UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER



**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.

| For Examiner's Use | |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| Total | |

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.

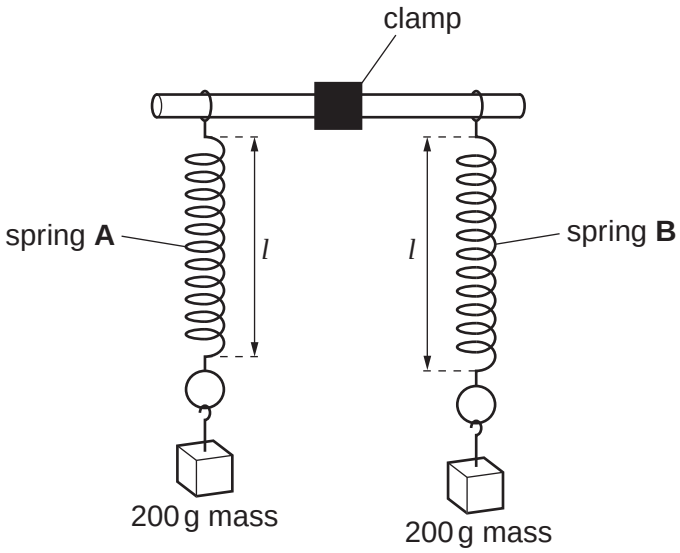



**Fig. 1.1**

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**.

$l$ = ..... mm

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

$e_A$ = ..... mm

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

$l$ = ..... mm

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

$e_B$ = ..... mm

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

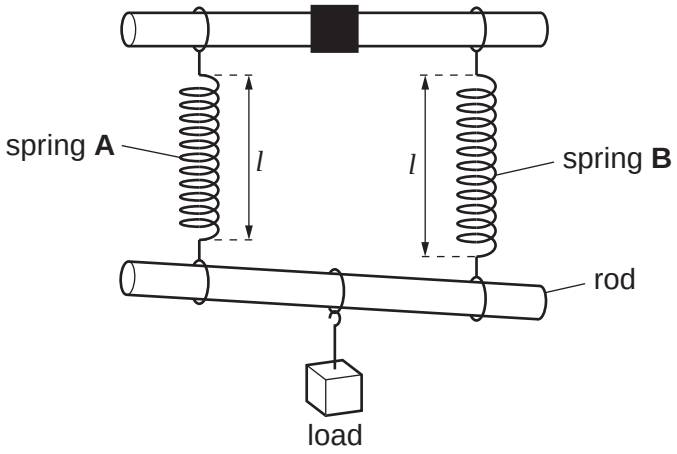



**Fig. 1.2**

**(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 $(e_{\mathbf{A}} + e_{\mathbf{B}})/4 = e_{av}$.

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.

.....

.....

**2** The IGCSE class is investigating the cooling of water.

Fig. 2.1. shows the apparatus used.

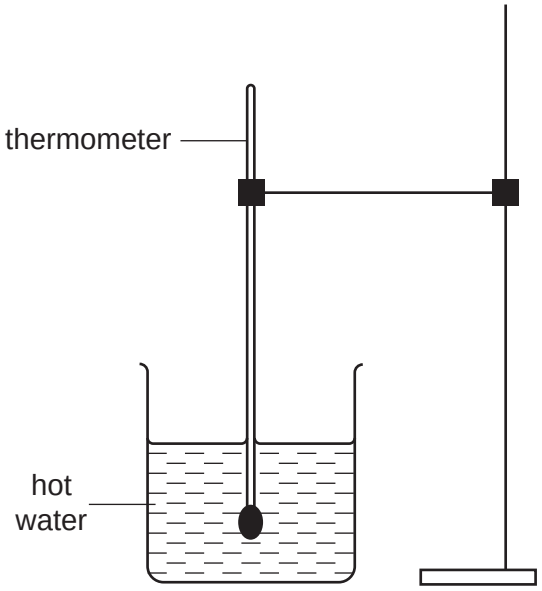



**Fig. 2.1**

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 | $\theta$ / °C |
|---|---|
| 0 | 85 |
| 30 | 78 |
| 60 | 74 |
| 90 | 71 |
| 120 | 69 |
| 150 | 67 |
| | |
| 300 | 63 |

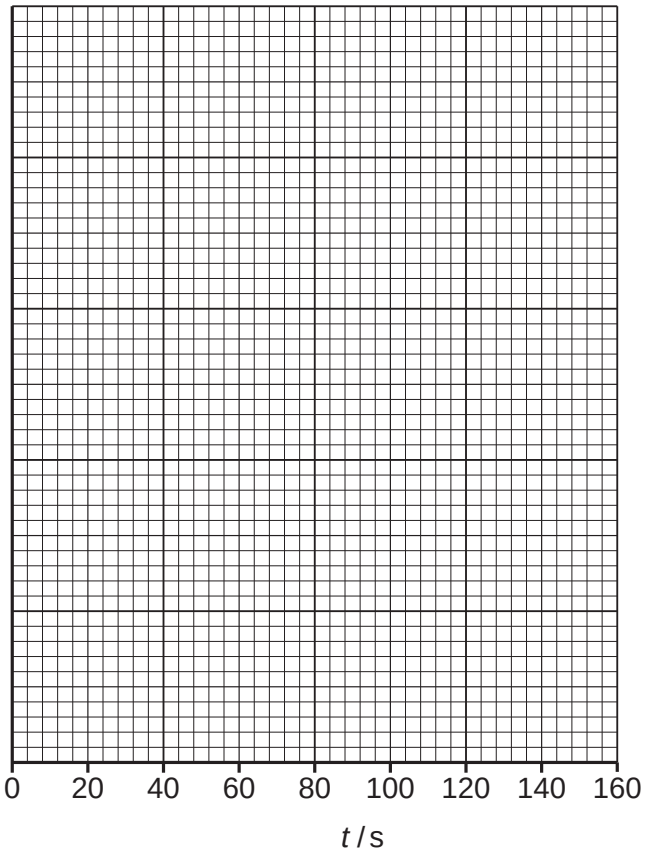
**(a) (i)** Using the information in the table, calculate the temperature change $T_1$ of the water in the first 150 s.

$T_1$ = .....

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

$T_2$ = .....
[3]

**(b)** Plot a graph of $\theta$ / °C ($y$-axis) against $t$ / s ($x$-axis) for the first 150 s. [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 potential difference across a lamp.

**(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.

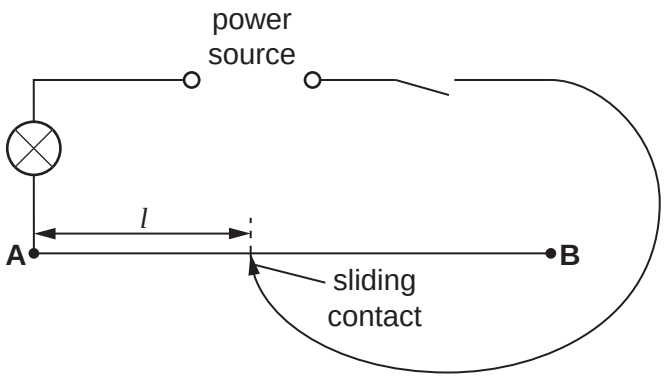



**Fig. 3.1**

[2]

**(b)** A student switches on and places the sliding contact on the resistance wire at a distance $l$ = 0.200 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**

| $l$/m | $V$/V | $\left\lvert\frac{V}{l}\right\rvert$ |
|---|---|---|
| 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 prope... to the length $l$ of resistance wire in the circuit. State whether or not you agree with... 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.

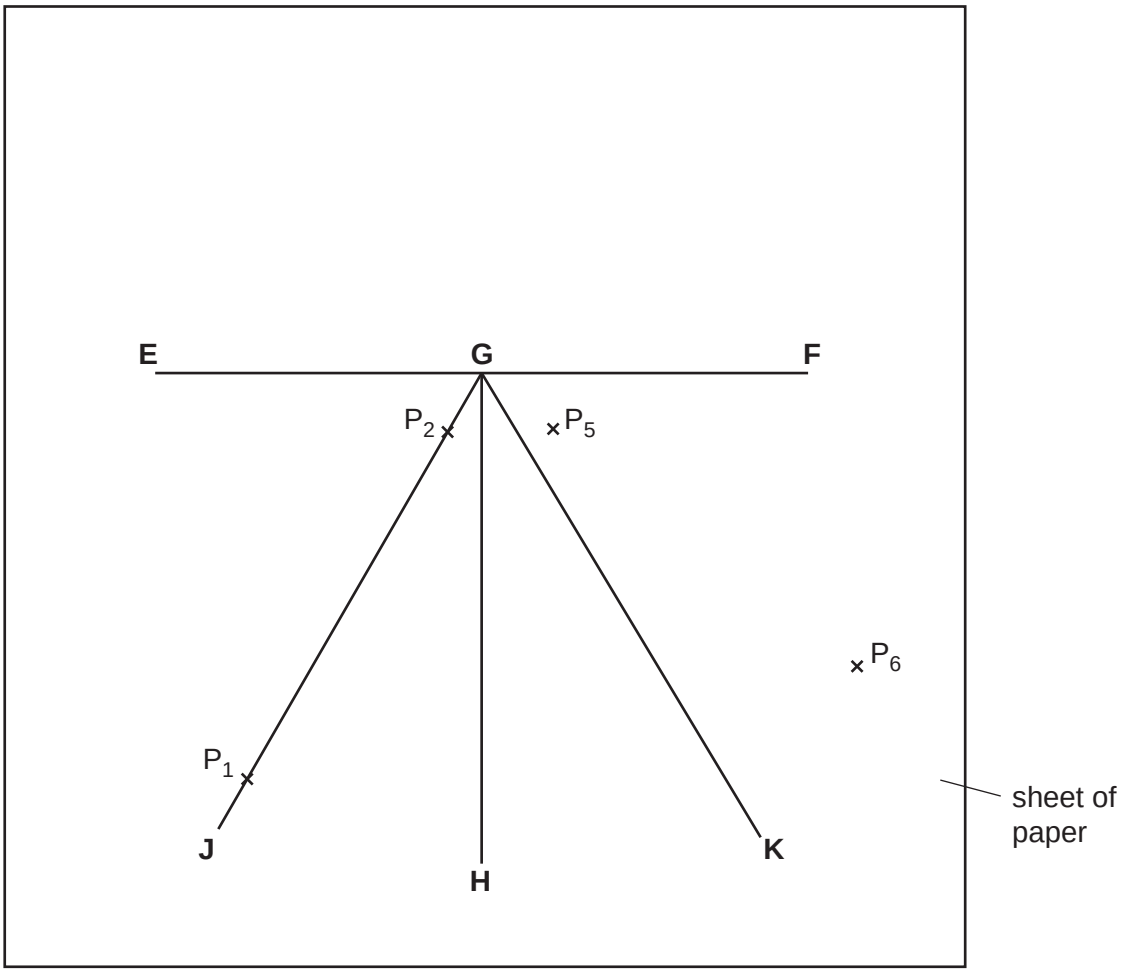



**Fig. 4.1**

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* = .....

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

$r_1$ = .....

[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°. Start with **E'** below the line **EGF**. The straight line **E'F'** shows a 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 $P_6$.

$r_2$ = .....

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

$\alpha$ = .....

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

difference between $2\theta$ and $\alpha$ = .....
[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.

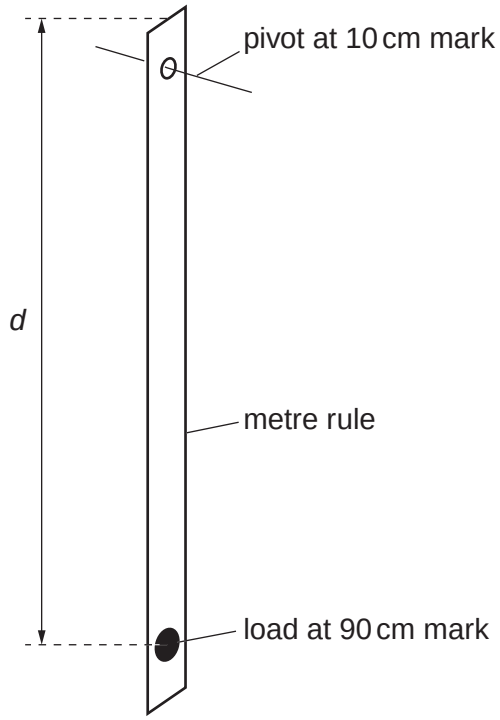



**Fig. 5.1**

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 t... 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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