- Last Lecture
  - Introduction to momentum
- Today
  - More on momentum
  - Combining momentum and energy
- Important Concepts
  - Momentum is a vector, energy is not.
  - Think carefully about internal versus external forces.
  - Energy changes due to forces along the motion, momentum changes due to external forces acting over a period of time.

Important Reminders

- Pset #7 due this Thursday.
  - Bring it to class here at 10am or drop it at my office before 6:30pm.
- MasteringPhysics due tonight and then again next Monday.
- No class this Friday.

Momentum

- Very simple formula: $\vec{p}_{Tot} = \Sigma\left(m_i \vec{v}_i\right)$
  - Note the vector addition!
- Momentum of a system is conserved only if:
  - No net external forces acting on the system.
  - Or, study the system only over a very short time span.

$$\Delta\vec{p}_{Tot} = \int \vec{F} dt$$

Momentum and Energy

- Some processes can be solved by Work&Energy, some by momentum, some multi-process problems require both techniques.
- Collisions almost never conserve kinetic energy.
  - Collisions that conserve kinetic energy are called elastic.
  - Never assume that a collision is elastic unless told so.
- Work&Energy can be solved for 1 unknown, momentum can be used to find 1 unknown per spatial dimension.