Physics 1210

Spring 2016

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Equation Sheet For Exam #2

Kinematics

$$v_{\text{avg}} = \frac{x_2 - x_1}{t_2 - t_1} = \frac{\Delta x}{\Delta t} \qquad \vec{\boldsymbol{v}} = \frac{d\vec{\boldsymbol{r}}}{dt} \qquad a_{\text{avg}} = \frac{v_2 - v_1}{t_2 - t_1} = \frac{\Delta v}{\Delta t} \qquad \vec{\boldsymbol{a}} = \frac{d\vec{\boldsymbol{v}}}{dt} \qquad g = 9.80 \text{ m/s}^2$$

$$x_1 = x_0 + v_0 t + \tfrac{1}{2}at^2 \qquad v_1 = v_0 + at \qquad v_1^2 = v_0^2 + 2a(x_1 - x_0) \qquad a_{\text{rad}} = \frac{v^2}{R} = \frac{4\pi^2 R}{T^2}$$

$$\sum \vec{\boldsymbol{F}} = m\vec{\boldsymbol{a}} \qquad \vec{\boldsymbol{w}} = m\vec{\boldsymbol{g}} \qquad f_s \le \mu_s N \qquad f_k = \mu_k N \qquad f = kv \qquad f = Dv^2 \qquad f_{\text{spring}} = -kx$$

Momentum/Impulse

$$\vec{\boldsymbol{p}} = m\vec{\boldsymbol{v}} \qquad J = \Delta(mv) = F\Delta t \qquad x_{\text{cm}} = \frac{\sum m_i x_i}{\sum m_i}$$

Work/Energy

$$W = \vec{\boldsymbol{F}} \cdot \vec{\boldsymbol{s}} = Fs\cos\theta \qquad K_1 + U_1 + W_{\text{other}} = K_2 + U_2 \qquad P = \frac{\Delta W}{\Delta t} = \vec{\boldsymbol{F}} \cdot \vec{\boldsymbol{v}}$$

$$W = \Delta K \qquad K = \tfrac{1}{2}mv^2 \qquad U_{\text{spring}} = \tfrac{1}{2}kx^2 \qquad U_{\text{grav}} = mgy \qquad F = -\frac{dU}{dx}$$

Angular Motion

$$\theta_1 = \theta_0 + \omega_0 t + \tfrac{1}{2}\alpha t^2 \qquad \omega_1 = \omega_0 + \alpha t \qquad \omega_1^2 = \omega_0^2 + 2\alpha(\theta_1 - \theta_0)$$

$$\omega = \frac{d\theta}{dt} \qquad \alpha = \frac{d\omega}{dt} \qquad s = r\theta \qquad v = r\omega \qquad a_{\text{tan}} = r\alpha \qquad a_{\text{rad}} = \omega^2 r \qquad 2\pi = 360^\circ$$

$$I = \sum_i m_i r_i^2 \qquad I = I_{\text{cm}} + Md^2$$