

6 (a) Define electric potential difference across a component.

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 [1]

(b) A circuit contains four resistors and a battery of electromotive force (e.m.f.) 8.0V with negligible internal resistance. When the variable resistor has resistance R , the currents in the circuit are 0.030A, I_1 and I_2 , as shown in Fig. 6.1.

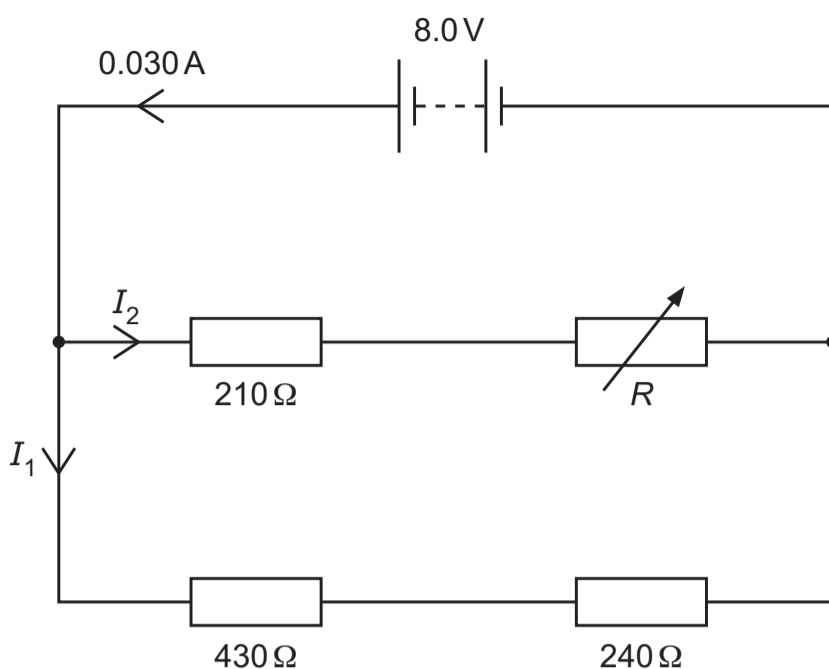


Fig. 6.1

(i) Determine the charge passing through the battery in a time of 4.0 minutes.

charge = C [2]

(ii) Calculate I_1 .

I_1 = A [2]

(iii) Calculate I_2 .

I_2 = A [1]

(iv) Determine R .

R = Ω [2]

(c) The variable resistor in (b) is fitted with a scale so that its resistance can be accurately determined. The resistor of resistance 240Ω is now replaced by a new resistor X of unknown resistance. A galvanometer is connected as shown in Fig. 6.2.

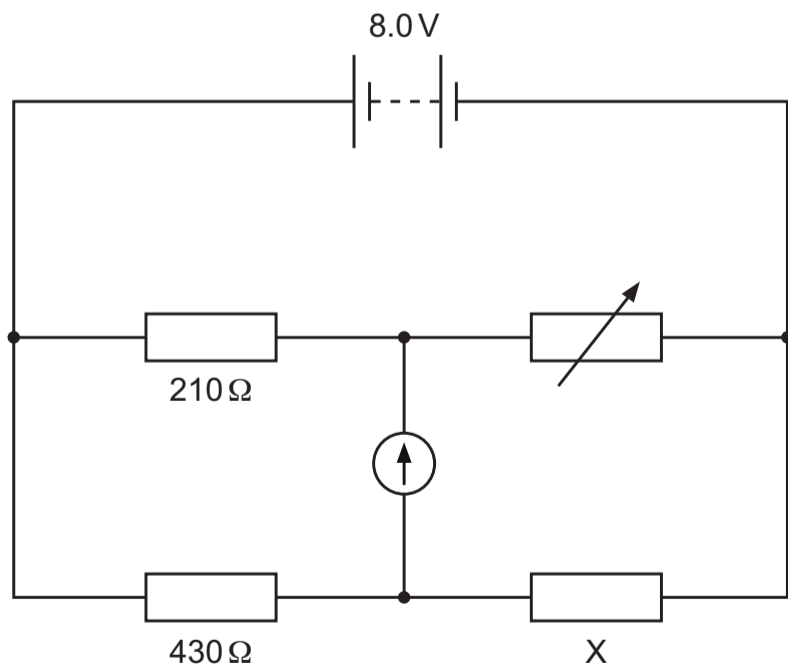


Fig. 6.2

With reference to ratios of resistances, explain how this circuit can be used to determine the resistance of X.

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 [2]