UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

PHYSICS **0625/05**

Paper 5 Practical Test **October/November 2007**

1 hour 15 minutes

Additional Materials: As listed in the Confidential Instructions

READ THESE INSTRUCTIONS FIRST

If you have been given an Answer Booklet, follow the instructions on the front cover of the Booklet.
Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.
You are expected to record all your observations as soon as these observations are made.
An account of the method of carrying out the experiments is **not** required.

At the end of the examination, hand in only the Answer Booklet.

This document consists of **9** printed pages, **3** blank pages and **1** Answer Booklet.

UNIVERSITY *of* CAMBRIDGE
International Examinations

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1   *In this experiment you are to investigate the rate of cooling of hot water.*

Record all of your observations on pages 2 and 3 of your Answer Booklet. Carry out the instructions referring to Fig. 1.1.
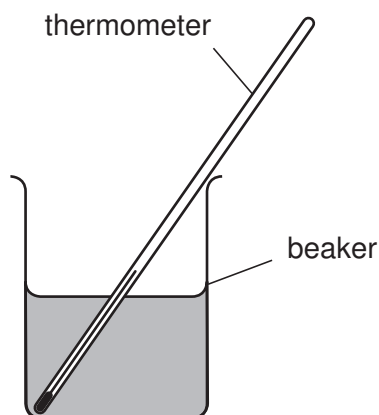
Fig. 1.1

You are provided with a supply of hot water.

(a) Measure and record room temperature θ_0.

(b) Pour hot water into the beaker until it is about one-third full.

(c) Measure and record the temperature θ of the hot water and at the same time start the stopwatch. Record the temperature at time $t = 0\,s$ in the table.

(d) Measure and record the temperature of the water in the beaker every 30 s for a total of five minutes.

(e) Complete the column headings in the table.

(f)   **(i)**   Calculate the temperature fall T_1 in the first minute of your experiment.

        (ii) Calculate the temperature fall T_2 in the final minute of your experiment.

(g) Theory suggests that the rate of cooling of the hot water at any time depends on the difference between the temperature of the water at that time and room temperature.

 (i) State and explain whether your results support this theory.

 (ii) Suggest three variables that you would attempt to keep constant if you were to investigate this theory further.

(h) Suggest one addition you could make to the apparatus provided in order to reduce the rate of evaporation of the water from the beaker.

2 *In this experiment you are to investigate a simple balance.*

Record all of your observations on page 4 of your Answer Booklet.

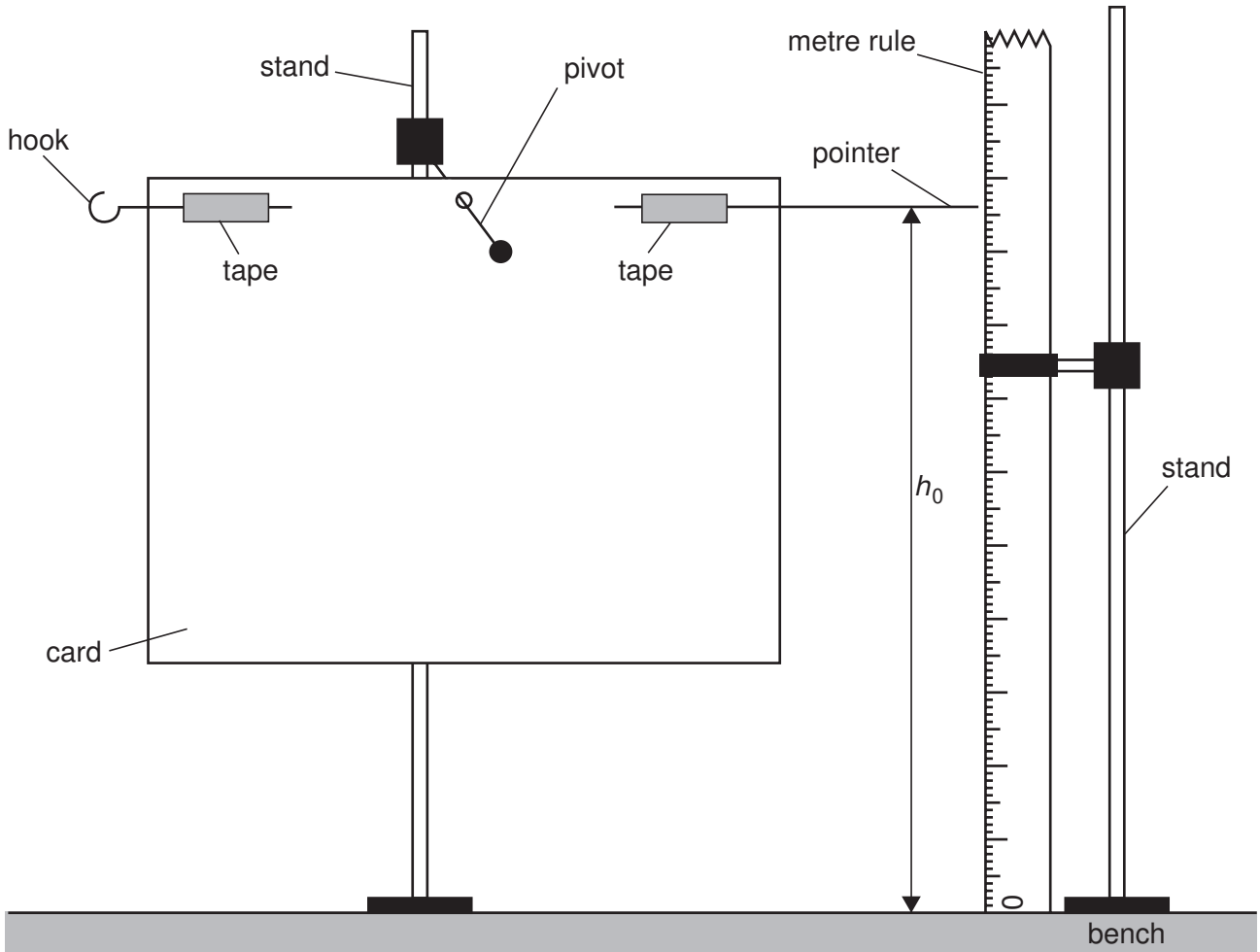Carry out the following instructions referring to Fig. 2.1.

Fig. 2.1

(a) Place the metre rule close to the end of the pointer as shown in Fig. 2.1 and record the height h_0 of the pointer above the bench.

(b) Hang one of the paper clips provided on the hook. Record the new height h of the pointer above the bench.

**(c)** Calculate and record the height difference d using the equation

$$d = (h - h_0).$$

(d) Repeat steps **(b)** and **(c)** using different numbers of paper clips, from $N = 2$ to $N = 6$.

(e) Plot the graph of d/mm (y-axis) against N (x-axis).

(f) Remove the paper clips from the hook. Hang the nail on the hook. Record the height h_n of the pointer above the bench.

(g) Use the graph to determine the number of paper clips that have the same mass as the nail. Show your working and give your answer to 1 decimal place.

3 *In this experiment you will investigate the potential difference across lamps and the currents in the lamps.*

Record all of your observations and answers on page 5 of your Answer Booklet.

Carry out the following instructions referring to Fig 3.1, which shows the circuit that has been set up for you.
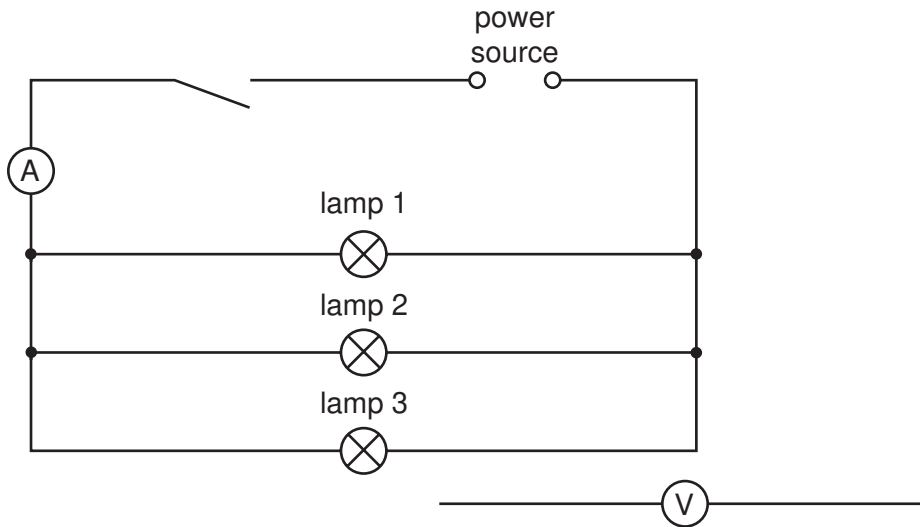
Fig. 3.1

(a) Close the switch. Record the current I, shown by the ammeter.

Switch off.

(b) Remove the ammeter from the circuit. Reconnect the ammeter to measure the current I_1 in lamp 1.

Close the switch. Record the current I_1. Open the switch.

(c) Repeat step **(b)** to measure and record the current I_2 in lamp 2 and the current I_3 in lamp 3.

(d) Theory suggests that $I = I_1 + I_2 + I_3$. State whether or not your readings support this theory. Give a reason for your answer.

(e) To test the theory further you would need to vary the current I. State how you would vary the current I.

(f) Connect the voltmeter across lamp 3. Close the switch. Measure and record the potential difference V across the lamps. Open the switch.

(g) Calculate the resistance R of the lamps arranged in parallel using the equation

$$R = V/I.$$

(h) Connect the voltmeter across the switch.

    (i) Close the switch. Measure and record the potential difference V_a across the switch.

    (ii) Open the switch. Measure and record the potential difference V_b across the switch.

4 *In this experiment you will investigate the refraction of light through a transparent block.*

Record all of your observations and answers on page 6 of your Answer Booklet.

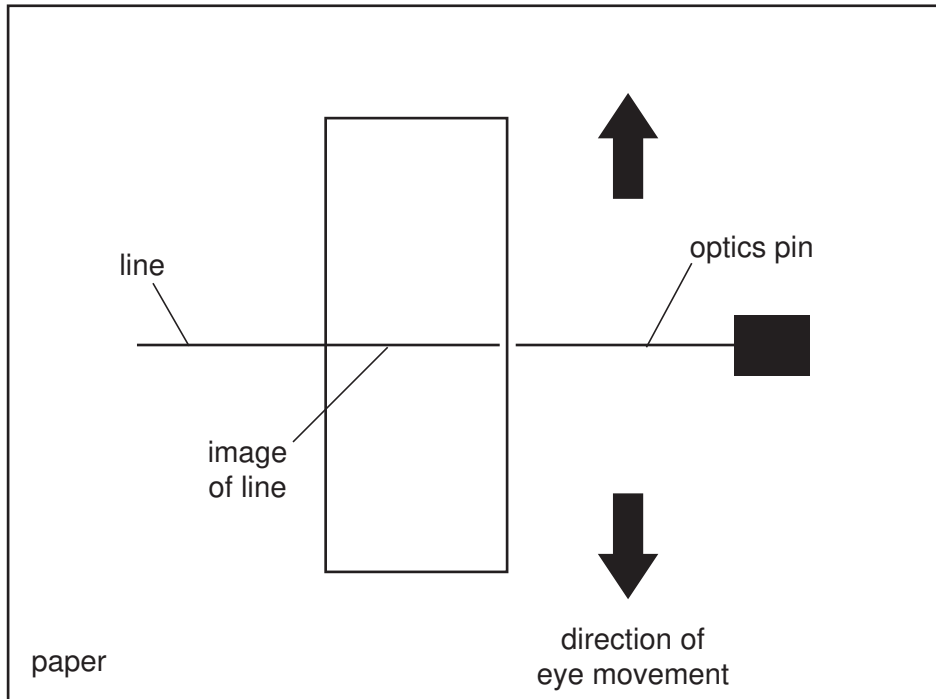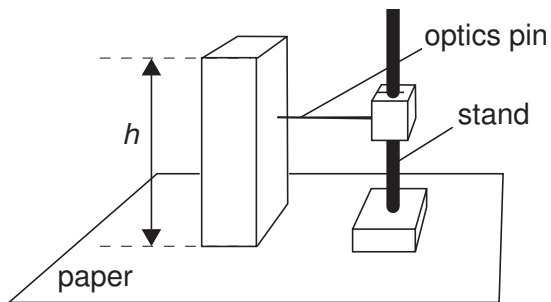Carry out the following instructions referring to Fig. 4.1, Fig. 4.2 and Fig. 4.3.

Fig. 4.1

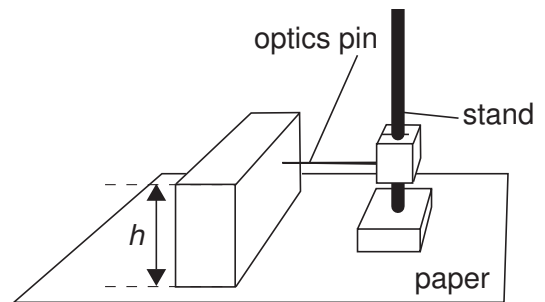

Fig. 4.2

Fig. 4.3

(a) Draw a straight line approximately in the centre of the sheet of plain paper.

(b) Stand the transparent block on the paper with one of its shortest sides over the line as shown in Figs 4.1 and 4.2.

(c) Look, with one eye closed, vertically down through the block. You will see the image within the block of the pencil line you have drawn on the paper.

(d) Place the optics pin horizontally with its point touching the transparent block approximately in the centre so that the pencil line and the pin appear to form one straight line. Move your eye slightly in a horizontal plane, as shown in Fig. 4.1. You will see that the image of the pencil line and the pin appear to separate.

(e) Continue to look vertically down through the block and slowly move the pin downwards until you find a position where the pin and the image of the pencil line do not separate when you move your eye.

(f) Without changing the position of the point of the pin that is touching the block, measure and record the vertical distance x between the paper and the pin.

(g) Measure and record the height h of the transparent block.

(h) Calculate the refractive index n of the material of the block using the equation

$$n = \frac{h}{h-x}.$$

(i) Stand the transparent block on the paper with one of its longest sides over the line as shown in Fig. 4.3.

(j) Repeat steps **(c)** to **(h)**.

(k) Calculate the average value of the refractive index n.

(l) To obtain a reliable value for the vertical distance x between the paper and the pin it is important that the pin is horizontal. Explain briefly with the aid of a diagram how you checked that the pin was horizontal.

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