

Name: \_\_\_\_\_

**Unit 6 Quiz Review**

1. What is the definition of momentum? What is the unit for momentum?
2. Describe the basic formula for momentum in words.
3. What would happen to an object's momentum if the speed of that object increased?
4. A baseball and a ping-pong ball are both moving at the same velocity. Which has more momentum and why?
5. When you catch a baseball, you cause the baseball's momentum to change. What is the formula for calculating the change in momentum of an object?
6. a) What is the definition of impulse?  
b) How is it calculated?  
c) What is the unit for impulse?
7. In terms of momentum and force, why did Humpty Dumpty have a "great" fall? What could have been added at the bottom of the wall to keep Humpty Dumpty from breaking? Why?
8. What is meant by the statement, "momentum is conserved?"
9. Give an example of conservation of momentum between two objects.
10. The momentum of an object is determined by what two factors?
11. Using the concept of impulse, explain why we use airbags.

12. Solve for the momentum of each object for a-d.

a) A truck with a mass of 2250 kg moving at a velocity of 25 m/s east

b) A car with a mass of 1210 kg moving at a velocity of 51 m/s west

c) A truck with a mass of 6120 kg moving at a velocity of 10 m/s backward

d) A car with a mass of 1540 kg moving at a velocity of 38 m/s south

13. One tennis ball is hit against a brick wall at a velocity of 3 m/s and it bounces off at a velocity of 2 m/s. Another tennis ball is hit against a brick wall at a velocity of 4 m/s and it bounces off at a velocity of 3 m/s. Which tennis ball has the greatest change in momentum? Why?

14. An ice skater initially skating at a velocity of 3 m/s speeds up to a velocity of 5 m/s. Does the momentum of the skater increase or decrease? Why?

15. A 1200 kg car is initially moving at 2.7 m/s. It speeds up to 3.8 m/s. What is the impulse experienced by the car?

16. Before a collision, Object A has 20 kg m/s of momentum. Object B is at rest. After the collision, Object A has 12 kg m/s of momentum. How much momentum does object B have after the collision?

17. A car is moving at a speed of 15 m/s when it rear-ends an identical car at rest. After the collision, the second car moves at a speed of 8 m/s. What is the speed of the first car after the collision?

18. In which type or types of collision is momentum conserved?

19. Give an example of a perfectly inelastic collision.

20. If an engine supplies a force of 1200 N, how much time is required to accelerate an 800 kg car from rest to 18 m/s?

21. An 85 kg astronaut floating in space pushes a 30 kg asteroid that is floating nearby. If the asteroid moves to the right at 4.4 m/s after the push, what is the astronaut's velocity?

22. A dry cleaner throws a 22 kg bag of laundry onto a 9.0 kg cart. The cart was initially moving with a velocity of 3 m/s to the right and the dry cleaner threw the laundry with a velocity of 1 m/s to the left. What is the final velocity of the laundry and cart?

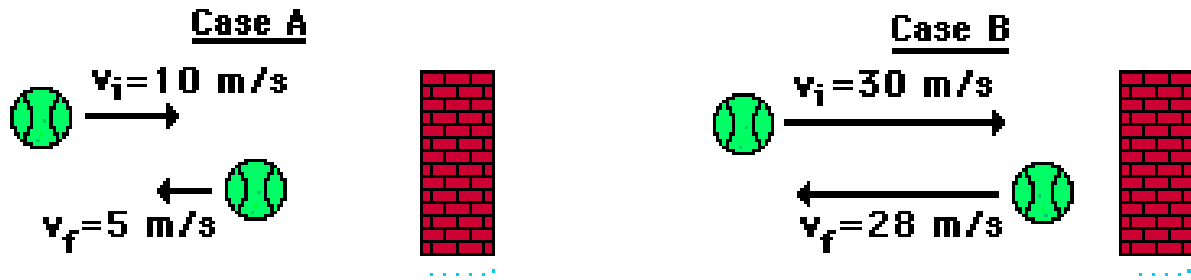
23. What impulse is required to have a change of velocity of 2 m/s in an 1800 kg car?

24. When trying to catch a water balloon, which type of collision should one attempt to have if one wants the water balloon to survive?

25. An astronaut carrying a camera in space finds herself drifting away from a space shuttle after her tether breaks. If she has no propulsion device, what should she do to move back to the shuttle?

26. During practice, a student kicks a 0.40 kg soccer ball with a velocity of 8.5 m/s into a 0.15 kg bucket lying on its side. The bucket travels with the ball after the collision. What is the final velocity of the bucket and soccer ball together?

27. A ball strikes the wall in the two ways below:



a) Which case (A or B) has the greatest change in velocity?

b) Which case has the greatest change in momentum?

c) Which case has the greatest impulse?

28. A compact car, mass 725 kg, is moving at 28 m/s toward the east. The driver of the car suddenly slams on the brakes for 2 seconds. The force on the car is -5000 N. Calculate the final velocity of the car.

29. A driver accelerates a 240 kg jet ski, which results in a force that speeds up the jet ski from 6 m/s to 28 m/s over a time interval of 60 seconds. Determine the force that is exerted on the jet ski.

30. A  $6 \times 10^{-2}$  kg tennis ball moves at a velocity of 12 m/s. The ball is struck by a racket, causing it to rebound in the opposite direction at a speed of 18 m/s. What is the change in the ball's momentum?

31. If a 5 kg object experiences a 10 N force for a duration of 0.10 seconds, then what is the momentum change of the object?

32. **\*\*Pre-AP, On-Level Challenge\*\*** A bullet with a mass of  $5 \times 10^{-3}$  kg is loaded into a gun. The loaded gun has a mass of 0.52 kg. The bullet is fired, causing the empty gun to recoil at a speed of 2.1 m/s. What is the speed of the bullet?

33. A 0.15 kg baseball moving at a speed of 45 m/s crosses the plate and strikes the 0.25 kg catcher's mitt (originally at rest). Determine the velocity of the ball and the mitt after the collision.

34. Jennifer, who has a mass of 50 kg, is riding at 35 m/s in her red sports car when she must suddenly slam on the brakes to avoid hitting a deer crossing the road. She strikes the air bag, which brings her body to a stop in 0.5 s. What force does the air bag exert on her?

35. One sticky pool ball with a mass of 2 kg is sitting stationary on the ground while the other sticky pool ball with a mass of 3 kg is moving with a velocity of 1 m/s. The second ball strikes the first stationary ball and they move together. What is the final speed of the two pool balls?

36. A red car is moving at 10 m/s and strikes a blue car of equal mass at rest. The blue car starts moving at 7 m/s. What is the speed of the red car after the collision?