SECTION B

Answer **all** the questions.

16 A student uses the circuit shown in **Fig. 16.1** to determine the resistivity of a metal in the form of a wire.

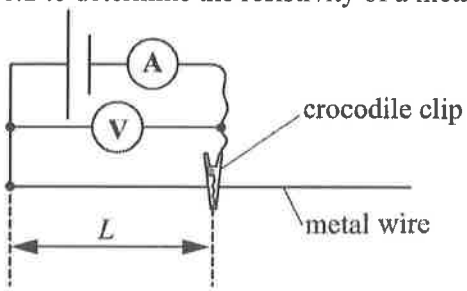

Fig. 16.1

The length L of the wire is changed with the help of a crocodile clip. The current in the wire is I, the p.d. across the wire is V and the wire has resistance R.
The table in **Fig. 16.2** shows the results recorded by the student from the experiment.

L / m	V / V	I / A	R / Ω
0.050	0.40	0.160	2.50
0.200	0.40	0.140	2.86
0.400	0.40	0.072	
0.800	0.40	0.036	11.1
1.000	0.40	0.029	13.8

Fig. 16.2

Fig. 16.3 shows the graph of R against L for this wire.

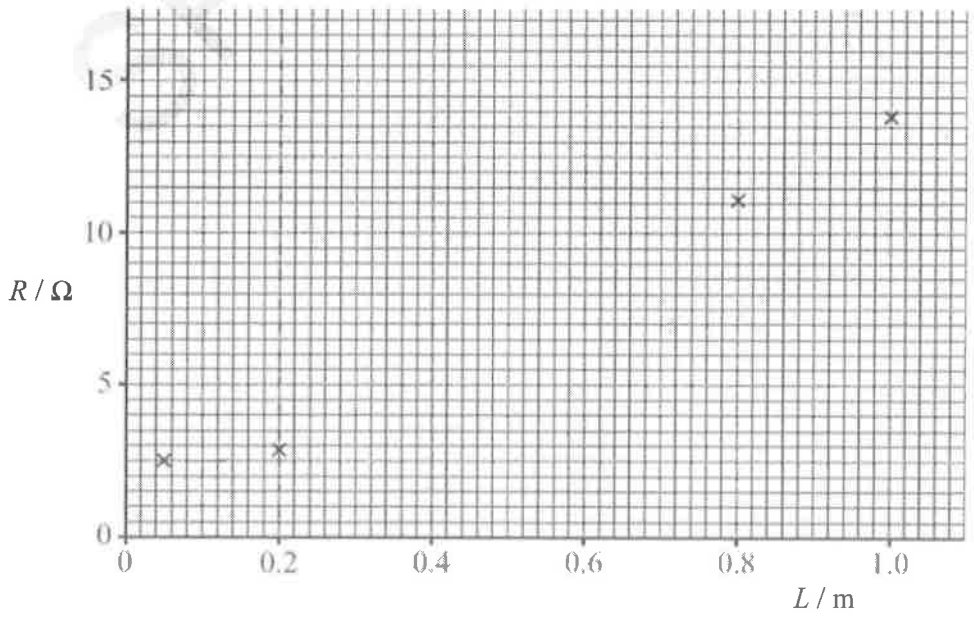

Fig. 16.3

(a) Complete the table by calculating the resistance of the wire of length 0.400 m. On **Fig. 16.3** plot the data point corresponding to this length.

[1]

(b) The student observed that the wire was significantly hotter when the shortest length $L = 0.050$ m was used.
The cross-sectional area of the wire is $8.0 \times 10^{-8}\ m^2$.

Use **Fig.16.3** to determine the resistivity of the metal.

resistivity = ... Ω m **[3]**

(c) The voltmeter used in the experiment had a zero error. The potential difference recorded in the experiment was smaller than it should have been.

Discuss how the actual value of the resistivity of the metal would differ from the value calculated in **(b)**.

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..... **[3]**