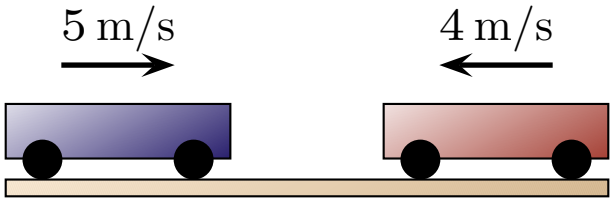
Question 1

A $4\,\mathrm{kg}$ cart moves to the right with speed $5\,\mathrm{m/s}$. A $6\,\mathrm{kg}$ cart moves to the left with speed $4\,\mathrm{m/s}$. The two carts stick together.

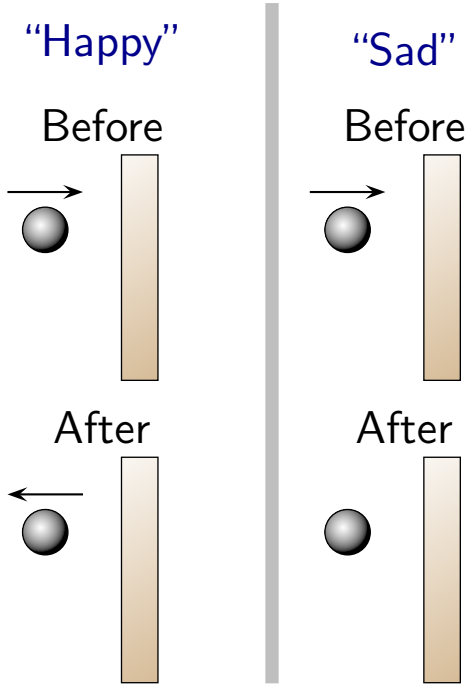


Which of the following best describes the carts after the collision?

1. They will be at rest.
2. Both carts will *definitely* move right.
3. Both carts will *definitely* move left.
4. Whether the carts move left or right depends on the severity of the collision.

Question 2

Two balls are each thrown with the same speed at identical wooden blocks, initially at rest. The masses of the balls are identical but one ("happy") rebounds from the block and the other ("sad") stops.



Prior to collision the speeds of the balls are identical. In which case is the speed of the block greatest after the collision?

1. Speeds are the same.
2. "Happy" ball collision.
3. "Sad" ball collision.

Question 3

A $200\,\mathrm{kg}$ raft is initially at rest on a lake in which there are no water currents nor any wind. A $100\,\mathrm{kg}$ person on the raft is initially at rest and then starts to walk west (as observed from the shore). There is negligible air resistance and friction between the raft and the water.

Which best describes the motion of the raft after the person starts to walk?

1. The raft remains stationary.
2. The raft moves east with the same speed as the person.
3. The raft moves east with half the speed of the person.
4. The raft moves west with the same speed as the person.
5. The raft moves west with half the speed of the person.

Question 4

You are initially at rest on the ground and you jump up and return back down to the ground. Which of the following is true (ignore Earth's rotation and orbit around the sun)?

1. Earth is absolutely stationary during this process.
2. Earth rebounds in the opposite direction from you and keeps moving in that direction.
3. Earth rebounds in the opposite direction from you and keeps moving in that direction but slows to a stop.
4. Earth rebounds in the opposite direction at a constant velocity, stops and then reverses direction at a constant velocity.
5. Earth rebounds in the opposite direction, slows to a stop, reverses direction. Velocity constantly changes.