Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	

CENTRE NUMBER		CANDIDATE NUMBER	

2366762448

PHYSICS **0625/53**

Paper 5 Practical Test **October/November 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	
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 **12** printed pages.

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CAMBRIDGE
International Examinations

[Turn over

1 In this experiment, you will investigate the resistance of identical wires connected in parallel.

The circuit has been set up for you as shown in Fig. 1.1, with crocodile clip **A** connected to the right-hand end of wire **A**.

Carry out the following instructions, referring to Fig. 1.1.

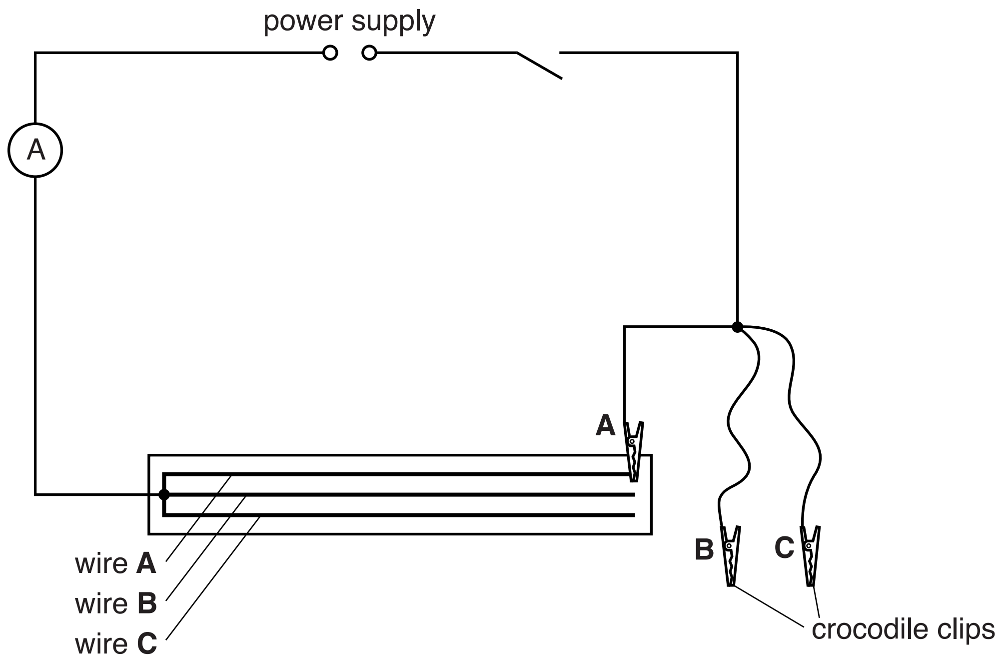


Fig. 1.1

(a) **(i)** On Fig. 1.1, use the appropriate symbol to show a voltmeter connected to measure the potential difference across wire **A**. [1]

(ii) Connect the voltmeter in this position.

(b) **(i)** Switch on. Measure, and record in Table 1.1, for wire **A**, the potential difference V and the current I in the circuit. Switch off.

Table 1.1

wire combination	V/V	I/A
A		
A and **B**		
A, **B** and **C**		

[3]

(ii) Without disconnecting crocodile clip **A**, connect crocodile clip **B** to the right hand end of wire **B.** It does not matter if crocodile clips **A** and **B** touch.

Repeat step **(b)(i)** for this combination of wires, **A** and **B** in parallel.

(iii) Without disconnecting crocodile clips **A** or **B**, connect crocodile clip **C** to the right hand end of wire **C**. It does not matter if the crocodile clips touch.

Repeat step **(b)(i)** for this combination of wires, **A**, **B** and **C** in parallel.

(c) Calculate the resistance R of each wire combination, using the equation $R = \frac{V}{I}$.

resistance of wire **A** R_1 = ...

resistance of wires **A** and **B** in parallel R_2 = ...

resistance of wires **A**, **B** and **C** in parallel R_3 = ...

[3]

(d) (i) A student suggests that when 2 identical wires are connected in parallel, their resistance should be equal to $\frac{1}{2}$ of the resistance of a single wire.

State whether your findings agree with this suggestion.

Justify your answer by reference to your results, giving values to support your justification.

statement ....

....

justification ....

....

....

[2]

(ii) Use your results to suggest the relationship that should exist between R_3 and R_1.

....

....[1]

[Total: 10]

2 In this experiment, you will investigate the refraction of light in a transparent block. You will determine a quantity known as the refractive index of the material of the block.

Carry out the following instructions, using the separate ray-trace sheet provided. You may refer to Fig. 2.1 for guidance.

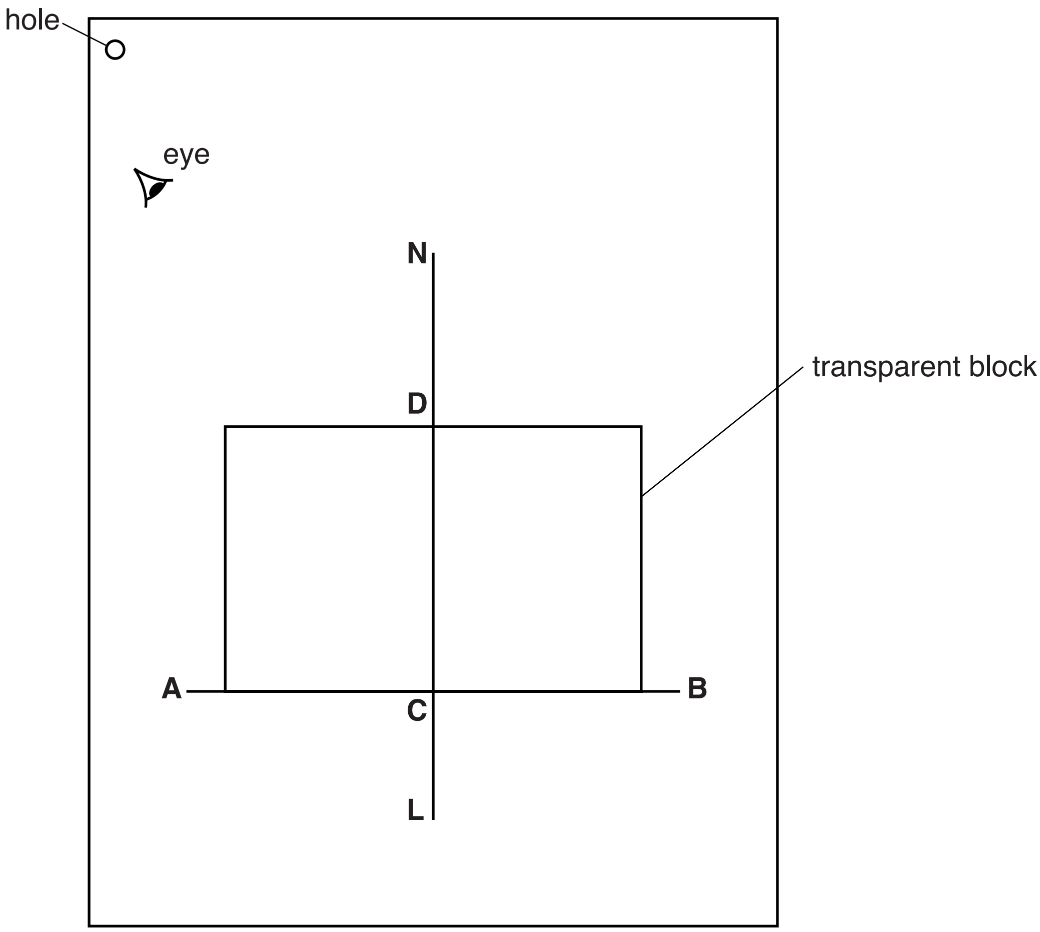


Fig. 2.1

(a) Draw a line approximately 12 cm long and about 6 cm from the bottom of the ray-trace sheet. Label this line **AB**.

Draw a normal to **AB** at its centre. Extend the normal for at least 15 cm above **AB** towards the top of the sheet. Label the normal **NL**.

Label the point at which **NL** crosses **AB** with the letter **C**.

(b) Place the transparent block so that its long side is on line **AB**, as shown in Fig. 2.1.

(c) **(i)** Carefully draw around the block.

(ii) Place a pin P_1 at point **C**.

(iii) View the image of P_1 through the block, from the direction indicated by the eye in Fig. 2.1. Place two pins P_2 and P_3, a suitable distance apart, so that pins P_2 and P_3 and the image of P_1 all appear exactly one behind the other. Label the positions of P_2 and P_3.

(iv) Remove the block and pins from the ray-trace sheet.

(v) Label the point at which **NL** crosses the top edge of the block with the letter **D**.

(vi) Draw a line joining the positions of P_2 and P_3. Extend this line until it crosses **NL**. Label the point at which the line crosses **NL** with the letter **E**.

(d) **(i)** Measure the length *a* of line **DC**.

a = ...

(ii) Measure the length *b* of line **DE**.

b = ...
[2]

(iii) Calculate a value n_1 for the refractive index of the block, using your values from **(d)(i)** and **(d)(ii)** and the equation $n_1 = \frac{a}{b}$.

n_1 = ...[1]

Question 2 continues on the next page.

(e) **(i)** Place the block so that its shorter side is on line **AB**, as shown in Fig. 2.2.

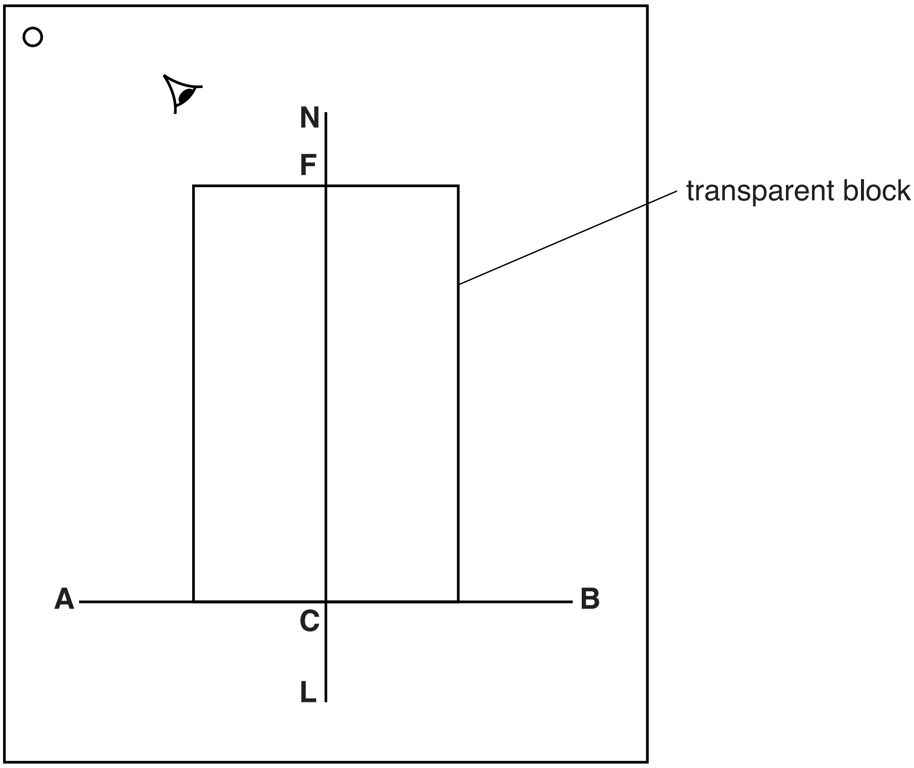


Fig. 2.2

(ii) Repeat steps **(c)(i)** to **(c)(iv)**.

(iii) Label the point at which **NL** crosses the top edge of the block with the letter **F**.

(iv) Draw a line joining the new positions of P_2 and P_3. Extend this line until it crosses **NL**. Label the point at which the line crosses **NL** with the letter **G.**

(f) **(i)** Measure the length *c* of line **FC**.

c = ...

(ii) Measure the length *d* of line **FG**.

d = ...

(iii) Calculate a second value n_2 for the refractive index of the block, using your values from **(f)(i)** and **(f)(ii)** and the equation $n_2 = \frac{c}{d}$.

n_2 = ...
[1]

(g) A student suggests that a third value for the refractive index could be obtained by repeating the experiment with the block standing on edge, as shown in Fig. 2.3.

You are **not** required to carry out this experiment.

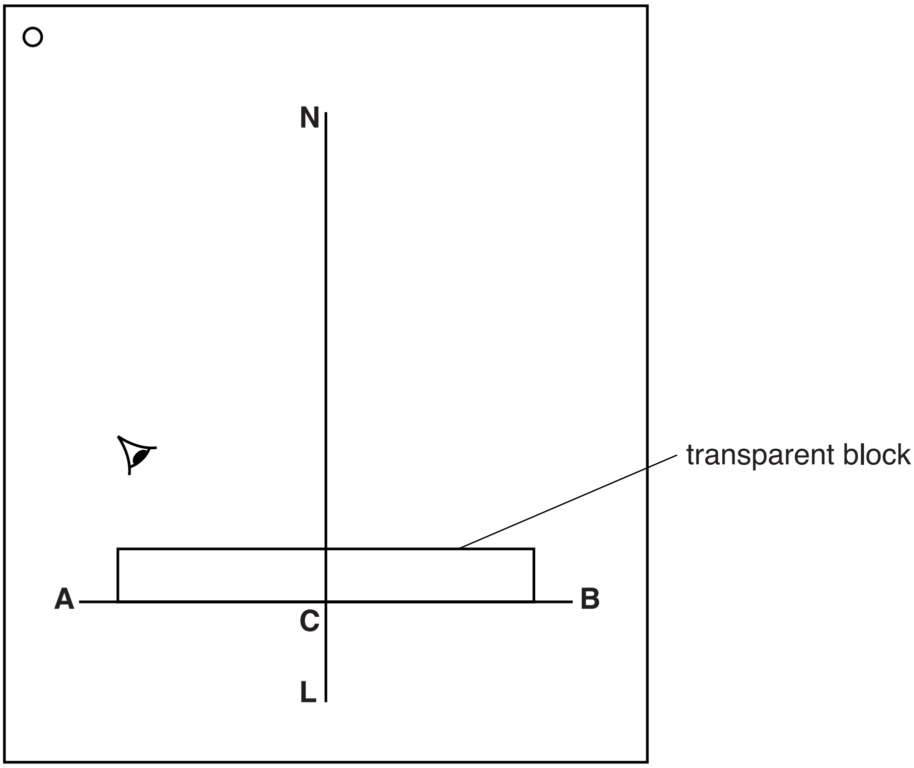


Fig. 2.3

State and explain whether this third value for the refractive index is likely to be more or less reliable than the other two values for the refractive index.

statement ....

explanation ....

....

.... [2]

Tie your ray-trace sheet into this Booklet between pages 6 and 7. [4]

[Total: 10]

3 In this experiment, you will investigate the behaviour of a spring, and then use the spring to determine the weight of an object.

The stand and spring have been set up. You are provided with an object **X** and a set of loads which will be used to stretch the spring.

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

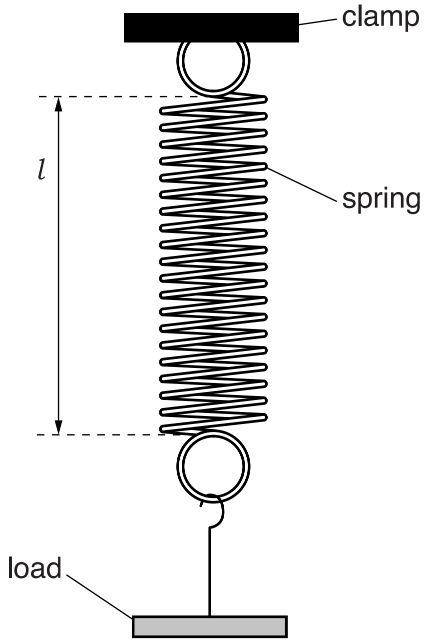


Fig. 3.1

(a) **(i)** Hang a load of weight $L = 1.0\,N$ on the spring.

Measure, and record in Table 3.1, the stretched length l of the spring, as indicated in Fig. 3.1.

(ii) Describe a precaution that you took when measuring the length of the spring, to ensure a reliable reading. You may draw a diagram.

....

....[1]

(iii) Repeat step **(a)(i)** for L values of 2.0 N, 3.0 N, 4.0 N and 5.0 N.

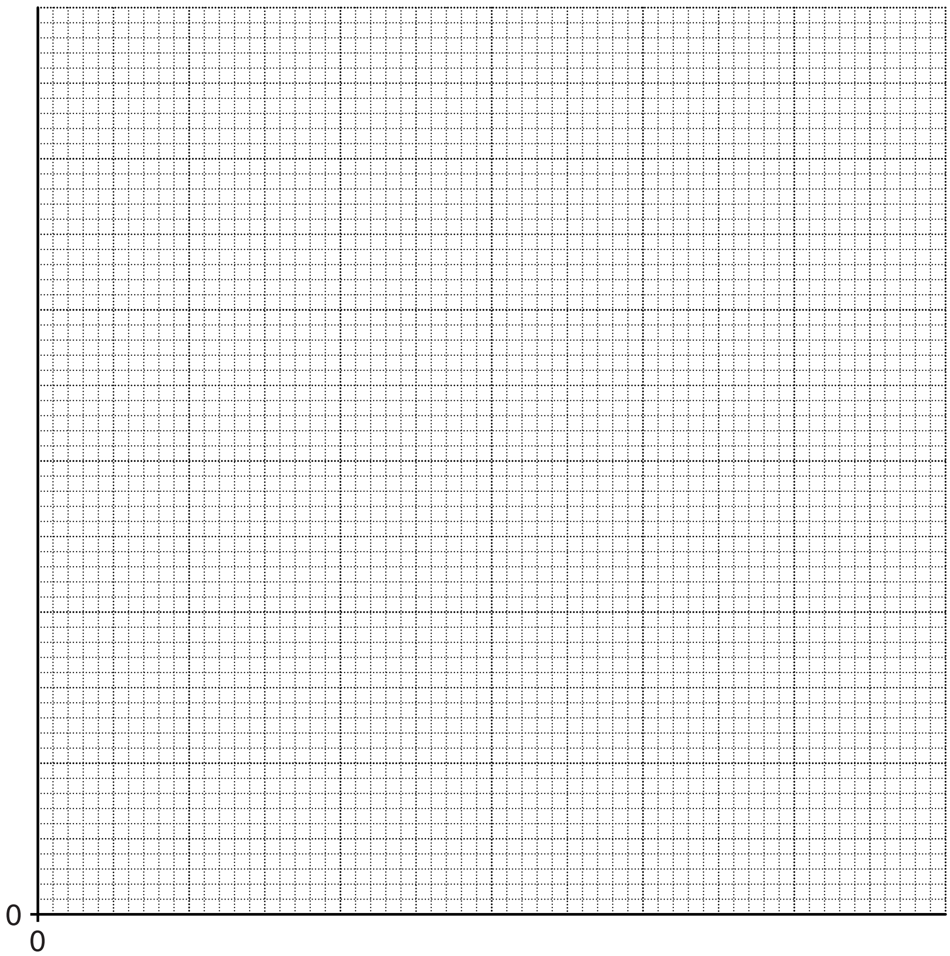
(iv) Remove the load from the spring.

Table 3.1

L/N	l/cm
1.0	
2.0	
3.0	
4.0	
5.0	

[1]

(b) Plot a graph of l/cm (y-axis) against L/N (x-axis).



[4]

(c) Use your graph to determine the length l_0 of the spring with no load attached.

l_0 = ...[1]

(d) **(i)** Suspend object **X** from the spring and measure the stretched length l of the spring.

l = ...

(ii) Use the graph, and your reading from **(d)(i)**, to determine the weight W of object **X**. Show clearly on the graph how you obtained your answer.

W = ... N
[2]

(e) A student measures the weight of a different load using this same method. He gives the weight as 2.564 N.

Explain why this is not a suitable number of significant figures for this experiment.

....

....

....[1]

[Total: 10]

4 In this experiment, you will investigate the transfer of thermal energy.

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

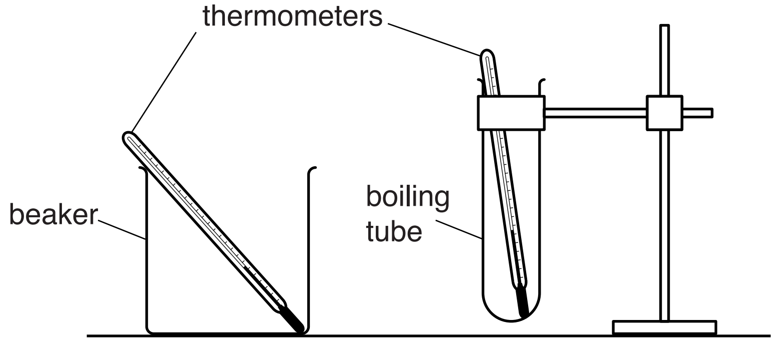


Fig. 4.1

(a) (i) Pour 40 cm^3 of cold water into the boiling tube.

Record, in the first row of Table 4.1, the temperature θ_C of the cold water.

(ii) Pour 300 cm^3 of hot water into the beaker.

Record, in the first row of the table, the temperature θ_H of the hot water.

(iii) Lower the boiling tube into the beaker of hot water and immediately start the stopclock.

Record, in the table, the temperature θ_C of the cold water and the temperature θ_H of the hot water at times t = 30 s, 60 s, 90 s, 120 s, 150 s and 180 s.

Table 4.1

	boiling tube with 40 cm^3 of cold water		boiling tube with 20 cm^3 of cold water	
t/	θ_C/	θ_H/	θ_C/	θ_H/
0				
30				
60				
90				
120				
150				
180				

[4]

(b) **(i)** Carefully pour away the water from the boiling tube and the beaker. Make sure that the boiling tube is secure in the clamp.

Pour 20 cm^3 of cold water into the boiling tube. Record its temperature θ_C in the table.

Repeat steps **(a)(ii)** and **(a)(iii)**.

(ii) Complete the column headings in the table.

(c) Write a conclusion stating how the quantity of cold water in the boiling tube affects its temperature rise.

....

....

....[1]

(d) Another student wishes to check your conclusion by repeating the experiment with 10 cm^3 of cold water.

Suggest two conditions which he should keep the same so that the comparison will be fair.

1. ....

....

2. ....

....
[2]

(e) Scientists in an industrial laboratory wish to use this experiment as a model of a heat exchanger, which transfers thermal energy between liquids.

Suggest **two** different improvements to the apparatus which would make the heating of the cold water more efficient.

For your **first** suggestion, explain why it would be an improvement.

suggestion 1 ....

explanation ....

....

suggestion 2 ....
[3]

[Total: 10]