Name _____ Hour _____

Conservation of Momentum-
Momentum of Collisions

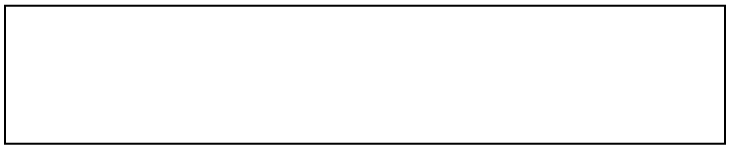
_____:The total momentum of a system remains constant during a collision. (Momentum lost by one object is gained by another)

_____ = _____

3 Types of Collision:

1. Explosion: _____

2. Elastic Collision: _____



3. Inelastic Collision: _____

Name _____ Hour _____

Conservation of Momentum Example:

1. A 76 kg boater, initially at rest in a stationary 45 kg boat, steps out of the boat and onto the dock. If the boater moves out of the boat with a velocity of 2.5 m/s to the right, what is the final velocity of the boat?

   Type of collision: _____

   Equation: _____

2. A 1500 kg car traveling at 15 m/s collides with a 4500 kg truck that is initially at rest at a stoplight. The car and truck stick together and move together after the collision. What is their final velocity?

   Type of collision: _____

   Equation: _____

3. A 4 kg bowling ball moving at 8.0 m/s has a head on collision with another bowling ball (mass = 6 kg) initially at rest. The first ball stops after the collision. Find the velocity of the second ball.

   Type of collision: _____

   Equation: _____

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Conservation of Momentum Problems:

1. A skater with a mass of 100 kg glides at 2.5 m/s and collides with a stationary skater (mass=80 kg). If the two skaters hold onto each other, with what velocity will they move together after colliding? (1.39 m/s)

2. A bullet with a mass of 25 **grams** is shot from a 5.6 kg gun with a velocity of 125 m/s. Calculate the velocity the gun would move backward with if it was not held in place. (0.558 m/s)

3. Two superballs are thrown at each other and they hit and bounce off each other. The first ball has a mass of 35 **grams** and is moving with a speed of 11.2 m/s and it hits the second ball (mass=150 **grams**) moving at 13.5 m/s. If the second ball slows down to 9.2 m/s after the collision, what is the final velocity of the first ball? (29.6 m/s)

Other momentum problems:

4. A pitcher claims he can throw a 0.156 kg baseball with as much momentum as a quarterback throws a football. If the quarterback throws the 0.43 kg football with a velocity of 40 **mph**, what **speed in mph** must the baseball be thrown at for his claim to be true? (110 mph)

5. Rudolph (m=200 lbs) puts on a rocket pack to help him increase his velocity from 20 m/s to 35.5 m/s. If the force needed to accomplish this was 1200 N, how much time did it take? (1.17 sec)

Name _____ Hour _____

Bucket Day on Momentum

1. What is the letter for momentum?
2. What is the momentum of a school bus parked outside?
3. What is the equation for momentum?
4. What is the letter for impulse?
5. What is the equation for impulse?
6. What is the unit for impulse?
7. What unit do we typically use to measure force?
8. What is the unit for momentum?
9. When you catch a water balloon, what variable do you control as you cradle it?
10. What is a g force?
11. How do you find the number of g's?
12. What is the equation for when two objects explode apart?
13. If you have a mass of 50 kg and are traveling at 2 m/s, what is your momentum?
14. What two variables does momentum depend on?
15. What is the conservation of momentum?
16. What is an elastic collision?
17. What is an inelastic collision?
18. If you triple the velocity while keeping mass constant, what happens to the momentum?
19. If you double the mass while keeping velocity constant, what happens to the momentum?
20. If you divide momentum by mass, what unit do you end up with?
21. If you divide momentum by velocity, what variable do you end up with?
22. If you double the force to stop an object, but the momentum remains constant, what should happen to the time?
23. If you triple the time it takes to stop an object, but the momentum remains constant, what should happen to the force of the impace?