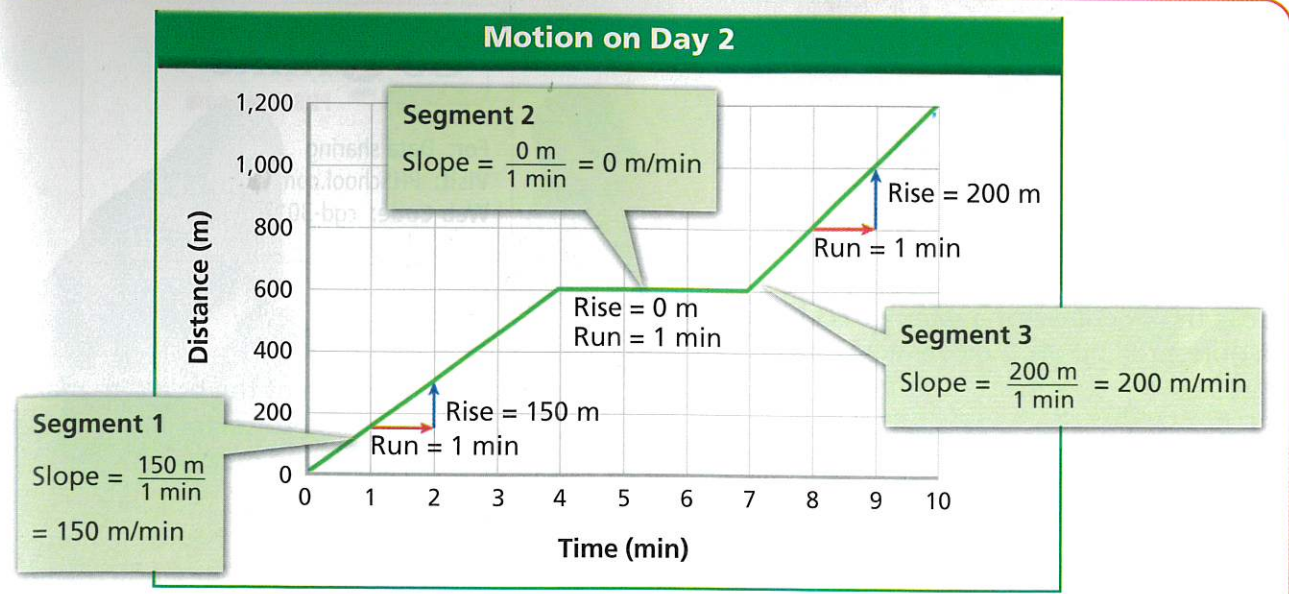
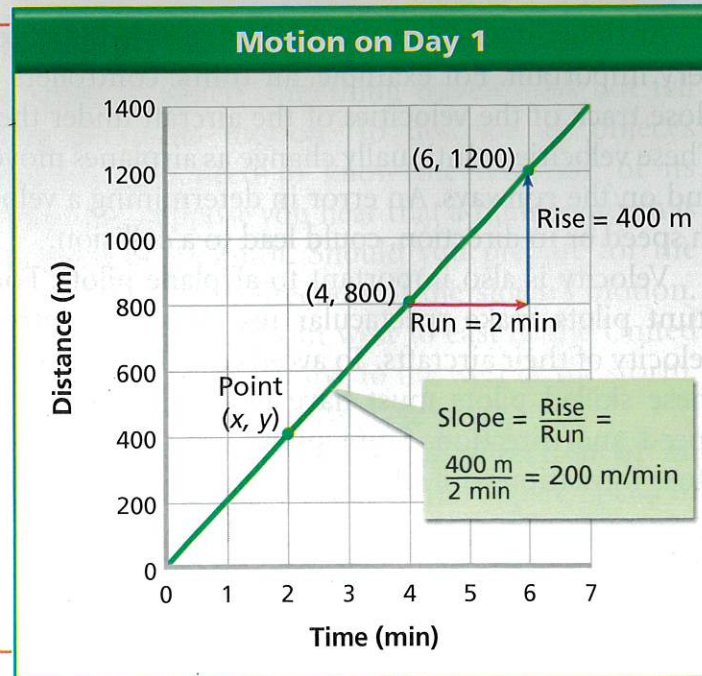


FIGURE 6
Graphing Motion

Distance-versus-time graphs can be used to analyze motion. On the jogger's first day of training, her speed is the same at every point. On the second day of training, her speed varies. **Reading Graphs** On the first day, how far does the jogger run in 5 minutes?



Graphing Motion

You can show the motion of an object on a line graph in which you plot distance versus time. The graphs you see in Figure 6 are distance-versus-time motion graphs. Time is shown on the horizontal axis, or x -axis. Distance is shown on the vertical axis, or y -axis. A point on the line represents the distance an object has traveled at a particular time. The x value of the point is time, and the y value is distance.

The steepness of a line on a graph is called **slope**. The slope tells you how fast one variable changes in relation to the other variable in the graph. In other words, slope tells you the rate of change. Since speed is the rate that distance changes in relation to time, the slope of a distance-versus-time graph represents speed. The steeper the slope is, the greater the speed. A constant slope represents motion at constant speed.

Calculating Slope You can calculate the slope of a line by dividing the rise by the run. The rise is the vertical difference between any two points on the line. The run is the horizontal difference between the same two points.

$$\text{Slope} = \frac{\text{Rise}}{\text{Run}}$$

In Figure 6, using the points shown, the rise is 400 meters and the run is 2 minutes. To find the slope, you divide 400 meters by 2 minutes. The slope is 200 meters per minute.



Reading Checkpoint What is the slope of a graph?

Different Slopes Most moving objects do not travel at a constant speed. The graph above shows a jogger's motion on her second day. The line is divided into three segments. The slope of each segment is different. From the steepness of the slopes you can tell that the jogger ran the fastest during the third segment. The horizontal line in the second segment shows that the jogger's distance did not change at all.

Section 1 Assessment

Target Reading Skill

Using Prior Knowledge Review your graphic organizer and revise it based on what you just learned about motion.

Reviewing Key Concepts

- Reviewing** How do you know if an object is moving?
 - Explaining** Why is it important to know if your reference point is moving?
 - Applying Concepts** Suppose you are riding in a car. Describe your motion relative to the car, the road, and the sun.
- Defining** What is speed?
 - Describing** What do you know about the motion of an object that has an average speed of 1 m/s?
 - Comparing and Contrasting** What is the difference between speed and velocity?

- Identifying** What does the slope of a distance-versus-time graph show you about the motion of an object?
- Calculating** The rise of a line on a distance-versus-time graph is 600 m and the run is 3 minutes. What is the slope of the line?

Math Practice

This week at swim practice, Jamie swam a total of 1,500 m, while Ellie swam 1.6 km.

- Converting Units** Convert Ellie's distance to meters. Who swam the greater distance: Jamie or Ellie?
- Converting Units** How many kilometers did Jamie swim?