

## Momentum Intro

1. A 10 kg cart is moving east at 20 m/s when it strikes a 2 kg cart at rest. After the collision, the 2 kg cart is moving at 15 m/s. Find the speed and direction of the 10 kg cart.
2. A baseball bat ( $m=1.5$  kg) is moving at 32 m/s when it hits a baseball ( $m=0.25$  kg) moving at 32 m/s. After the collision, the ball is moving at 43 m/s. Find the speed of the bat post-collision. (Hint- be careful of +/- signs!)
3. The 8 kg cart starts from rest, rolls down the hill and collides with the 10 kg cart and the two stick together.
  - a. Find their speed and direction after the collision.
  - b. Find the total KE immediately before the collision.
  - c. Find the total KE immediately after the collision.



4. Jordan and Jeremy are ice-skating. Jordan has a mass of 55 kg and Jeremy has a mass of 60 kg. They are both initially at rest and Jeremy is holding a 5 kg medicine ball that he throws at 5 m/s toward Jordan.
  - a. What is Jeremy's speed and direction after throwing the ball?
  - b. What is Jordan's speed and direction after catching the ball?
5. Two cars are headed toward each other, each traveling at 40 m/s. Car 1 has a mass of 1000 kg and is headed east. Car 2 has a mass of 1200 kg and is headed west. After the collision, the cars are stuck together.
  - a. Find the speed and direction of the combined mass.
  - b. Find the KE lost in the collision.
  - c. Where did the lost energy go?