Freshman Physics	Name:		Per:
MS- Momentum Practice Problems		Due Date:	

Which is more difficult to stop: A tractor-trailer truck barreling down the highway at 35 meters per second, or a small two-seater sports car traveling the same speed?

You probably guessed that it takes more force to stop a large truck than a small car. In physics terms, we say that the truck has greater *momentum*.

We can find momentum using this equation:

## momentum = mass of object × velocity of object

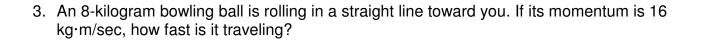
*Velocity* is a term that refers to both speed and direction. For our purposes we will assume that the vehicles are traveling in a straight line. In that case, velocity and speed are the same.

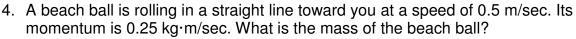
The equation for momentum is abbreviated like this: *p=m×v* 

Momentum, symbolized with a p, is expressed in units of kg·m/sec; m is the mass of the object, in kilograms; and v is the velocity of the object in m/sec.

## Use your knowledge about solving equations to work out the following problems. Be sure to show all your work with units:

- 1. If the truck has a mass of 2,000 kilograms, what is its momentum? (v = 35 m/s) Express your answer in kg·m/sec.
- 2. If the car has a mass of 1,000 kilograms, what is its momentum? (v = 35 m/s)











- 5. A 4,000-kilogram truck travels in a straight line at 10.0 m/sec. What is its momentum?
- 6. A 1,400-kilogram car is also traveling in a straight line. Its momentum is equal to that of the truck in the previous question. What is the velocity of the car?
- 7. Which would take more force to stop in 10 seconds: an 8.0-kilogram ball rolling in a straight line at a speed of 0.2 m/sec or a 4.0-kilogram ball rolling along the same path at a speed of 1.0 m/sec?

- 8. The momentum of a car traveling in a straight line at 20 m/sec is 24,500 kg·m/sec. What is the car's mass?
- 9. A 0.14-kilogram baseball is thrown in a straight line at a velocity of 30 m/sec. What is the momentum of the baseball?

kg·m/sec. What is the velocity of the ball?

10. Another pitcher throws the same baseball in a straight line. Its momentum is 2.1

11.A 1-kilogram turtle crawls in a straight line at a speed of 0.01 m/sec. What is the turtle's momentum?







## **Momentum Problems – Answer Key**

(CPO worksheet)

Remember : I am much more interested in your work. I've provided the answers so you can make sure that your work is leading you in the right direction.

- 1. p = 70,000 kg m/s
- 2. p= 35,000 kg m/s
- 3. v= 2 m/s
- 4. m = 0.5 kg
- 5. p= 40,000 kg m/s
- 6. v = 28.6 m/s
- 7. ball 1: 1.6 kg m/s ; ball 2: 4 kg m/s
- 8. m= 1225 kg
- 9. p= 42 kg m/s
- 10. v= 15 m/s
- 11. p= 0.01 kg m/s