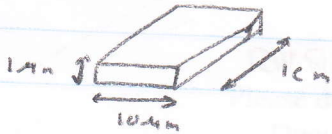


1. $\rho = 1.7 \mu\Omega\text{-cm}$



R?

$$R = \rho L/A$$

$$= 1.7 \mu\Omega\text{-cm} \cdot \frac{10\text{cm}}{10\text{mm} \cdot 1\text{mm}}$$

$$= 1.7(\times 10^{-6}) \times 10^{-2} \cdot \frac{1 \times 10^{-2}}{(10 \times 10^{-6})(1 \times 10^{-6})}$$

$$= 1.7 \times 10^{-8} \cdot (10 \times 10^8)$$

$$= 17 \Omega$$

10 pts

10 pts

2. metal circular wire

$$d = 1\text{mm} = 1 \times 10^{-3}$$

$$L = 50\text{cm} = 50 \times 10^{-2}$$

$$R = 100 \Omega$$

a) ρ ?

$$R = \rho L/A$$

$$\frac{R A}{L} = \rho$$

6 pts

$$\rho = 100 \cdot \frac{\pi \left(\frac{1 \times 10^{-3}}{2}\right)^2}{50 \times 10^{-2}} = 1.57 \times 10^{-4} \Omega\text{-m}$$

6 pts

b) Conductivity

$$\sigma = \frac{1}{\rho}$$

$$= \frac{1}{1.57 \times 10^{-4}}$$

$$= 6366.2 \text{ S/m}$$

6 pts

6 pts

c) R? if wire $L \times 10 = 50 \times 10^{-2} \times 10 = 5\text{m}$

$$R = \rho L/A$$

$$= 1.57 \times 10^{-4} \cdot \frac{5}{\pi \left(\frac{1 \times 10^{-3}}{2}\right)^2}$$

6 pts

$$= 999.5 \Omega$$

6 pts

2) Conductance of wire length $4 \times 10 = (50 \times 10^{-2}) \cdot 10 = 5$

$$G = \sigma \frac{A}{L}$$

$$= 6366.2 \cdot \frac{\pi \left(\frac{1 \times 10^{-3}}{2} \right)^2}{5}$$

← 7 pts

$$= 0.001 \text{ S } (\Omega^{-1})$$

← 7 pts

3. $\rho = 10^{-3} \Omega \cdot \text{cm} = 10^{-3} \cdot 10^{-2} \Omega \cdot \text{m}$

a) $d = 1 \text{ mm} = 1 \times 10^{-3}$

$L = 50 \text{ cm} = 50 \times 10^{-2}$

R?

$$R = \rho \frac{L}{A}$$

← 7 pts

$$= 10^{-3} \Omega \cdot \text{m} \cdot \frac{50 \times 10^{-2}}{\pi \left(\frac{1 \times 10^{-3}}{2} \right)^2}$$

$$= 6.37 \Omega$$

← 8 pts

b) $\rho = 1 \text{ k}\Omega \cdot \text{cm} = 1000 \cdot 10^{-2} = 10$

$d = 1 \text{ mm} = 1 \times 10^{-3}$

$L = 50 \text{ cm} = 50 \times 10^{-2}$

R?

$$R = \rho \frac{L}{A}$$

← 7 pts

$$= 10 \cdot \frac{50 \times 10^{-2}}{\pi \left(\frac{1 \times 10^{-3}}{2} \right)^2}$$

$$= 6.37 \times 10^6 \Omega$$

← 8 pts