

**Chapter 7 Impulse and Momentum**

**Momentum and Impulse**

**Pre-Test - Post-Test**

1. A freight train rolls along a track with considerable momentum. If it were to roll at the same speed but had twice as much mass, its momentum would be \_\_\_\_\_.
 

|               |                |
|---------------|----------------|
| A) doubled.   | C) quadrupled. |
| B) unchanged. | D) zero.       |
  
2. Compared to a sports car moving at 30 miles per hour, the same sports car moving at 60 miles per hour has \_\_\_\_\_.
 

|                            |                                 |
|----------------------------|---------------------------------|
| A) twice as much momentum. | C) four times as much momentum. |
| B) the same momentum.      | D) none of the above.           |
  
3. The momentum change of an object is equal to the \_\_\_\_\_.
 

|  |
|--|
| A) impulse acting on it.                       |
| B) force acting on it times its velocity.      |
| C) object's mass times the force acting on it. |
| D) force acting on it.                         |
| E) velocity of the object.                     |
  
4. In order to increase the final momentum of a golf ball, we could \_\_\_\_\_.
 

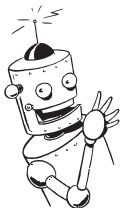
|  |
|--|
| A) increase the time of contact with the ball. |
| B) increase the force acting on it.            |
| C) follow through when hitting the ball.       |
| D) all of the above                            |
  
5. A small economy car (low mass) and a limousine (high mass) are pushed from rest across a parking lot, equal distances with equal forces. The car that receives the greater impulse is the \_\_\_\_\_.
 

|                       |                                    |
|-----------------------|------------------------------------|
| A) small economy car. | C) neither A nor B (same for each) |
| B) limousine.         |                                    |
  
6. Compared to falling on a wooden floor, a wine glass may not break when it falls on a carpeted floor because \_\_\_\_\_.
 

|                                |                             |
|--------------------------------|-----------------------------|
| A) lesser impulse in stopping. | C) less change in momentum. |
| B) longer time to stop.        | D) none of these.           |
  
7. The force of an apple hitting the ground depends upon \_\_\_\_\_.
 

|  |
|--|
| A) the time of impact with the ground.         |
| B) the speed of the apple just before it hits. |
| C) whether or not the apple bounces.           |
| D) all of the above.                           |

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1. What has greater mass, a pencil or big truck?
  
2. Which would be harder to stop, a moving pencil or a moving big truck?
  
3. What is momentum?
  
4. What factors affect an object's momentum?
  
5. What is the formula for momentum?
  
6. By time the Titanic spotted the iceberg it was way too late to change its fate. Discuss in terms of momentum.

**Changes in Momentum**

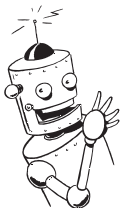
7. How do you change the momentum of an object?
  
8. List two ways you can increase an object's change in momentum.

9. What is the formula for impulse?
  
10. Derive the impulse/momentum formula from Newton's laws.
  
11. In sports that require contact with a ball, explain why the follow-through so important.
  
12. For the same force, why does a gun with longer barrel impart more speed to a bullet than a gun with a shorter barrel?
  
13. Discuss the advisability of loose coupling with railroad cars and slack between the cars from the point of view of impulse and momentum.



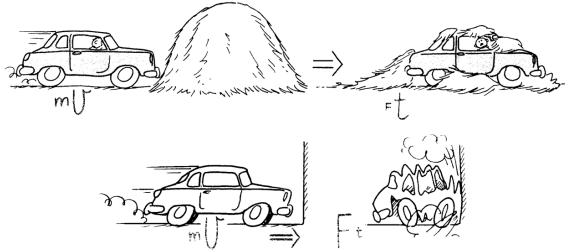
14. If you throw a raw egg against a wall it breaks, but if you can throw it into a hanging sheet it will not break. Explain.
  
15. Why do you bend your knees when you land on the floor after jumping?
  
16. What is the advantage of playing on natural turf versus artificial grass?

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17. Two identical cars are traveling at the same speed. One collides with a brick wall, and the other with a haystack. They both come to a complete stop.



- a) Which car will experience the greater change in momentum?
- b) Which car will experience the greater change in impulse?
- c) Which car will experience the greater force?

18. Many years ago, automobiles were manufactured to be as rigid as possible. Today's autos are designed to crumple upon impact. Explain the difference.

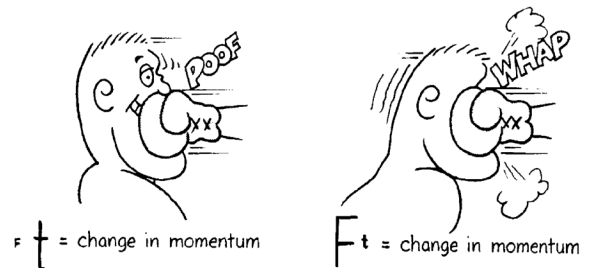
19. You are stopped at a traffic light when you notice the person behind you is approaching quickly and not paying attention. If you are about to be rear ended should you apply the brakes or take your foot off the brake? Explain

20. In terms of impulse and momentum, explain how air bags in cars reduce the chance of injury in accidents.

21. Why would it be a serious folly for a bungee jumper to use a stronger steel cable instead of an elastic cord?

22. You are sky diving and your parachute does not open, give one option that may save your life.

23. When a boxer is going to be hit by a punch they are told to "ride" it out, what does this mean and why do boxers do it?



24. Explain why a boxer tires more when he misses his opponent then when he hits him.

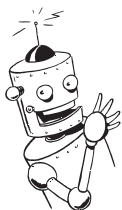
25. What factors affect how much an object's momentum changes?

**Bouncing**

26. How does the impulse of a bounce compare to stopping only?

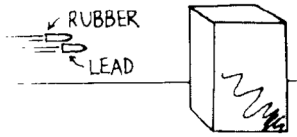
27. A glass falls off the counter and lands on the floor. Is the glass more likely to break if it bounces or doesn't bounce.

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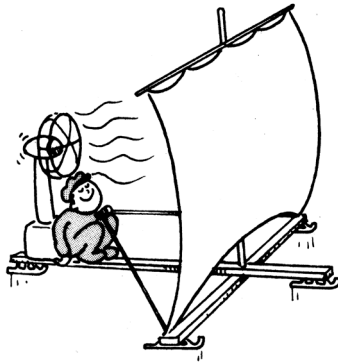
### Chapter 7 Impulse and Momentum

28. A rubber bullet and an metal bullet both have the same size, speed, and mass. They are fired at a block of wood.



- a) Which is most likely to knock the block over?
  
  
- b) Which is most likely to damage the block?

29. An ice sail craft is stalled on a frozen lake on a windless day. The skipper sets up a fan as shown. If all the wind bounces backward from the sail, will the craft be set in motion? If so, in what direction?



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