

Conductivity, Resistance and Resistivity

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

Resistance : Ω

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

Resistivity : $\Omega \text{ m}$

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

Resistivity

Silver: $1.59 \times 10^{-8} \Omega \text{ m}$

Copper: $1.7 \times 10^{-8} \Omega \text{ m}$

Gold: $2.44 \times 10^{-8} \Omega \text{ m}$

Glass: $10^{10} \sim 10^{14} \Omega \text{ m}$

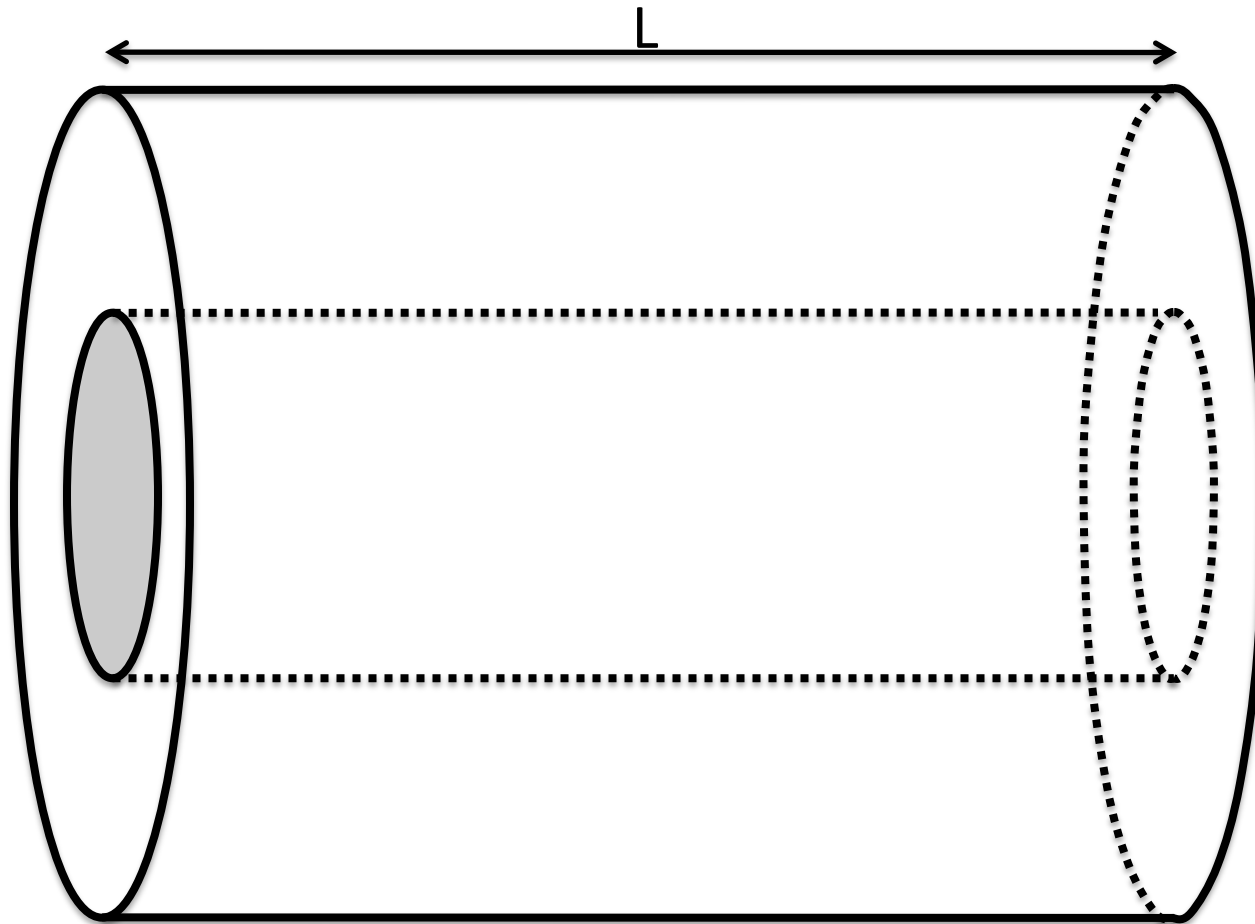
Ohm's Law

$$\vec{J} = \sigma \vec{E}$$

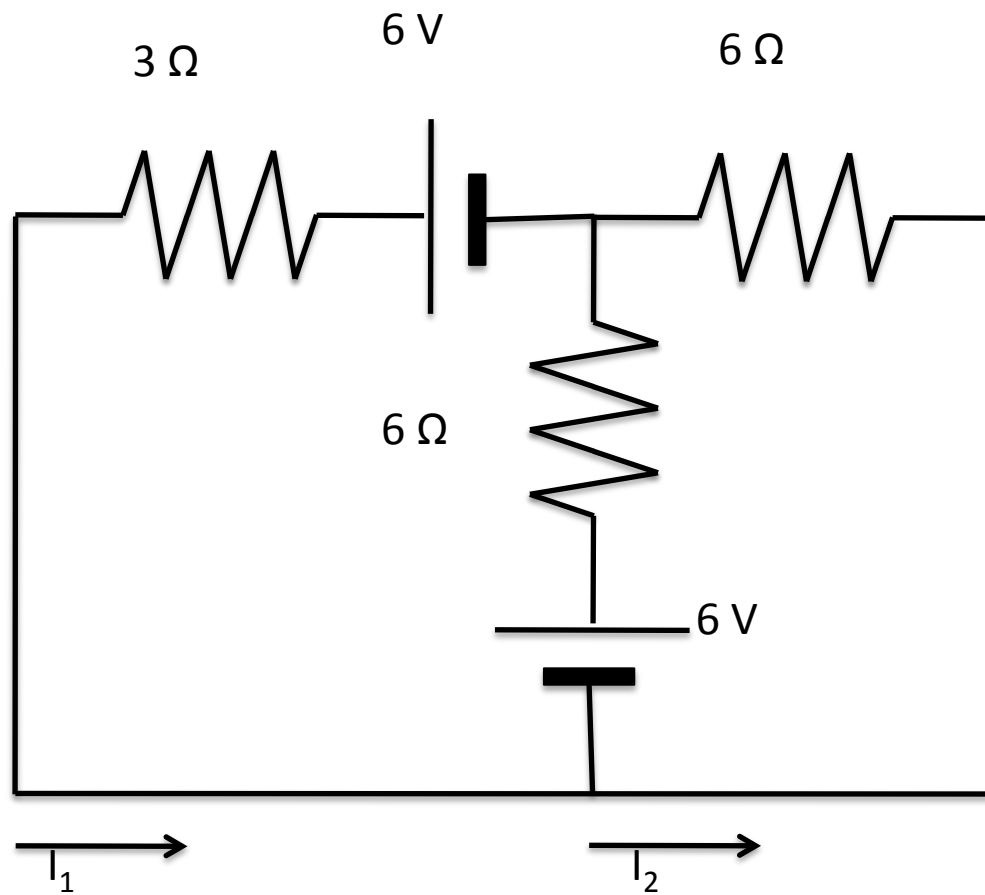
$$V = IR$$

$$P = IV$$

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

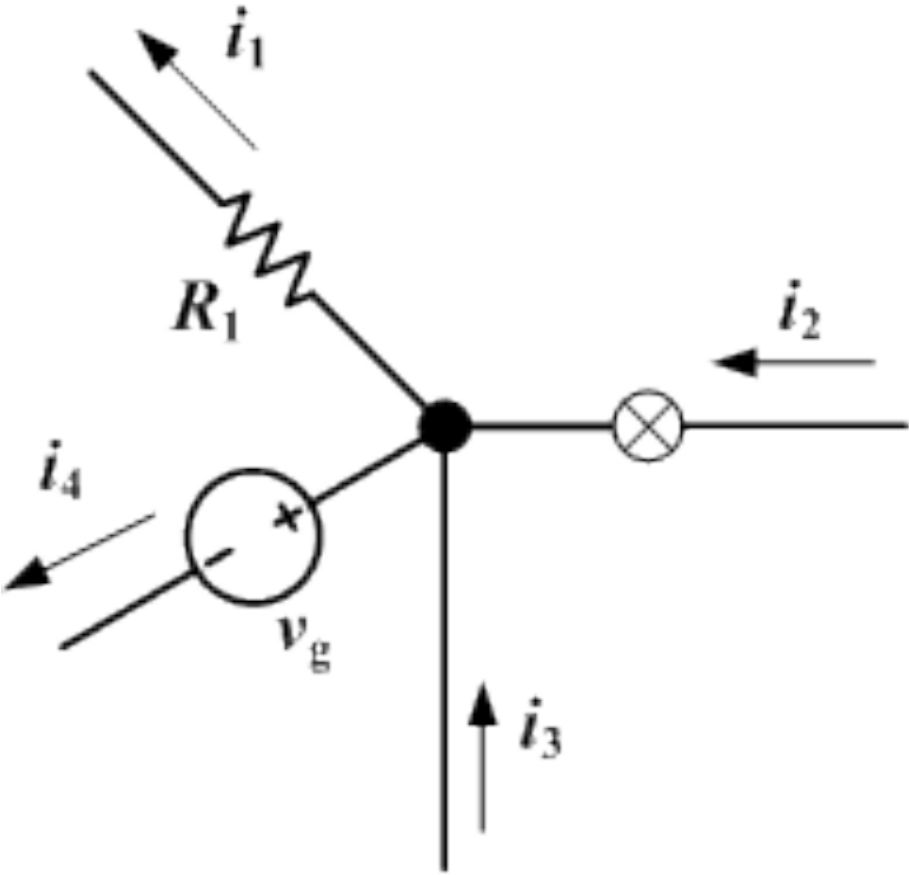


How do we understand behaviors of complex circuits?



Kirchhoff's Law

1. Conservation of Charge



Kirchhoff's Law

2. Conservation of Energy

$$\sum_{\text{ClosedLoop}} \Delta V = 0$$

