Potentially useful formulas and constants (see both sides):

$$v_{\rm av} = \frac{\Delta x}{\Delta t}\,,\ \ v(t) = \lim_{\Delta t\to 0}\frac{\Delta x}{\Delta t}\,,\ \ a_{\rm av} = \frac{\Delta v}{\Delta t}\,,\ \ a(t) = \lim_{\Delta t\to 0}\frac{\Delta v}{\Delta t}\,,\ \ 1\,{\rm m} = 3.281\,{\rm ft}\,,\ \ 1\,{\rm mi} = 5280\,{\rm ft}\,,\ \ g = 9.81\,{\rm m/s^2}\,,$$

$$v = a\Delta t + v_0\,,\ \ x = \frac{1}{2}a(\Delta t)^2 + v_0\Delta t + x_0\,,\ \ v^2 = v_0^2 + 2a(x-x_0)\,,\ \ v_{\rm av} = \frac{1}{2}(v+v_0)\,,\ \ x = \frac{-b\pm\sqrt{b^2-4ac}}{2a}\,,$$

$$\vec{A} = A_x\hat{x} + A_y\hat{y}\,,\ \ A_x = A\cos\theta\,,\ \ A_y = A\sin\theta\,,\ \ A = \sqrt{A_x^2+A_y^2}\,,\ \ \theta = \tan^{-1}\frac{A_y}{A_x}\,,\ \ \vec{v} = \vec{v}\,' + \vec{V}\,,$$

$$\vec{v}_{\rm av} = \frac{\Delta\vec{r}}{\Delta t}\,,\ \ \vec{a}_{\rm av} = \frac{\Delta\vec{v}}{\Delta t}\,,\ \ \vec{v} = \vec{a}\Delta t + \vec{v}_0\,,\ \ \vec{r} = \frac{1}{2}\vec{a}(\Delta t)^2 + \vec{v}_0\Delta t + \vec{r}_0\,,\ \ v^2 = v_0^2 + 2a_x(x-x_0) + 2a_y(y-y_0)\,,$$

$$\vec{F} = m\vec{a}\,,\ \ \vec{F}_{\rm grav} = -G\frac{m_1m_2}{r^2}\frac{\vec{r}}{r}\,,\ \ G = 6.67\cdot 10^{-11}\,{\rm N\,m^2/\,kg^2}\,,\ \ w = mg\,,\ \ g = \frac{GM}{R^2}\,,\ \ f_k = \mu_k N\,,\ \ f_s \le \mu_s N\,,$$

$$\vec{F}_{\rm spring} = -k\Delta\vec{r}\,,\ \ a_c = \frac{v^2}{r}\,,\ \ v = \frac{2\pi r}{T} = \omega r\,,\ \ \vec{F}_{\rm drag} = -bv^n\hat{v}\,,\ \ T_{\rm orbit} = \frac{2\pi}{\sqrt{GM}}r^{3/2}\,,\ \ v_{\rm orbit} = \sqrt{\frac{GM}{r}}\,,$$

$$E = K + U\,,\ \ K = \frac{1}{2}mv^2\,,\ \ \Delta K = W \equiv Fd\cos\theta\,,\ \ \Delta E = W_{nc}\,,\ \ U_{\rm near} = mgh\,,\ \ U_{\rm grav} = -G\frac{mM}{r}\,,\ \ U_{\rm spring} = \frac{1}{2}kd^2\,,$$

$$P_{\rm av} = \frac{W}{\Delta t} = Fv_{\rm av}\cos\theta\,,\ \ 1\,{\rm hp} = 746\,{\rm W}\,,\ \ \vec{I} = \vec{F}_{\rm av}\Delta t = \Delta\vec{p}\,,\ \ \vec{p} = m\vec{v}\,,$$

$$v_{1f} = \frac{(1+e)m_2v_{2i} + (m_1-em_2)v_{1i}}{m_1+m_2}\,,\ \ v_{2f} = \frac{(1+e)m_1v_{1i} + (m_2-em_1)v_{2i}}{m_1+m_2}\,,$$

$$M = \sum_n m_n\,,\ \ \vec{R} = \frac{1}{M}\sum_n m_n\vec{r}_n\,,\ \ \vec{V}_{\rm cm} = \frac{1}{M}\sum_n m_n\vec{v}_n\,,\ \ \vec{A}_{\rm cm} = \frac{1}{M}\sum_n m_n\vec{a}_n\,,\ \ \vec{F}^{\rm net}_{\rm ext} = M\vec{A}_{\rm cm}\,.$$

$$\omega_{\rm av} = \frac{\Delta\theta}{\Delta t}\,,\ \ \omega = \alpha\Delta t + \omega_i\,,\ \ \alpha_{\rm av} = \frac{\Delta\omega}{\Delta t}\,,\ \ \theta = \frac{1}{2}\alpha(\Delta t)^2 + \omega_i\Delta t + \theta_i\,,\ \ \omega^2 = \omega_i^2 + 2\alpha\Delta\theta\,,$$

$$\vec{R}_{\rm cog} = \frac{1}{W}\sum_n w_n\vec{r}_n\,,\ \ a_c = r\omega^2\,,\ \ a_t = r\alpha\,,\ \ v_t = r\omega\,,\ \ f = 1/T\,,\ \ \omega = 2\pi f = 2\pi/T\,,$$

$$I\alpha = \tau\,,\ \ \tau = r_\perp F = rF_t = rF\sin\theta\,,\ \ L = r_\perp p = I\omega\,,\ \ K_{\rm rot} = \frac{1}{2}I\omega^2\,,\ \ W_{\rm rot} = \tau\Delta\theta\,,\ \ \Delta L = \tau_{\rm av}\Delta t\,,$$

$$I = \sum_i m_ir_i^2\,,\ \ I_{\rm rod}^{\rm end} = \frac{1}{3}ml^2\,, I_{\rm rod}^{\rm ctr} = \frac{1}{12}ml^2\,, I_{\rm cyl} = \frac{1}{2}MR^2\,,\ \ I_{\rm shell} = \frac{2}{3}MR^2\,,\ \ I_{\rm sphere} = \frac{2}{5}MR^2\,,$$

$$\omega = \sqrt{k/m} = \sqrt{g/l}\,,\ \ x = A\cos\omega t\,,\ \ v = -A\omega\sin\omega t\,,\ \ a = -A\omega^2\cos\omega t\,,\ \ E = \frac{1}{2}kA^2\,,\ \ A = A_0e^{-bt/(2m)}\,,$$

$$\omega = \sqrt{lmg/I}\,,\ \ F/A = Y\Delta L/L_0\,,\ \ F/A = S\Delta x/L_0\,,\ \ \Delta P = -B\Delta V/V_0\,,$$

$$\rho = m/V\,,\ \ P = F/A\,,\ \ Q = cm\Delta T\,,\ \ Q = mL\,,\ \ Q = kA\Delta Tt/L\,,\ \ R = 8.31\,{\rm J/(mol\cdot K)}\,,\ \ c_{\rm water} = 4186\,{\rm J/(kg\cdot K)}\,,$$

$$T_C = \frac{5}{9}(T_F - 32\,^\circ{\rm F})\,,\ \ 1\,{\rm Pa} = 1\,{\rm N/m^2}\,,\ \ 1\,{\rm atm} = 1.013\times10^5\,{\rm Pa} = 760\,{\rm mmHg}\,,\ \ L_{f\rm water} = 3.35\times10^5\,{\rm J/kg}\,,$$

$$1\,{\rm bar} = 10^5\,{\rm Pa}\,,\ \ P_2 = P_1 + \rho gh\,,\ \ F_B = \rho gV\,,\ \ \rho_1A_1v_1 = \rho_2A_2v_2\,,\ \ P_1 + \frac{1}{2}\rho v_1^2 + \rho gy_1 = P_2 + \frac{1}{2}\rho v_2^2 + \rho gy_2\,,$$

$$\Delta L = \alpha L_0\Delta T\,,\ \ \Delta V = \beta V_0\Delta T\,,$$

$$T = T_C + 273.15\,{\rm K}\,,\ \ N_A = 6.022\times10^{23}/{\rm mol}\,,\ \ 1\,u = 1.6605\times10^{-27}\,{\rm kg}\,,\ \ PV = nRT = NkT\,,$$

$$k = R/N_A = 1.38\times10^{-23}\,{\rm J/K}\,,\ \ {\rm M = N_Am}\,,\ \ {\rm K_{av}} = \frac{3}{2}{\rm kT}\,,\ \ {\rm v_{rms}} = \sqrt{\rm 3kT/m} = \sqrt{\rm 3RT/M}\,,\ \ {\rm U} = \frac{3}{2}{\rm nRT}\,,$$

$$\text{rel. humidity} = \frac{\text{partial vapor pressure}}{\text{equil. vapor pressure}}\times 100\%\,,\ \ Q = e\sigma T^4At\,,\ \ \sigma = 5.67\times10^{-8}\,{\rm J/(s{\cdot}m^2{\cdot}K^4)}\,,$$

Potentially useful formulas and constants (see both sides)

$$\Delta U = Q - W\,,\;\; W = P\Delta V\,,\;\; PV^{\gamma} = \text{const.}\,,\;\; \gamma = C_P/C_V = 5/3\,,\;\; nC = mc\,,\;\; W = nRT\ln(V_f/V_i)\,,$$

$$C_P = \frac{5}{2}R\,,\;\; C_V = \frac{3}{2}R\,,\;\; Q_H = W + Q_C\,,\;\; e = W/Q_H\,,\;\; e_C = 1 - T_C/T_H\,,\;\; Q_C/Q_H = T_C/T_H\,,$$

$$\Delta S = Q/T\,,\;\; \Delta S = cm\ln(T_f/T_i)\,,\;\; \text{COP}_{\text{frig}} = Q_c/W\,,\;\; \text{COP}_{\text{pump}} = Q_h/W\,,\;\; W_{\text{lost}} = T_{\text{min}}\Delta S\,.$$

$$\Delta S = nC_V\ln\frac{T_f}{T_i} + nR\ln\frac{V_f}{V_i},\;\; \Delta S = nC_P\ln\frac{T_f}{T_i},\;\; \Delta S = \frac{mL}{T}.$$

$$v = f\lambda\,,\;\; v = \sqrt{\frac{F}{\mu}}\,,\;\; \mu = m/L\,,\;\; \beta = 10\,\text{dB}\,\log(I/I_0)\,,\;\; I_0 = 10^{-12}\,\text{W/m}^2\,,\;\; I = P/A\,,$$

$$f_o = f_s\frac{1 \pm u_o/v}{1 \mp u_s/v}\,,\;\; f_{\text{beat}} = |f_1 - f_2|\,,\;\; f_n = n\frac{v}{2L}\,,\;\; n = 1, 2, 3, \ldots \;\; \text{or} \;\; n\frac{v}{4L}\,,\;\; n = 1, 3, 5, \ldots$$