

- 6 (a) Two resistors, each of resistance R , are connected first in series and then in parallel.

Show that the ratio

$$\frac{\text{combined resistance of resistors connected in series}}{\text{combined resistance of resistors connected in parallel}}$$

is equal to 4.

[1]

- (b) The variation with potential difference V of the current I in a lamp is shown in Fig. 6.1.

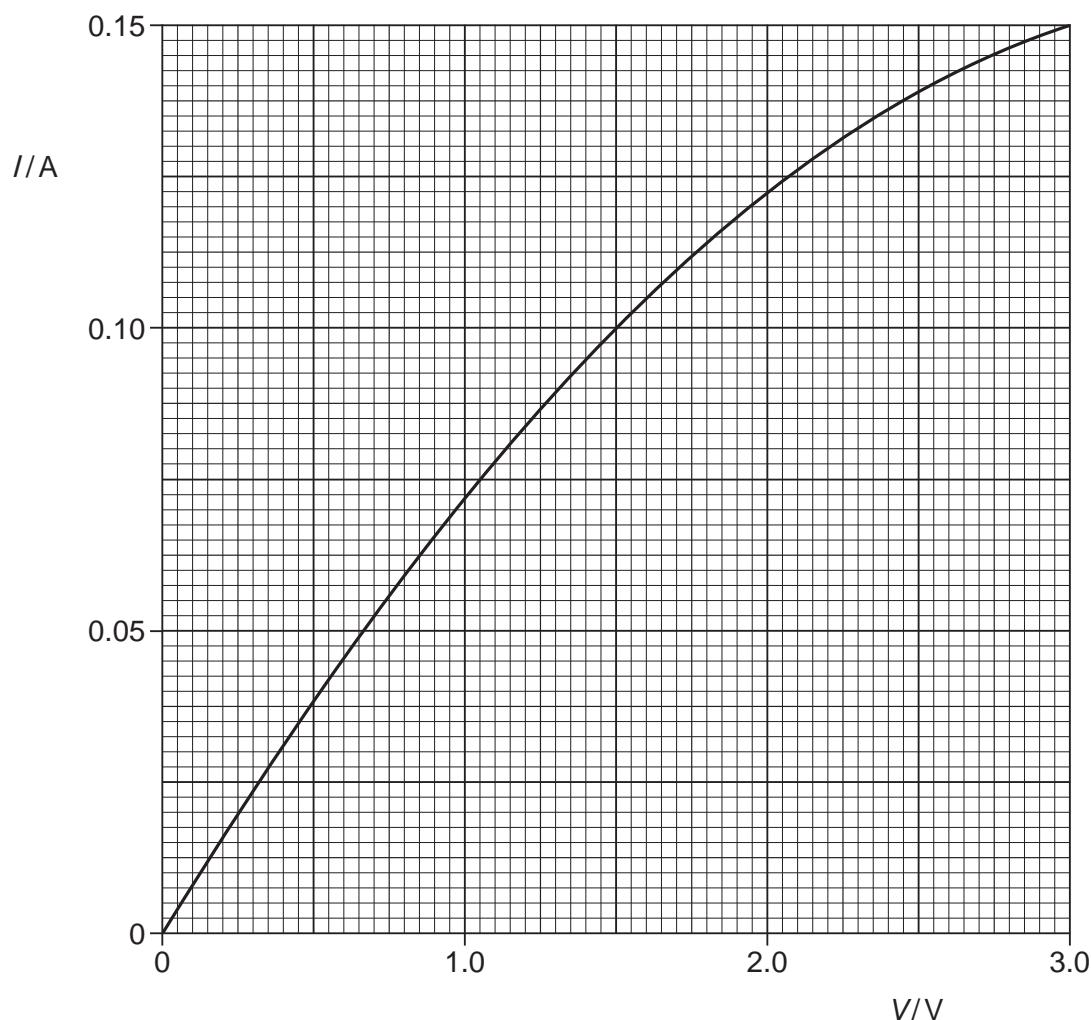


Fig. 6.1

Calculate the resistance of the lamp for a potential difference across the lamp of 1.5V.

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

- (c) Two lamps, each having the I - V characteristic shown in Fig. 6.1, are connected first in series and then in parallel with a battery of e.m.f. 3.0V and negligible internal resistance.

Complete the table of Fig. 6.2 for the lamps connected to the battery.

	p.d. across each lamp/V	resistance of each lamp/ Ω	combined resistance of lamps/ Ω
lamps connected in series
lamps connected in parallel

Fig. 6.2

[4]

- (d) (i) Use data from the completed Fig. 6.2 to calculate the ratio

$$\frac{\text{combined resistance of lamps connected in series}}{\text{combined resistance of lamps connected in parallel}}.$$

$$\text{ratio} = \dots [1]$$

- (ii) The ratios in (a) and (d)(i) are not equal.

By reference to Fig. 6.1, state and explain qualitatively the change in the resistance of a lamp as the potential difference is changed.

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[3]