



# **A Level Physics A**

**H556/02** Exploring physics

## **Question Set 13**

1 (a) Derive the S.I. base units for resistance.

base units: ..... [2]

(b) Fig. 16.1 shows the  $I$ - $V$  characteristics of two electrical components **L** and **R**.

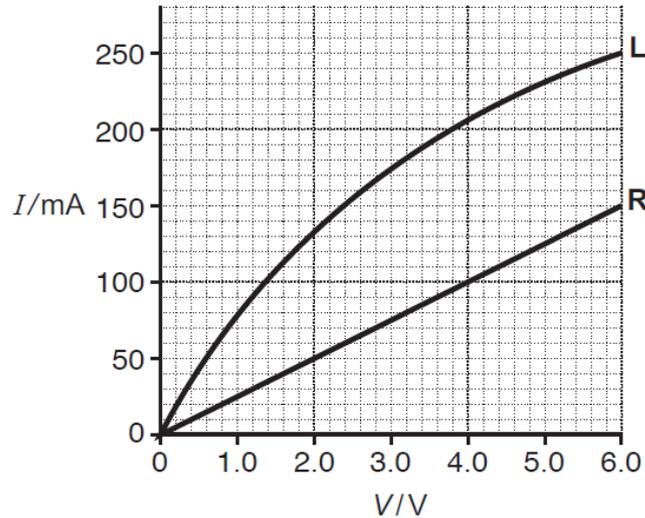


Fig. 16.1

The component **L** is a filament lamp and the component **R** is a resistor.

(i) Show that the resistance of **R** is  $40\ \Omega$ .

[1]

(ii) Fig. 16.2 shows the components **L** and **R** connected in series to a battery of e.m.f.  $6.0\text{ V}$ .

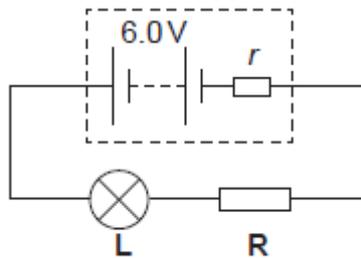


Fig. 16.2

The resistor **R** is a cylindrical rod of length  $8.0\text{ mm}$  and cross-sectional area  $2.4 \times 10^{-6}\text{ m}^2$ . The current in the circuit is  $100\text{ mA}$ .

1 Use Fig. 16.1 to determine the internal resistance  $r$  of the battery.

$r = \dots\dots\dots\ \Omega$  [3]

2 Calculate the resistivity  $\rho$  of the material of the resistor **R**.

$\rho = \dots\dots\dots\ \Omega\text{m}$  [2]

3 There are  $6.5 \times 10^{17}$  charge carriers within the volume of **R**.

Calculate the mean drift velocity  $v$  of the charge carriers within the resistor **R**.

$v = \dots\dots\dots \text{ms}^{-1}$  [3]

**Total Marks for Question Set 13: 11**

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