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.

Momentum

- Very simple formula: \( \vec{p}_{\text{tot}} = \sum (m_i \vec{v}_i) \)
  - 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.

\[
\Delta \vec{p}_{\text{tot}} = \int \vec{F} \, dt
\]

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 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.