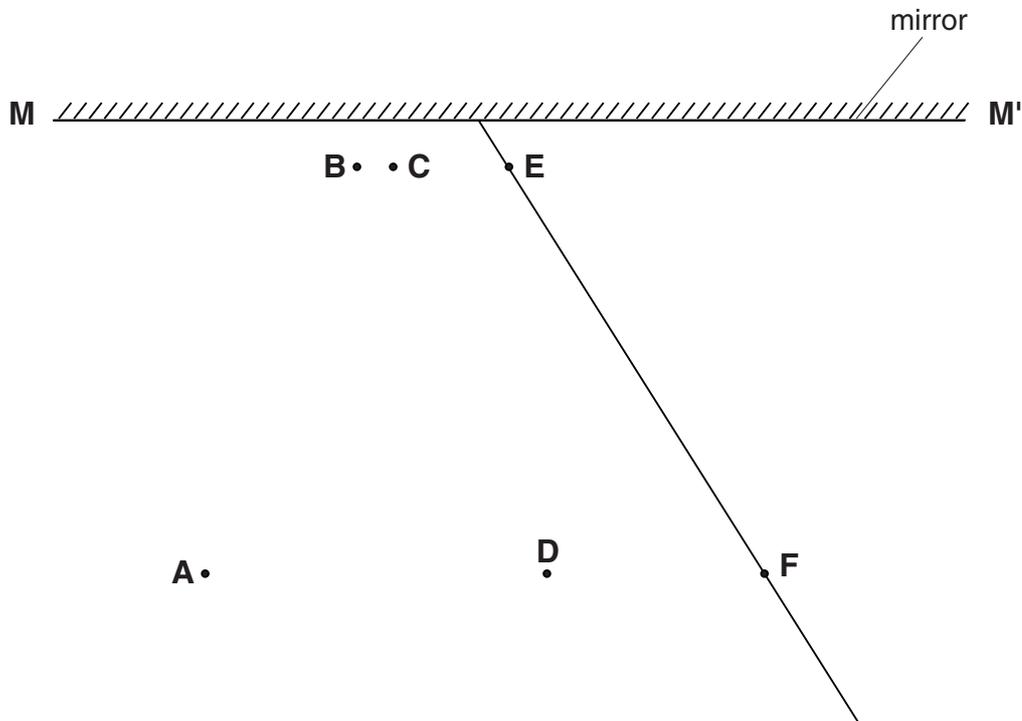
Fig. 2.1

The student looks into the mirror **MM'** and views the images of pins **A** and **B**. He then places pins **C** and **D** so that pins **C** and **D** and the images of pins **A** and **B** appear to be in line.

(a) On Fig. 2.1,

   (i) draw the incident ray in this experiment,

  (ii) draw the reflected ray,

 (iii) draw a normal at the point where the incident ray meets the mirror,

  (iv) measure the angle of incidence i.

       i = ...

[3]

(b) The student moves pin **B** and then repeats the experiment, obtaining the reflected ray **EF**.

    (i) On Fig. 2.1, continue the lines **CD** and **EF** behind the mirror to find the point where they meet. Label this point **X**.

    (ii) Draw the line **AX**. Label with the letter **Y** the point where line **AX** crosses the mirror **MM'**.

    (iii) Use your rule to measure the distances **AY** and **YX**.

        AY = ...

        YX = ...

        [2]

(c) According to theory, **AY** = **YX**. Suggest why, in spite of very careful work, the student's values may have been slightly different.

....

.... [1]

[Turn over

3 **(a)** Fig. 3.1 shows the scale of an ammeter. Draw the position of the pointer when the ammeter reading is 0.35 A. [1]
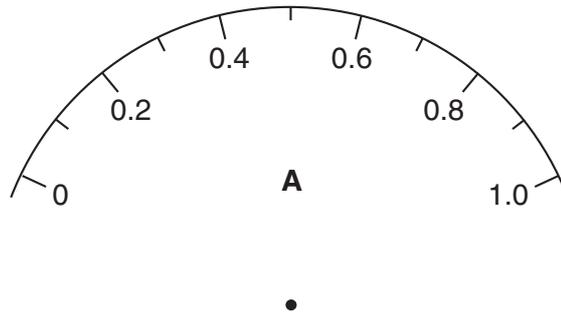

Fig. 3.1

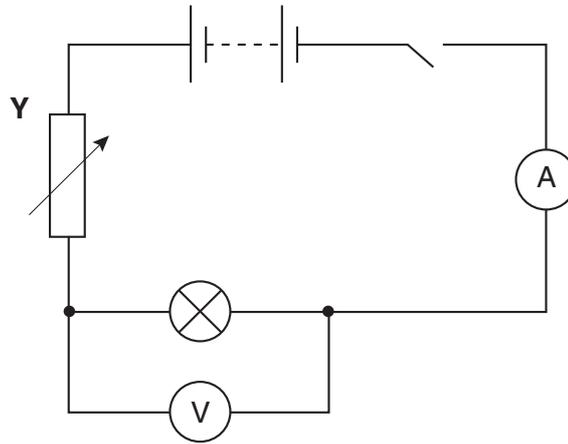**(b)** The ammeter was used in the circuit shown in Fig. 3.2 to investigate the current in a lamp.

Fig. 3.2

    (i) Name the component labelled **Y**.

       ....

(ii) The table shows the current *I* in the lamp for different values of the p.d. *V* across the lamp.

V/	*I/*	*R/*
1.9	0.31	
1.5	0.26	
0.8	0.20	

1. Calculate the values for the resistance *R* of the lamp, using the equation

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

Write your answers in the table.

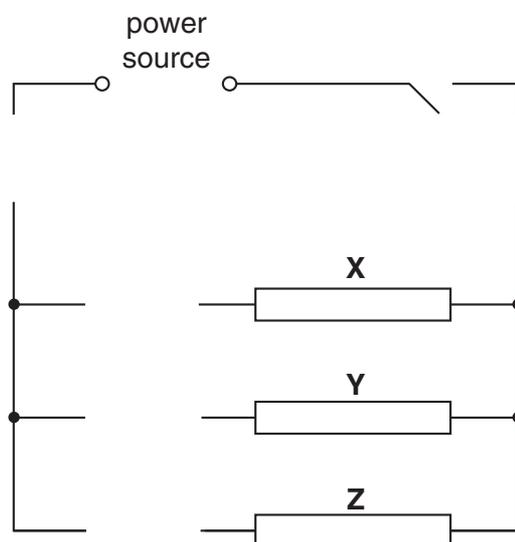2. Complete the column headings in the table.

(iii) Suggest how the value of *V* could be varied.

....

....
[8]

(c) Fig. 3.3 shows a power source connected to three resistors labelled **X**, **Y** and **Z**.

power
source

X

Y

Z

Fig. 3.3

Complete the diagram to show

(i) a voltmeter connected to measure the voltage across the resistors,

(ii) an ammeter connected to measure the current in resistor **X** only,

(iii) connecting wires to complete the circuit.
[3]

[Turn over

4 The IGCSE class was studying the acceleration *a* of a toy truck that was pulled along a track by a force *F*. The arrangement is shown in Fig. 4.1.
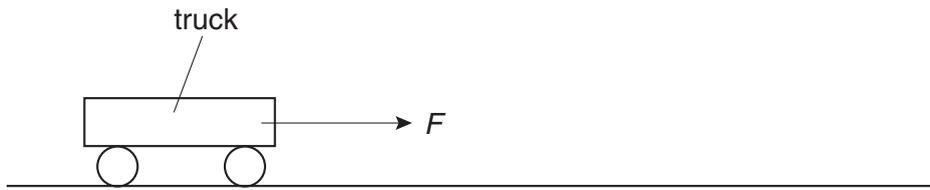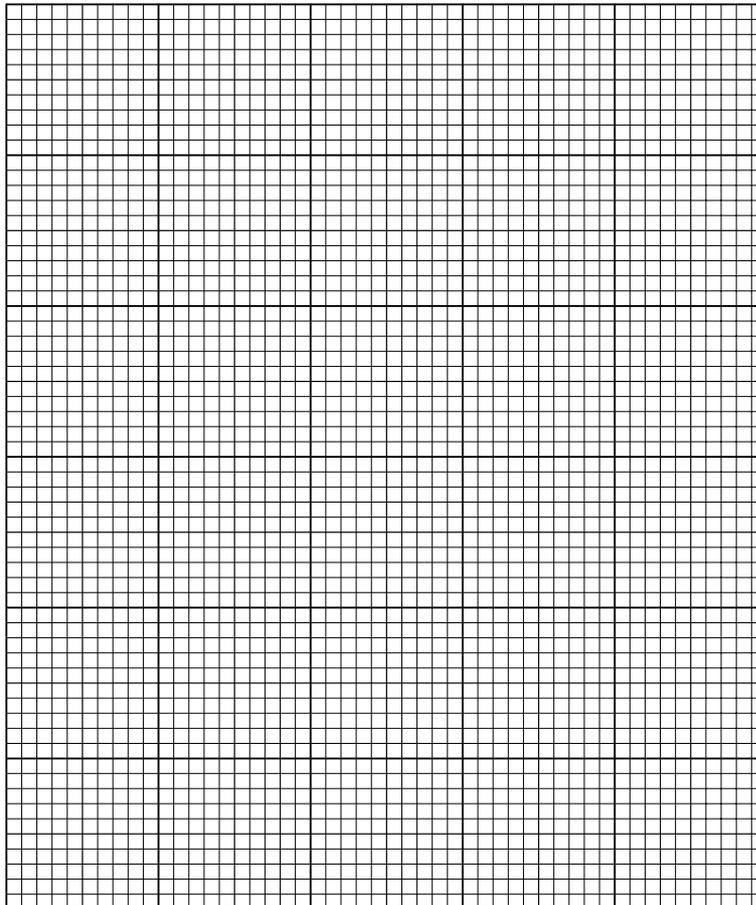
truck

Fig. 4.1

The results obtained are shown in the table.

F/N	*a*/(m/s^2)
0.5	0.35
1.0	0.72
1.5	1.02
2.0	1.44
2.5	1.74

(a) Plot a graph of *F*/N (*y*-axis) against *a*/(m/s^2) (*x*-axis). Draw the line of best fit through your points. [6]

(b) Theory suggests that the relationship between force and acceleration is given by the equation

$$F = ma,$$

where m is the mass of the truck.

The gradient of the graph is equal to the mass of the truck.

From the graph, determine the mass m of the truck. Show clearly how you obtained the necessary information.

$m =$ .... [4]

[Turn over

5 A student wants to find out which of the three materials is the best thermal insulator.

The student's apparatus at the beginning of each test is as shown in Fig. 5.1.
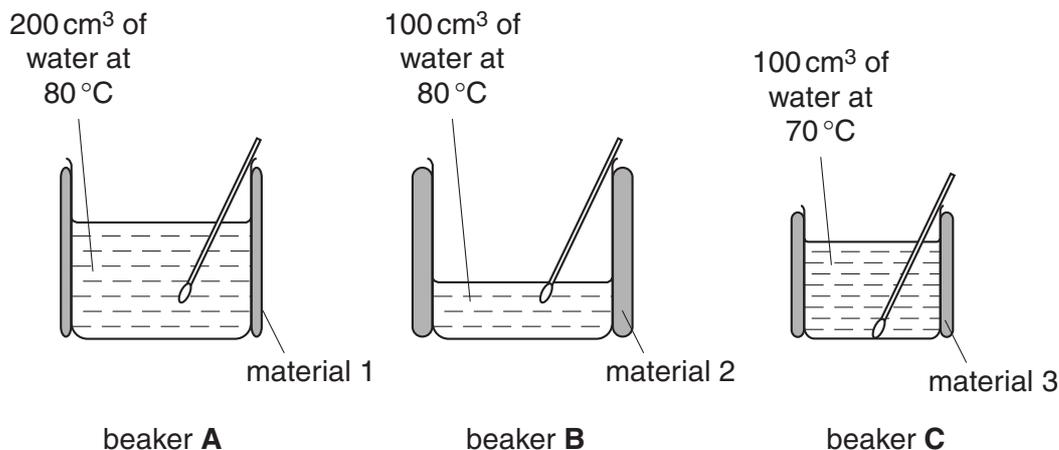
200 cm³ of water at 80 °C   100 cm³ of water at 80 °C   100 cm³ of water at 70 °C

material 1   material 2   material 3

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

Fig. 5.1

Each beaker is surrounded by a different insulating material. The water is allowed to cool and the temperatures are recorded at different times. The student is unable to write a correct conclusion because the variables have not been controlled.

(a) Study Fig. 5.1 and then state **two** ways in which you would improve the control of variables.

1. ....

....

2. ....

.... [2]

(b) State the reading shown on the thermometer shown in Fig. 5.2.

°C   110   100   90   80   70   60   50   40   30   20   10   0

Fig. 5.2

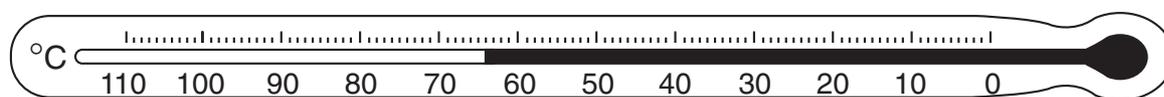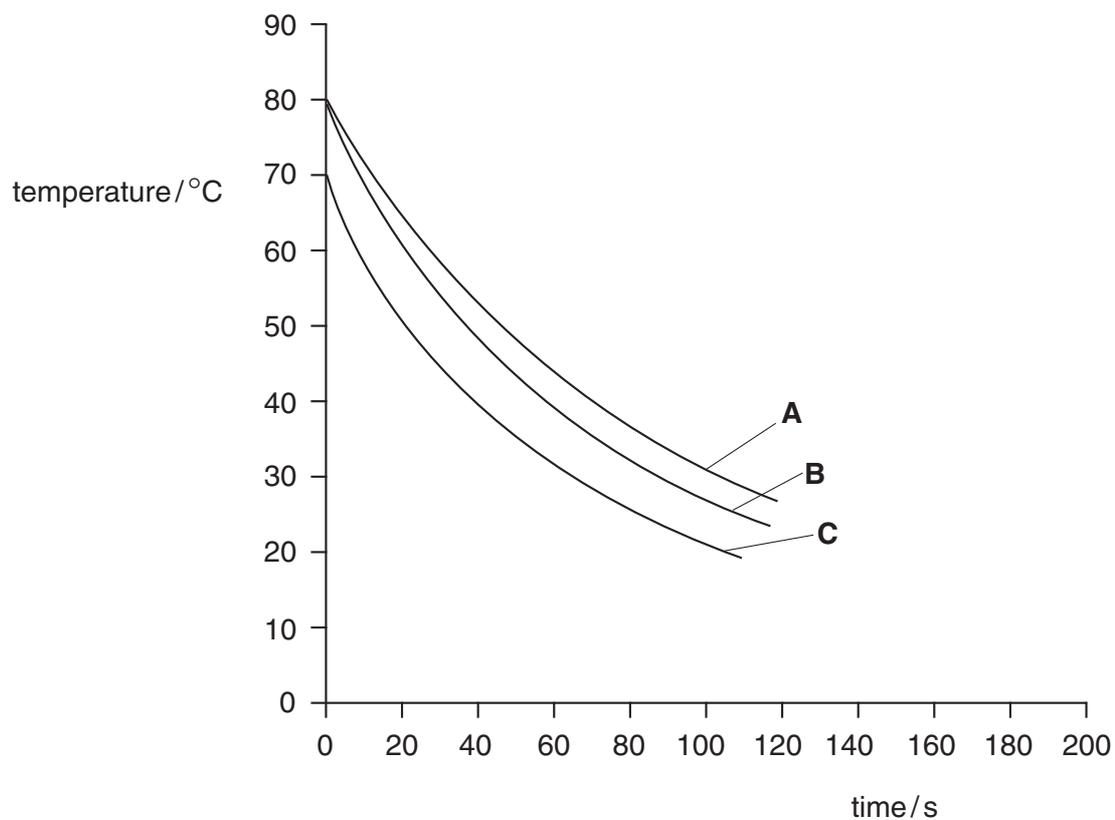temperature reading .... [1]

(c) The graph of Fig. 5.3 shows the results obtained by the student.

The graph lines **A**, **B** and **C** correspond to the beakers **A**, **B** and **C**.

Fig. 5.3

Which beaker cools the most quickly in the first 60 s?

.... [1]

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