

Worksheet 27: Impulse, Momentum

1. How much energy is lost when a 10kg cart moving to the east at 2 m/s collides (totally) inelastically with a 5 kg cat moving to the west at 3 m/s?
2. You toss a wooden block (mass 1 kg) straight upward at 2 meters per second. As you do this, you are standing on the surface of the earth (mass $6 * 10^{24}$ kg).
 - a) How much momentum have you given to the block?
 - b) The earth gains the exact opposite momentum. What is its resulting (change in) velocity?
 - c) How much kinetic energy did you have to give to the block to have it leave your hand at 2 m/s? How much energy did you give to the earth?
3. A (stationary) 10 kg bomb blows up into three chunks: a 2 kg piece flies to the west at 50 m/s; a 3 kg piece flies to the east at 40 m/s; how fast is the remaining piece moving, and in which direction, east or west?
4. A hose shoots water at the rate of 3 kg per minute. You aim it straight upward; it flies up at 2 meters per second. In theory, you could use this to cause an object to “levitate” against the force of gravity. How much mass could this support?

These answers might NOT match Ray's; they're what I got.

Answers:

1. 41.667 J

2a. 2 J

2b. $3.33 * 10^{-24}$ m/s

2c. 2 J; $3.33 * 10^{-24}$ J

3. -4 m/s (4 m/s to the west)

4. 0.0102 kg