Chapter 4   Linear Motion

Exercises

4.1 Motion Is Relative (page 47)

1. Is the following sentence true or false? When we describe the motion of one object with respect to another, we say that the object is moving relative to the other object. _____

2. An object is _____ if its position relative to a fixed point is _____.

3. A driver is going 20 kilometers per hour down the street. What is the driver's speed relative to?

    _____

4.2 Speed (pages 48–49)

4. Define speed. _____

5. Complete the following equation: speed = distance/_____.

6. How is the slash symbol read in *km/h*? _____

7. Circle the letters of the sentences that are true of instantaneous speed.

    a. Instantaneous speed is the total distance covered divided by time.

    b. Instantaneous speed is the speed at any instant.

    c. The speedometer on a car shows the instantaneous speed.

    d. If you traveled 30 kilometers in 1 hour, your instantaneous speed would be 30 km/h.

8. How is average speed calculated?

    _____

9. If you traveled 80 kilometers in 2 hours, what was your average speed?

    _____

10. If your average speed is 30 kilometers per hour and your trip took 1 hour, what was the total distance covered?

    _____

4.3 Velocity (page 50)

Determine if each of the following statements is true or false. Write the correct word on the line provided.

_____ 11. Speed is velocity in a given direction.

_____ 12. The speed of a plane can be described as 300 mi/h.

_____ 13. The velocity of a car can be described as 60 km/h to the north.

_____ 14. Speed is a vector quantity.

_____ 15. Velocity is a vector quantity.

16. If either the _____ or the _____ is changing (or both are), then the velocity is changing.

4.4 Acceleration (pages 51–52)

17. What is acceleration?

_____

18. How is acceleration calculated?

_____

19. In physics, the term *acceleration* applies to both _____ and _____ in speed.

20. Acceleration is a change in speed, a change in _____, or both.

21. Is the following sentence true or false? Acceleration is a vector quantity.

_____

22. If a car is traveling around a curve on a highway at a constant speed, is the car accelerating? Explain your answer.

_____

23. Circle the letter of the value and units that represent acceleration.

   a. 5 km   b. 15 km/s

   c. 25 s/km   d. 55 km/s^2

4.5 Free Fall: How Fast (pages 53–55)

24. Is the following sentence true or false? In real life, air resistance has no effect on the acceleration of a falling object. _____

25. An object moving under the influence of the gravitational force only is said to be in _____.

26. Define elapsed time.

_____

Match each symbol or value with the correct phrase.

Phrase	Symbol or Value
_____ **27.** an approximate value of the acceleration of an object in free fall	a. 10 m/s^2
_____ **28.** used to represent acceleration due to gravity	b. *g*
_____ **29.** an accurate value of acceleration of an object in free fall	c. *v*
_____ **30.** used for both speed and velocity in the equation for instantaneous speed	d. 9.8 m/s^2

Chapter 4   Linear Motion

31. What is the instantaneous speed of an object that is at its highest point when it is thrown straight up in the air? _____

32. When an object is thrown straight up into the air, what is its acceleration when it is moving upward? _____

33. What is the acceleration of the same object in the above question when it is descending? _____

4.6 Free Fall: How Far (page 56)

34. Is the following sentence true or false? For each second of free fall, an object falls a greater distance than it did in the previous second.

_____

35. At the end of time *t*, an object in free fall has fallen a distance equal to

_____

36. What are the equations used to calculate velocity and distance for a freely falling object?

_____

_____

4.7 Graphs of Motion (pages 57–58)

Use the graph below to answer Questions 37–39.

Speed vs. Time for a Freely Falling Object
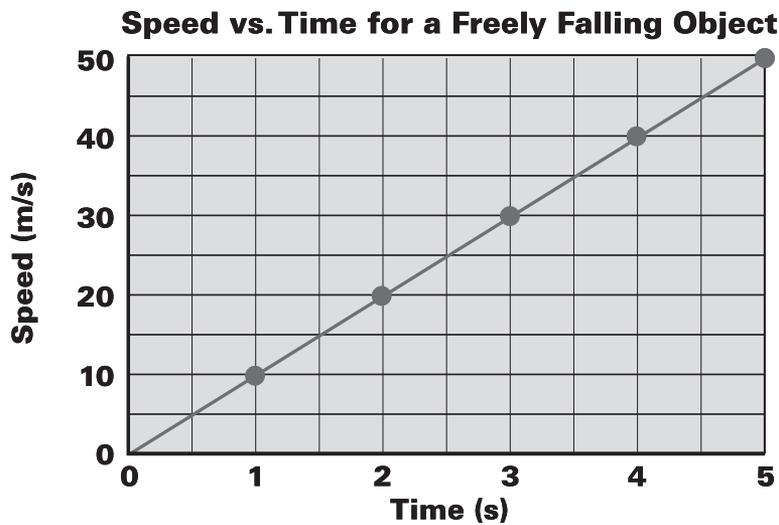
37. What is the relationship between time and speed on this graph?
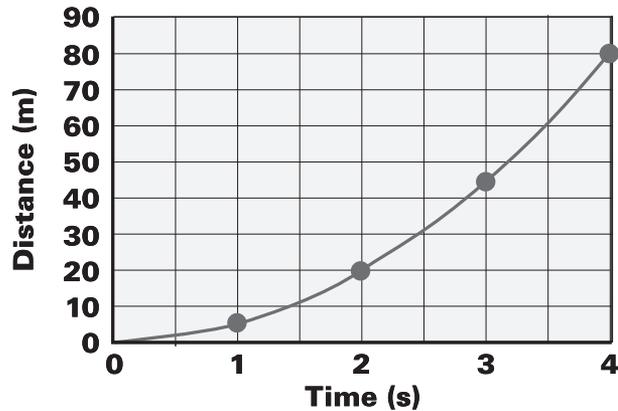
_____

38. What does the slope of the line on this graph represent?

_____

39. What is the slope of the graph?

_____

Chapter 4   Linear Motion

Use the graph below to answer Questions 40 and 41.

Distance vs. Time for a Freely Falling Object

40. The relationship between distance and time on this graph is
_____ and the curve is _____.

41. What does the slope of the line at each point represent?

_____

4.8 Air Resistance and Falling Objects (page 59)

42. Explain why a dropped coin reaches the ground before a feather.

_____

_____

43. Explain what would happen if a coin and a feather were dropped in a
vacuum tube.

_____

44. If air resistance is negligible, a falling object can be considered

_____.

4.9 How Fast, How Far, How Quickly How Fast Changes (page 59)

Match each word or equation with the correct phrase.

Phrase	Word or Equation
_____ **45.** the word for how fast something freely falls from rest after an elapsed time	a. $d = \frac{1}{2}gt^2$
_____ **46.** the equation for speed and velocity	b. $v = gt$
_____ **47.** the word for how far an object has fallen	c. acceleration
_____ **48.** the equation for distance	d. speed
_____ **49.** the word for the rate at which velocity changes	e. distance