

5 (a) State Ohm's law.

[2]

(b) The variation of current I with potential difference V for a filament lamp is shown in Fig. 5.1.

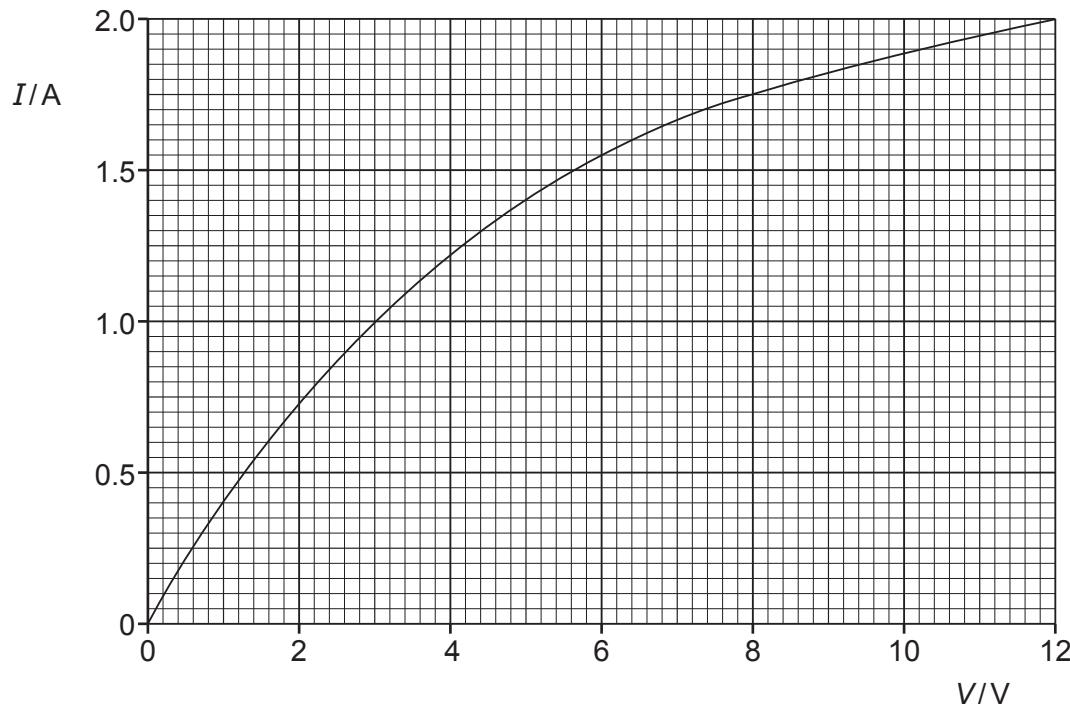


Fig. 5.1

The resistance of the filament lamp increases with potential difference.

(i) State how Fig. 5.1 shows this.

[1]

(ii) Explain why the resistance varies in this way.

[1]

- (c) Fig. 5.2 shows a circuit with a battery of electromotive force (e.m.f.) 12.0V connected to a linear potentiometer AB and two identical filament lamps P and Q.

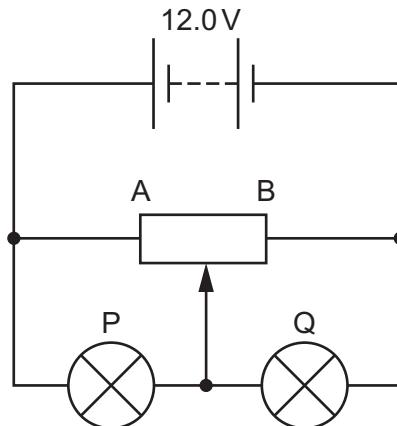


Fig. 5.2

The battery has negligible internal resistance and the lamps each have the same I - V characteristic shown in Fig. 5.1.

When the slider of the potentiometer is at its midpoint, as shown in Fig. 5.2, the current I in the battery is 1.78A.

Determine:

- (i) the current in lamp P

$$\text{current} = \dots \text{A} [1]$$

- (ii) the total power dissipated in lamps P and Q

$$\text{total power} = \dots \text{W} [2]$$

- (iii) the resistance of the potentiometer between its ends A and B.

$$\text{resistance} = \dots \Omega [2]$$

- (d) The slider of the potentiometer in (c) is moved to end A.

State and explain the effect on the brightness of lamps P and Q.

lamp P:

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lamp Q:

.....

[2]