

A Level Physics A

H556/02 Exploring physics

Question Set 4

1 (a) State **one** S.I. base quantity other than length, mass and time.

..... [1]

(b) Fig. 17 shows two resistors **X** and **Y** connected in series.

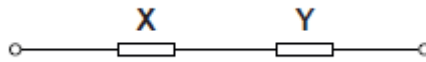


Fig. 17

The resistors are wires. Both wires have the same length L and diameter d . The material of **X** has resistivity ρ and the material of **Y** has resistivity 2ρ .

(i) Show that the total resistance R of the wires is given by the equation

$$R = \frac{12\rho L}{\pi d^2}.$$

[2]

(ii) A student uses the equation in (i) to determine R .

The table below shows the data recorded by the student in her lab book.

Quantity	Value
ρ	$4.7 \times 10^{-7} \Omega \text{ m}$
L	$9.5 \pm 0.1 \text{ cm}$
d	$0.270 \pm 0.003 \text{ mm}$

1. Name the likely instruments used by the student to measure L and d .

L :

d :

[1]

2. Use the data in the table and the equation in (i) to determine R and the absolute uncertainty. Write your answer to the correct number of significant figures.

$$R = \dots \pm \dots \Omega \quad [4]$$

3. The instrument used to measure d has a zero-error. The measured d is much **larger** than the actual value.

Discuss how the actual value of R compares with the value calculated above.

[1]

Total Marks for Question Set 4: 9

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