6 Two resistors A and B have resistances R_1 and R_2 respectively. The resistors are connected in series with a battery, as shown in Fig. 6.1.
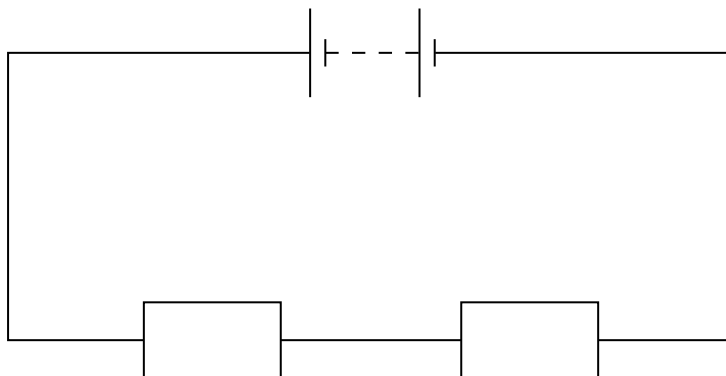

Fig. 6.1

The battery has electromotive force (e.m.f.) E and zero internal resistance.

(a) State the energy transformation that occurs in

    (i) the battery,

        ....

        .... [1]

    (ii) the resistors.

        ....

        .... [1]

(b) The current in the circuit is I.

    State the rate of energy transformation in

    (i) the battery,

        .... [1]

    (ii) the resistor A.

        .... [1]

(c) The resistors are made from metal wires. Data for the resistors are given in Fig. 6.2.

resistor	A	B
resistivity of metal	ρ	$\rho/2$
length of wire	l	l
diameter of wire	d	$2d$

Fig. 6.2

information from Fig. 6.2 to determine the ratio

$$\frac{\text{power dissipated in A}}{\text{power dissipated in B}}.$$

ratio = ... [3]

(d) The resistors A and B are connected in parallel across the same battery of e.m.f. *E*. Determine the ratio

$$\frac{\text{power dissipated in A}}{\text{power dissipated in B}}.$$

ratio = ... [2]