



Reading Science

Name: _____

Date: _____

Watch Your Velocity!

- 1 The motion of an object can be determined by the object's speed, velocity, and/or acceleration. The distance an object travels over a certain period of time is its speed. An object's speed and the specific direction it is traveling is its velocity. A change in an object's velocity over a specific period of time is called acceleration.
- 2 In order to measure velocity, you must know the speed and direction of a given object. Imagine riding in the car with your family, taking a trip to the mall. As you head down the street, your mother applies pressure to the gas pedal to move the car forward. The car, which was previously moving at 25 miles per hour, is now proceeding forward at 45 miles per hour. Pushing the gas pedal causes the car to accelerate, or speed up. Because the constant rate of speed and the direction—in other words, the velocity—of the car increases, your family will get to your destination much faster. In this case, the velocity and the acceleration of the car are in the same direction.
- 3 Velocity can be constant, or it can change. Once your family reaches the main highway, your car is stuck in weekend traffic. Because of this, your mother now applies pressure to the brake pedal, causing the car to slow down, or decelerate. The car slows back down from 45 miles per hour to 25 miles per hour. In this case, the velocity of the car and its acceleration are in opposite directions. When you accelerate or decelerate, you change your velocity by a specific amount over a specific amount of time.
- 4 For motion to be described accurately, it needs to be described relative to a point of reference. A point of reference is an object or position near the object in motion. During your trip to the mall, there are several ways to describe your motion. Assume that you are sitting in the car, which is moving at a speed of 25 miles per hour. Here the ground is your point of reference. Both you and the car are moving 25 miles per hour relative to the ground. If the car is the point of reference, then you are not moving relative to the car. If you pass a car that is driving 20 miles per hour, then you are moving 5 miles per hour relative to the other car. Three different points of reference result in three different descriptions of your motion. For this reason, it is important to indicate your point of reference when measuring velocity. Most often, speed is determined with respect to the ground. However, in some instances the speed or velocity may be determined with respect to an object or an observer.
- 5 Remember, you need to know two things in order to truly describe how fast an object is going. You need to know its velocity and the point of reference. How else can the officer tell if your mother is speeding?





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1. The term **acceleration** was used in paragraphs 1-3. Which of the following could be a definition of acceleration?
- A “A change in an object's speed”
 - B “An object at rest”
 - C “A change in an object's direction”
 - D Both A and C
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2. In which of these three situations is the object accelerating?
- 1. A trash truck takes off from the curb.
 - 2. A book rests on a shelf.
 - 3. An airplane banks to circle around the airport.
- A Only 1
 - B Only 2
 - C Both 1 and 3
 - D 1, 2, and 3
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3. When a police officer is trying to decide if a driver is speeding, what is his or her point of reference?
- A The ground
 - B His or her car
 - C The speed limit
 - D All of the above



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4. Which words help you determine the meaning of the word **decelerate** in paragraph 3?

A *Velocity can be constant, or it can change.*

B *Applies pressure to the brake pedal*

C *Causing the car to slow down*

D *Stuck in weekend traffic*

5. A bowling ball moves 18 meters every 2 seconds down the lane at a bowling alley. What is the speed of the bowling ball?

A 18 meters per second

B 9 meters per second

C 2 meters per second

D 36 meters per second