College Prep Physics / 22 Name:_____
Momentum Worksheet IV 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***

*M*omentum, 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 <u>show all your work with units</u>:

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)

3. An 8-kilogram bowling ball is rolling in a straight line toward you. If its momentum is 16 kg·m/sec, how fast is it traveling?

4. A beach ball is rolling in a straight line toward you at a speed of 0.5 m/sec. Its momentum is 0.25 kg·m/sec. What is the mass of the beach ball?

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?

10. Another pitcher throws the same baseball in a straight line. Its momentum is 2.1 kg·m/sec. What is the velocity of the ball?

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