

**Ch 2 Linear Motion Review****Multiple Choice**

Identify the choice that best completes the statement or answers the question.

- \_\_\_\_\_ 1. Speed is
- a measure of how fast something is moving.
  - always measured in terms of a unit of distance divided by a unit of time.
  - the distance covered per unit time.
  - all of the above.
  - none of the above.
- \_\_\_\_\_ 2. One possible unit of speed is
- miles per hour.
  - light years per century.
  - kilometers per hour.
  - all of the above.
  - none of the above.
- \_\_\_\_\_ 3. When you look at the speedometer in a moving car, you can see the car's
- average distance traveled.
  - instantaneous acceleration.
  - average speed.
  - instantaneous speed.
  - average acceleration.
- \_\_\_\_\_ 4. Acceleration is defined as the CHANGE in
- time it takes to move from one place to another place.
  - velocity of an object.
  - distance divided by the time interval.
  - velocity divided by the time interval.
  - time it takes to move from one speed to another speed.
- \_\_\_\_\_ 5. Suppose you are in a car that is going around a curve. The speedometer reads a constant 30 miles per hour. Which of the following is NOT true?
- You and the car are accelerating.
  - Your acceleration is constantly changing.
  - Your velocity is constant.
  - Your direction is constantly changing.
  - Your speed is constant.
- \_\_\_\_\_ 6. A car travels 15 meters in the first second of travel, 15 meters again during the second second of travel, and 15 meters again during the third second. Its acceleration is
- $0 \text{ m/s}^2$ .
  - $15 \text{ m/s}^2$ .
  - $30 \text{ m/s}^2$ .
  - $45 \text{ m/s}^2$ .
  - none of the above

- \_\_\_\_\_ 7. A sportscar starts from rest and after 9 seconds it is moving at 27 m/s. What is the sportscar's average acceleration?
- 0.33 m/s<sup>2</sup>
  - 3.33 m/s<sup>2</sup>
  - 3 m/s<sup>2</sup>
  - 9 m/s<sup>2</sup>
  - none of the above
- \_\_\_\_\_ 8. As an object falls freely in a vacuum, its
- velocity increases.
  - acceleration increases.
  - both A and B.
  - none of the above.
- \_\_\_\_\_ 9. In the absence of air resistance, objects fall at constant
- speed.
  - velocity.
  - acceleration.
  - distances each successive second.
  - all of the above
- \_\_\_\_\_ 10. A ball is thrown upwards and caught when it comes back down. In the absence of air resistance, the speed of the ball when caught would be
- less than the speed it had when thrown upwards.
  - more than the speed it had when thrown upwards.
  - the same as the speed it had when thrown upwards.
- \_\_\_\_\_ 11. Suppose an object is in free fall. Each second the object falls
- the same distance as in the second before.
  - a larger distance than in the second before.
  - with the same instantaneous speed.
  - with the same average speed.
  - none of the above
- \_\_\_\_\_ 12. If you drop a feather and a coin at the same time in a tube filled with air, which will reach the bottom of the tube first?
- The feather
  - Neither—they will both reach the bottom at the same time.
  - The coin
- \_\_\_\_\_ 13. Consider drops of water leaking from a water faucet. As the drops fall they
- remain at a relatively fixed distance from each other.
  - get farther apart.
  - get closer together.
- \_\_\_\_\_ 14. A ball tossed vertically upward rises, reaches its highest point, and then falls back to its starting point. During this time the acceleration of the ball is always
- in the direction of motion.
  - opposite its velocity.
  - directed downward.
  - directed upward.

15. The hang time (time one's feet are off the ground in a jump) for most athletes is
- less than 1 second.
  - considerably more than 1 second.
  - about 1 second.
  - slightly more than 1 second.
16. When a basketball player jumps to make a shot, once the feet are off the floor, the jumper's acceleration
- varies with body orientation.
  - depends on launch speed.
  - is usually greater for taller players (but not always).
  - depends on all the above.
  - is  $g$ ; no more, no less.
17. Suppose you take a trip that covers 490 km and takes 7 hours to make. Your average speed is
- 490 km/h.
  - 70 km/h.
  - 980 km/h.
  - 3430 km/h.
  - 35 km/h.
18. Suppose a minivan is moving in a straight line and steadily increases its speed. It moves from 20 km/h to 25 km/h the first second and from 25 km/h to 30 km/h the next second. What is the minivan's acceleration?
- 20 km/h·s
  - 30 km/h·s
  - 5 km/h·s
  - 10 km/h·s
  - 25 km/h·s
19. A ball is thrown straight up. At the top of its path its instantaneous speed is
- 0 m/s.
  - about 5 m/s.
  - about 10 m/s.
  - about 20 m/s.
  - about 50 m/s.
20. A ball is thrown straight up. At the top of its path its acceleration is
- 0 m/s<sup>2</sup>.
  - about 5 m/s<sup>2</sup>.
  - about 10 m/s<sup>2</sup>.
  - about 20 m/s<sup>2</sup>.
  - about 50 m/s<sup>2</sup>.
21. When something falls to the ground, it accelerates. This acceleration is called the acceleration due to gravity and is symbolized by the letter  $g$ . What is the value of  $g$  on Earth's surface?
- 0 m/s<sup>2</sup>
  - about 5 m/s<sup>2</sup>
  - about 10 m/s<sup>2</sup>
  - about 20 m/s<sup>2</sup>
  - about 50 m/s<sup>2</sup>

- \_\_\_\_\_ 22. A minivan accelerates at  $2 \text{ m/s}^2$ . Assuming the minivan starts from rest, how much time does it need to accelerate to a speed of  $20 \text{ m/s}$ ?
- 2 seconds
  - 10 seconds
  - 20 seconds
  - 40 seconds
  - none of the above
- \_\_\_\_\_ 23. If a freely falling object were somehow equipped with a speedometer, its speed reading would increase each second by
- about  $5 \text{ m/s}$ .
  - about  $10 \text{ m/s}$ .
  - about  $15 \text{ m/s}$ .
  - a variable amount.
  - a rate that depends on its initial speed.
- \_\_\_\_\_ 24. If a ball were equipped with a speedometer and allowed to fall freely on a planet where the acceleration due to gravity is  $19 \text{ m/s}^2$ , the reading on the speedometer would increase each second by
- $19 \text{ m/s}$ .
  - $38 \text{ m/s}$ .
  - a rate that depends on its initial speed.
  - $15 \text{ m/s}$ .
  - $10 \text{ m/s}$ .
- \_\_\_\_\_ 25. A freely falling object starts from rest. After falling for 8 seconds, it will have a speed of about
- $40 \text{ m/s}$ .
  - $8 \text{ m/s}$ .
  - $80 \text{ m/s}$ .
  - more than  $400 \text{ m/s}$ .
  - $400 \text{ m/s}$ .
- \_\_\_\_\_ 26. A freely falling object starts from rest. After falling for 3 seconds, it will have a speed of about
- $15 \text{ m/s}$ .
  - $30 \text{ m/s}$ .
  - $60 \text{ m/s}$ .
  - $120 \text{ m/s}$ .
  - none of the above
- \_\_\_\_\_ 27. If you drop a feather and a coin at the same time in a vacuum tube, which will reach the bottom of the tube first?
- Neither-they will both reach the bottom at the same time.
  - The coin
  - The feather
- \_\_\_\_\_ 28. If a projectile is fired straight up at a speed of  $10 \text{ m/s}$ , the total time to return to its starting point is about
- 1 second.
  - 2 seconds.
  - 10 seconds.
  - 20 seconds.
  - not enough information to estimate.

29. The vertical height attained by a basketball player who achieves a hang time of a full one second is about
- 0.8 m.
  - 1 m.
  - 1.2 m.
  - 2.5 m.
  - more than 2.5 m.
30. Suppose a jumper claims a hang time of 2 seconds. Then that jumper must be able to jump a vertical distance of
- 1 m.
  - 2 m.
  - 3 m.
  - 4 m.
  - 5 m.

**True/False**

Indicate whether the statement is true or false.

31. The rate at which distance is covered is called speed.
32. Average speed is defined as the time it takes for a trip divided by the distance.
33. Velocity is different from speed in that velocity is speed in a given direction.
34. A unit of velocity is the meter.
35. The rate at which velocity changes with time is called acceleration.
36. A unit of acceleration is meters per second.
37. When a car rounds a corner at a constant speed, its acceleration is zero.
38. Even though a car is slowing down, it is still accelerating, in the most general definition of acceleration.
39. A ball is thrown into the air. At the highest point, the ball has zero velocity and zero acceleration.
40. As a ball falls freely, the distance it falls each second is the same.
41. When we discuss the motion of something, its motion is described relative to the motion of something else.
42. Unless stated otherwise, when we discuss the speeds of things, we mean with respect to the center of the universe.

**Essay**

43. Write a short paragraph explaining the difference between speed and velocity, and give examples of both.
44. Write a short paragraph explaining what acceleration is and why a car is accelerating as it rounds a corner.
45. Write a short paragraph on how fast things fall on Earth. Compare this to motion on the moon, where the acceleration due to gravity is about  $1.6 \text{ m/s}^2$ .