Formulas
(you need very few of these!!)

$$\vec{A}\cdot\vec{B} = |A||B|\cos\theta,\ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a},\ \sin\theta = \frac{o}{h},\ \sum \vec{F} = m\vec{a}$$

$$\sin 30° = 0.5 = \cos 60°, \cos 30° = 0.866 = \sin 60°,\ \tan 45° = 1$$

$$\sin 45° = 0.707 = \cos 45°,\ g = 10\frac{m}{\sec^2},\ C = 2\pi r,\ A = \pi r^2$$

$$V = \frac{4}{3}\pi r^3,\ A_{sphere} = 4\pi r^2,\ A_{cylinder} = 2\pi rh,\ x = x_0 + v_0 t + \frac{1}{2}a_x t^2$$

$$\Delta L = L\alpha\Delta T \quad \Delta V = V\beta\Delta T \quad T_c = T - 273° \quad T_F = \frac{9}{5}T_C + 32°$$

$$W = \int dW = \int_{V_i}^{V_f} pdV,\ \Delta E_{\text{int}} = Q - W \quad Q = cm(T_f - T_i) \quad Q = Lm$$

$$H = \frac{Q}{t} = kA\frac{T_h - Tc}{L} \quad P_r = \sigma\varepsilon AT^4$$

$$\text{N}_A = 6.02\times 10^{23}\,\text{mol}^{-1} \quad pV = nRT \quad W_{isothermal} = nRT\ln\left(\frac{V_f}{V_i}\right) \quad v_{rms} = \sqrt{\frac{3RT}{M}}$$

$$\overline{K} = \frac{3}{2}kT \quad k = 1.38\times 10^{-23}\,\text{J / K} \quad R = 8.31\,\text{J}/\text{mol K} \quad pV^\gamma = const \quad \gamma = \frac{C_p}{C_v}$$

$$C_p = C_v + R,\ C_v = \frac{3}{2}R \text{ (ideal monatomic gas)} \quad E_{\text{int}} = nC_vT \quad \Delta E_{\text{int}} = nC_V\Delta T$$

$$\Delta S = S_f - S_i = \int_i^f \frac{dQ}{T} \quad \varepsilon = \frac{|W|}{|Q_h|} \quad \varepsilon = 1 - \frac{|Q_c|}{|Q_h|} = 1 - \frac{T_c}{T_h} \quad K = \frac{|Q_c|}{|W|}$$

$$K = \frac{|Q_c|}{|Q_h| - |Q_c|} = \frac{T_c}{T_h - T_c}$$

$$\vec{F} = \frac{q_1 q_2}{4\pi\varepsilon_0 r^2}\hat{r} \quad \vec{E} = \frac{\vec{F}}{q_o} \quad \vec{F} = q\vec{E} \quad \vec{E} = \frac{|q|}{4\pi\varepsilon_0 r^2}\hat{r} \quad d\vec{E} = \frac{|dq|}{4\pi\varepsilon_0 r^2}\hat{r}$$

$$q = \lambda L,\ dq = \lambda ds,\ q = \sigma A,\ dq = \sigma dA,\ q = \rho V,\ dq = \rho dV$$

$$\varepsilon_0 \Phi = q_{enc} \quad \Phi = \oint \vec{E} \cdot d\vec{A} \quad \varepsilon_0 \oint \vec{E} \cdot d\vec{A} = q_{enc},\ \varepsilon_0 = 8.85 \times 10^{-12}\ \mathrm{C}^2/\mathrm{N\ m}^2$$

$$V = \vec{E} \cdot \vec{d},\ V = \frac{q}{4\pi\varepsilon_0 r}\ ,\ E_x = -\frac{\partial V}{\partial x},\ E_y = -\frac{\partial V}{\partial y},\ E_z = -\frac{\partial V}{\partial z}$$

$$\Phi_B = \int B \cdot dA,\ \Phi_B = B \cdot A,\ v = \frac{dx}{dt},\ \varepsilon = -\frac{d\Phi_B}{dt}$$

$$i = \frac{dq}{dt},\ i = \int \vec{J} \cdot d\vec{A},\ \rho = \frac{1}{\sigma} = \frac{E}{J},\ R = \frac{\rho L}{A},\ P = iV,\ P = i^2 R = \frac{V^2}{R}$$

$$V = iR,\ C = \frac{q}{V},\ C_{eq} = \kappa C_{air},\ C = \frac{\varepsilon_0 A}{d},\ \varepsilon_L = -L\frac{di}{dt},\ L = \frac{N\Phi_B}{i}$$

$$\omega = \frac{1}{\sqrt{LC}} \quad I = \frac{\varepsilon_m}{Z} \quad Z = \sqrt{R^2 + (X_L - X_C)^2} \quad X_L = \omega_d L \quad X_C = \frac{1}{\omega_d C}$$

$$\tan\varphi = \frac{X_L - X_C}{R},\ C_{eq} = \sum_{j=1}^{n} C_j,\ \frac{1}{C_{eq}} = \sum_{j=1}^{n}\frac{1}{C_j},\ R_{eq} = \sum_{j=1}^{n} R_j,\ \frac{1}{R_{eq}} = \sum_{j=1}^{n}\frac{1}{R_j}$$

$$F_B = q\vec{v} \times \vec{B},\ qvB = \frac{mv^2}{r},\ F_B = i\vec{L} \times \vec{B},\ dF_B = id\vec{L} \times \vec{B},\ \tau = \vec{\mu} \times \vec{B}$$

$$\mu = NiA,\ q = CV(1 - e^{-t/RC}),\ i = \frac{dq}{dt} = i_0 e^{-t/\tau_l} \quad \tau_L = \frac{L}{R}$$

$$U = \frac{q^2}{2C} = \frac{1}{2}CV^2,\ U_B = \frac{1}{2}Li^2,\ V_s = V_p\frac{N_s}{N_p},\ I_s = I_p\frac{N_p}{N_s}$$