Principles of Physics: Problem Set #7

Rotational Motion and Angular Momentum

for circular motion: $\theta = \frac{s}{r}$; $\omega = \frac{\Delta\theta}{\Delta t} = \frac{v}{r}$; $\alpha = \frac{\Delta\omega}{\Delta t} = \frac{a_{path}}{r}$; $a_{center} = \frac{v^2}{r}$

for $\alpha = \text{constant}$: $\omega = \omega_o + \alpha t$, $\theta = \theta_o + \omega_o t + \frac{1}{2}\alpha t^2$

$\tau = rF = I\alpha$; $L = I\omega$; $L_{tot}^{before} = L_{tot}^{after}$; $I_{\text{point}} = mr^2$; $I_{\text{disk}} = \frac{1}{2}MR^2$

Due: Friday Oct. 12 in class

Note: Lab papers are due Mon, Oct. 8 ... (double spaced, pdf format) email to me before midnight.

Reading assignment:

for Mon,	Ch 4 (pp 77-80)	[Rotational motion and torque]
for Wed,	Ch 4 (pp 79-81)	[Conservation of angular momentum]
for Fri,	Ch 5 (pp 103-108)	[Work and energy]

Problem assignment:

(WARNING - The problem naming/numbering scheme in the text is confusing, so ALWAYS double check whether a problem is guided review (**GR**), skill building (**SB**), **Synthesis**, etc.)

CHAPTER 4

SB-23 (pg 87 ... earth's rotation)

SB-25 (pg 87 ... conservation of angular momentum for an ice skater)

SB-28 (pg 88 ... torque and acceleration for an engine; given result in rad/s and rpm)

SB-31 (pg 88 ... mouse on a turntable)

SB-32 (pg 88 ... ball on a string)

SB-33 (pg 88 ... geosynchronous satellite orbit)

SB-35 (pg 88 ... angular quantities for a bicycle ride)

MC-6,7 (pg 89 ... circular motion)