1. ____ For a short time a car moves with a constant acceleration. Which of the following best describes its motion during this time?

A. The car travels the same distance each second.
B. The velocity of the car changes by the same amount each second.
C. The car travels less distance each second than it did the second before.
D. The velocity of the car increases more each second than it did the second before.

2. ____ A bullet is dropped from a high bridge. At the same instant a gun fires a similar bullet straight downward. Which of the following best describes the motion of the bullets just before each hits the water? Assume air resistance is negligible.

A. The two bullets have the same acceleration.
B. The acceleration of the fired bullet is greater than that of the dropped bullet.
C. The acceleration of the fired bullet is less than that of the dropped bullet.
D. The answer depends on the height of the bridge.

3. ____ Which of the following is not described by a vector quantity?

A. The mass of an object. C. The acceleration of an object.
B. The velocity of an object. D. The position of an object.

4. ____ A car is traveling westward with a speed of 30 m/s when the driver sees a traffic light ahead change to red. The driver applies the brakes and decelerates at a rate of 4 m/s$^2$ eastward. What is the velocity of the car 5 seconds later?

A. 20 m/s westward C. 10 m/s eastward
B. 20 m/s eastward D. 10 m/s westward

5. ____ A ball is thrown vertically upward with a speed of 30 m/s. How high will it rise?

A. 92 m C. 46 m
B. 23 m D. 69 m

6. ____ Which of the following correctly describes the motion of a ball thrown from center field to home plate. Neglect air resistance.

A. The acceleration at the top is zero.
B. The speed at the top is zero.
C. The speed at the top is equal to the initial vertical speed.
D. The speed at the top is equal to the initial horizontal speed.
7. Your friend is driving her car northward in congested traffic. She is moving with a speed of 4 m/s. If you flip a coin upward with a speed of 3 m/s so that the coin goes up and lands back in your hand what is the speed of the coin as seen by a pedestrian who is standing on the sidewalk?

A. 7 m/s  
B. 6 m/s  
C. 5 m/s  
D. 4 m/s

8. Which of the following statements correctly describes the motion of a satellite that moves in a circular orbit just above the earth’s atmosphere?

A. The acceleration of the satellite in orbit is zero.  
B. The acceleration of a satellite in orbit is in a direction that is parallel to the earth’s surface.  
C. During part of the orbit the satellite speeds up and during the other part it slows down. 
D. The satellite accelerates downward at a rate a little less than 9.8 m/s².

9. A boy throws a ball off a cliff so that the ball is initially moving horizontally northward with a speed of 20 m/s. What is the velocity of the ball two seconds later? Use a value of 10 m/s² for the acceleration of gravity.

A. 0 m/s northward, 20 m/s downward  
B. 20 m/s northward, 20 m/s downward  
C. 20 m/s northward, 10 m/s downward 
D. 10 m/s northward, 20 m/s downward

10. Twin brothers are fighting over their little red wagon. One of them pulls northward with a force of 25 N and the other pulls southward with a force of 15 N. The wagon has a mass of 5 kg. What is the acceleration of the wagon?

A. 2 m/s²  
B. 8 m/s²  
C. 3 m/s²  
D. 5 m/s²

11. A box is being pulled northward across the floor. What is the direction of the frictional force that acts on the box?

A. upward 
B. northward 
C. southward 
D. downward

12. A box is being pushed up a ramp by a UPS driver. Which of the following is not a reaction force to those forces that act on the box?

A. The gravity force that the box exerts on the earth.  
B. The force that the box exerts on the ramp upward, along the ramp. 
C. The force that the box exerts on the ramp upward, perpendicular to the ramp.  
D. The force that the ramp exerts on the box downward, along the ramp.

13. Suppose that you were on a planet where the acceleration of gravity was 2.45 m/s².

A. Your weight is the same as it is when you are on the earth.  
B. Your mass is the same as it is when you are on the earth. 
C. Your mass is four times larger than it is when you are on the earth.  
D. Your weight is four times larger than it is when you are on the earth.

14. A skydiver has a mass of 60 kg. What is the force of air resistance on her when her velocity has nearly reached her terminal velocity?

A. about 0 N  
B. about 600 N  
C. about 60 N  
D. about 100 N
15. A friend is standing on her roller blades facing north when she throws a ball northward with a speed of 20 m/s. The mass of the ball is .4 kg and her mass is 50 kg. What is her speed just after throwing the ball?

A. 0 m/s  
B. 0.56 m/s  
C. 0.16 m/s  
D. 0.32 m/s

16. Two objects collide and move off stuck together in a collision. Which of the following best describes the collision?

A. The total momentum after the collision is the same as the total momentum before the collision but the total kinetic energy after the collision is less than the total kinetic energy before the collision.  
B. The total momentum after the collision is less than the total momentum before the collision and the total kinetic energy after the collision is less than the total kinetic energy before the collision.  
C. The total momentum after the collision is the same as the total momentum before the collision and the total kinetic energy after the collision is the same as the total kinetic energy before the collision.  
D. The total momentum after the collision is less than the total momentum before the collision but the total kinetic energy after the collision is the same as the total kinetic energy before the collision.

17. A car that has a mass of 800 kg is initially moving with a speed of 20 m/s when it hits a Michigan red oak tree and is stopped in a time of .1 s. What is the magnitude of a constant force acting on the car that would stop it in this time?

A. 40,000 N s  
B. 80,000 N s  
C. 160,000 N s  
D. 200,000 N s

18. The area under the force versus time graph of a force that acts on an object is called the impulse. Which one of the following statements describes the effect of an impulse acting on an object?

A. The impulse equals the change in the energy of an object.  
B. The impulse equals the change in the momentum of an object.  
C. The impulse equals the energy of an object.  
D. The impulse equals the momentum of an object.

19. A boy pulls on the handle of a lawn mower with a force that has an upward component of 30 N and a northward component of 40 N. How much work does the boy do when he moves the lawn mower northward by a distance of 6 m?

A. 300 J  
B. 180 J  
C. 240 J  
D. 360 J

20. A ball with a mass of .4 kg is given an initial speed of 25 m/s. What is its initial kinetic energy?

A. 125 J  
B. 250 J  
C. 100 J  
D. 50 J

21. A ball with a mass of .4 kg is given an initial kinetic energy of 200 J. What is its kinetic energy after it has risen a height of 20.4 m?

A. 160 J  
B. 80 J  
C. 120 J  
D. 40 J
22. ____ A Concepts of Physics student climbs a set of stairs moving vertically upward a height of 8 m. She does this in a time of 9 s. If her mass is 60 kg what is the power that she generated?

A. 53 W  
B. 106 W  
C. 523 W  
D. 1046 W

23. ____ Your friend is 1.8 meters tall. What is the angle that your friend makes to your eye when he stands at a distance from you of 3 m?

A. 5.4 radians  
B. 1.7 radians  
C. 1.2 radians  
D. 0.6 radians

24. ____ A flywheel is rotating with a constant angular velocity of 4 radians per second. How much time is required for it to rotate through an angle of 12 radians?

A. 3 s  
B. 0.33 s  
C. 6 s  
D. 48 s

25. ____ A flywheel has an angular acceleration of 4 rad/s² when a torque of 10 J is applied. What is the value of the moment of inertia of this flywheel?

A. 0.8 kg m²  
B. 0.4 kg m²  
C. 40 kg m²  
D. 2.5 kg m²

26. ____ Four Concepts of Physics students are on a rotating merry-go-round. What happens when they move from a place near the center to the outside of the merry-go-round?

A. The total angular momentum of the merry-go-round and students does not change but the rotational kinetic energy decreases.
B. The total angular momentum of the merry-go-round and students does not change but the rotational kinetic energy increases.
C. The total angular momentum of the merry-go-round and students increases but the rotational kinetic energy does not change.
D. The total angular momentum of the merry-go-round and students decreases but the rotational kinetic energy does not change.

27. ____ A car moves around a curve that has a radius of curvature of 80 m. If the speed of the car is 24 m/s what is the magnitude of the car’s centripetal acceleration?

A. 3.33 m/s²  
B. 7.2 m/s²  
C. 0.3 m/s²  
D. 0.6 m/s²

28. 0 3

Turn to the next page to answer the last question. Any of the responses A, B, C, D or E will give you 3 points. No response will give you 0 points. I will not look at responses to question 28 on the last page until the grader separates it from the rest of your test so that I will not know what your response was.

Read chapter 11 for Friday.
28. ____ Which of the following best characterizes your response to this class?

A. I am finding that this course is much too easy.
B. I am finding that the course is about the right level but we are moving through material much too slowly.
C. I am finding that the course is about the right level and the time that we spend on the subject matter is about the right amount.
D. I am finding that the course is at too high a level but the time that we spend on the subject matter is about the right amount.
E. I am finding that the course is at too high a level and that we are moving through material much too quickly.

Answers:

26. A  27. B