Ryan Rambali
Momentum Review
SPH4U6

Page 264-269

1. *Suppose object A has greater momentum than object B. Which of the following can you conclude?*

2. *trampoline. Her speed as she hits the trampoline is 5.2 m/s, and she comes to a stop in 0.20 s. What is the average magnitude of the force exerted on the gymnast by the trampoline?*

6. *When an acorn falls and hits the ground, Earth's response is imperceptible.*

7. *In an inelastic collision only momentum is conserved.*

8. *When two objects undergo a perfectly elastic head-on collision, each object will always have a final velocity equal to the initial velocity of the other object.*

9. *A head-on collision is a collision in which the initial and the final velocities of colliding masses lie in the same line.*

12. *Verify, using the definition of momentum, that the units for momentum are the same as those for force multiplied by time.*

14. *Two construction workers use different hammers to pound in nails. Both swing their hammers with the same speed, and the duration of both hammers' collisions with the nails is equal. However, one worker seems to achieve more force than the other. Offer a possible explanation*

21. *Two tennis balls of equal mass are moving in directions opposite to each other. The tennis balls are travelling with equal speed when they collide head-on. You can assume that this collision is perfectly elastic. Describe in your own words what happens after the tennis balls collide.*

23. *Two soccer players collide head-on and are stopped. If the mass of one player is 1.2 times the mass of the other player, what can you conclude about their initial speeds?*

22. *In a curling match, a 20.0 kg stone (Figure 4) with an initial speed of 2.0 m/s glides to a stop after 30.0 m. Determine the work done on the stone by friction*

26. *Hockey player 1 is travelling at a velocity of 12 m/s [N] and hockey player 2 is travelling at a velocity of 18 m/s [S] when they collide head-on. After colliding, the hockey players hang on to each other and slide along the ice with a velocity of 4.0 m/s [S]. If hockey player 1 weighs 120 kg, calculate how much hockey player 2 weighs.*

28. *A 1.2 kg cart slides eastward down a frictionless ramp from a height of 1.8 m and then onto a horizontal surface where it has a head-on elastic collision with a stationary 2.0 kg cart cushioned by an ideal Hooke's law spring. The maximum compression of the spring during the collision is 2.0 cm.*

A. *Determine the spring constant*

B. *Calculate the velocity of each cart just after the collision.*

C. *After the collision, the 1.2 kg cart rebounds up the ramp. Determine the maximum height reached by the cart.*

31. *Two balls of different masses and equal speeds undergo a head-on elastic collision. If the balls are moving in opposite directions after the collision, how can you determine from the outcome of the collision which object has a greater mass?*

32. *A curling stone travelling at 5.0 m/s collides with a stationary stone of the same mass. Following the collision, the two stones travel at angles of 17° and 38° in opposite directions with respect to the initial motion of the first stone.*

A. *Draw a diagram of the stones' motion.*

B. *Calculate the speed of each stone after the collision*

33. *During a spacewalk, three astronauts wearing jetpacks approach each other at equal speeds along lines equally spaced by an angle of 120° (Figure 1). As the astronauts approach each other, they take each other's hands. If the astronauts come to rest after colliding, what conclusion can you draw?*

37. *Ball 1 of mass 0.1 kg makes an elastic head-on collision with ball 2 of unknown mass that is initially at rest. If ball 1 rebounds at one-third of its original speed, determine the mass of ball 2.*

39. *Suppose a watermelon with a mass of 2.0 kg undergoes a head-on elastic collision on a frictionless counter with a grapefruit with a mass of 0.8 kg. If the total kinetic energy of the system is 10.5 J and the total momentum is 7.5 kg·m/s, determine the possible initial and final velocities for the watermelon and the grapefruit*

49. *A block of ice of mass 50.0 g slides along a frictionless, frozen lake at a speed of 0.30 m/s. It collides with a 100.0 g block of ice that is sliding in the same direction at 0.25 m/s (Figure 4). Th e two blocks stick together.*

A. *How fast are the two blocks moving aft er the collision?*

B. *How much kinetic energy is lost?*

51. *Two equal-mass hockey pucks undergo a glancing collision. Puck 1 is initially at rest and is struck by puck 2 travelling at a velocity of 13 m/s [E]. Puck 1 travels at an angle of [E 18° N] aft er the collision.*

Puck 2 travels at an angle of [E 4° S]. Determine the fi nal velocity of each puck