$$\mu_0 = 4\pi \times 10^{-7} T \cdot m/A$$
$$\mu_0 = 1.26 \times 10^{-6} T \cdot m/A$$
$$k = \frac{1}{4\pi\epsilon_0} = 8.99 \times 10^9\ N \cdot m^2/C^2$$
$$\epsilon_0 = 8.85 \times 10^{-12}\ C^2/\left(N \cdot m^2\right)$$
$$e = 1.60 \times 10^{-19}\ C$$
$$G = 6.67 \times 10^{-11}\ N \cdot m^2/kg^2$$
$$h = 6.626 \times 10^{-34} J \cdot s$$
$$g = 9.8 m/s^2$$
$$c = 3.00 \times 10^8 m/s$$
$$N_\mathrm{A} = 6.02 \times 10^{23}\ \mathrm{mol}^{-1}$$
$$m_\mathrm{e} = 9.11 \times 10^{-31}\ kg$$
$$m_\mathrm{p} = 1.67 \times 10^{-27}\ kg$$
$$1\ \mathrm{m} = 3.28\ \mathrm{ft}$$
$$1\ \mathrm{lb} = 4.45\ N$$
$$1\ \mathrm{eV} = 1.6 \times 10^{-19} J$$
$$\rho_\mathrm{aluminum} = 2.75 \times 10^{-8} \Omega \cdot m$$
$$\rho_\mathrm{silver} = 1.47 \times 10^{-8} \Omega \cdot m$$
$$\rho_\mathrm{copper} = 1.72 \times 10^{-8} \Omega \cdot m$$
$$\rho_\mathrm{gold} = 2.44 \times 10^{-8} \Omega \cdot m$$
$$\rho_\mathrm{steel} = 20 \times 10^{-8} \Omega \cdot m$$
$$F = k\frac{|q_1||q_2|}{r^2}$$
$$dq = i\ dt$$
$$q = ne$$
$$\vec{E} = \frac{\vec{F}}{q_0}$$
$$E = \frac{1}{4\pi\epsilon_0}\frac{|q|}{r^2}$$
$$E = \frac{qz}{4\pi\epsilon_0\left(z^2+R^2\right)^{3/2}} \quad \text{(ring)}$$
$$E = \frac{\sigma}{2\epsilon_0}\left(1 - \frac{z}{\sqrt{z^2+R^2}}\right) \quad \text{(disk)}$$
$$\Phi = \oint \vec{E} \cdot d\vec{A}$$
$$\epsilon_0 \Phi = q_\mathrm{enc}$$
$$\epsilon_0 \oint \vec{E} \cdot d\vec{A} = q_\mathrm{enc}$$
$$E = \frac{\sigma}{\epsilon_0} \quad \text{(surface)}$$
$$E = \frac{\sigma}{2\epsilon_0} \quad \text{(sheet)}$$
$$E = \frac{\lambda}{2\pi\epsilon_0 r} \quad \text{(line)}$$
$$V \equiv \frac{U}{q} = \frac{-W}{q}$$
$$\Delta V \equiv \frac{K_2 - K_1}{q}$$
$$V = = V_f - V_i = -\int_i^f \vec{E} \cdot d\vec{s}$$
$$V = \frac{1}{4\pi\epsilon_0}\frac{q}{r}$$
$$V = \Sigma_i \frac{1}{4\pi\epsilon_0}\frac{q_i}{r_i}$$
$$V = \int dv = k\int \frac{dq}{r}$$
$$qV = \frac{1}{2}mv^2$$
$$E_s = -\frac{\partial V}{\partial s}$$
$$E_x = -\frac{\partial V}{\partial x}$$
$$E_y = -\frac{\partial V}{\partial y}$$
$$U = \frac{kq_1q_2}{r}$$
$$q = CV$$
$$C = \frac{\epsilon_0 A}{d} \quad \text{parallel}$$
$$C = 2\pi\epsilon_0 \frac{L}{\ln(b/a)} \quad \text{cylindrical}$$
$$C = 4\pi\epsilon_0 \frac{ab}{b-a} \quad \text{spherical}$$
$$C = 4\pi\epsilon_0 R \quad \text{sphere}$$
$$C_\mathrm{eq} = \Sigma_{j=1}^n C_j$$
$$C_\mathrm{eq} = \frac{1}{\Sigma_{j=1}^n \frac{1}{C_j}}$$
$$U = \frac{q^2}{2C}$$
$$U = \frac{1}{2}CV^2$$
$$i \equiv \frac{dq}{dt}$$
$$i = \int \mathbf{J} \cdot d\mathbf{A}$$
$$J = \frac{I}{A}$$
$$V = IR$$
$$\rho \equiv \frac{E}{J}$$
$$\mathbf{E} = \rho\mathbf{J}$$
$$\sigma \equiv \frac{1}{\rho}$$
$$R = \rho\frac{L}{A}$$

$$
\begin{aligned}
P &= i^2 R \\
P &= \frac{V^2}{R} \\
P &= \frac{E}{t} \\
P &= iV \\
\mathcal{E} &= \frac{dW}{dq} \\
i &= \frac{\mathcal{E}}{R} \\
R_{\text{eq}} &= \Sigma_{j=1}^{n} R_j \\
\frac{1}{R_{\text{eq}}} &= \Sigma_{j=1}^{n} \frac{1}{R_j} \\
P_{\text{emf}} &= i\mathcal{E} \\
q &= q_0 e^{-t/RC} \\
T_{1/2} &= RC \ln 2 \\
\vec{F}_B &= q\vec{v} \times \vec{B} \\
F_B &= |q| vB \sin\phi \\
|q| vB &= \frac{mv^2}{r} \\
r &= \frac{mv}{|q|B} \\
T &= \frac{2\pi m}{qB} \\
f &= \frac{qB}{2\pi m} \\
\omega &= \frac{qB}{m} \\
\vec{F}_B &= i\vec{L} \times \vec{B} \\
d\vec{F}_B &= i \; d\vec{L} \times \vec{B} \\
d\vec{B} &= \frac{\mu_0}{4\pi} \frac{i \; d\vec{s} \times \vec{r}}{r^3} \\
B &= \frac{\mu_0 i}{2\pi r} \quad \text{(long straight wire)} \\
B &= \frac{\mu_0 i \phi}{4\pi R} \quad \text{(arc)} \\
F_{ba} &= \frac{\mu_0 L i_a i_b}{2\pi d} \quad \text{(two straight wires)} \\
\oint \vec{B} \cdot d\vec{s} &= \mu_0 i_{\text{enc}} \\
B &= \mu_0 i n \quad \text{(solenoid)} \\
B &= \frac{\mu_0 i N}{2\pi} \frac{1}{r} \quad \text{(toroid)} \\
\Phi_B &= \int \vec{B} \cdot d\vec{A} \quad \text{(magnetic flux)} \\
\Phi_B &= BA \\
\mathcal{E} &= -\frac{d\Phi_B}{dt} \quad \text{(Faraday's Law)} \\
\mathcal{E} &= BLv
\end{aligned}
$$

$$
\begin{aligned}
\oint \vec{E} \cdot d\vec{s} &= -\frac{d\Phi_B}{dt} \\
L &= \frac{N\Phi}{i} \quad \text{(inductance)} \\
\frac{L}{l} &= \mu_0 n^2 A \quad \text{(solenoid)} \\
\mathcal{E}_L &= -L\frac{di}{dt} \\
L\frac{di}{dt} + Ri &= \mathcal{E} \\
\tau_L &= \frac{L}{R} \\
i &= i_0 e^{-t/\tau_L} \\
U_B &= \frac{1}{2} L i^2 \\
i_{\text{rms}} &= \frac{i}{\sqrt{2}} \\
V_2 &= \frac{N_2}{N_1} V_1 \\
E &= cB \\
c &= \lambda f \\
n &= \frac{c}{v} \\
I &= \frac{1}{2} I_0 \quad \text{(unpolarized)} \\
I &= I_0 \cos^2\theta \quad \text{(polarized)} \\
\theta_1' &= \theta_1 \quad \text{(reflection)} \\
n_2 \sin\theta_2 &= n_1 \sin\theta_1 \quad \text{(refraction)} \\
\theta_c &= \sin^{-1} \frac{n_2}{n_1} \\
s' &= -s \\
f &= \pm\frac{r}{2} \quad \text{(spherical)} \\
\frac{1}{s} + \frac{1}{s'} &= \frac{1}{f} \\
m &= \frac{-s'}{s} \quad \text{(magnification)} \\
\gamma &= \frac{1}{\sqrt{1-(v/c)^2}} \\
\Delta t &= \gamma \Delta t_0 = \frac{\Delta t_0}{\sqrt{1-(v/c)^2}} \\
L &= \frac{L_0}{\gamma} = L_0 \sqrt{1-(v/c)^2} \\
K &= (\gamma - 1)\, mc^2 \\
E &= \gamma mc^2 \\
E &= hf \\
\lambda &= \frac{h}{p}
\end{aligned}
$$