Cambridge IGCSE

**Cambridge International Examinations**
Cambridge International General Certificate of Secondary Education

| | | | |
|---|---|---|---|
| CANDIDATE NAME | | | |
| CENTRE NUMBER | | CANDIDATE NUMBER | |

*7270233363*

**PHYSICS** **0625/51**

Paper 5 Practical Test **May/June 2014**

**1 hour 15 minutes**

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions.

**READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name in the spaces at the top of the page.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

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 | |
| Total | |

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

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

DC (NH/SW) 81258/4


CAMBRIDGE International Examinations

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1 In this experiment, you will investigate the motion of a mass hanging on a spring.

Carry out the following instructions, referring to Figs. 1.1 and 1.2. The spring has been set up for you.

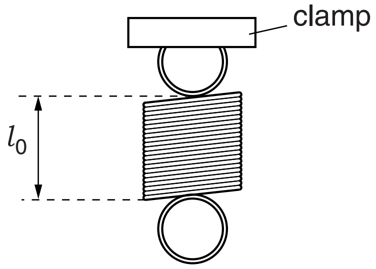



**Fig. 1.1**

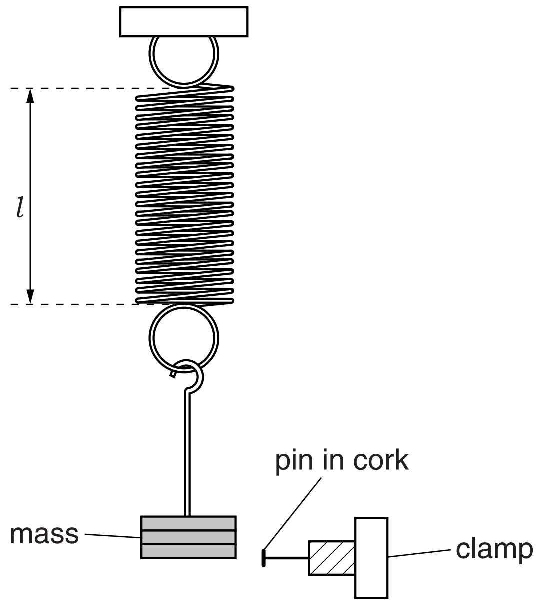



**Fig. 1.2**

**(a)** Measure and record the length $l_0$ of the unstretched spring, in mm.

$l_0$ = ........................................mm [1]

**(b)** Suspend a mass of 300 g from the spring.

**(i)** Measure and record the new length $l$ of the spring.

$l$ = ........................................mm [1]

**(ii)** Calculate the extension $e$ of the spring, using the equation $e = (l - l_0)$.

$e$ = ..............................................mm

**(iii)** Calculate a value for the spring constant $k$ using the equation $k = \frac{F}{e}$, where $F$ = 3.0 N. Include the appropriate unit.

$k$ = ..................................................... [1]

**(c)** Adjust the position of the lower clamp so that the pin is level with the bottom of the mass when the mass is not moving. Pull the mass down a short distance and release it so that it oscillates up and down. Fig. 1.3 shows one complete oscillation.

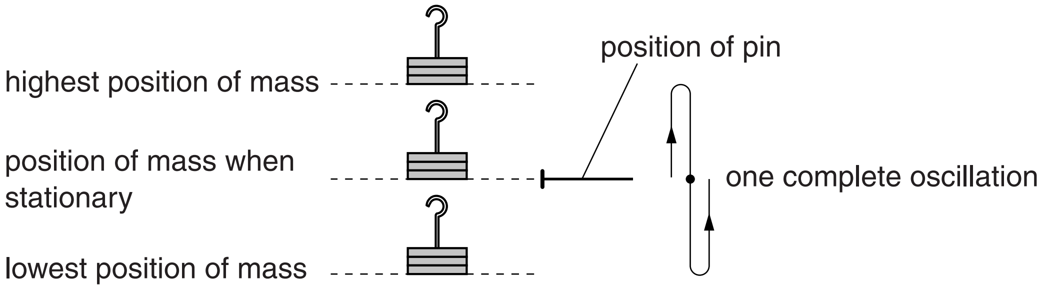



**Fig. 1.3**

**(i)** Measure and record the time $t$ taken for 10 complete oscillations.

$t$ = ...................................................

**(ii)** Calculate the time $T$ taken for one complete oscillation.

$T$ = ...................................................
[2]

**(d)** Replace the mass of 300 g with a mass of 500 g. Repeat the steps in part **(c)**.

$t$ = ...................................................

$T$ = ...................................................
[2]

**(e)** A student suggests that the time $T$ taken for one oscillation should not be affected by the change in mass.

State whether your results support this suggestion. Justify your answer by reference to your results.

statement ..........................................................................................................................

justification ..........................................................................................................................

..........................................................................................................................

..........................................................................................................................
[2]

**(f)** Explain briefly how you can avoid a line-of-sight (parallax) error when measuring the length of the spring. You may draw a diagram.

..........................................................................................................................

..........................................................................................................................

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

[Total: 10]

**2** In this experiment, you will investigate the cooling of a thermometer bulb under different conditions.

Carry out the following instructions, referring to Figs. 2.1 and 2.2.

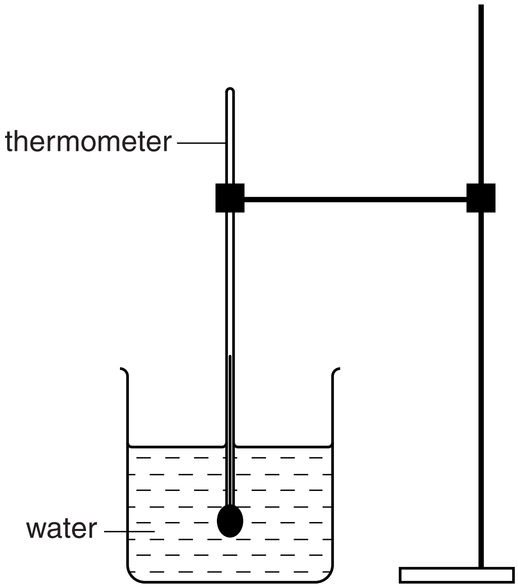



**Fig. 2.1**

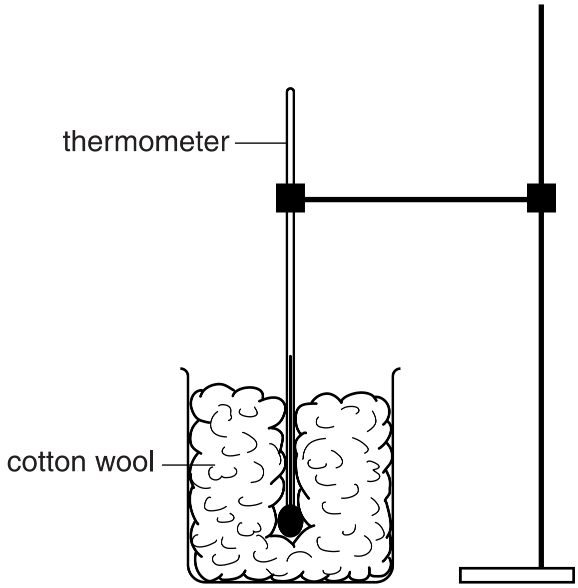



**Fig. 2.2**

**(a)** Place the thermometer in the beaker of hot water, as shown in Fig. 2.1.

**(i)** When the thermometer reading stops rising, record the temperature $\theta_H$ of the hot water.

$\theta_H$ = ................................................[1]

**(ii)** **Remove the thermometer** from the beaker of hot water. Immediately start the stopclock.

**(iii)** After 30 s, measure the temperature $\theta$ shown on the thermometer. Record in Table 2.1 the time $t$ = 30 s and the temperature reading.

**(iv)** Continue recording the time and temperature readings every 30 s until you have six sets of readings.

**Table 2.1**

| | without insulation | with insulation |
|---|---|---|
| $t$/ | $\theta$/ | $\theta$/ |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

[5]

**(b)** Complete the column headings in the table.

**(c)** Replace the thermometer in the beaker of hot water and record its temperature.

$\theta_H$ = ..................................................[1]

**(d) (i)** Remove the thermometer from the beaker of hot water and place it in the beaker containing cotton wool. Immediately start the stopclock. Ensure that the thermometer bulb is completely surrounded by cotton wool as shown in Fig. 2.2.

**(ii)** After 30 s, measure the temperature $\theta$ shown on the thermometer. Record the temperature reading in Table 2.1.

**(iii)** Continue recording the temperature every 30 s until you have six readings.

**(e)** State whether the cotton wool insulation increases, decreases, or has no significant effect on the rate of cooling of the thermometer bulb, compared with the rate of cooling with no insulation. Justify your answer by reference to your results.

statement ..........................................................................................................................

justification ..........................................................................................................................

..........................................................................................................................................
[2]

**(f)** Suggest **one** condition that should be kept constant when this experiment is repeated.

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

[Total: 10]

**3** In this experiment, you will investigate the resistance of a lamp filament.

Carry out the following instructions, referring to Fig. 3.1.

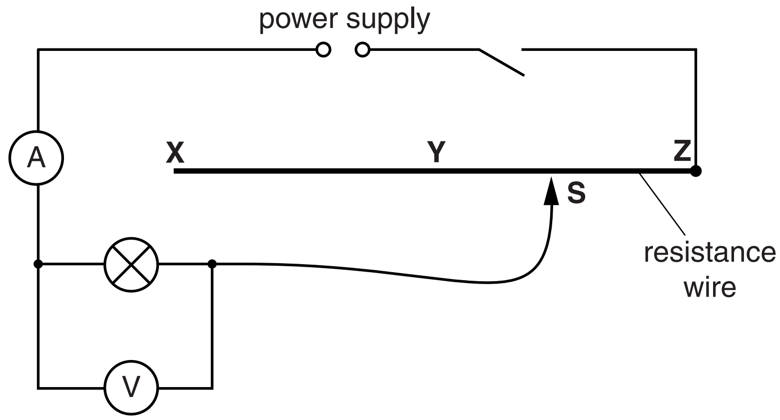



**Fig. 3.1**

**(a)** **(i)** Switch on. Connect the sliding contact **S** to point **X** in the circuit. Measure and record the potential difference $V$ across the lamp and the current $I$ in the circuit. Switch off.

$V$ = ...................................................

$I$ = ...................................................
[2]

**(ii)** Calculate the resistance $R$ of the lamp filament using the equation $R = \frac{V}{I}$.

$R$ = ................................................[1]

**(b)** **(i)** Switch on. Connect the sliding contact **S** to point **Y** in the circuit. Measure and record the potential difference $V$ across the lamp and the current $I$ in the circuit. Switch off.

$V$ = ...................................................

$I$ = ...................................................

**(ii)** Calculate the resistance $R$ of the lamp filament using the equation $R = \frac{V}{I}$.

$R$ = ...................................................
[2]

**(c)** **(i)** Switch on. Connect the sliding contact **S** to point **Z** in the circuit. Measure and record the potential difference $V$ across the lamp and the current $I$ in the circuit. Switch off.

$V$ = ...................................................

$I$ = ...................................................

**(ii)** Calculate the resistance $R$ of the lamp filament using the equation $R = \frac{V}{I}$.

$R$ = ................................................[1]

**(d)** Comment on the effect of increasing the current $I$ on the resistance of the lamp filament.

An increase in the current $I$ in the lamp filament ......................................................................

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

**(e)** Suggest a practical reason why, if you were to repeat this experiment, the repeat measurements might be slightly different from the results you obtained.

..............................................................................................................................

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

**(f)** A student carries out this experiment using a different lamp. He takes readings using various lengths of resistance wire in the circuit. He plots a graph of $V$/V against $I$/A.

Fig. 3.2 is a sketch of the graph.

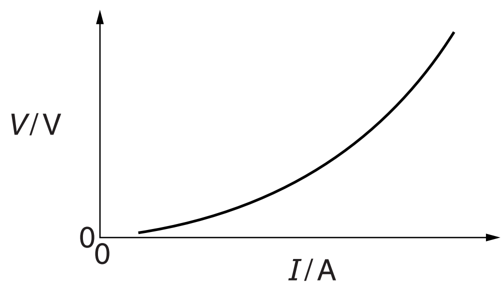



**Fig. 3.2**

State whether the graph shows that the resistance increases, decreases or remains constant as the current increases. Justify your conclusion by reference to the graph.

The resistance .............................................. .

justification ..............................................................................................................

..............................................................................................................................
[2]

[Total: 10]

**4** In this experiment, you will investigate reflection using a plane mirror.

Carry out the following instructions, referring to Fig. 4.1.

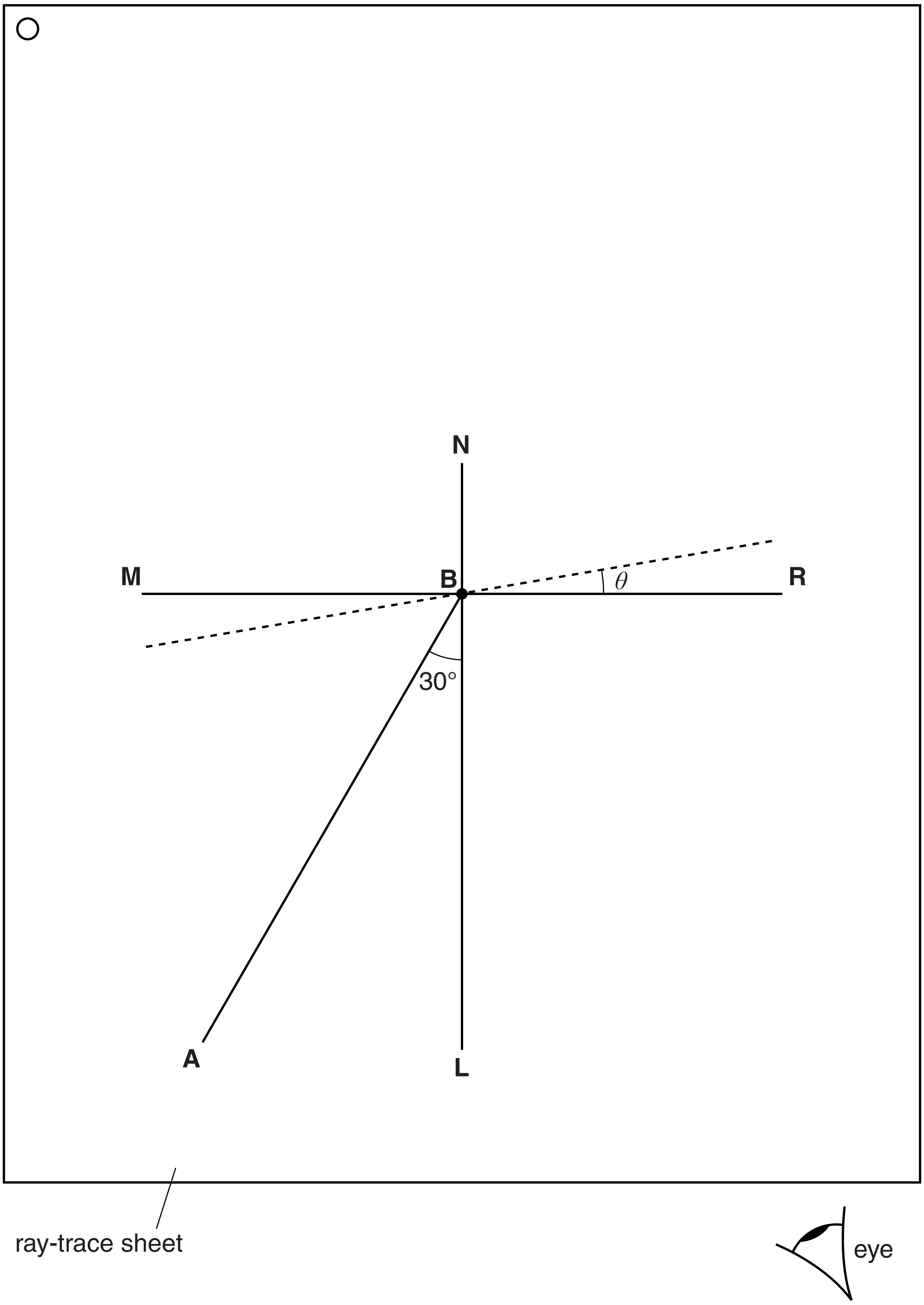



**Fig. 4.1**

**(a)** Draw a line 10 cm long near the middle of the ray-trace sheet. Label the line **MR**. Draw a normal to this line that passes through its centre. Label the normal **NL**. Label the point at which **NL** crosses **MR** with the letter **B**.

**(b)** Draw a line 8 cm long from **B** at an angle of incidence $i$ = 30° to the normal, below **MR** and to the left of the normal. Label the end of this line **A**.

**(c)** Place two pins $P_1$ and $P_2$ on line **AB** a suitable distance apart.

**(d)** Place the reflecting face of the mirror vertically on the line **MR**.

**(e)** View the images of pins $P_1$ and $P_2$ from the direction indicated by the eye in Fig. 4.1. Place two pins $P_3$ and $P_4$ some distance apart, so that pins $P_3$ and $P_4$, and the images of $P_2$ and $P_1$, all appear exactly one behind the other. Label the positions of $P_3$ and $P_4$.

**(f)** Remove pins $P_3$ and $P_4$ and the mirror. Draw the line joining the positions of $P_3$ and $P_4$. Extend the line until it meets **NL**.

**(g)** Measure, and record in Table 4.1, the angle $\alpha$ between **NL** and the line joining the positions of $P_3$ and $P_4$. At this stage the angle $\theta$ between the mirror and line **MR** is 0° as shown in the table.

**(h)** Do not move pins $P_1$ and $P_2$. Draw lines at angles $\theta$ = 10°, 20°, 30° and 40° to **MR**, one of which is shown in Fig. 4.1. Repeat steps **(d)** to **(g)**, placing the mirror on each of the **new lines** in turn, so that you obtain five sets of readings.

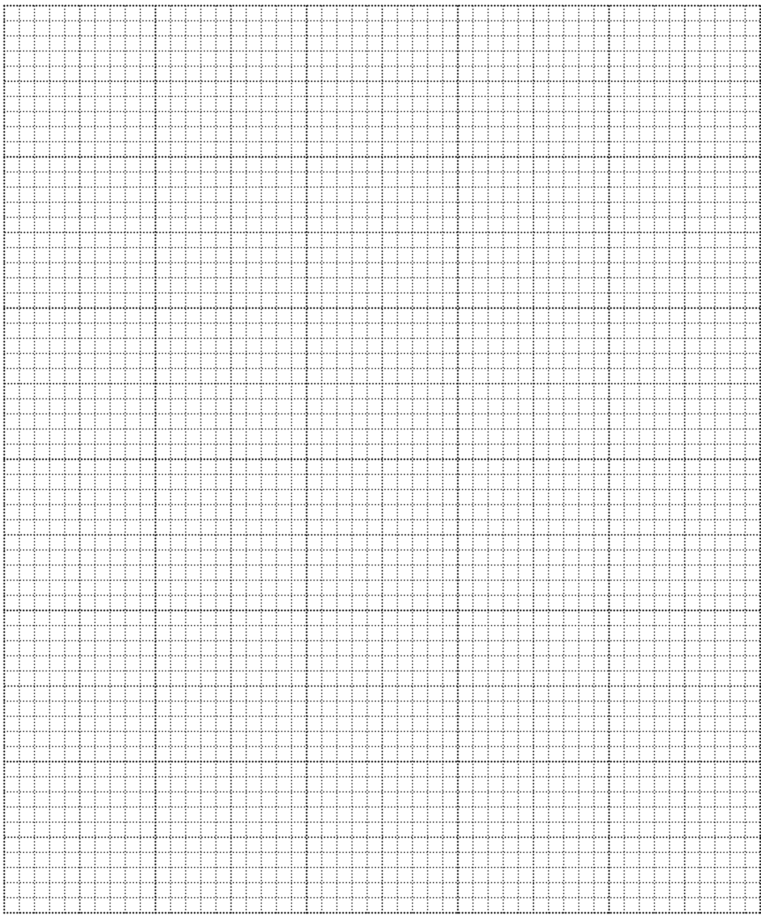
[5]

**Table 4.1**

| $\theta$/° | $\alpha$/° |
|---|---|
| 0 | |
| 10 | |
| 20 | |
| 30 | |
| 40 | |

**(i)** Plot a graph of $\alpha/°$ ($y$-axis) against $\theta/°$ ($x$-axis).



[5]

**Tie your ray-trace sheet into this Booklet between pages 10 and 11.**

[Total: 10]