Final Exam
8:30-11:00 am, May 8th, 2007, Tuesday
208 Kupfrian Hall (Different from the room for the previous exams)
From Chapter 1 to Chapter 9
Bring your scientific calculators.

http://www.geocities.com/kenahn7

Last class: April 30th, Monday
Review session: To be announced on web

Today...
Return Quiz #12
Chapter 9

Last class, we learned...

Section 9-6, Collision and Impulse

\[ \vec{F} = \frac{\Delta \vec{p}}{\Delta t} \quad \text{or} \quad \Delta \vec{p} = \vec{F} \times \Delta t = \vec{I} \]

Section 9-7, Conservation of Linear Momentum

\[ \vec{P} = \vec{p}_1 + \vec{p}_2 + \vec{p}_3 + \ldots = m_1 \vec{v}_1 + m_2 \vec{v}_2 + m_3 \vec{v}_3 + \ldots \]

If \( \vec{F}_{\text{net}} = 0 \), then the total linear momentum does not change,
that is, \( \vec{P}_i = \vec{P}_f \)
\rightarrow Conservation of Linear Momentum
Sample Problem 9-7

Two-dimensional explosion: A firecracker placed inside a coconut of mass $M$, initially at rest on a frictionless floor, blows the coconut into three pieces that slide across the floor. An overhead view is shown in the Figure. Piece $C$, with mass $0.30M$, has final speed $v_{f,C} = 5.0$ m/s.

(a) What is the speed of piece $B$, with mass $0.20M$?
(b) What is the speed of piece $A$?

Chapter 9. Center of Mass and Linear Momentum

From Section 9-1 to Section 9-7

Center of Mass
Linear Momentum
Impulse
Conservation of Linear Momentum

Section 9-8, Momentum and Kinetic Energy in Collisions
Section 9-8, Momentum and Kinetic Energy in Collisions

Before collision

\[ 3 \text{ kg particle} \quad 1 \text{ kg particle} \quad +x \text{ direction} \]

1 m/s \quad 4 m/s

During collision

??? m/s

After collision

??? m/s

If \( \vec{F}_{\text{net external}} = 0 \), then the total momentum is conserved.

\[ m_1 \vec{v}_{1,i} + m_2 \vec{v}_{2,i} = m_1 \vec{v}_{1,f} + m_2 \vec{v}_{2,f} \]

How about the total kinetic energy, \( \frac{1}{2} m_1 v_1^2 + \frac{1}{2} m_2 v_2^2 \)?

If conserved, the collision is called an "elastic collision".

If NOT conserved, the collision is called an "inelastic collision".
Two objects on a frictionless horizontal surface collide as shown above.

(a) Find the velocity of the 1 kg object.
(b) Is this elastic or inelastic collision?