



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

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**PHYSICS**

**0625/61**

Paper 6 Alternative to Practical

**May/June 2010**

**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, graphs or rough working.

Do not use staples, paper clips, highlighters, glue or correction fluid.

**DO NOT WRITE IN ANY BARCODES.**

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.

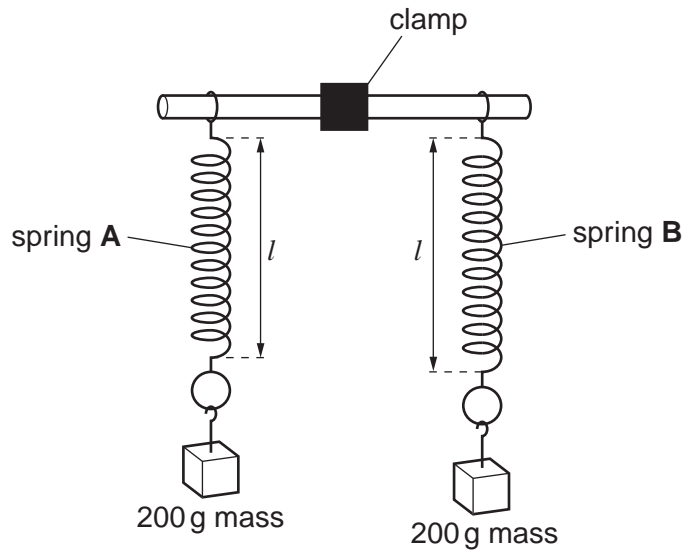
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1	
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<b>Total</b>	

This document consists of **11** printed pages and **1** blank page.



- 1 An IGCSE student is investigating the stretching of springs.

Fig. 1.1 shows the apparatus used for the first part of the experiment.



**Fig. 1.1**

The unstretched length  $l_A$  of spring **A** is 15 mm.

The unstretched length  $l_B$  of spring **B** is 16 mm.

- (a) The student hangs a 200 g mass on each spring, as shown in Fig. 1.1.

- (i) On Fig. 1.1 measure the new length  $l$  of spring **A**.

$$l = \dots\dots\dots \text{ mm}$$

- (ii) Calculate the extension  $e_A$  of the spring using the equation  $e_A = (l - l_A)$ .

$$e_A = \dots\dots\dots \text{ mm}$$

- (iii) On Fig. 1.1 measure the new length  $l$  of spring **B**.

$$l = \dots\dots\dots \text{ mm}$$

- (iv) Calculate the extension  $e_B$  of the spring using the equation  $e_B = (l - l_B)$ .

$$e_B = \dots\dots\dots \text{ mm}$$

[2]

(b) The student then sets up the apparatus as shown in Fig. 1.2.

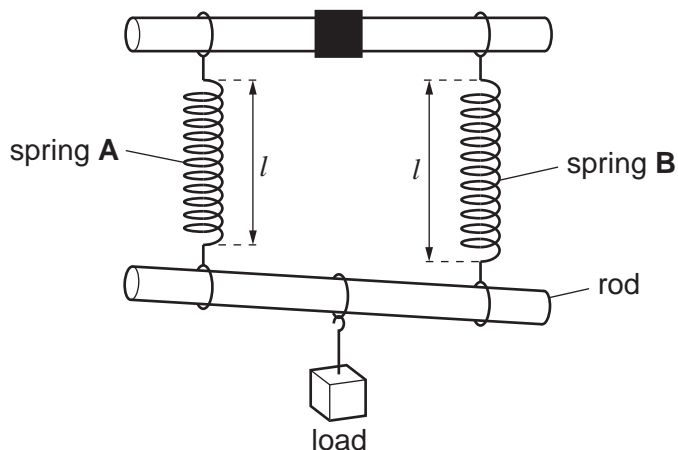


Fig. 1.2

(i) On Fig. 1.2 measure the new length of each of the springs.

spring A:  $l =$  ..... mm

spring B:  $l =$  ..... mm

(ii) Calculate the extension of each spring using the appropriate equation from part (a).

spring A:  $e =$  ..... mm

spring B:  $e =$  ..... mm

(iii) Calculate the average of these two extensions  $e_{av}$ . Show your working.

$e_{av} =$  .....mm  
[3]

(c) It is suggested that  $(e_A + e_B)/4 = e_{av}$ .

State whether your results support this theory and justify your answer with reference to the results.

Statement .....

Justification .....

..... [2]

(d) Describe briefly one precaution that you would take to obtain accurate length measurements.

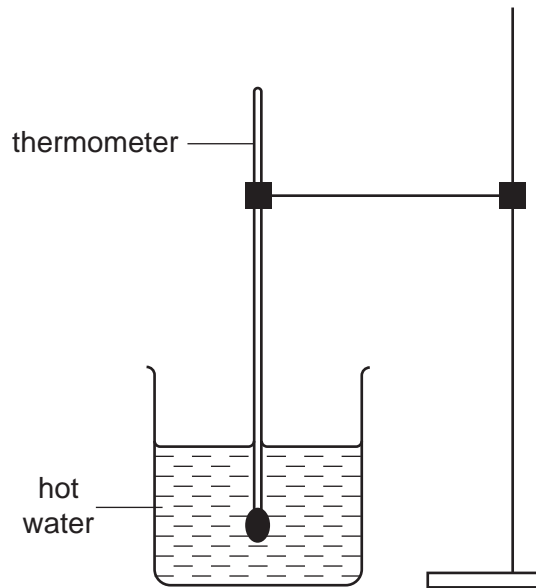
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..... [1]

2 The IGCSE class is investigating the cooling of water.

Fig. 2.1. shows the apparatus used.



**Fig. 2.1**

Hot water is poured into the beaker and temperature readings are taken as the water cools.

Table 2.1 shows the readings taken by one student.

**Table 2.1**

$t/s$	$\theta / ^\circ\text{C}$
0	85
30	78
60	74
90	71
120	69
150	67
300	63

(a) (i) Using the information in the table, calculate the temperature change  $T_1$  of the water in the first 150s.

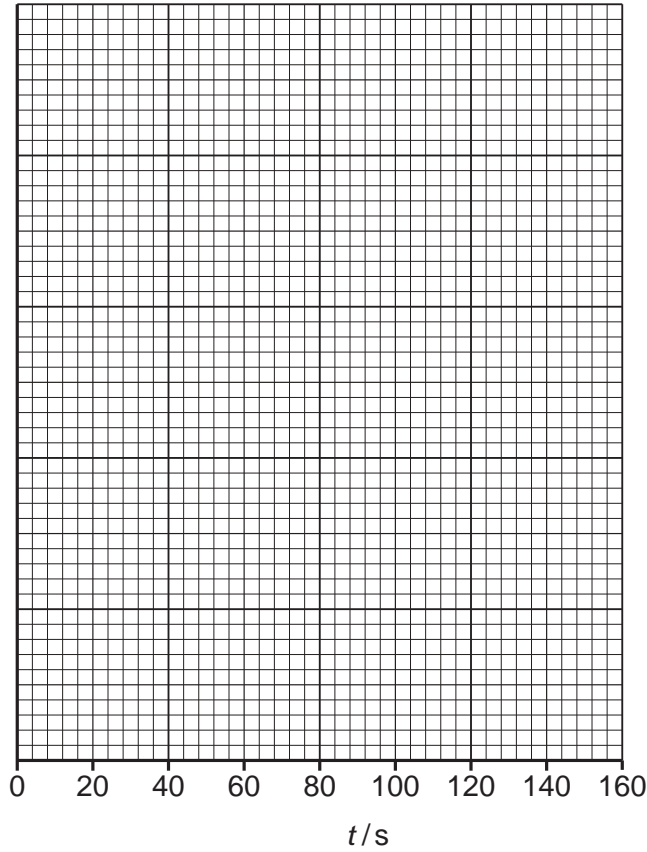
$$T_1 = \dots\dots\dots$$

- (ii) Using the information in the table, calculate the temperature change  $T_2$  of the water in the final 150s.

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$T_2 = \dots\dots\dots$  [3]

- (b) Plot a graph of  $\theta / ^\circ\text{C}$  (y-axis) against  $t/\text{s}$  (x-axis) for the first 150s. [5]



- (c) During the experiment the rate of temperature change decreases.
- (i) Describe briefly how the results that you have calculated in part (a) show this trend.

.....  
 .....

- (ii) Describe briefly how the graph line shows this trend.
- .....  
 .....

[2]

- 3 The IGCSE class is investigating the effect of the length of resistance wire in a circuit on the potential difference across a lamp.

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- (a) Fig. 3.1 shows the circuit without the voltmeter. Complete the circuit diagram to show the voltmeter connected in the circuit to measure the potential difference across the lamp.

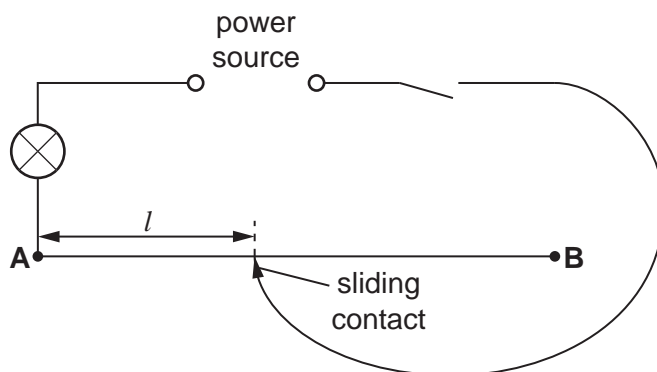


Fig. 3.1

[2]

- (b) A student switches on and places the sliding contact on the resistance wire at a distance  $l = 0.200\text{ m}$  from end A. He records the value of  $l$  and the potential difference  $V$  across the lamp. He then repeats the procedure using a range of values of  $l$ . Table 3.1 shows the readings.

Table 3.1

$l/\text{m}$	$V/\text{V}$	$\frac{V}{l}$
0.200	1.67	
0.400	1.43	
0.600	1.25	
0.800	1.11	
1.00	1.00	

- (i) For each pair of readings in the table calculate and record in the table the value of  $\frac{V}{l}$ .
- (ii) Complete the table by writing in the unit for  $\frac{V}{l}$ .

[3]

- (c) A student suggests that the potential difference  $V$  across the lamp is directly proportional to the length  $l$  of resistance wire in the circuit. State whether or not you agree with this suggestion and justify your answer by reference to the results.

Statement .....

Justification .....

.....[2]

- (d) State one precaution that you would take in order to obtain accurate readings of  $V$  in this experiment.

.....

.....

.....[1]

- 4 An IGCSE student is investigating reflection from a plane mirror.

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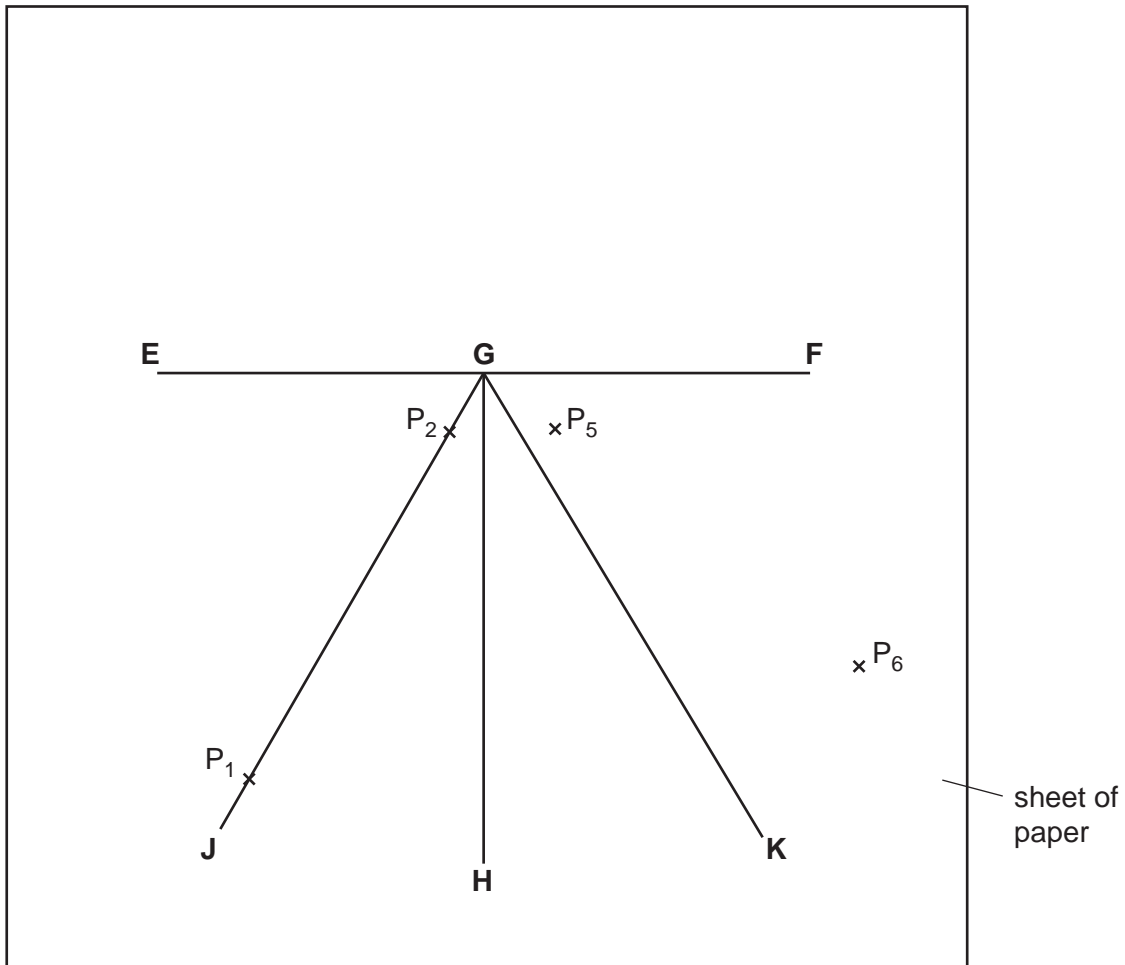


Fig. 4.1

The student is using a sheet of plain paper on a pin board. Fig. 4.1 shows the sheet of paper. The straight line **EF** shows the position of the reflecting surface of a plane mirror standing vertically on the sheet of paper. Line **GH** is a normal to line **EF**. Line **JG** marks an incident ray and line **GK** is the corresponding reflected ray. The student marks the position of the incident ray with two pins ( $P_1$  and  $P_2$ ) and uses two more pins ( $P_3$  and  $P_4$ ) to find the direction of the reflected ray.

- (a) (i) On Fig. 4.1 mark with two neat crosses, labelled  $P_3$  and  $P_4$ , suitable positions for the pins to find the direction of the reflected ray.

- (ii) On Fig. 4.1 measure the angle of incidence  $i$ .

$$i = \dots\dots\dots$$

- (iii) On Fig. 4.1 measure the angle of reflection  $r_1$ .

$$r_1 = \dots\dots\dots$$

[3]



- (b) (i) On Fig. 4.1 draw a line **E'GF'** such that the angle  $\theta$  between this line and the line **EGF** is  $10^\circ$ . Start with **E'** below the line **EGF**. The straight line **E'F'** shows a new position of the reflecting surface of the plane mirror standing vertically on the sheet of paper.

The points labelled  $P_5$  and  $P_6$  mark the positions of two pins placed so that  $P_5$ ,  $P_6$  and the images of  $P_1$  and  $P_2$  appear in line with each other.  $P_1$  and  $P_2$  have not been moved since the original set-up.

- (ii) Using a ruler, draw a line joining the points labelled  $P_5$  and  $P_6$ , and continue this line to meet the line **E'F'**.
- (iii) Measure the angle of reflection  $r_2$  between line **GH** and the line joining the points labelled  $P_5$  and  $P_6$ .

$$r_2 = \dots\dots\dots$$

- (iv) Calculate the angle  $\alpha$  through which the reflected ray has moved.

$$\alpha = \dots\dots\dots$$

- (v) Calculate the difference between  $2\theta$  and  $\alpha$ .  
 $\theta$  is the angle between the two positions of the mirror.

$$\text{difference between } 2\theta \text{ and } \alpha = \dots\dots\dots [3]$$

- (c) Theory suggests that if the mirror is moved through an angle  $\theta$  then the reflected ray will move through an angle of  $2\theta$ .  
State whether your result supports the theory and justify your answer by reference to the result.

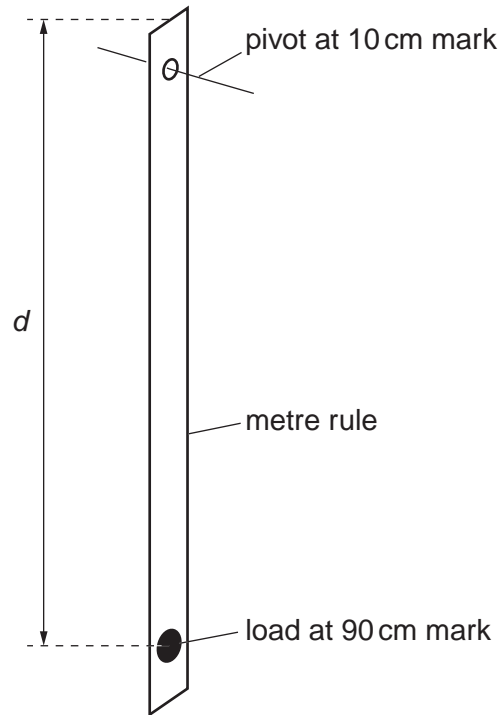
Statement .....

Justification .....

.....[2]

5 The IGCSE class is investigating the swing of a loaded metre rule.

The arrangement of the apparatus is shown in Fig. 5.1.



**Fig. 5.1**

A student displaces the rule a small distance to one side and allows it to swing. The time  $t$  taken for 10 complete swings is recorded. She calculates the time  $T$  taken for one swing. She repeats the procedure using different values of the distance  $d$ .

The readings are shown in the Table 5.1.

**Table 5.1**

0.900	18.4	1.84	
0.850	17.9	1.79	
0.800	17.5	1.75	
0.750	17.1	1.71	
0.700	16.7	1.67	

(a) Complete the column headings in the table.

[3]

(b) Explain why the student takes the time for ten swings and then calculates the time for one swing, rather than just measuring the time for one swing.

.....  
.....[1]

(c) The student tries to find a relationship between  $T$  and  $d$ . She first suggests that  $T \times d$  is a constant.

- (i) Calculate the values of  $T \times d$  and enter the values in the final column of the table.
- (ii) State whether or not the results support this suggestion and give a reason for your answer.

Statement .....

.....

Reason .....

.....

[2]

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