

- 6 A battery of electromotive force (e.m.f.) 4.5 V and negligible internal resistance is connected to two filament lamps P and Q and a resistor R, as shown in Fig. 6.1.

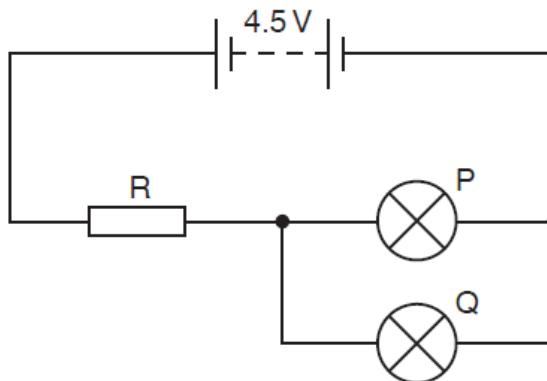


Fig. 6.1

The current in lamp P is 0.15 A. The  $I$ - $V$  characteristics of the filament lamps are shown in Fig. 6.2.

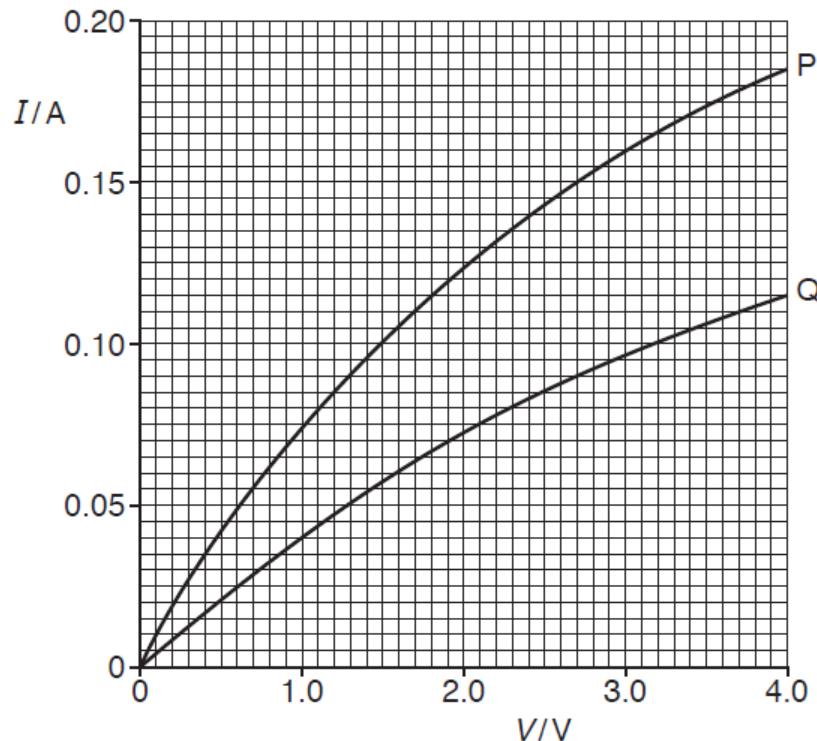


Fig. 6.2

- (a) Use Fig. 6.2 to determine the current in the battery. Explain your working.

current = ..... A [2]

- (b) Calculate the resistance of resistor R.

resistance = .....  $\Omega$  [2]

- (c) The filament wires of the two lamps are made from material with the same resistivity at their operating temperature in the circuit. The diameter of the wire of lamp P is twice the diameter of the wire of lamp Q.

Determine the ratio

$$\frac{\text{length of filament wire of lamp P}}{\text{length of filament wire of lamp Q}}$$

ratio = ..... [3]

- (d) The filament wire of lamp Q breaks and stops conducting.

State and explain, qualitatively, the effect on the resistance of lamp P.

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..... [2]

.....[Total:9 ]

## **Section B**

Answer **one** question from this Section in the spaces provided.