

Momentum – Class Questions

1. Consider two carts of masses m and $2m$ at rest on an air-track. If you push first one cart for $3s$ and then the other for the same length of time, exerting equal force on each, how does the momentum of the light cart compare to the momentum of the heavy cart?
2. Consider two carts of masses m and $2m$ at rest on an air-track. If you push first one cart for $3s$ and then the other for the same length of time, exerting equal force on each, how does the kinetic energy of the light cart compare to the kinetic energy of the heavy cart?
3. A person attempts to knock down a large wooden bowling pin by throwing a ball at it. The person has two balls of equal size and mass, one made of rubber and the other of putty: the rubber ball bounces back, while the ball of putty sticks to the pin. Which ball is most likely to topple the bowling pin?
4. A student gets up on a table and then steps off. Considering only the time after he leaves the table and before he hits the ground, how does the momentum he acquires compare to the momentum acquired by the earth?
5. Two skidding cars collide with each other. Can we apply conservation of momentum to this problem?

6. Two identical cars collide on a level frictionless air-track. Consider two possible scenarios for the collision:
- Cart A strikes stationary cart B: Cart A comes to rest and cart B moves forward.
 - Cart A strikes stationary cart B: the two carts stick together and move forward.
- In which case is momentum conserved?
7. A golf ball is fired at a bowling ball initially at rest and bounces back elastically. How do the momentum and kinetic energy of the bowling ball compare to the momentum and kinetic energy of the golf ball after the collision?
8. A golf ball is fired at a bowling ball initially at rest and sticks to it. How do the momentum and kinetic energy of the bowling ball compare to the momentum and kinetic energy of the golf ball after the collision?
9. A golf ball is fired at a bowling ball initially at rest and sticks to it. How does the kinetic energy of the golf ball before the collision compare to the kinetic energy of the combined system after the collision?