Date _____ Period _____ Name _____

CHAPTER 2

Study Guide Key

Representing Motion

Vocabulary Review

Write the term that correctly completes the statement. Use each term once.

average speed	instantaneous position	origin	resultant
average velocity	instantaneous velocity	particle model	scalar
coordinate system	magnitude	position	time interval
displacement	motion diagram	position-time graph	vector
distance			

1. instantaneous velocity — The speed and direction of an object at a particular instant is the _____.
2. magnitude — Another term given for the size of a quantity is the _____.
3. position — The _____ is the location of an object relative to an origin.
4. time interval — The formula $t_f - t_i$ represents _____.
5. vector — A _____ is a quantity with both magnitude and direction.
6. average velocity — Ratio of the change in position to the time interval during which the change occurred is the _____.
7. coordinate system — A system that defines the zero point of the variable you are studying is the _____.
8. origin — The zero point is also called the _____.
9. position-time graph — A graph with time data on the horizontal axis and position data on the vertical axis is a _____.
10. motion diagram — A _____ shows a series of images showing the position of a moving object over equal time intervals.
11. resultant — A vector that represents the sum of two or more vectors is a _____.
12. particle model — A simplified motion diagram that shows the object in motion as a series of points is a _____.
13. distance — A scalar quantity that is the length, or size, of the displacement vector is _____.
14. scalar — A quantity that has only magnitude is _____.

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15. instantaneous position The location of an object at a particular instant is _____.

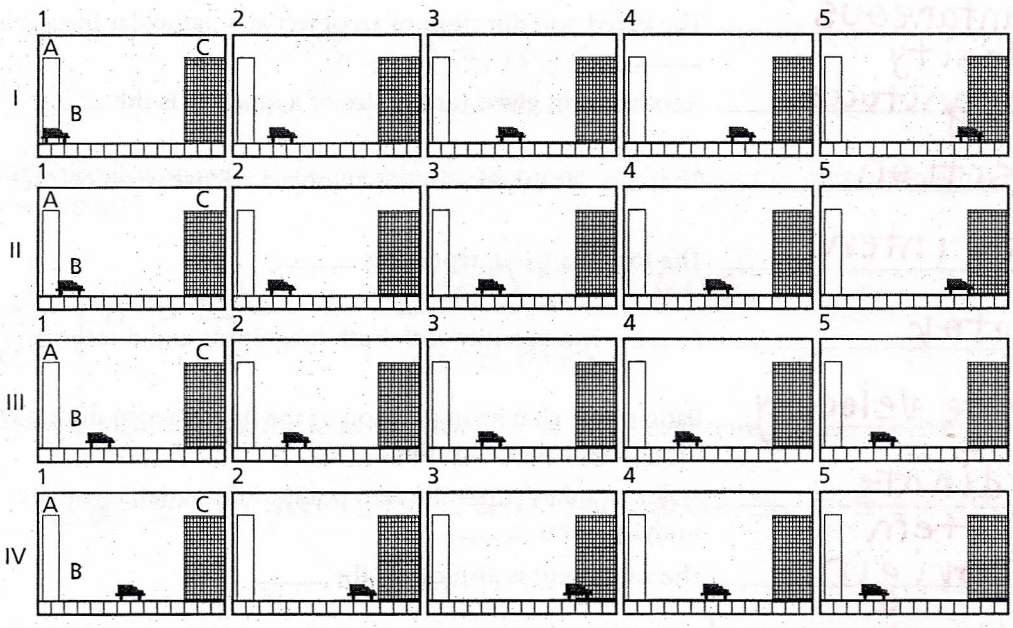
16. displacement The vector quantity that defines the distance and direction between two positions is _____.

17. average speed The absolute value of the slope on a position-time graph is _____.

Section 2.1 Picturing Motion

In your textbook, read about motion diagrams on pages 31–33.

Refer to the diagrams below to answer questions 1–5. Circle the letter of the choice that best completes the statement.



1. In set I, the object that is moving is _____.

   a. A
   c. C
   b. B
   d. none of the above

2. Set II shows that object B is _____.

   a. at rest
   c. slowing down
   b. increasing its speed
   d. traveling at a constant speed

3. Set _____ shows object B is slowing down.

   a. I
   c. III
   b. II
   d. IV

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4. Set _____ shows object B at rest.

a. I **c.** III

b. II **d.** IV

5. Set _____ shows object B traveling at a constant speed.

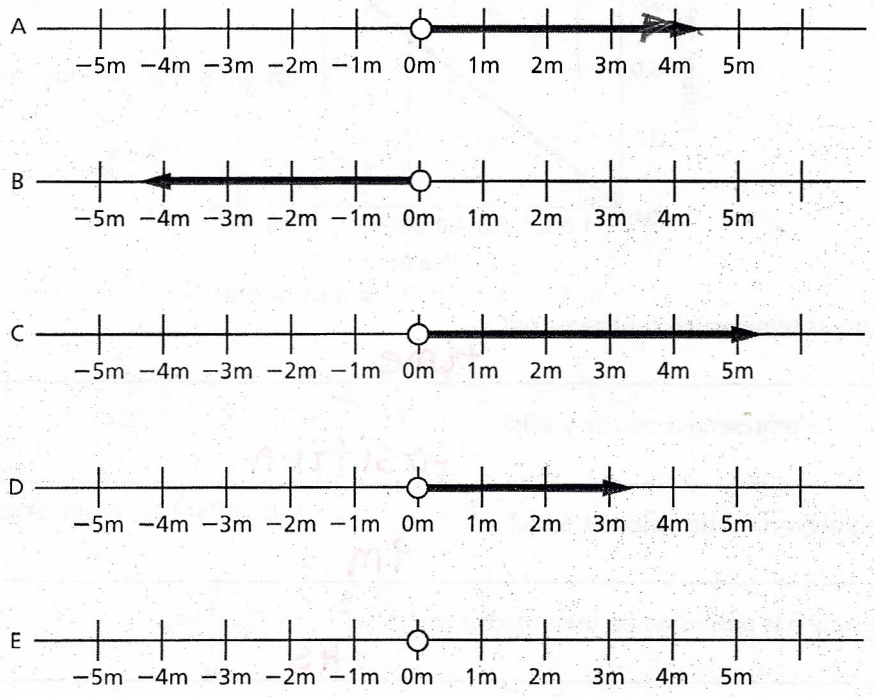
a. I **c.** III

b. II **d.** IV

Section 2.2 Where and When?

In your textbook, read about coordinate systems on pages 34–35.

Refer to the diagrams below to answer questions 1–5.



1. What are the position vectors for A, B, C, D, and E?

4m, −4m, 5m, 3m, 0m

2. If the object is moving from left to right in D, and each division represents the passage of 1 s, what is the velocity of the object?

$v = \Delta d / \Delta t$ $v = 3\text{m}/3\text{s} = 1\text{m/s}$

3. If the object is moving from right to left in D, what is the velocity of the object?

−1m/s

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4. In which sets are there objects with positive position vectors?

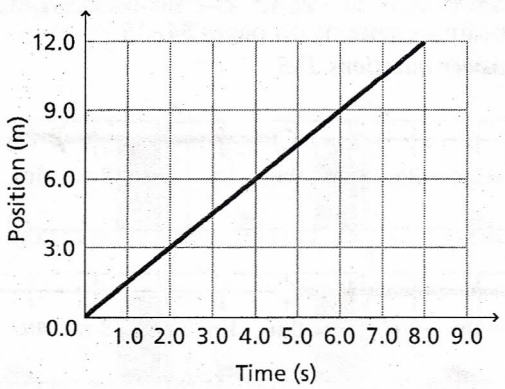
A, C, D

5. In which sets are there objects with negative position vectors?

B

Section 2.3 Position-Time Graphs

In your textbook, read about position-time graphs on pages 38–42. Refer to the diagram below to answer questions 1–7.



1. What quantity is represented on the x-axis?

time

2. What quantity is represented on the y-axis?

position

3. What is the position of the object at 6.0 s?

9m

4. How much time has passed when the object is at 6.0 m?

4s

5. How far does the object travel for every second it is in motion?

$v = \Delta d / \Delta t \qquad \Delta d = v \cdot \Delta t = 3m/2s = 1.5 m/s$

6. If the object continues at this speed, when will the object reach 18.0 m?

$v = \Delta d / \Delta t \qquad \Delta d = v \cdot \Delta t = 1.5 m/s \cdot \Delta t \qquad \Delta t = \frac{\Delta d}{v} = \frac{18m}{1.5 m/s} = 12s$

7. Where will the object be after 300 s?

$\Delta d = v \cdot \Delta t = 1.5 m/s \cdot 300s = 450m$

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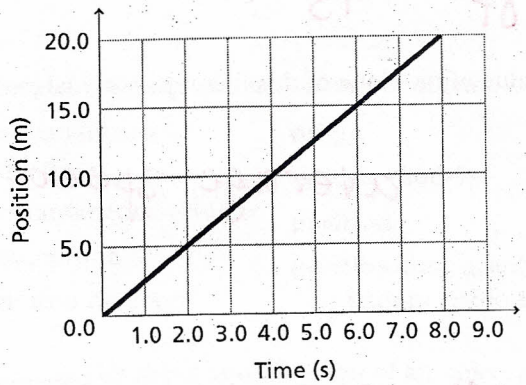
Section 2.4 How Fast?

In your textbook, read about speed and velocity on pages 43–47.

Refer to the diagram below to answer questions 1–12.



1. What is the formula for finding Δt?

$\Delta t = tf - ti$

2. Find Δt for the change in position from $d = 5$ m to $d = 15$ m.

$\Delta t = 6s - 2s = 4s$

3. What is the formula for finding Δd?

$\Delta d = df - di$

4. Find Δd for the time interval from $t = 2.0$ s to $t = 8.0$ s.

$\Delta d = 20m - 5m = 15m$

5. What is the formula for finding the slope on a position-time graph?

$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{\Delta d}{\Delta t}$

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6. What is the slope of this line?

$$v = \frac{\Delta d}{\Delta t} = \frac{10\text{m}}{4\text{s}} = 2.5\text{ m/s}$$

7. What does the absolute value of the slope of this line represent?

average speed

8. What is the velocity of this object in m/s?

$$v = 2.5\text{ m/s}$$

9. If this object continues at the same velocity, how long would it take this object to reach a position of $d = 150$ m?

$$v = \frac{\Delta d}{\Delta t} \quad \Big| \quad \Delta t = \frac{\Delta d}{v} = \frac{150\text{m}}{2.5\text{m/s}} = 60\text{s}$$

10. If this object continues at the same velocity, how far will it have traveled when $t = 200$ s?

$$\Delta d = v \cdot \Delta t = 2.5\text{ m/s} \cdot 200\text{s} = 500\text{ m}$$

11. What formula would you use to determine the position of this object if it had an initial position vector and then traveled at a fixed velocity for a certain amount of time?

$$d_2 = d_1 + v \cdot \Delta t$$

12. How far will this object have traveled if it had an initial position of 220 m and traveled at a velocity of 2.5 m/s for 48 s?

$$d_2 = 220\text{m} + 2.5\text{m/s} \cdot 48\text{s} = 220\text{m} + 120\text{m}$$

$$d_2 = 340\text{m}$$

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