Elastic and Perfectly Inelastic Collisions

Name: _____ Period: ____ Date: _____

1. Sumo wrestlers must be very heavy to be successful in their sport, which involves pushing the rival out of the ring. One of the greatest sumo champions, Akebono, had a mass of 227 kg. The heaviest sumo wrestler ever, Konishiki, at one point had a mass of 267 kg. Suppose these two wrestlers are opponents in a match. Akebono moves left with a speed of 4.0 m/s, while Konishiki moves to the right toward Akebono with an unknown speed. After the wrestlers undergo a perfectly inelastic collision, both have a velocity of 0.59 m/s to the right. From this information, calculate Konishiki's velocity before colliding with Akebono.

2. The largest beet root on record had a mass of 18.4 kg. The largest cabbage on record had a mass of 56.2 kg. Imagine these two vegetables traveling in opposite directions. The cabbage, which travels 5.00 m/s to the left, collides with the beet root. After the collision, the cabbage has a velocity of 6.60×10^{-2} m/s to the left, and the beet root has a velocity of 10.1 m/s to the left. What is the beet root's velocity before the elastic collision?

3. A dump truck used in Canada has a mass of 5.50×10^5 kg when loaded and 2.30×10^5 kg when empty. Suppose two such trucks, one loaded and one empty, crash into each other at a monster truck show. The trucks are supplied with special bumpers that make a collision almost perfectly elastic. If the trucks hit each other at equal speeds of 5.00 m/s and the less massive truck, which was originally moving to the left, recoils to the right with a speed of 9.10 m/s, what is the velocity of the full truck after the collision?

4. Yvonne van Gennip of the Netherlands ice skated 10.0 km with an average speed of 10.8 m/s. Suppose van Gennip crosses the finish line at her average speed and takes a huge bouquet of flowers handed to her by a fan. As a result, her speed drops to 10.01 m/s. If van Gennip's mass is 63.0 kg, what is the mass of the bouquet?

5. Speeds as high as 273 km/h have been recorded for golf balls. Suppose a golf ball whose mass is 45.0 g is moving to the right at 273 km/h and strikes another ball that is at rest. If after the perfectly elastic collision the original golf ball moves 91 km/h to the left and the other ball (which was originally at rest) moves 182 km/h to the right, what is the mass of the second ball?

6. American juggler Bruce Sarafian juggled 11 identical balls at one time in 1992. Each ball had a mass of 0.20 kg. Suppose two balls have an elastic head-on collision during the act. The first ball moves away from the collision with a velocity of 3.0 m/s to the right, and the second ball moves away with a velocity of 4.0 m/s to the left. If the first ball's velocity before the collision is 4.0 m/s to the left, what is the velocity of the second ball before the collision?