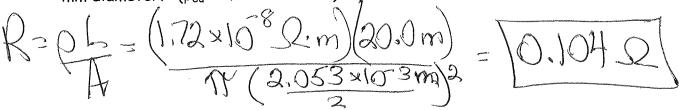


Practice - 20.3 Resistance and Resistivity

1. What is the resistance of a 20.0-m-long piece of 12-gauge copper wire having a 2.053-mm diameter? ( $\rho_{Cu}$  = 1.72 × 10<sup>-8</sup>  $\Omega$ ·m)



2. The diameter of 0-gauge copper wire is 8.252 mm. Find the resistance of a 1.00-km length of such wire used for power transmission. ( $\rho_{Cu}$  = 1.72 × 10<sup>-8</sup>  $\Omega$ ·m)

$$R = \rho L = (1.72 \times 10^{8} R \cdot m)(1.00 \times 10^{3} m) = [0.322.0]$$

3. If the 0.100-mm diameter tungsten filament in a light bulb is to have a resistance of 0.200  $\Omega$  at 20.0 °C, how long should it be? ( $\rho_W$  = 5.6 × 10<sup>-8</sup>  $\Omega$  m)

$$R = P \longrightarrow 1 = RA = (0.200 \Omega) \pi (0.100 \times 10^{3} m)^{2}$$

$$R = \frac{1}{4} \longrightarrow \frac{1}{2} \times \frac{1}{2$$

4. Find the ratio of the diameter of aluminum to copper wire, if they have the same resistance per unit length (as they might in household wiring). ( $\rho_{Cu} = 1.72 \times 10^{-8} \ \Omega$  m

and 
$$\rho_{AI} = 2.65 \times 10^{-8} \Omega m$$
)
$$RAI = Rcu \Rightarrow PAI = Peu \Rightarrow AAI = PAI \Rightarrow T(2) = PAI$$

$$AAI = Rcu \Rightarrow PAI = Peu \Rightarrow AAI = PAI \Rightarrow T(2) = PAI$$

$$AAI = PAI \Rightarrow PAI \Rightarrow PCU \Rightarrow PCU \Rightarrow T(2) \Rightarrow PCU \Rightarrow PC$$

long, when  $1.00 \times 10^3$  V is applied to it? (Such a rod may be used to make nuclear-particle detectors, for example.) ( $\rho_{S_1} = 2300 \, \Omega \cdot m$ )  $I = \frac{V}{R} = \frac{AV}{PL} = \frac{AV}{PL} = \frac{AV}{PL} = \frac{(2.54 \times 10^3 \text{m})^2}{(2300 \, \Omega \cdot m)(20.0 \times 10^3 \text{m})} = 1.10 \times 10^4 \text{A}$ 

5. What current flows through a 2.54-cm-diameter rod of pure silicon that is 20.0 cm

- 6. A wire is drawn through a die, stretching it to four times its original length. By what factor does its resistance increase? AS LT, AL Volume = Constant

  NEW = ANEW

  ROLD = AIAX = AIAX

  LNEW = HLOLD & ANEW = AIA

  LNEW = HLOLD & ANEW = III
  - = P 4 Lold F Aold = 16