

**Directions:** Answer the following word problems using the acceleration equation given in class. Make sure you show ALL of your work and do not forget your final units.

**Acceleration Practice Problems**

1. A car's velocity changes from 5 m/s north to 60 m/s north in 20 seconds. Calculate the car's average acceleration.
2. As a roller coaster starts down a hill, its speed is 10 m/s. Three seconds later, its speed is 32 m/s at the bottom of the hill. What is the roller coaster's acceleration?
3. A swimmer speeds up from 1.1 m/s to 1.3 m/s during the last 20 seconds of the workout. What is the acceleration of the swimmer during this interval?
4. A satellite's original velocity is 10,000 m/s. After 60 seconds, it is 5,000 m/s. What is the satellite's acceleration?
5. A runner begins the reaches a maximum velocity of 5.5 km/h. After 2 hours, what is the runner's acceleration?

# Math Skills

## LESSON 3

### Solve for Acceleration

Acceleration is a measure of how much the velocity of an object changes in a unit of time. Acceleration is measured in units such as  $\text{m/s}^2$ .

Acceleration is the change in velocity during a time interval divided by the time interval during which the velocity changes. This can be shown by the equation below, where  $a$  = acceleration,  $v_f$  = final speed,  $v_i$  = initial speed, and  $t$  = total time.

$$a = \frac{(v_f - v_i)}{t}$$

Pablo is running sprints. At 10 seconds, his speed is 2 m/s. At 20 seconds, his speed is 4 m/s. What was his acceleration during this time? To solve this problem, follow the steps below.

**Step 1** Identify the variables given in the problem:

Subtract to find the time interval.

$$v_f = 4 \text{ m/s}$$

$$v_i = 2 \text{ m/s}$$

$$t = 20 \text{ s} - 10 \text{ s} = 10 \text{ s}$$

**Step 2** Substitute the known values to solve the equation.

You are solving for  $a$ , the acceleration.

$$a = \frac{(v_f - v_i)}{t}$$

$$a = \frac{(4 \text{ m/s} - 2 \text{ m/s})}{10 \text{ s}}$$

$$a = 0.2 \text{ m/s}^2$$

### Practice

- After 30 s, a runner is sprinting at 3 m/s. But, 10 s later, the runner is sprinting at 3.8 m/s. What is the runner's acceleration during this time?
- A car was moving at 14 m/s. After 30 s, its speed increased to 20 m/s. What was the acceleration during this time?
- Kiko is coasting on her bicycle down a hill. After 3 s, her speed is 10 m/s. After 8 s, her speed is 25 m/s. What is her acceleration during this time?
- Han's younger sister is riding her tricycle in a straight line. After 3 s, her speed is 0.5 m/s. After 5 s, her speed is 1.5 m/s. What is her acceleration during this time?