**Momentum Practice Problems**

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Per:\_\_\_\_\_\_\_\_ 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 show all your work with units:**

1. If the truck has a mass of 2,000 kilograms and is moving at a speed of 35 m/s, what is its momentum? Express your answer in kg·m/sec.
2. If the car has a mass of 1,000 kilograms and is traveling at a speed of 35 m/s, what is its momentum?
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?

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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 1250 kg car is stopped at a traffic light. A 3550 kg tuck moving at 8.33 m/s hits the car from behind. If bumpers lock, how fast will the two vehicles move?
6. If an 800 kg sports car slows to 13 m/s to check out an accident scene and the 1200 kg pick-up truck behind him continues traveling at 25 m/s, with what velocity will the two move as they lock bumpers after a rear-end collision?
7. A 2.50 kg ball moving at 7.50 m/s is caught by a 70.0 kg man while the man is standing on ice. How fast will the man / ball combination be moving after the ball is caught by the man?
8. A 1200 kg car traveling North at 20.0 m/s collides with a 1400 kg car traveling South at 22.0 m/s. The two cars collide and entangle. What is the resulting velocity of the wreckage?
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