$$I = \frac{dQ}{dt} \qquad R = \rho \frac{\ell}{A} \qquad I = \frac{V}{R} \qquad P = IV \qquad j = \frac{I}{A} \qquad j = nev_d$$

$R_{eq} = R_1 + R_2 + \cdots$ (in series)

$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \cdots$ (in parallel)

$\frac{1}{C_{eq}} = \frac{1}{C_1} + \frac{1}{C_2} + \cdots$ (in series)

$C_{eq} = C_1 + C_2 + \cdots$ (in parallel)

Kirchhoff's Loop Law:

$$\sum_i \Delta V_i = 0$$

Kirchhoff's Junction Law:

$$\sum I_{in} = \sum I_{out}$$

$$\tau = RC \qquad I = I_0 e^{-\frac{t}{\tau}} \qquad Q = C\Delta V$$

$$d\vec{F} = I\, d\vec{\ell} \times \vec{B} \qquad \vec{F} = I\vec{\ell} \times \vec{B} \qquad \vec{F} = q\vec{v} \times \vec{B} \qquad \vec{F} = q\left(\vec{E} + \vec{v} \times \vec{B}\right)$$

$$f = \frac{qB}{2\pi m} \qquad r = \frac{mv}{qB} \qquad \mathcal{E}_H = E_H d = v_d B d$$

$$B = \frac{\mu_0}{2\pi} \frac{I}{r} \qquad \oint \vec{B} \cdot d\vec{\ell} = \mu_0 I_{encl}$$

$B = \mu_0 nI = \mu_0 \frac{N}{L} I$ solenoid

$B = \frac{\mu_0 NI}{2\pi r}$ toroid

$$d\vec{B} = \frac{\mu_0 I}{4\pi} \frac{d\vec{\ell} \times \hat{r}}{r^2}$$

$$dB = \frac{\mu_0 I}{4\pi} \frac{d\ell \sin\theta}{r^2}$$

$$\mathcal{E} = -N \frac{d\Phi_B}{dt} \qquad \Phi_B = \vec{B} \cdot \vec{A} \qquad d\Phi_B = \vec{B} \cdot d\vec{A}$$

$$V_s = V_p \frac{N_s}{N_p} \qquad I_p V_p = I_s V_s = P$$