

1. Sometimes the curiosity factor at the scene of a car accident is so great that it actually produces secondary accidents as a result, while people watch to see what is going on. If an 800.-kg sports car slows to 13.0 m/s to check out an accident scene and the 1200.-kg pick-up truck behind him continues traveling at 25.0 m/s, with what velocity will the two move if they lock bumpers after a rear-end collision?

2. Jeanne rolls a 7.0-kg bowling ball down the alley for the league championship. One pin is still standing, and Jeanne hits it head-on with a velocity of 9.0 m/s. The 2.0-kg pin acquires a forward velocity of 14.0 m/s. What is the new velocity of the bowling ball?

3. Running at 2.0 m/s, Bruce, the 45.0-kg quarterback, collides with Biff, the 90.0-kg tackle, who is traveling at 7.0 m/s in the other direction. Upon collision, Biff continues to travel forward at 1.0 m/s. How fast is Bruce knocked backwards?

4. Anthony and Sissy are participating in the "Roll-a-Rama" roller skating dance championship. While 75.0-kg Anthony roller skates backwards at 3.0 m/s, 60.0-kg Sissy jumps into his arms with a velocity of 5.0 m/s in the same direction. a) How fast does the pair roll backwards together? b) If Anthony is skating toward Sissy when she jumps, would their combined final velocity be larger or smaller than your answer to part a? Why?

5. To test the strength of a retainment wall designed to protect a nuclear reactor, a rocket-propelled F-4 Phantom jet aircraft was crashed head-on into a concrete barrier at high speed in Sandia, New Mexico, on April 19, 1988. The F-4 phantom had a mass of 19,100 kg, while the retainment wall's mass was 469,000 kg. The wall sat on a cushion of air that allowed it to move during impact. If the wall and F-4 moved together at 8.41 m/s during the collision, what was the speed of the F-4 Phantom upon impact?

6. Miguel, the 72.0-kg bullfighter, runs toward an angry bull at a speed of 4.00 m/s. The 550.-kg bull charges toward Miguel at 12.0 m/s and Miguel must jump on the bull's back at the last minute to avoid being run over. What is the new velocity of Miguel and the bull as they move across the arena?

7. Two sumo wrestlers run towards each other, the first has a mass of 150kg and is running at 14m/s. The second wrestler has a mass of 200kg and is running with a speed of 18m/s. They collide in a perfectly elastic collision. If the second wrestler bounces backwards at 4m/s. Find the final velocity of the first wrestler.

8. In terms of momentum and the conservation of momentum, explain why a rocket can move forward in space without having anything to push off when in space.