

Classwork tab: [bpsphysics.weebly.com](http://bpsphysics.weebly.com)

Solutions packet momentum

Review

Collisions

Inelastic - momentum is conserved, kinetic energy is not conserved.

perfectly inelastic - objects stick together after colliding.

Elastic - Momentum & Kinetic Energy are conserved

Example) A 1500 kg car traveling at  $15 \text{ m/s}$  South collides with a 4500 kg truck that is initially at rest. The truck and car stick together & move together after the collision. What is the final velocity of the car truck system?

$$p_0 = p_f$$

Perfectly inelastic)  $m_1 v_1 + m_2 v_2 = m_1 v_f + m_2 v_f$   
 $m_1 v_1 + m_2 v_2 = (m_1 + m_2) v_f$

$$(1500 \text{ kg})(15 \text{ m/s}) + (4500 \text{ kg})(0 \text{ m/s}) = (1500 \text{ kg} + 4500 \text{ kg}) v_f$$

$$22,500 \text{ kg m/s} + 0 \text{ kg m/s} = (6000 \text{ kg}) v_f$$

$$v_f = \frac{22,500 \text{ kg m/s}}{6000 \text{ kg}} = \boxed{3.75 \text{ m/s South}}$$

### Classwork

1. A grocery shopper tosses a 9.0 kg bag of rice with a speed of 5.5 into a 18.0 kg shopping cart that was at rest. What is the final velocity of the bag-cart system?
2. A 15,000 kg railroad car moving at  $7.0 \text{ m/s}$  north collides with another car of the same mass moving in the same direction at  $1.5 \text{ m/s}$ . What is the final velocity of the system?
3. A dry cleaner throws a 22 kg bag into a 9.0 kg cart. The bag-cart system moves with a velocity of  $3.0 \text{ m/s}$  to the right. What was the initial velocity of the bag? -

