



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

CANDIDATE  
NAME

CENTRE  
NUMBER

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**PHYSICS**

**0625/53**

Paper 5 Practical Test

**May/June 2015**

**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**

<b>1</b>	
<b>2</b>	
<b>3</b>	
<b>4</b>	
<b>Total</b>	

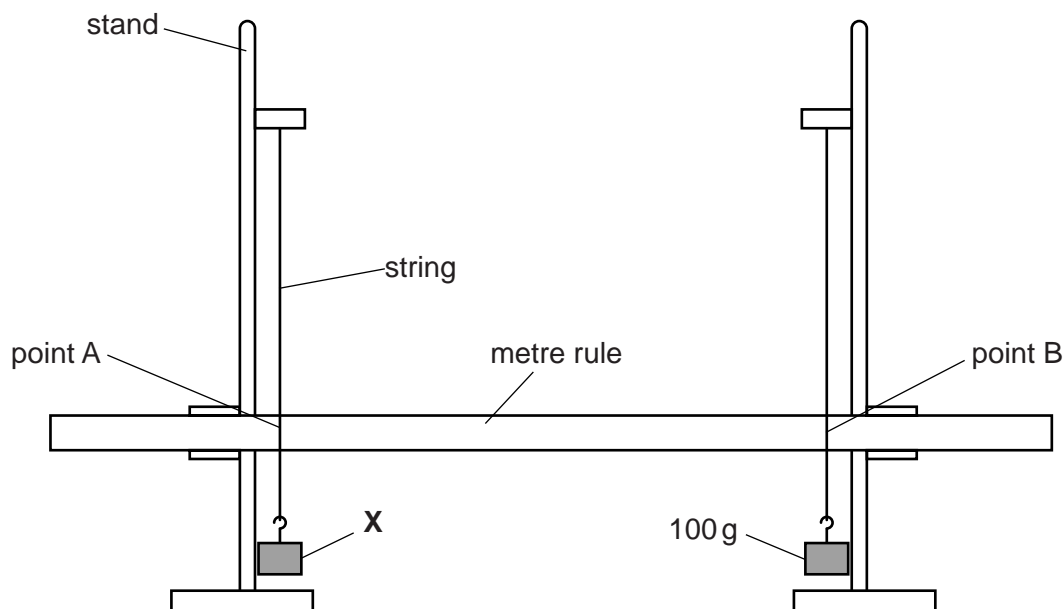
The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

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

- 1 In this experiment, you will determine the mass of an object using two strings.

The apparatus has been set up for you. **Do not change** the position of the rule or the distance between the stands. You are also provided with two loops of string labelled **P** and **Q**.

Carry out the following instructions, referring to Figs. 1.1 and 1.2.



**Fig. 1.1**

- (a) (i) Record the scale reading  $a_0$  on the rule, at point A, where the string crosses the rule, as indicated in Fig. 1.1.

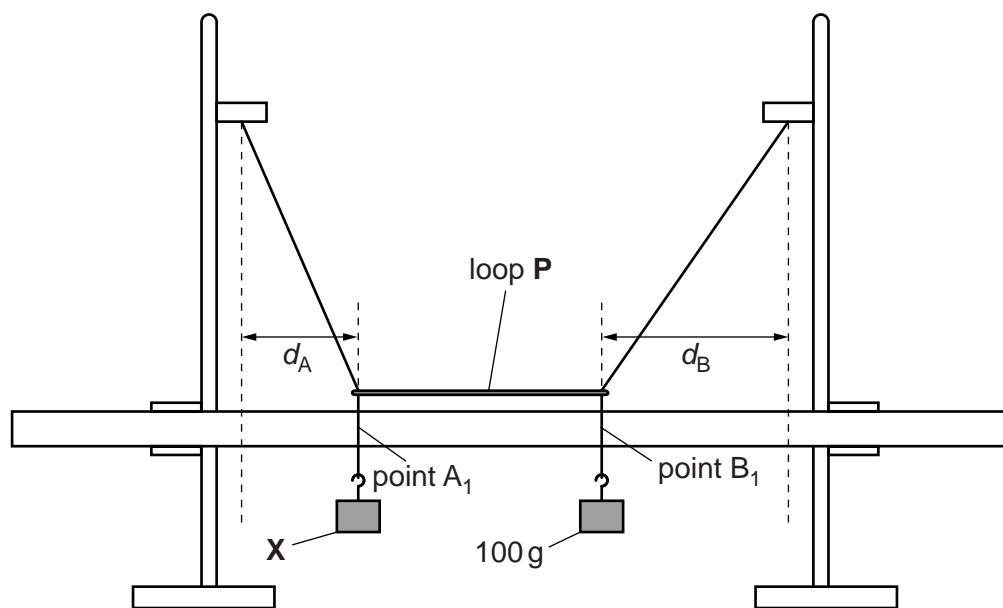
$a_0 = \dots\dots\dots$

- (ii) Record the scale reading  $b_0$  at point B.

$b_0 = \dots\dots\dots$

[2]

- (b) Carefully place loop **P** around the vertical strings so that the strings are pulled closer together as shown in Fig. 1.2. The loop must be horizontal and should be just above the rule.



**Fig. 1.2**

- (i) Record in Table 1.1 the scale reading  $a_1$  at point  $A_1$ , as indicated in Fig. 1.2.
- (ii) Record in Table 1.1 the scale reading  $b_1$  at point  $B_1$ .

**Table 1.1**

loop	$a_1/\text{cm}$	$b_1/\text{cm}$	$d_A/\text{cm}$	$d_B/\text{cm}$	$M/\text{g}$
<b>P</b>					
<b>Q</b>					

- (iii) Calculate and record in the table the distance  $d_A$ , as indicated in Fig. 1.2. Use your results from (a)(i) and from the table.  $d_A$  is the difference between  $a_0$  and  $a_1$ .
- (iv) Calculate and record the distance  $d_B$ . Use your results from (a)(ii) and from the table.  $d_B$  is the difference between  $b_0$  and  $b_1$ .
- (v) Calculate and record in the table a value for the mass  $M$  of object **X**, using your results from the table and the equation  $M = \frac{k d_B}{d_A}$ , where  $k = 100\text{g}$ .
- (vi) Remove loop **P** from the vertical strings and replace it with loop **Q**.
- (vii) Repeat steps (b)(i) to (b)(v) for loop **Q**.

[5]

- (c) Explain how you made sure that the loops were horizontal. You may draw a diagram.

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.....

.....[1]

- (d) A student suggests that  $d_A$  and  $d_B$  might be directly proportional to each other.

Briefly describe how this experiment could be extended to investigate the suggestion.

.....

.....

.....[2]

[Total: 10]

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- 2 In this experiment, you will investigate the cooling of water.

Carry out the following instructions, referring to Fig. 2.1.

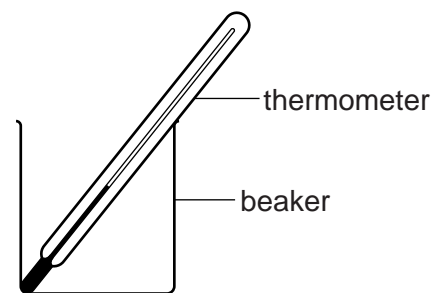


Fig. 2.1

- (a) (i) Pour approximately  $100\text{ cm}^3$  of hot water into the beaker.
- (ii) Read the temperature of the hot water and immediately start the stopclock.

In the first row of Table 2.1, record this temperature  $\theta$ .

- (iii) Record in the table, the temperature  $\theta$  of the water at times  $t = 30\text{ s}$ ,  $60\text{ s}$ ,  $90\text{ s}$ ,  $120\text{ s}$ ,  $150\text{ s}$ ,  $180\text{ s}$ ,  $210\text{ s}$ ,  $240\text{ s}$  and  $270\text{ s}$ .

Table 2.1

$t/\text{s}$	$\theta/^\circ\text{C}$
0	

[2]

- (b) (i) Calculate the average cooling rate  $x_1$  for the first 90 s of the experiment. Use your readings from the table and the equation  $x_1 = \frac{(\theta_0 - \theta_{90})}{T}$ , where  $T = 90$  s and  $\theta_0$  and  $\theta_{90}$  are the temperatures at 0 s and 90 s. Give the unit for the cooling rate.

$$x_1 = \dots\dots\dots[2]$$

- (ii) Calculate the average cooling rate  $x_2$  in the next 90 s of the experiment. Use your readings from the table and the equation  $x_2 = \frac{(\theta_{90} - \theta_{180})}{T}$ , where  $T = 90$  s and  $\theta_{90}$  and  $\theta_{180}$  are the temperatures at 90 s and 180 s.

$$x_2 = \dots\dots\dots[1]$$

- (iii) Calculate the average cooling rate  $x_3$  in the last 90 s of the experiment. Use your readings from the table and the equation  $x_3 = \frac{(\theta_{180} - \theta_{270})}{T}$ , where  $T = 90$  s and  $\theta_{180}$  and  $\theta_{270}$  are the temperatures at 180 s and 270 s.

$$x_3 = \dots\dots\dots[1]$$

- (c) Use your results from (b) to predict the average cooling rate  $x_4$  for the next 90 s, if the experiment had been carried on for a longer time. Justify your prediction by reference to your results.

prediction for  $x_4 = \dots\dots\dots$

justification  $\dots\dots\dots$   
 $\dots\dots\dots$   
 $\dots\dots\dots$   
 $\dots\dots\dots$  [2]

- (d) State **one** precaution which you took to ensure that the temperature readings were as reliable as possible.

$\dots\dots\dots$   
 $\dots\dots\dots$  [1]

- (e) A student wishes to find out if a similar pattern of results might be obtained under different conditions.

State a variable which he could change in your experiment to explore this.

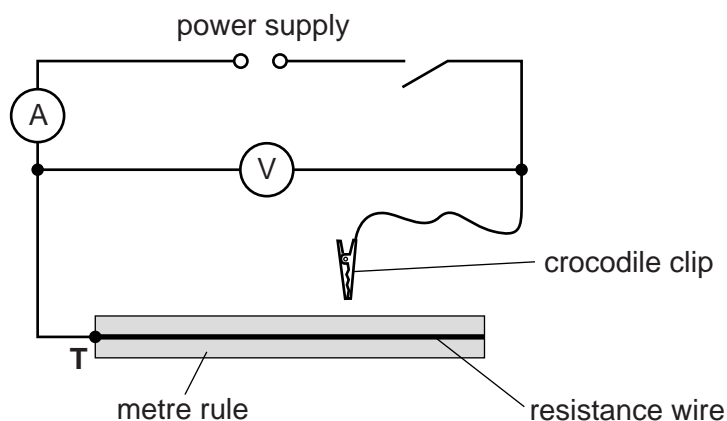
$\dots\dots\dots$  [1]

[Total: 10]

- 3** In this experiment, you will determine the resistance per unit length of a wire.

The circuit has been set up for you as shown in Fig. 3.1.

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



**Fig. 3.1**

- (a) (i)** Connect the crocodile clip to a length  $l$  of the resistance wire where  $l = 0.900$  m measured from the end T.

Switch on. Measure, and record in Table 3.1, the potential difference  $V$  and the current  $I$ . Switch off.

- (ii)** Repeat **(a)(i)** for  $l = 0.800$  m,  $0.700$  m,  $0.600$  m and  $0.500$  m.

**Table 3.1**

$l/\text{m}$	$V/\text{V}$	$I/\text{A}$	$R/\Omega$
0.900			
0.800			
0.700			
0.600			
0.500			

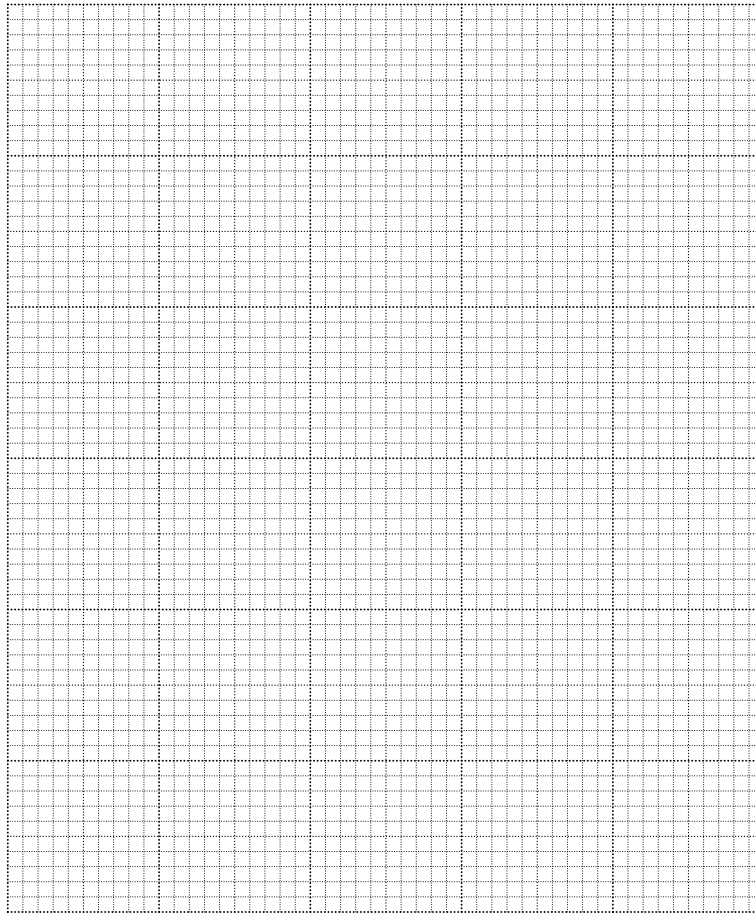
[2]

- (b)** Calculate, and record in the table, the resistance  $R$  of each length of the wire, using the equation  $R = \frac{V}{I}$ .

[1]



- (c) Plot a graph of  $R/\Omega$  (y-axis) against  $l/m$  (x-axis).



[4]

- (d) (i) Determine the gradient  $G$  of the graph. Show clearly on the graph how you obtained the necessary information.

$G = \dots\dots\dots$ [1]

- (ii) For this experiment and wire, the resistance per unit length  $r$  of the wire is numerically equal to  $G$ .

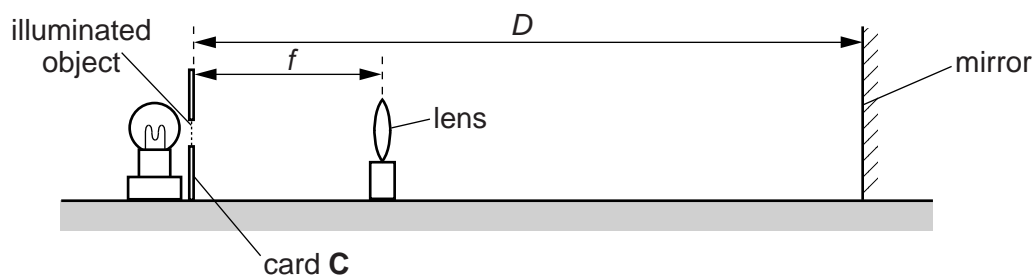
Give a value for  $r$ , to a suitable number of significant figures for this experiment. Include the unit.

$r = \dots\dots\dots$ [2]

[Total: 10]

- 4 In this experiment, you will determine the focal length of a converging lens by two methods.

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



**Fig. 4.1**

- (a) (i) Arrange the illuminated object, lens and mirror as shown in Fig. 4.1. Set the distance  $D$  between the mirror and the illuminated object to 20 cm.
- (ii) Move the lens until a sharp image appears on the front of the card **C** by the side of the illuminated object.
- (iii) Measure, and record in Table 4.1, the distance  $f$  between the lens and the illuminated object.  $f$  is a value for the focal length of the lens in this experiment.

**Table 4.1**

$D/\text{cm}$	$f/\text{cm}$
20	
40	

[1]

- (b) (i) Repeat steps (a)(i) to (a)(iii) for a distance  $D = 40$  cm.
- (ii) Use your results from the table to calculate  $F_1$ , an average value for  $f$ .

$$F_1 = \dots\dots\dots[1]$$

- (c) (i) Set up the lens, illuminated object and screen as shown in Fig. 4.2.

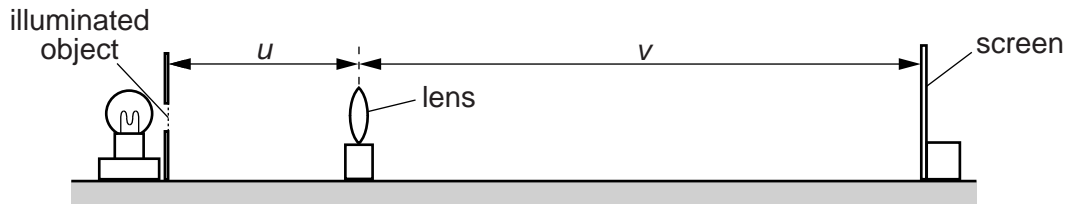


Fig. 4.2

- (ii) Set the distance  $u$  between the illuminated object and the lens to 20.0 cm.  
 (iii) Move the screen until a sharp image of the illuminated object appears on the screen.  
 (iv) Measure, and record in Table 4.2, the distance  $v$  between the lens and the screen.

Table 4.2

$u/\text{cm}$	$v/\text{cm}$	$f/\text{cm}$
20.0		
30.0		

[3]

- (v) Repeat steps (c)(ii) to (c)(iv) for a value of  $u = 30.0$  cm.  
 (vi) For each value of  $u$ , calculate and record in the table the focal length  $f$ , using your results from the table and the equation  $f = \frac{uv}{(u + v)}$ .

- (d) (i) Use your results from Table 4.2 to calculate  $F_2$ , a second average value for  $f$ .

$$F_2 = \dots\dots\dots [1]$$

- (ii) A student suggests that  $F_1$  and  $F_2$  should be equal.

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

statement .....

justification .....

.....

[2]

(e) Describe two precautions you took in order to obtain reliable results in this experiment.

1. ....

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2. ....

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[2]

[Total: 10]

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