

- 7 (a) Define the *ohm*.

..... [1]

- (b) A uniform wire has resistance 3.2Ω . The wire has length 2.5m and is made from metal of resistivity $460\text{ n}\Omega\text{ m}$.

Calculate the cross-sectional area of the wire.

$$\text{cross-sectional area} = \dots \text{ m}^2 \quad [3]$$

- (c) A cell of electromotive force (e.m.f.) E and internal resistance r is connected to a variable resistor of resistance R , as shown in Fig. 7.1.

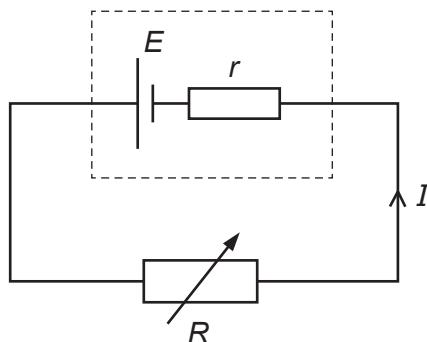


Fig. 7.1

The current in the circuit is I .

- (i) State, in terms of energy, why the potential difference across the variable resistor is less than the e.m.f. of the cell.

..... [1]

- (ii) State an expression for E in terms of I , R and r .

$$E = \dots \quad [1]$$

- (iii) The resistance R of the variable resistor is changed so that it is equal to r .

Determine an expression, in terms of only E and r , for the power P dissipated in the variable resistor.

$$P = \dots \quad [2]$$