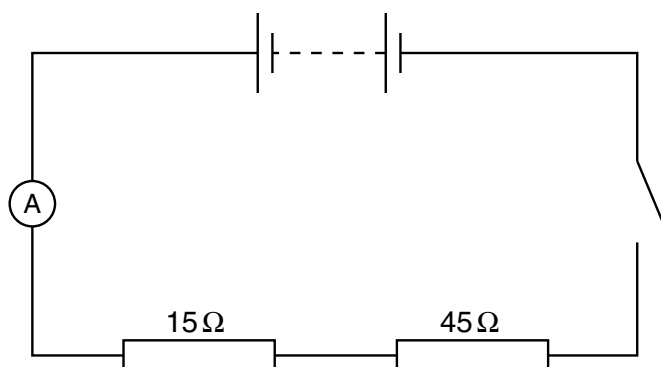


- 7 A student set up the circuit shown in Fig. 7.1.



**Fig. 7.1**

The resistors are of resistance  $15\ \Omega$  and  $45\ \Omega$ . The battery is found to provide  $1.6 \times 10^5\text{ J}$  of electrical energy when a charge of  $1.8 \times 10^4\text{ C}$  passes through the ammeter in a time of  $1.3 \times 10^5\text{ s}$ .

- (a)** Determine

- (i)** the electromotive force (e.m.f.) of the battery,

e.m.f. = ..... V

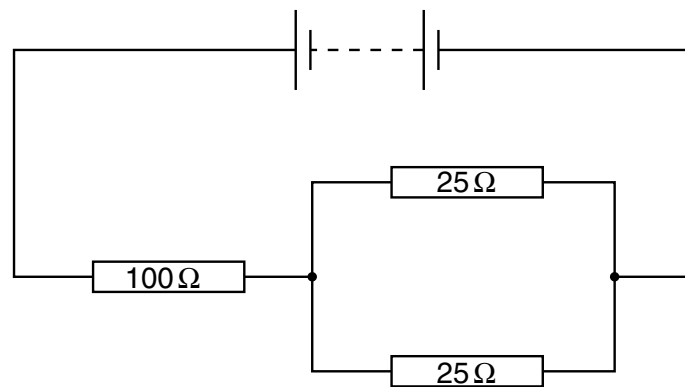
- (ii)** the average current in the circuit.

current = ..... A  
[4]

- 8 A student has available some resistors, each of resistance  $100\ \Omega$ .
- (a) Draw circuit diagrams, one in each case, to show how a number of these resistors may be connected to produce a combined resistance of
- (i)  $200\ \Omega$ ,
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- (b) The arrangement of resistors shown in Fig. 8.1 is connected to a battery.



**Fig. 8.1**

The power dissipation in the  $100\ \Omega$  resistor is  $0.81\ \text{W}$ . Calculate

- (i) the current in the circuit,

current = ..... A

- (ii) the power dissipation in each of the  $25\ \Omega$  resistors.

power = ..... W

[4]

- 7 (a) A student has been asked to make an electric heater. The heater is to be rated as 12 V 60 W, and is to be constructed of wire of diameter 0.54 mm. The material of the wire has resistivity  $4.9 \times 10^{-7} \Omega \text{ m}$ .

(i) Show that the resistance of the heater will be  $2.4 \Omega$ .

[2]

(ii) Calculate the length of wire required for the heater.

length = ..... m [3]

- (b) Two cells of e.m.f.  $E_1$  and  $E_2$  are connected to resistors of resistance  $R_1$ ,  $R_2$  and  $R_3$  as shown in Fig. 7.1.

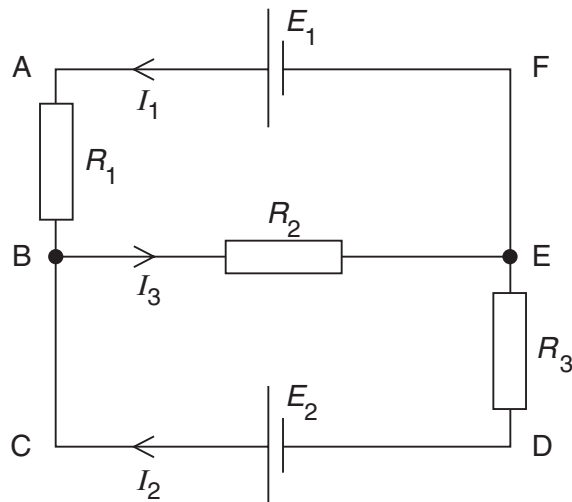


Fig. 7.1

The currents  $I_1$ ,  $I_2$  and  $I_3$  in the various parts of the circuit are as shown.

(i) Write down an expression relating  $I_1$ ,  $I_2$  and  $I_3$ .

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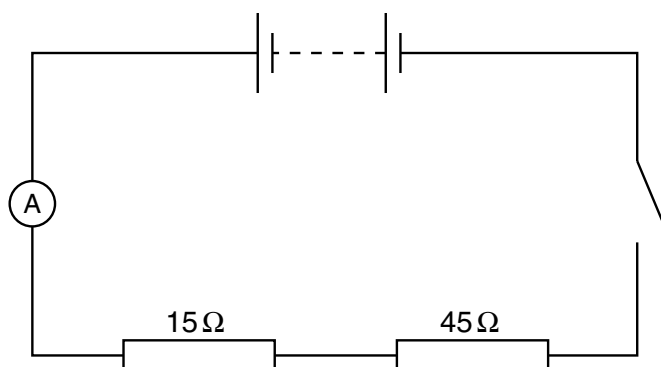
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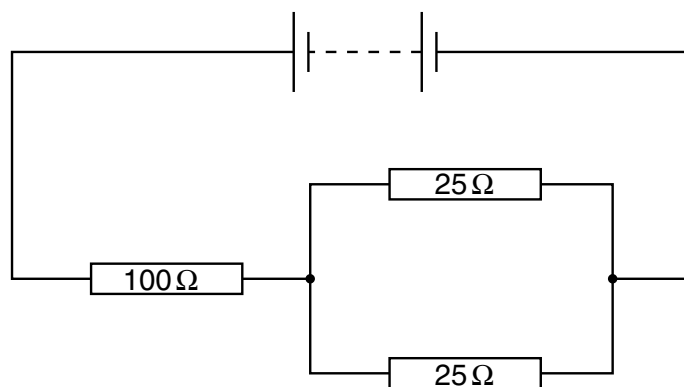
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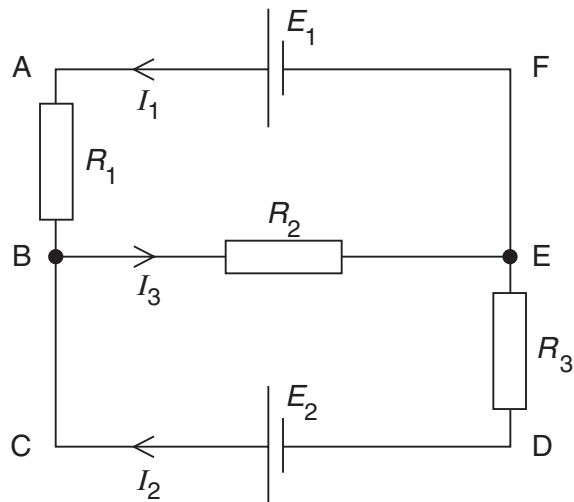


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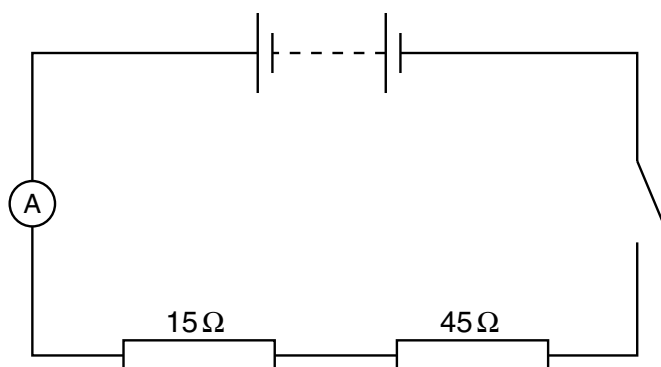
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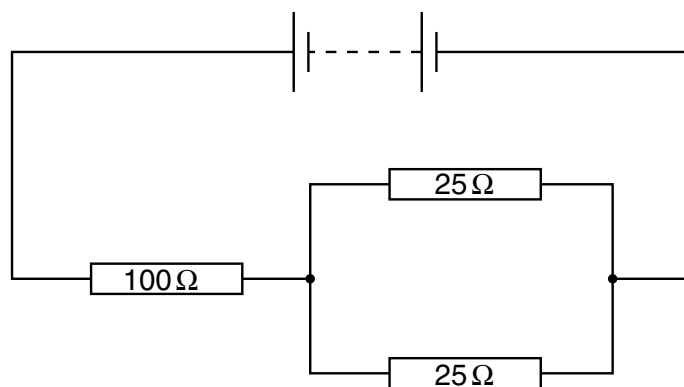
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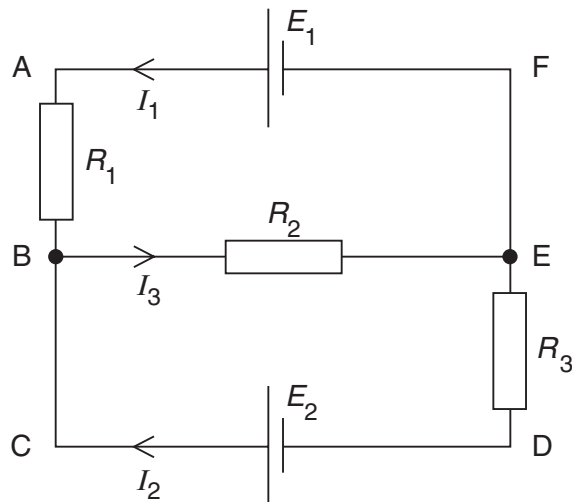


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.....

[2]