



- 5 A thin copper wire has a diameter of 0.18 mm and is 96 m long.

The resistivity of copper is $1.7 \times 10^{-8} \Omega \text{ m}$.

- (a) (i) Calculate the resistance of this wire.

$$\text{resistance} = \dots \Omega [3]$$

- (ii) When the wire hangs vertically, suspended from one end, it stretches slightly under its own weight.

State and explain what happens to the resistance of the wire.

.....
.....
..... [1]

- (iii) A cable of length 96 m consists of 16 strands of this wire.

Calculate the resistance of the cable.

$$\text{resistance} = \dots \Omega [1]$$

- (b) The current in the cable in (a)(iii) is 2.5 A.

- (i) Determine the power dissipated in the cable.

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

- (ii) The number density of charge carriers in copper is $8.5 \times 10^{28} \text{ m}^{-3}$.

Calculate the magnitude of the average drift velocity of the electrons in each strand of the copper wire.

$$\text{drift velocity} = \dots \text{ms}^{-1} [2]$$

