

## Chapter 8 Momentum

**Conservation of Momentum****Pre-Test - Post-Test**

- Suppose a girl is standing on a pond where there is no friction between her feet and the ice. In order to get off the ice, she can \_\_\_\_\_.
  - bend over touching the ice in front of her, then bring her feet to her hands.
  - get on her hands and knees and crawl off the ice.
  - throw something in the direction opposite to that in which she wants to go.
  - walk very slowly on tiptoe.
  - all of the above will work
- A cannon recoils from launching a cannonball. The speed of the cannon's recoil is small because the \_\_\_\_\_.
  - cannon has far more mass than the cannonball.
  - force against the cannon is relatively small.
  - momentum of the cannon is unchanged.
  - impulse on the cannon is less than the impulse on the cannonball.
  - none of the above
- A cannon fires a cannonball. The speed of the cannonball will be the same as the speed of the recoiling cannon \_\_\_\_\_.
  - because momentum is conserved.
  - because both velocity and momentum are conserved.
  - because velocity is conserved.
  - if the mass of the cannonball equals the mass of the cannon.
  - none of the above
- Superman is at rest in space when he throws an asteroid that has more mass than he does. Which moves faster, Superman or the asteroid?
 

A) The asteroid	C) Superman
B) They both move at the same speed.	D) none of these.
- Recoil is noticeable if we throw a heavy ball while standing on roller skates. If instead we go through the motions of throwing the ball but hold onto it, our net recoil velocity will be \_\_\_\_\_.
 

A) the same as before.	C) small but noticeable.
B) zero.	
- Two carts having the same mass and speeds move toward each other on a track and stick together. After the collision the velocity of the carts is \_\_\_\_\_.
  - There is not enough information to say.
  - twice the original velocity.
  - the same as the original velocity.
  - zero.
  - one half the original velocity.

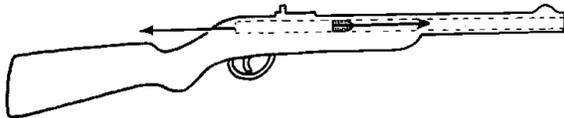


Chapter 8 Momentum

# Conservation of Momentum

## 8.4 Conservation of Momentum

1. State is the law of conservation of momentum?
2. When a bullet is fired, its momentum indeed changes! Also the momentum of the recoiling rifle changes. So momentum is not conserved for the bullet, and momentum is not conserved for the rifle. In what sense do we say that momentum is conserved?



3. In terms of momentum conservation, why does a cannon recoil when fired?
4. Why is it difficult for a fire fighter to hold a hose that ejects large amounts of high-speed water?
5. If a ball is projected upward from the ground with 10 units of momentum, what is the momentum of recoil of the world?
6. Why do we not feel the recoil of the Earth?

7. When an apple falls from a tree and strikes the ground without bouncing, what becomes of its momentum?
8. If you throw a ball horizontally while standing on roller skates, you roll backward with a momentum that matches that of the ball. Will you roll backward if you go through the motions of throwing the ball, but instead hold on to it? Explain.
9. Your friend says that the law of momentum conservation is violated when a ball rolls down a hill and gains momentum. What do you say?

10. What happens to the earth as you walk in one direction?
11. Before rockets in space were common, a popular misconception was that a rocket needs air to push against in order to work. This of course is not true, how is a rocket propelled in a region completely devoid of an atmosphere?

## 8.5 Collisions

12. Collisions are classified into two types, what are those two types of collisions?
13. Discuss the difference between elastic and inelastic collisions.

© 2012 Doc Fizzix Products. Saving the world with his knowledge of science



**Chapter 8 Momentum**

14. Would a head-on collision between two cars be more damaging to the occupants if the cars stuck together or if the cars rebounded upon impact?

15. In designing a car, would it be better to design vehicles to stick together during collisions or to bounce? Explain

16. You are going to be in a collision between a heavy car and a light car, if the vehicles stick together after the collision would it be better to be in the light vehicle or the heavy vehicle?

17. You are going to be in a collision between a heavy car and a light car, if the vehicles bounce away from one another after the collision would it be better to be in the light vehicle or the heavy vehicle?

18. A 1-kg lump of clay traveling at 0.5 meters per second collides with a second 1-kg lump of clay traveling the same speed but in the opposite direction. If the stick together and become one 2-kg lump of clay, what is the speed of the 2-kg lump of clay?

**Brain Challenge**

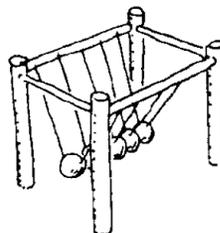
*A Mack truck and a Volkswagen have a head-on collision.*



- Which vehicle will experience the greater impulse?
- Which vehicle will experience the greater change in its momentum?
- Which vehicle will experience the greater acceleration?

*A bug is smashed into the windshield of a fast-moving car. Tell whether the following statements are true or false.*

- The forces of impact on the bug and on the car are the same size.
  - The impulses on the bug and on the car are the same size.
  - The changes in speed of the bug and of the car are the same.
  - The changes in momentum of the bug and of the car are the same size.
19. Would it be a violation of the law of conservation of momentum if two balls are dropped and only one came out the other side but with twice the speed? Explain



© 2012 Doc Fizzix Products. Saving the world with his knowledge of science



© 2012 Doc Fizzix Products. Saving the world with his knowledge of science

