

PHYS 1443 – Section 001

Lecture #11

Tuesday, June 20, 2006

Dr. Jaehoon Yu

- Linear Momentum
- Linear Momentum and Forces
- Conservation of Momentum
- Impulse and Momentum Change
- Collisions
- Two Dimensional Collision s
- Center of Mass

Today's homework is HW #6, due 7pm, Friday, June 23!!



Announcements

- Quiz this Thursday
 - Early in the class
 - Covers Ch. 8.5 – Ch. 9
- Mid-term grade discussions tomorrow
 - Bottom half of the class



Linear Momentum

The principle of energy conservation can be used to solve problems that are harder to solve just using Newton's laws. It is used to describe motion of an object or a system of objects.

A new concept of linear momentum can also be used to solve physical problems, especially the problems involving collisions of objects.

Linear momentum of an object whose mass is m and is moving at a velocity of v is defined as

$$\vec{p} = m\vec{v}$$

What can you tell from this definition about momentum?

1. *Momentum is a vector quantity.*
2. *The heavier the object the higher the momentum*
3. *The higher the velocity the higher the momentum*
4. *Its unit is kg.m/s*

What else can we see from the definition? Do you see force?

The change of momentum in a given time interval

$$\frac{\Delta\vec{p}}{\Delta t} = \frac{m\vec{v} - m\vec{v}_0}{\Delta t} = \frac{m(\vec{v} - \vec{v}_0)}{\Delta t} = m \frac{\Delta\vec{v}}{\Delta t} = m\vec{a} = \sum \vec{F}$$

