6A Spring 2014 Equation Sheet

$\bar{v} = \frac{\Delta x}{\Delta t}$ $\quad \vec{v} = \frac{dx}{dt}$ $\quad \bar{a} = \frac{\Delta v}{\Delta t}$ $\quad \vec{a} = \frac{dv}{dt}$

$v_{xf} = v_{xi} + a_x t$ $\quad v_{yf} = v_{yi} + a_y t$

$x_f = x_i + \frac{1}{2}(v_{xi} + v_{xf})t$ $\quad y_f = y_i + \frac{1}{2}(v_{yi} + v_{yf})t$

$x_f = x_i + v_{xi}t + \frac{1}{2}a_x t^2$ $\quad y_f = y_i + v_{yi}t + \frac{1}{2}a_y t^2$

$v_{xf}^2 = v_{xi}^2 + 2a_x(x_f - x_i)$ $\quad v_{yf}^2 = v_{yi}^2 + 2a_y(y_f - y_i)$

$a_c = \frac{v^2}{r}$ $\quad \bar{v_c} = \frac{2\pi r}{T}$

$\vec{F_{net}} = m\vec{a}$ $\quad \vec{F_x} = m\vec{a_x}$ $\quad \vec{F_y} = m\vec{a_y}$

$F_{sp} = -kx$ $\quad F_g = mg$ $\quad f = \mu N$

$\vec{A} \cdot \vec{B} = ABcos\theta$ $\quad W = \vec{F} \cdot \vec{d} = \vec{F} \cdot \vec{x} = \vec{F} \cdot \vec{r}$ (where d=x=r)

$KE = \frac{1}{2}mv^2$ $\quad \Delta KE = W_{net}$ $\quad P = \frac{\Delta W}{\Delta t} = \vec{F} \cdot \vec{v}$

$E_i = E_f$ $\quad PE = U = mg\Delta y$ $\quad U_{sp} = \frac{1}{2}kx^2$

$F_x = -\frac{dU}{dx}$ $\quad F = \frac{GmM}{r^2}$ $\quad a = \frac{GM}{r^2}$

$T^2 = \frac{4\pi^2 r^3}{GM}$ $\quad U = -\frac{GMm}{r}$ $\quad v_{esc} = \sqrt{\frac{2GM}{r}}$

$\vec{r}_{cm} = \frac{\sum m_i \vec{r}_i}{M_{tot}}$ $\quad \vec{p} = m\vec{v}$ $\quad \vec{p_i} = \vec{p_f}$ $\quad \vec{F}_{net} = \frac{\Delta p}{\Delta t}$

$\bar{\omega} = \frac{\Delta \theta}{\Delta t}$ $\quad \vec{\omega} = \frac{d\theta}{dt}$ $\quad \bar{\alpha} = \frac{\Delta \omega}{\Delta t}$ $\quad \vec{\alpha} = \frac{d\omega}{dt}$

$s = \theta r$ $\quad v = \omega r$ $\quad a = \alpha r$

$\omega_f = \omega_i + \alpha t$ $\quad \theta_f = \theta_i + \frac{1}{2}(\omega_i + \omega_f)t$

$\theta_f = \theta_i + \omega_i t + \frac{1}{2}\alpha t^2$ $\quad \omega_f^2 = \omega_i^2 + 2\alpha(\theta_f - \theta_i)$

$\vec{\tau} = \vec{r} \times \vec{F} = rFsin\theta = I\alpha$ $\quad \vec{L} = \vec{r} \times \vec{p} = rpsin\theta = I\omega$

$I = \sum m_i r_i^2$ $\quad KE_{rot} = \frac{1}{2}I\omega^2$ $\quad W = \Delta KE_{rot}$ $\quad OE = \frac{1}{2}kA^2$

$f = \frac{1}{T}$ $\quad \omega = 2\pi f$ $\quad \omega = \sqrt{\frac{k}{m}}$ $\quad \omega = \sqrt{\frac{\kappa}{I}}$

$x(t) = Acos(\omega t + \phi)$ $\quad v(t) = -\omega Asin(\omega t)$ $\quad a(t) = -\omega^2 Acos(\omega t)$

$|g| = 9.8$ m/s $\quad G = 6.67 \times 10^{-11}$ N·m^2/kg^2

1 inch = 2.54 cm $\quad$ 1 mile=1.6 km $\quad$ 1 mi/hr=0.447 m/s

1 m/s=2.2 mi/hr=3.28 ft/s $\quad 2\pi$ rad = 1 rev = 360°