Quiz 7
Name:_____
Answer each of the following questions. Show all work for full credit.
(1) A boxcar traveling 14 m/s strikes a second car at rest. The two stick together and move off with a speed of 5.0 m/s. What is the mass of the second car?
Consider the motion in one dimension, with the positive direction being the direction of motion of the first car. Let A represent the first car and B represent the second car. Momentum will be conserved in the collision. Note that

(2) A 725-kg two-stage rocket is traveling at a speed of ■ away from Earth when a predesigned explosion separates the rocket into two sections of equal mass that then move with a speed of ■ relative to each other along the original line of motion. (a) What is the speed and direction of each section (relative to Earth) after the explosion? [Hint:]
(b) How much energy was supplied by the explosion? [Hint: What is the change in kinetic energy as a result of the explosion?]
(a) Consider the motion in one dimension with the positive direction being the direction of motion before the separation. Let A represent the upper stage (that moves away faster) and B represent the lower stage. It is given that and

(b) The change in kinetic energy was supplied by the explosion.

(3) With what impulse does a 0.50-kg newspaper have to be thrown to give it a velocity of 3.0 m/s? [Hint: Impulse is the change of momentum,]
Impulse is the change of momentum. This is a one-dimensional configuration.

(4) A ball of mass 0.440 kg moving east (direction) with a speed of 3.80 m/s collides head-on with a 0.220-kg ball at rest. If the collision is perfectly elastic, what will be the speed and direction of each ball after the collision?
Let A represent the 0.440-kg ball and B represent the 0.220-kg ball. We have and

Substitute this relationship into the momentum conservation equation for the collision.