Ricardo and Carmelita are enjoying St. Joseph's Lake at dusk in a canoe. Ricardo has mass 80kg, Carmelita is lighter, and the canoe has mass 30kg. When the canoe is at rest in the placid water, they exchange seats, which are 3.0 m apart and symmetrically located with respect to the canoe's center. Ricardo notices that the canoe moved 40cm relative to a submerged log during the exchange, and calculates Carmelita's mass, which she has not told him. What is it?

Consider these situations:

(i) a ball moving at speed v is brought to rest;
(ii) the same ball is projected from rest so that it moves at speed v;
(iii) the same ball moving at speed v is brought to rest and then projected backward to its original speed.
In which case(s) does the ball undergo the largest change in momentum?

1. (i)
2. (i) and (ii)
3. (i), (ii),and (iii)
4. (ii)
5. (ii) and (iii)
6. (iii)

A car accelerates from rest. In doing so the absolute value of the car’s momentum changes by a certain amount and that of the Earth changes by

1. a larger amount.
2. the same amount.
3. a smaller amount.
4. The answer depends on the interaction between the two.

A car accelerates from rest. It gains a certain amount of kinetic energy and Earth

1. gains more kinetic energy.
2. gains the same amount of kinetic energy.
3. gains less kinetic energy.
4. loses kinetic energy as the car gains it.

Suppose a ping-pong ball and a bowling ball are rolling toward you. Both have the same momentum, and you exert the same force to stop each. How do the time intervals to stop them compare?

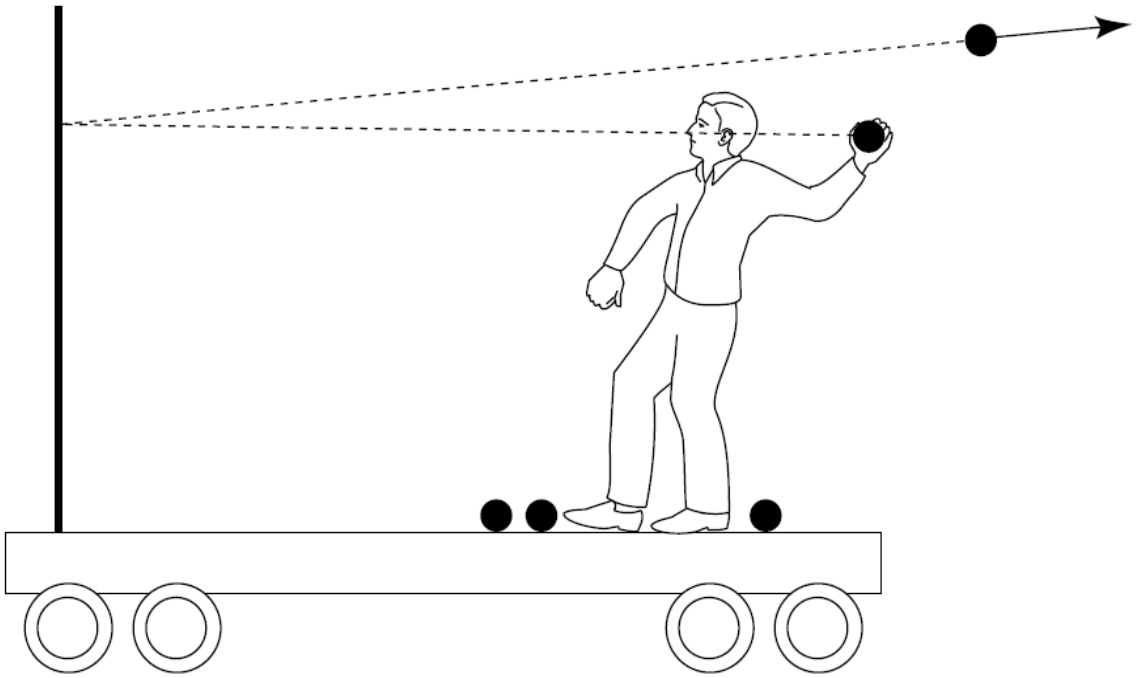
1. It takes less time to stop the ping-pong ball.
2. Both take the same time.
3. It takes more time to stop the ping-pong ball.

Suppose a ping-pong ball and a bowling ball are rolling toward you. Both have the same momentum, and you exert the same force to stop each. How do the distances needed to stop them compare?

1. It takes a shorter distance to stop the ping-pong ball.
2. Both take the same distance.
3. It takes a longer distance to stop the pingpong ball.

Suppose you are on a cart, initially at rest on a track with very little friction. You throw balls at a partition that is rigidly mounted on the cart. If the balls bounce straight back as shown in the figure, is the cart put in motion?

1. Yes, it moves to the right.
2. Yes, it moves to the left.
3. No, it remains in place.



Suppose rain falls vertically into an open cart rolling along a straight horizontal track with negligible friction.As a result of the accumulating water, the speed of the cart

1. increases.
2. does not change.
3. decreases.

Suppose rain falls vertically into an open cart rolling along a straight horizontal track with negligible friction.As a result of the accumulating water, the kinetic energy of the cart

1. increases.
2. does not change.
3. decreases.