

- 5 (a) Define the *ohm*.

.....

 [1]

- (b) A wire has a resistance of $1.8\ \Omega$. The wire has a uniform cross-sectional area of $0.38\ \text{mm}^2$ and is made of metal of resistivity $9.6 \times 10^{-7}\ \Omega\ \text{m}$.

Calculate the length of the wire.

length = m [3]

- (c) A resistor X of resistance $1.8\ \Omega$ is connected to a resistor Y of resistance $0.60\ \Omega$ and a battery P, as shown in Fig. 5.1.

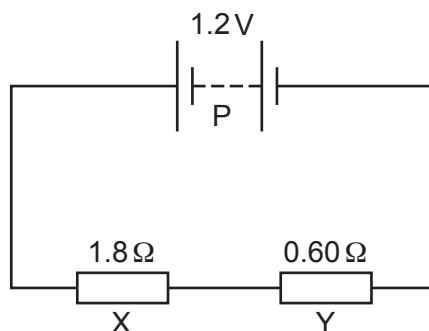


Fig. 5.1

The battery P has an electromotive force (e.m.f.) of 1.2V and negligible internal resistance.

- (i) Explain, in terms of energy, why the potential difference (p.d.) across resistor X is less than the e.m.f. of the battery.

.....

 [1]

- (ii) Calculate the potential difference across resistor X.

potential difference = V [2]

- (d) Another battery Q of e.m.f. 1.2V and negligible internal resistance is now connected into the circuit of Fig. 5.1 to produce the new circuit shown in Fig. 5.2.

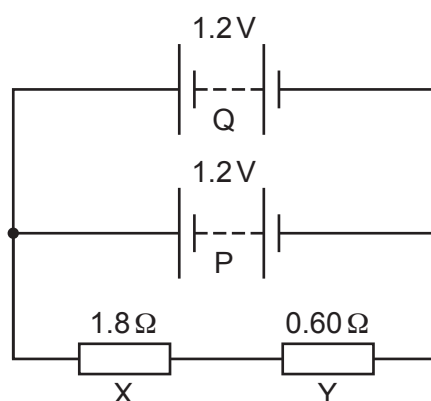


Fig. 5.2

State whether the addition of battery Q causes the current to decrease, increase or remain the same in:

- (i) resistor X [1]
 (ii) battery P. [1]

- (e) The circuit shown in Fig. 5.2 is modified to produce the new circuit shown in Fig. 5.3.

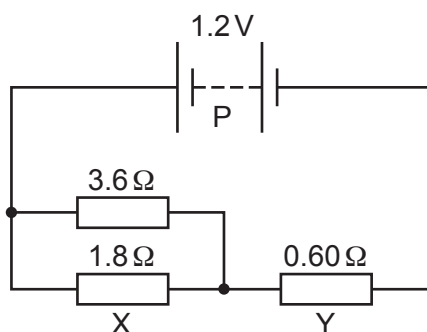


Fig. 5.3

Calculate:

- (i) the total resistance of the two resistors connected in parallel

resistance = Ω [1]

- (ii) the current in resistor Y.

current = A [2]

[Total: 12]