

# PHYSICS 151 READING

## ASSIGNMENT FOR OCTOBER 15

### SECTIONS 9.1-9.3

Please notice that this file is two pages long.

#### 9.1 - Impulse

- Impulse -  $\vec{J}$  (All the obvious letters were taken)
- For a constant force,  $\vec{F}_c$  impulse is force multiplied by how long the force is exerted,  $\vec{J} = \vec{F}_c \Delta t$
- We often just think about the average force acting on an object,  $\vec{F}_{av}$ , since that's guaranteed to be a constant force
- For changing forces, we have to make a graph of force versus time and find the area

#### 9.2 - Momentum and the Impulse-Momentum Theorem

- Rewriting Newton's Second Law gives  $\vec{F}_{av} = \frac{m\vec{v}_f - m\vec{v}_i}{\Delta t}$
- Momentum,  $\vec{p} = m\vec{v}$  (All the obvious letters were taken). Unit =  $kg \cdot m/s$
- Second Law:  $\vec{F}_{av} = \frac{\Delta \vec{p}}{\Delta t}$

- Impulse-Momentum Theorem: Impulse = change in momentum.  $\vec{J} = \Delta \vec{p}$
- Hard to show but the impulse-momentum theorem holds not only for constant forces but *also for changing forces!!*
- For a collection of particles, we find the total momentum  $\vec{P}$  (capital  $P$ ) by doing vector addition

### 9.3 - Solving Impulse and Momentum Problems

- The impulse approximation - only "big" forces effect the motion of an object over short time periods
- Read the examples carefully, we'll see similar problems on the homework and next exam