

Formula Sheet For PH 211 Final Exam

$$v_x = v \cos \theta$$

$$v_y = v \sin \theta$$

$$v = \sqrt{v_x^2 + v_y^2}$$

$$\theta = \tan^{-1}\left(\frac{v_y}{v_x}\right)$$

$$\vec{v}_{avg} = \frac{\Delta \vec{r}}{\Delta t}$$

$$\vec{a}_{avg} = \frac{\Delta \vec{v}}{\Delta t}$$

$$\vec{v} = \frac{d\vec{r}}{dt}$$

$$\vec{a} = \frac{d\vec{v}}{dt}$$

$$g = 9.80 \text{ m/sec}^2$$

$$\vec{s}_f = \vec{s}_i + \vec{v}_{is}t + \frac{1}{2}\vec{a}_s t^2$$

$$\vec{v}_{fs} = \vec{v}_{is} + \vec{a}_s t$$

$$v_{fs}^2 = v_{is}^2 \pm 2a_s \Delta s$$

$$\omega = \frac{d\theta}{dt}$$

$$v_t = \omega r$$

$$a_c = \frac{v^2}{r} = \omega^2 r$$

$$T = \frac{2\pi r}{v} = \frac{2\pi}{\omega}$$

$$t_1 = \sqrt{\frac{2h}{g}}$$

$$R_1 = v_o \sqrt{\frac{2h}{g}}$$

$$t_2 = \frac{2v_o \sin \theta}{g}$$

$$R_2 = \frac{v_o^2 \sin 2\theta}{g}$$

$$h_2 = \frac{v_o^2 \sin^2 \theta}{2g}$$

$$\vec{F}_{net} = \Sigma \vec{F} = 0$$

$$\vec{F}_{net} = \Sigma \vec{F} = m\vec{a} = \frac{d\vec{p}}{dt}$$

$$a = g \sin \theta \quad v = \sqrt{2gh}$$

$$\vec{F}_G = m\vec{g}$$

$$F_{fk} = \mu_k F_N$$

$$F_{fs} \leq \mu_s F_N$$

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

$$K = \frac{1}{2}mv^2$$

$$U_g = mgy$$

$$U_s = \frac{1}{2}k(\Delta s)^2$$

$$\vec{F}_{sp} = -k\Delta \vec{s}$$

$$K_i + U_i = K_f + U_f$$

$$W = \int \vec{F} \cdot d\vec{s}$$

$$W = \vec{F} \cdot \Delta \vec{r}$$

$$W_{net} = \Delta K$$

$$P = \frac{dE}{dt} = \vec{F} \cdot \vec{v}$$

$$P_{avg} = \frac{\Delta E}{\Delta t} = \vec{F} \cdot \vec{v}_{avg}$$