Answer on Question 70703, Physics, Other

Question:

Calculate the resistance of a copper wire of length $2.5\ m$ and diameter $0.36\ mm$.

Solution:

We can find the resistance of a copper wire from the formula:

$$R = \rho \frac{l}{A},$$

here, R is the resistance of the copper wire, $\rho = 1.68 \cdot 10^{-8}\ \Omega \cdot m$ is the resistivity of the copper wire, $l = 2.5\ m$ is the length of the copper wire, $A = \frac{\pi d^2}{4}$ is the cross-sectional area of the copper wire and $d = 3.6 \cdot 10^{-4}\ m$ is the diameter of the copper wire.

Then, we get:

$$R = \rho \frac{l}{A} = \rho \frac{l}{\frac{\pi d^2}{4}} = 4 \cdot \rho \frac{l}{\pi d^2} = 4 \cdot 1.68 \cdot 10^{-8}\ \Omega \cdot m \cdot \frac{2.5\ m}{\pi \cdot (3.6 \cdot 10^{-4}\ m)^2} =$$
$$= 0.412\ \Omega.$$

Answer:

$R = 0.412\ \Omega.$