Changes in kinetic energy for perfectly inelastic collisions

1. A 0.25 kg arrow with a velocity of 12 m/s to the west strikes and pierces the center of a 6.8 kg target.

a. What is the final velocity of the combined mass?

b. What is the decrease in kinetic energy during the collision?

2. During practice, a student kicks a 0.40 kg soccer ball with a velocity of 8.5 m/s to the south into a 0.15 kg bucket lying on its side. The bucket travels with the ball after the collision.

a. What is the final velocity of the combined mass?

b. What is the decrease in kinetic energy during the collision?

3. A 56 kg ice skater traveling at 4.0 m/s to the north suddenly grabs the hand of a 65 kg skater traveling at 12.0 m/s in the opposite direction as they pass. The two skaters continue skating together with joined hands.

a. What is the final velocity of the two skaters?

b. What is the decrease in kinetic energy during the collision?