

- 5 Fig. 5.1 shows a 12V power supply with negligible internal resistance connected to a uniform metal wire AB. The wire has length 1.00m and resistance 10Ω. Two resistors of resistance 4.0Ω and 2.0Ω are connected in series across the wire.

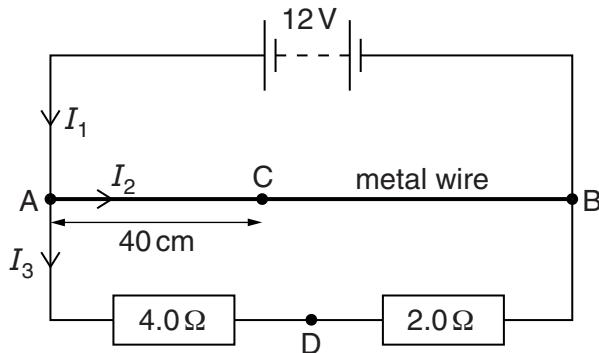


Fig. 5.1

Currents  $I_1$ ,  $I_2$  and  $I_3$  in the circuit are as shown in Fig. 5.1.

- (a) (i) Use Kirchhoff's first law to state a relationship between  $I_1$ ,  $I_2$  and  $I_3$ .

..... [1]

- (ii) Calculate  $I_1$ .

$$I_1 = \dots \text{A} [3]$$

- (iii) Calculate the ratio  $x$ , where

$$x = \frac{\text{power in metal wire}}{\text{power in series resistors}} .$$

$$x = \dots [3]$$

- (b) Calculate the potential difference (p.d.) between the points C and D, as shown in Fig. 5.1. The distance AC is 40 cm and D is the point between the two series resistors.

$$\text{p.d.} = \dots \text{V} [3]$$