Test Bank for College Physics Reasoning and Relationships 2nd Edition by Nicholas Giordano ISBN 0840058195 9780840058195

MULTIPLE CHOICE

NARRBEGIN: 2.2
2.2 What is Motion?
NARREND

1. Which formula is dimensionally consistent with an expression yielding a value for velocity? (*a* is acceleration, *x* is distance, and *t* is time)
   a. v/t^2
   b. vx^2
   c. v^2/t
   d. at

   ANS: D PTS: 1 DIF: 1

2. If *a* is acceleration, *v* is velocity, *x* is position, and *t* is time, then which equation is not dimensionally correct?
   a. $t = x/v$
   b. $a = v^2/x$
   c. $v = a/t$
   d. $t^2 = 2x/a$

   ANS: C PTS: 1 DIF: 1

3. When we add a displacement vector to another displacement vector, the result is:
   a. a velocity.
   b. an acceleration.
   c. another displacement.
   d. a scalar.

   ANS: C PTS: 1 DIF: 1

4. When NASA was communicating with astronauts on the Moon, the time from sending on the Earth to receiving on the moon was 1.33 s. Find the distance from Earth to the Moon. (The speed of radio waves is 3.00 10^8 m/s.)
   a. 240,000 km
   b. 384,000 km
   c. 399,000 km
   d. 768,000 km

   ANS: C PTS: 1 DIF: 2

5. In which of the following cases is the displacement's magnitude half the distance traveled?
   a. 10 steps east followed by 3 steps west
   b. 22 steps east followed by 11 steps west
   c. 5 steps east followed by 10 steps west
   d. 15 steps east followed by 5 steps west

   ANS: D PTS: 1 DIF: 2

6. A change in a physical quantity w having initial value w_i and final value w_f is given by which of the following?
   a. $w_i \quad w_f$
   b. $w_f \quad w_i$
   c. $(w_f + w_i)/2$
   d. none of the above

   ANS: B PTS: 1 DIF: 1

7. Displacement is which of the following types of quantities?
   a. vector
   b. scalar
   c. magnitude
   d. dimensional

   ANS: A PTS: 1 DIF: 1

8. A truck moves 70 m west, then moves 120 m east, and finally moves west again a distance of 90 m. If east is chosen as the positive direction, what is the truck's resultant displacement?
   a. 40 m
   b. 40 m
   c. 280 m
   d. 280 m

   ANS: B PTS: 1 DIF: 2

9. Which of the following is not a vector quantity?
   a. temperature
   b. velocity
   c. acceleration
   d. displacement

   ANS: A PTS: 1 DIF: 1

10. In one-dimensional motion, the average speed of an object that moves from one place to another and then back to its original place has which of the following properties?
   a. It is positive.
   b. It is negative.
   c. It is zero.
   d. It can be positive, negative, or zero.

   ANS: A PTS: 1 DIF: 2

11. In one-dimensional motion where the direction is indicated by a plus or minus sign, the average velocity of an object has which of the following properties?
   a. It is positive.
   b. It is negative.
   c. It is zero.
   d. It can be positive, negative, or zero.

   ANS: D PTS: 1 DIF: 1

12. An object moves 20 m east in 30 s and then returns to its starting point taking an additional 50 s. If west is chosen as the positive direction, what is the sign associated with the average velocity of the object?
   a. +
   b.
   c. 0 (no sign)
   d. any of the above

   ANS: C PTS: 1 DIF: 1

13. An object moves 10 m east in 30 s and then returns to its starting point taking an additional 70 s. If west is chosen as the positive direction, what is the average speed of the object?
   a. 0.20 m/s
   b. –0.20 m/s
   c. 0.50 m/s
   d. 0 m/s

   ANS: A PTS: 1 DIF: 2

14. A bird, accelerating from rest at a constant rate, experiences a displacement of 37 m in 11 s. What is the average velocity?
   a. 1.7 m/s
   b. 2.5 m/s
   c. 3.4 m/s
   d. zero

   ANS: C PTS: 1 DIF: 1

15. Jeff throws a ball straight up. For which situation is the vertical velocity zero?
   a. on the way up
   b. at the top
   c. on the way back down
   d. none of the above

   ANS: B PTS: 1 DIF: 1

16. A railroad train travels forward along a straight track at 80.0 m/s for 1000 m and then travels at 40.0 m/s for the next 1000 m. What is the average velocity?
a. 60.0 m/s
b. 37.5 m/s
c. 63.7 m/s
d. 53.3 m/s

ANS: D PTS: 1 DIF: 3

17. The distance of the Earth from the Sun is 93,000,000 miles. If there are $3.15\ 10^7$ s in one year, find the speed of the Earth in its orbit about the Sun.
a. 9.28 miles/s
b. 18.6 miles/s
c. 27.9 miles/s
d. 37.2 miles/s

ANS: B PTS: 1 DIF: 2

18. A ball is thrown vertically upwards at 9.8 m/s. For its complete trip (up and back down to the starting position), its average velocity is:
a. 19.6 m/s.
b. 9.80 m/s.
c. 4.90 m/s.
d. not given.

ANS: D PTS: 1 DIF: 1

19. Changing the positive direction in a reference frame to the opposite direction does not change the sign of which of the following quantities?
a. velocity
b. average velocity
c. speed
d. displacement

ANS: C PTS: 1 DIF: 1

20. On a position-time graph, the slope of the straight line joining two points on the plotted curve that are separated in time by the interval *t*, is which of the following quantities?
a. average steepness
b. average velocity
c. instantaneous velocity
d. average acceleration

ANS: B PTS: 1 DIF: 1

21. A European sports car dealer claims that his car will accelerate at a constant rate from rest to 100 km/hr in 8.00 s. If so, what is the acceleration? (*Hint:* First convert speed to m/s.)
a. $3.47\ m/s^2$
b. $4.63\ m/s^2$
c. $11.4\ m/s^2$
d. $18.5\ m/s^2$

ANS: A PTS: 1 DIF: 2

22. A European sports car dealer claims that his product will accelerate at a constant rate from rest to a speed of 100 km/hr in 8.00 s. What is the speed after the first 5.00 s of acceleration? (*Hint:* First convert the speed to m/s.)
a. 34.7 m/s
b. 44.4 m/s
c. 23.1 m/s
d. 17.4 m/s

ANS: D PTS: 1 DIF: 2

23. An *x*-*t* graph is drawn for a ball moving in one direction. The graph starts at the origin and at $t = 6$ s the velocity of the ball is zero. We can be positive that at $t = 6$ s,
a. the slope of the curve is non-zero.
b. the acceleration is constant.
c. the ball has stopped.
d. none of the above answers is always correct.

ANS: C PTS: 1 DIF: 1

24. A *v*-*t* graph is drawn for a ball moving in one direction. The graph starts at the origin and at $t = 6$ s the acceleration of the ball is zero. We know that at $t = 6$ s,
    a. the slope of the curve is non-zero.
    b. the curve is not crossing the time axis.
    c. the velocity of the ball is not changing.
    d. the curve is at $v = 0$, $t = 0$.

    ANS: C PTS: 1 DIF: 1

25. The value of an object's acceleration may be characterized in equivalent words by which of the following?
    a. displacement
    b. rate of change of displacement
    c. velocity
    d. rate of change of velocity

    ANS: D PTS: 1 DIF: 1

26. A 50-g ball traveling at 25.0 m/s is bounced off a brick wall and rebounds at 20.0 m/s. A high-speed camera records this event. If the ball is in contact with the wall for 3.50 ms, what is the magnitude of the average acceleration of the ball during this time interval?
    a. 714 m/s^2
    b. 1430 m/s^2
    c. 6430 m/s^2
    d. 12,900 m/s^2

    ANS: D PTS: 1 DIF: 2

27. An object is dropped from a height. Once it is moving, which of the following statements is true, at least at one point?
    a. Its velocity is more than its acceleration.
    b. Its velocity is less than its acceleration.
    c. Its velocity is the same as its acceleration.
    d. Its velocity is never equal to its acceleration.

    ANS: D PTS: 1 DIF: 2

28. The slope of the acceleration-time curve represents:
    a. the velocity.
    b. the rate of change of acceleration.
    c. the rate of change of displacement.
    d. the area under the position vs. time curve.

    ANS: B PTS: 1 DIF: 1

29. A strobe photograph shows equally spaced images of a car moving along a straight road. If the time intervals between images is constant, which of the following cannot be positive?
    a. the speed of the car
    b. the average velocity of the car
    c. the acceleration of the car
    d. the direction of motion of the car

    ANS: C PTS: 1 DIF: 2

30. A strobe photograph of a car moving along a straight road shows the interval between each successive image to be diminishing. If the direction of motion of the car is taken as positive, which of the following are negative?
    a. the speed of the car
    b. the average velocity of the car
    c. the average acceleration of the car
    d. all of the above

    ANS: C PTS: 1 DIF: 2

31. A ball is pushed downhill with an initial velocity of 3.0 m/s. The ball rolls down a hill with a constant acceleration of 1.6 m/s^2. The ball reaches the bottom of the hill in 6.0 s. What is the ball's velocity at the bottom of the hill?

a. 10 m/s
c. 16 m/s
b. 13 m/s
d. 17 m/s

ANS: B PTS: 1 DIF: 2

32. A bird, accelerating from rest at a constant rate, experiences a displacement of 37 m in 11 s. What is the final velocity after 11 s?

a. 6.7 m/s
c. 13 m/s
b. 5.1 m/s
d. zero

ANS: A PTS: 1 DIF: 2

33. A bird, accelerating from rest at a constant rate, experiences a displacement of 37 m in 11 s. What is its acceleration?

a. 0.20 m/s^2
c. 0.51 m/s^2
b. 0.31 m/s^2
d. 0.61 m/s^2

ANS: D PTS: 1 DIF: 2

34. In the case of constant acceleration, the average velocity equals the instantaneous velocity:

a. at the beginning of the time interval.
b. at the end of the time interval.
c. half-way through the time interval.
d. three-fourths of the way through the time interval.

ANS: C PTS: 1 DIF: 2

35. A particle moves east at constant velocity $\vec{\mathbf{v}}$ for a time interval Δt. It then moves north at a constant velocity, with the same speed as before, for another time interval Δt Finally it moves east again with *the original velocity. At the instant an additional time interval* Δt has elapsed, which of the following *are true about the average velocity and the average acceleration for the motion described?*

a. The average velocity is $\vec{\mathbf{v}}$ and the average acceleration is zero.
b. The average velocity is $\vec{\mathbf{v}}$ and the average acceleration is not zero.
c. The average velocity is not $\vec{\mathbf{v}}$ and the average acceleration is zero.
d. The average velocity is not $\vec{\mathbf{v}}$ and the average acceleration is not zero.

ANS: C PTS: 1 DIF: 3

36. The first displacement is 7 m and the second displacement is 3 m. They <u>cannot</u> add together to give a total displacement of:

a. 10 m.
c. 4 m.
b. 7 m.
d. 3 m.

ANS: D PTS: 1 DIF: 1

37. An object, initially moving in the negative *x* direction, is subjected to a change in velocity in the negative *y* direction. If the resulting velocity vector is drawn from the origin, into which quadrant does this vector point?

a. 1st
b. 2nd
c. 3rd
d. None, since the object is now moving in the negative *y* direction.

ANS: C PTS: 1 DIF: 2

38. A car is initially moving at 30 m/s east and a little while later it is moving at 10 m/s north. Which of the following best describes the orientation of the average acceleration during this time interval?
a. north of west
b. northwest
c. west
d. north of east

ANS: A PTS: 1 DIF: 2

39. A hiker walks 200 m east and then walks 100 m north. In what direction is her resulting displacement?
a. north
b. east
c. northeast
d. None of the answers is correct.

ANS: D PTS: 1 DIF: 2

40. An object moves at a constant velocity of 12 m/s to the southwest for an interval of 20 s. Halfway through this interval, what is the magnitude of its instantaneous velocity?
a. It can be any value from 0 to 24 m/s.
b. 6 m/s
c. 12 m/s
d. More information is needed.

ANS: C PTS: 1 DIF: 1

41. Arvin the Ant is on a picnic table. He travels 30 cm eastward, then 20 cm northward, and finally 15 cm westward. What is the magnitude of Arvin's net displacement?
a. 25 cm
b. 65 cm
c. 50 cm
d. 29 cm

ANS: A PTS: 1 DIF: 2

42. A jogger runs halfway around a circular path with a radius of 70 m. What, respectively, are the magnitude of the displacement and the distance jogged?
a. 70 m, 220 m
b. 70 m, 440 m
c. 140 m, 220 m
d. 140 m, 440 m

ANS: C PTS: 1 DIF: 2

43. A runner circles a track of radius 100 m in 100 s moving at a constant rate. If the runner was initially moving east, what has been the runner's average acceleration when halfway around the track?
a. At a constant rate, the average acceleration would be zero.
b. 0.13 m/s^2, south
c. 0.25 m/s^2, west
d. No answer is correct.

ANS: C PTS: 1 DIF: 3

44. A car is moving along a straight highway and accelerates at a constant rate while going from point A to point B. If the acceleration is positive, increasing the speed of the car, where does the position where the instantaneous speed equals the average speed occur for the interval from A to B?
a. midway between A and B
b. closer to A than to B
c. closer to B than to A
d. Any of the answers could be correct depending on the original speed.

ANS: B PTS: 1 DIF: 2

45. A car is moving in the positive direction along a straight highway and accelerates at a constant rate while going from point A to point B. If the acceleration is positive, increasing the speed of the car, when does the position where the average speed equals the instantaneous speed occur during the time interval from A to B? Assume the time interval is T.

a. T/2 from the start of the interval
b. before T/2 from the start of the interval
c. after T/2 from the start of the interval
d. It depends on the speed at the start of the time interval.

ANS: A PTS: 1 DIF: 2

46. Suppose a particle is moving along a straight line with a speed *v* for a time *t*, then stops for a time *t*, and then resumes moving along the original direction with speed *v* for time *t*. What has been the average speed of the particle for the total time period 3*t*?

a. *v*
b. $2v/3$
c. 1.5 *v*
d. $\sqrt{2/3}v$

ANS: B PTS: 1 DIF: 2

47. On a position-time graph for a particle, suppose the plot starts at some positive position and as the time goes on the curve gets steeper and steeper while curving upwards. Which of the following must be true?

a. The speed of the particle is constant.
b. The acceleration of the particle is constant.
c. The speed of the particle is decreasing.
d. The acceleration of the particle is positive.

ANS: D PTS: 1 DIF: 2

48. On a velocity-time graph for a particle, suppose the plot starts at some positive velocity and then follows a straight line to zero at a later time. Which of the following must be true about a position vs. time graph for this same time interval?

a. The curve will start at a positive position value and follow a straight line to zero at the later time.
b. The curve will rise steeply at first and as time goes on will level out approaching its highest position value at the later time.
c. The curve will drop steeply at first and as time goes on will approach its lowest position value at the later time
d. The curve will start at the zero of position and follow a straight line to its highest position at the later time.

ANS: B PTS: 1 DIF: 2

NARRBEGIN: 2.3

2.3 The Principle of Inertia

NARREND

49. A physics student is riding on a train traveling north. Having read about inertia, the student performs an experiment with a golf ball. He reaches over the aisle and drops the ball from rest. Instead of hitting the floor directly below the student's hand, it hits to the north, i.e., forward of that position. Which of the following might be the cause for this to happen?

a. The train is moving at constant velocity.
b. The train is speeding up.
c. The train is slowing down.
d. Whatever the cause, it cannot be any of the answers given.

ANS: C PTS: 1 DIF: 2

NARRBEGIN: 2.4

2.4 Newton's Laws of Motion

NARREND

50. Five boys are pushing on a snowball, and each is pushing with a force of 20.0 N. However, each boy is pushing in a different direction. They are pushing north, northeast, east, southeast, and south. (Each boy is pushing at an angle of 45.0 relative to his neighbor.) What is the magnitude of the total force on the ball?

a. 54.2 N
b. 48.3 N
c. 24.1 N
d. 0 N

ANS: B PTS: 1 DIF: 2

51. The net force on an object in the positive *x* direction. Consider the following statements:

i) The object can be moving in the negative *x* direction.
ii) The object can be speeding up.
iii) The object can be slowing down.
iv) The object can be moving in the positive *y* direction.

Which of the statements are true?

a. (i) and (ii)
b. (ii) and (iii)
c. (iii) and (iv)
d. Choose this answer if all the statements are true.

ANS: D PTS: 1 DIF: 2

52. If we know an object is moving at constant velocity, we may assume:

a. the net force acting on the object is zero.
b. there are no forces acting on the object.
c. the object is accelerating.
d. the object is losing mass.

ANS: A PTS: 1 DIF: 1

53. Which of the following expresses a principle which was initially stated by Galileo and was later incorporated into Newton's laws of motion?

a. An object's acceleration is inversely proportional to its mass.
b. For every action there is an equal but opposite reaction.
c. The natural condition for a moving object is to remain in motion.
d. The natural condition for a moving object is to come to rest.

ANS: C PTS: 1 DIF: 1

54. A 7.0-kg bowling ball experiences a net force of 6.0 N. What will be its acceleration?

a. 0.86 m/s^2
b. 6.0 m/s^2
c. 7.0 m/s^2
d. 42 m/s^2

ANS: A PTS: 1 DIF: 1

55. An astronaut applies a force of 500 N to an asteroid, and it accelerates at 3.00 m/s^2. What is the asteroid's mass?

a. 1500 kg
b. 135 kg
c. 600 kg
d. 167 kg

ANS: D PTS: 1 DIF: 1

56. Two forces act on a 6.00-kg object. One of the forces is 11.0 N. If the object accelerates at 2.00 m/s^2, what is the greatest possible magnitude of the other force?

a. 33.0 N
c. 3.0 N
b. 23.0 N
d. 1.0 N

ANS: B PTS: 1 DIF: 2

57. If we know that a nonzero net force is acting on an object, which of the following must we assume regarding the object's condition? The object is:

a. at rest.
c. being accelerated.
b. moving with a constant velocity.
d. losing mass.

ANS: C PTS: 1 DIF: 1

58. An automobile of mass 2000 kg moving at 20 m/s is braked suddenly with a constant braking force of 10,000 N. How far does the car travel before stopping?

a. 40 m
c. 120 m
b. 80 m
d. 160 m

ANS: A PTS: 1 DIF: 2

59. The statement by Newton that "for every action there is an opposite but equal reaction" is regarded as which of his laws of motion?

a. first
c. third
b. second
d. fourth

ANS: C PTS: 1 DIF: 1

60. An airplane of mass 1.2 10^4 kg tows a glider of mass 0.6 10^4 kg. The airplane propellers provide a net forward thrust of 5.4 10^4 N. What is the glider's acceleration?

a. 2.0 m/s^2
c. 6.0 m/s^2
b. 3.0 m/s^2
d. 9.8 m/s^2

ANS: B PTS: 1 DIF: 2

61. A thrown stone hits a window but doesn't break it. Instead, it reverses direction and ends up on the ground below the window. In this case, we know:

a. the force of the stone on the glass > the force of the glass on the stone.
b. the force of the stone on the glass = the force of the glass on the stone.
c. the force of the stone on the glass < the force of the glass on the stone.
d. the stone didn't slow down as it hit the glass.

ANS: B PTS: 1 DIF: 2