Name ______________________________________ Section ____________

Physics 1210 Exam 3

14 April 2011

This test is closed-note and closed-book. No written, printed, or recorded material is permitted. Calculators are permitted but computers are not. No collaboration, consultation, or communication with other people (other than the administrator) is allowed by any means, including but not limited to verbal, written, or electronic methods. Sharing of calculators is prohibited. If you have a question about the test, please raise your hand. For multiple choice, you may choose two answers, and if one is correct, receive half credit, etc. For full credit on written problems, show the full thought process from basic equations to final results.

$2.2\,lbs = 1\,kg$

$2.2\,lbs = 1\,kg$

$1\,mi = 5280\,ft = 1760\,m$

$1\,Calorie = 4200\,J$

$1\,Ton = 2000\,lbs$

$V_{sphere} = \frac{4}{3}\pi R^3$

$V_{avg} = \frac{x_2 - x_1}{t_2 - t_1} = \frac{\Delta x}{\Delta t}$ $\quad a_{avg} = \frac{v_2 - v_1}{t_2 - t_1} = \frac{\Delta v}{\Delta t}$ $\quad a_{rad} = \frac{v^2}{R} = \frac{4\pi R^2}{T^2}$

$x_1 = x_0 + v_0 t + \frac{1}{2}at^2$ $\quad v_1 = v_0 + at$ $\quad v_1^2 = v_0^2 + 2a(x_1 - x_0)$

$\Sigma \bar{F} = m\bar{a}$ $\quad F_{spring} = -kx$ $\quad F_f = \mu F_n$

Work/Energy $\quad W = \bar{F}\cdot\bar{s}$ $\quad W = \Delta K$ $\quad U_s = \frac{1}{2}kx^2$ $\quad U_g = mgy$ $\quad P = \frac{\Delta W}{\Delta t} = Fv$ $\quad W_{grav} = -\Delta U$ $\quad F = -\frac{dU}{dx}$

Momentum/Impulse $\quad p = mv$ $\quad J = \Delta(mv) = Ft$ $\quad X_{cm} = \frac{\Sigma m_i x_i}{\Sigma m_i}$

Angular Motion $\quad \theta_1 = \theta_0 + \omega_0 t + \frac{1}{2}\alpha t^2$ $\quad \omega_1 = \omega_0 + \alpha t$ $\quad \omega_1^2 = \omega_0^2 + 2\alpha(\theta_1 - \theta_0)$

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

$s = r\theta$ $\quad v = r\omega$ $\quad a = r\alpha$ $\quad a_{rad} = \omega^2 r$

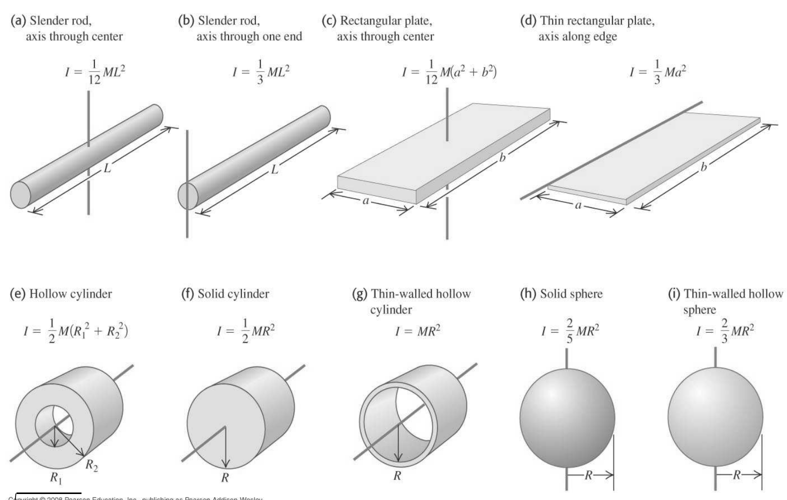
$I = \Sigma_i m_i r_i^2$ $\quad \bar{\tau} = \bar{r} \times \bar{F} = rF\sin\phi$ $\quad \Sigma\bar{\tau} = I\bar{\alpha}$ $\quad W = \Delta K = \tau\Delta\theta$

$Power_{rot} = \tau\omega$

$K_{rot} = \frac{1}{2}I\omega^2$ $\quad K_{total} = \frac{1}{2}mv_{cm}^2 + \frac{1}{2}I_{cm}\omega^2$

$\bar{L} = \bar{r} \times \bar{p} = r\,mv = I\omega$ $\quad \Delta L = \tau\Delta t$

$I_{\text{parallel}} = I_{cm} + Md^2$



Gravity: G=6.67x10^{-11} M m^2/kg^2

$F_g = -\frac{GM_1M_2}{r^2}$ $\quad U_g = -\frac{GM_1M_2}{r}$

$v_{circular} = \sqrt{\frac{GM_1}{r}}$

Periodic Motion

$f = \frac{1}{T}$ $\quad \omega = 2\pi f$ $\quad pendulum: \omega = \sqrt{\frac{g}{l}}$

$\omega = \sqrt{\frac{k}{m}}$ $\quad physical\ pendulum: \omega = \sqrt{\frac{mgd}{I}}$

$x = A\cos(\omega t + \phi)$ $\quad v = -\omega A\sin(\omega t + \phi)$ $\quad a = -\omega^2 A\cos(\omega t + \phi)$

$damped\ motion: x = Ae^{(-b/2m)}\cos(\omega' t)$ $\quad \omega' = \sqrt{\frac{k}{m} - \frac{b^2}{4m^2}}$