Introduction

"I seem to have been only like a boy playing on the seashore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me."

-- Newton

2005 Nobel Prize in Physics

Roy Glauber (USA), John Hall (USA) and Theodore Haensch (Germany)

Quantum Optics

Quantum Optics Research Group at U of T:

Professors: S. John, H-K. Lo, R. Marjoribanks, D. Miller, J. Sipe, A. Steinberg, J. Thywissen, H. Van Driel

Plus: 13 Research Associates and 29 Graduate Students

Announcements

- The PHY138 Mechanics home page neglected to list MP Problem Set #6 – Chapter 13
- It does now
  - Due Friday October 28 by 5 PM
- Drop-In Centre begins Tuesday next week:
  - MP200 (2nd floor over the coffee stand)
  - Monday – Thursday 10 AM – 2 PM
  - Week before the test: Monday – Thursday 10 AM – 5 PM

FYI

- Pre-Class Quiz Chapts 7 – 8
  - Due last Monday, October 3
  - The Newton's 3rd Law Question had a missing minus sign until mid-week.
    - Everybody gets full credit for this question
  - For the remaining 3 questions:
    - Mean = 86.7%

Last time

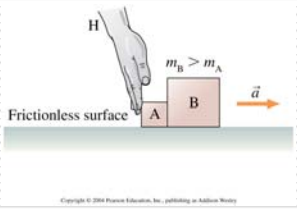
- Galilean Relativity
- Tarzan
- Uniform Circular Motion
  - Angular velocity $\omega = d\theta/dt$
  - r-t-z Coordinate System
  - v_t constant; $a_t = 0$; $a_r = v^2/r$
- Fictitious forces
  - Arise whenever we try to analyse in a non-inertial reference frame.

Today

- §7.6 – Nonuniform Circular Motion
  - This is what Tarzan is doing
- Chapter 8 – Newton's 3rd Law
  - A series of related examples

Linear Motion	Rotational Motion
$a = \text{constant}$	$\alpha \equiv \frac{a_t}{r} = \text{constant}$
$s_f = s_i + v_i t + \frac{1}{2} a t^2$	$\theta_f = \theta_i + \omega_i t + \frac{1}{2} \alpha t^2$
$v_f = v_i + a t$	$\omega_f = \omega_i + \alpha t$

Figure 8.13



$a = F_H/(m_A + m_B)$

$F_{A \text{ on } B} = m_B F_H/(m_A + m_B)$, to right

$F_{B \text{ on } A} = m_B F_H/(m_A + m_B)$, to left

2 Blocks Glued Together

$a = F/(m_A + m_B)$

$F_{A \text{ on } B} = m_A F / (m_A + m_B)$, to left

$F_{B \text{ on } A} = m_A F / (m_A + m_B)$, to right

Massless String S

$\vec{F}_{B \text{ on } S} = -\vec{F}_{A \text{ on } S}$

$T = F_{S \text{ on } B} = m_A F / (m_A + m_B)$, left

$T' = F_{S \text{ on } A} = m_A F / (m_A + m_B)$, right

Mass of String $m_S > 0$

$\vec{F}_{B \text{ on } S} \neq -\vec{F}_{A \text{ on } S}$

$T = F_{S \text{ on } B} = (m_A + m_S)F / m_{tot}$, left

$T' = F_{S \text{ on } A} = m_A F / m_{tot}$, right

$T > T'$