

Factors that govern **R**

- Material ρ The ability to carry electric current varies drastically
- Length **L** The longer the conductor, the greater its resistance
- Cross sectional area **A** The thicker the conductor, the less its resistance

$$R = \rho L/A$$

ρ is the resistivity, and depends on the material used

ρ reflects intrinsic properties of the material

ρ is a function of temperature

The unit of ρ is $\Omega \cdot m$

The work that must be done to take Q through V

$$W=QV$$

Since $I=Q/t$ or $Q=It$,

$$W=IVt \text{ (Electric work)}$$

Recall $P=\text{work done}/\text{time interval}=W/t$,

$$P=IV \text{ (Electric Power)}$$

Using Ohm's law $I=V/R$,

$$P=I^2R=V^2/R$$

The unit for Power is Watt, $1W=1J/s$