
Worksheet 12: Conservation of momentum

1. A hockey puck of mass 0.25 kg slides eastward across the ice at 25 m/s.
 - a. What is its momentum \vec{p}_1 (magnitude and direction)?

 - b. The puck collides with a hockey stick that was lying motionless on the ice while its owner fights. The puck rebounds in the exact opposite direction of its approach, moving at a speed of 10 m/s. Now what is its momentum \vec{p}_2 (magnitude and direction)?

 - c. What was the momentum change $\Delta\vec{p} = \vec{p}_2 - \vec{p}_1$ of the puck from before to after the collision (magnitude and direction)?

2. Show that when two otherwise isolated objects interact, their total change in momentum is zero.

3. Continue the hockey scenario from problem 1.
 - a. What was the momentum change of the hockey stick during the collision?

 - b. What is the momentum of the stick after the collision?

 - c. If the hockey stick has a mass of 1.0 kg. What is its velocity (magnitude and direction) after the collision?

4. If, instead of bouncing apart, the puck and stick cling together when they collide (totally inelastic collision), what would their velocity (magnitude and direction) be after the collision?