6 The variation with potential difference *V* of current *I* in a resistor X is shown in Fig. 6.1.
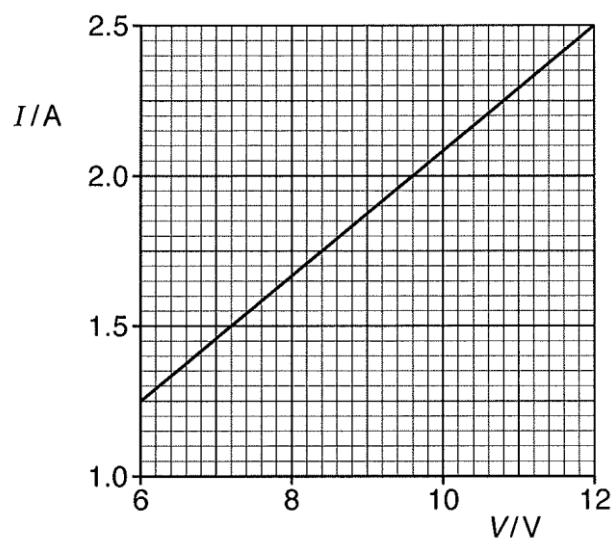

Fig. 6.1

(a) Use data from Fig. 6.1 to show that *I* is proportional to *V*.

[2]

(b) The resistor X is connected in the circuit shown in Fig. 6.2.
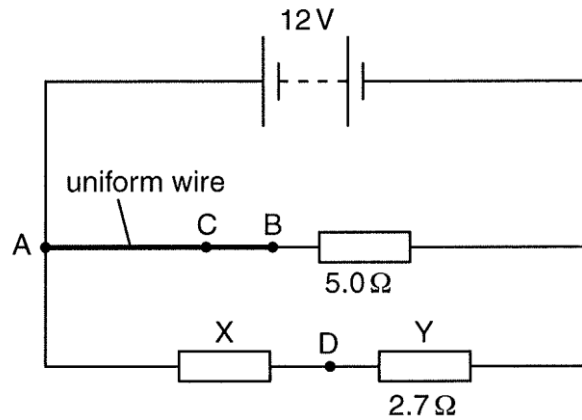
9.0 V

Fig. 6.2

A power supply of e.m.f. 9.0 V and negligible internal resistance is connected across a uniform resistance wire AB and a resistor of resistance 5.0 Ω.

The wire AB has length 1.0 m and resistance 4.0 Ω.

Resistor X and a resistor Y of resistance 2.7 Ω is connected in series across the power supply.

(i) Determine the resistance of the resistor X.

resistance = …………….................. Ω [1]

(ii) Calculate the current in

1. the wire AB,

current = …………….................. A [1]

2. the resistor X.

current = …………….................. A [1]

(iii) On Fig. 6.2, point C is at a distance 70 cm from point A on the wire AB. Point D is between resistor X and Y.

Calculate the potential difference between the points C and D.

potential difference = …………….................. V [3]

(iv) If the internal resistance of the power supply is not negligible, state and explain the change (if any) to answer in **(iii)**.

....

.... [1]