Describing and Measuring Motion

♦ Understanding Main Ideas

Use the following paragraph and graph to answer questions 1 through 5. Write your answers on a separate sheet of paper. Remember to include units in your answers.

On Saturday, Ashley rode her bicycle to visit Maria. Maria's house is directly east of Ashley's. The graph shows how far Ashley was from her house after each minute of her trip.

1. Ashley rode at a constant speed for the first 4 minutes of her trip. What was her constant speed?

2. What was her average speed for the entire trip?

3. What was her average velocity for the entire trip?

4. Ashley stopped to talk with another friend during her trip. How far was she from her house when she stopped?

5. Ashley's brother rode beside her for several minutes. During this time, was he moving relative to Ashley?

♦ Building Vocabulary

From the list below, choose the term that best completes each sentence. Write your answers on the line provided.

- motion
- International System of Units
- foot
- reference point
- yard
- meter
- average
- velocity
- speed

6. Scientists around the world use the ____________, a system of measurement based on the number ten.

7. An object is in ____________ when its distance from a(n) ____________ is changing.

8. Speed in a given direction is ____________ .

9. ____________ can be calculated if you know the distance that an object travels in one unit of time.

10. The basic SI unit of length is the ____________ .
Exploring Reference Points

Depending on the reference point you choose, the same object can seem to be moving or standing still. Furthermore, even if an object seems moving from two different reference points, observers at those points might disagree about its speed and direction.

Here is a simple example: In the diagram below, a crow is flying along at a constant speed, carrying a shiny marble. Suddenly, it accidentally drops the marble and watches it fall. The diagram shows the position of the crow and the marble at five points in time, one second apart. A person standing still on the ground also watches the marble fall.

Answer the following questions on a separate sheet of paper.

1. From the reference point of the crow, in what direction is the marble falling? Does it appear to follow a curved or straight path?

2. How many seconds does it take the marble to fall to the ground?

3. The sides of the grid squares in the diagram are 5 meters long. Using this, calculate the average speed of the marble during its fall from the point of view of the crow. About how fast was it traveling during the last second of its fall from this perspective?

4. From the reference point of the person on the ground, does the marble appear to fall in a straight or curved path?

5. Measure the distance that the marble traveled while falling from the perspective of the person. What was its average speed? About how fast was it traveling during the last second of its fall from this perspective? (Hint: You will need a ruler to answer this.)