Answer on Question#58880 — Physics / Electric Circuits

A 1 ohm resistor is to be made from a 1mm diameter wire of resistivity 2.2 x 10-8 ohm m. The length of the wire to one decimal is _____cm.

Solution:

Resistance of the wire can be calculated in the next way:

$$R = \rho \frac{l}{S}$$

where ρ is the resistivity if wire; l – length of the wire; S – cross-sectional area of wire.

Cross-sectional area can be calculated in the next way:

$$S = \pi \frac{d^2}{4}$$

where d is the diameter of the wire.

So the length of the wire equals:

$$l = \frac{\pi d^2 R}{4\rho} = \frac{3.14 * 1 * 10^{-6} * 1}{4 * 2.2 * 10^{-8}} = 35.6818\ (m)$$

Answer: 3568.2 cm