Physics 190 Formula Sheet 1

$$v = v_o + a\,t$$

$$x = x_o + \frac{1}{2}\left(v + v_o\right) t$$

$$x = x_o + v_o\,t + \frac{1}{2}\,a\,t^2$$

$$x = x_o + \left(\frac{v^2 - v_o^2}{2\,a}\right)$$

$$a_R = \frac{v^2}{r}$$

$$a = \frac{d\,v}{d\,t}$$

$$\vec{v_{ac}} = \vec{v_{ab}} + \vec{v_{bc}}$$

$$\vec{F_1} + \vec{F_2} + \cdots + \vec{F_N} = m\,\vec{a}$$

$$\sum_{n=1}^{N} \vec{F_n} = m\,\vec{a}$$

$$w = m\,g$$

$$f_k = \mu_k\,N$$

$$f_s \leq \mu_s\,N$$

$$W = F\,x\cos\theta$$

$$W = \vec{F}\cdot\vec{x}$$

$$K_T = \frac{1}{2}\,m\,v^2$$

$$\text{Power} = \frac{W}{t}$$

$$\vec{F} = -\,k\,\vec{x}$$

$$F = k\,x$$

$$\Delta U_s = \frac{1}{2}\,k\,x_2^2 - \frac{1}{2}\,k\,x_1^2$$

$$\Delta U_g = m\,g\,h_2 - m\,g\,h_1$$

$$\Delta K + \Delta U_g + \Delta U_s = W_f + W_F + \cdots$$

$$\vec{p} = m\,\vec{v}$$

$$\vec{F} = \frac{d\,\vec{p}}{d\,t}$$

$$\vec{p_{before}} = \vec{p_{after}}$$

$$x_{cm} = \frac{\sum_{n=1}^{N} m_n\,x_n}{\sum_{n=1}^{N} m_n}$$

$$\theta = \frac{s}{r}$$

$$\omega = \frac{d\,\theta}{d\,t} = \frac{v}{r}$$

$$\alpha = \frac{d\,\omega}{d\,t} = \frac{a}{r}$$

$$\omega = \omega_o + \alpha\,t$$

$$\theta = \theta_o + \frac{1}{2}\left(\omega + \omega_o\right) t$$

$$\theta = \theta_o + \omega_o\,t + \frac{1}{2}\,\alpha\,t^2$$

$$\theta = \theta_o + \left(\frac{\omega^2 - \omega_o^2}{2\,\alpha}\right)$$

$$K_R = \frac{1}{2}\,I\,\omega^2$$

$$\vec{\tau} = r\,F\sin\theta,\ \text{RHR}$$

$$\sum_{n=1}^{N} \vec{\tau_n} = I\,\vec{\alpha}$$

$$d\,\omega = \tau\,d\,\theta$$

$$\vec{L} = I\,\vec{\omega}$$

$$\vec{L} = m\,v\,r\sin\theta$$

$$\vec{\tau} = \frac{d\,\vec{L}}{d\,t}$$

$$\frac{d^2x}{d\,t^2} + \frac{k}{m}\,x = 0$$

$$\omega = \sqrt{\frac{k}{m}}$$

$$\omega = 2\,\pi\,f$$

$$T = \frac{1}{f}$$

$$E = \frac{1}{2}\,k\,A^2$$

$$F = \frac{G\,m_1\,m_2}{r^2}$$

$$G = 6.67 \times 10^{-11}\ \frac{N\,m^2}{kg^2}$$

$$T^2 = \frac{4\,\pi^2\,r^3}{G\,m}$$

$$U_g = -\,\frac{G\,m_1\,m_2}{r}$$

$$E = -\,\frac{G\,m_1\,m_2}{2\,r}$$

$$\Delta L = \alpha\,L_o\,\Delta T$$

$$P\,V = n\,R\,T$$

$$R = 8.31\ \frac{J}{\text{mole K}}$$

$$N_A = 6.02 \times 10^{23}\ \frac{\text{particles}}{\text{mole}}$$

$$N = n\,N_A$$

$$k_B = \frac{R}{N_A}$$

$$k_B = 1.38 \times 10^{-23}\ \frac{J}{K}$$

$$\Delta Q = m\,c\,\Delta T$$

$$1\ \text{cal} = 4.186\ J$$

$$c_{water} = 1\ \frac{\text{cal}}{\text{gram }^\circ C}$$

$$\Delta Q = m\,L$$

$$L_f = 79.7\ \frac{\text{cal}}{\text{gram}}$$

$$L_v = 540\ \frac{\text{cal}}{\text{gram}}$$

$$\frac{d\,Q}{d\,t} = -\,\kappa\,A\,\frac{d\,T}{d\,x}$$

$$W = \int_{V_1}^{V_2} P\,d\,V$$

$$d\,U = d\,Q - d\,W$$

$$P = \frac{2\,N\,K}{3\,V}$$

$$K = \frac{3}{2}\,k_B\,T$$

$$v_{rms} = \sqrt{\frac{3\,k_B\,T}{m}}$$

$$U = \frac{3}{2}\,N\,k_B\,T$$

$$C_V = \frac{f}{2}\,R$$

$$C_P - C_V = R$$

$$d\,Q = n\,C_V\,d\,T$$

$$d\,Q = n\,C_P\,d\,T$$

$$P\,V^\gamma = \text{constant}$$

$$\gamma = \frac{C_P}{C_V}$$

$$W = \left|Q_h\right| - \left|Q_c\right|$$

$$e = \frac{W}{\left|Q_h\right|}$$

$$e_{max} = 1 - \frac{T_c}{T_h}$$

$$d\,S = \frac{d\,Q}{T}$$