MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Horses with the greatest linear speed on a merry–go–round are located 1) _____
A) near the center.
B) near the outside.
C) anywhere, because they all move at the same speed.

2) Your pet hamster sits on a record player that has constant angular speed. If the hamster moves to a point twice as far from the center, then its linear speed 2) _____
A) doubles. B) halves. C) remains the same.

3) When railroad tracks make a curve, the outer track is longer. This means a wheel that rides on the outer track needs to somehow 3) _____
A) roll slower than the wheel on the inner track.
B) maintain the same speed as the wheel on the inner track.
C) roll faster than the wheel on the inner track.

4) When a train makes a curve, a tapered wheel rim is able to 4) _____
A) cover different distances per revolution.
B) maintain a fixed rotational speed.
C) reduce differences in angular speeds.

5) The tapered shape of the wheel rims that ride on railroad tracks allows opposite wheels to 5) _____
A) in effect, vary their diameters.
B) travel at different linear speeds for the same rotational speed.
C) both of these
D) none of these

6) The circumference of a bicycle wheel is 2 meters. If it rotates at 1 revolution per second then its linear speed is 6) _____
A) 1 m/s.
B) 2 m/s.
C) 3 m/s.
D) 3.14 m/s.
E) 6.28 m/s.

7) The net force exerted on a car traveling in a circular path at constant speed is 7) _____
A) directed forward, in the direction of travel.
B) directed toward the center of the curve.
C) zero because the car is not accelerating.
D) none of the above

8) The rotational inertia of your leg is greater when your leg is 8) _____
A) straight. B) bent. C) same either way

9) The rotational inertia of a pencil is greatest about an axis 9) _____

A) along its length, where the lead is.
B) about its midpoint, like a propeller.
C) about its end, like a pendulum.

10) An industrial flywheel has a greater rotational inertia when most of its mass is 10) _____

A) nearer the rim.
B) nearer the axis.
C) uniformly spread out as in a disk.

11) A coin and a ring roll down an incline at the same time. The one to first reach the bottom is the 11) _____

A) ring.
B) coin.
C) both reach the bottom at the same time

12) A vertically–held sledge hammer is easier to balance when the heavier end is 12) _____

A) on your hand.
B) at the top, away from your hand.
C) same either way

13) Compared with a force, a torque involves 13) _____

A) rotation. B) leverage.
C) distance from an axis of rotation. D) all the above

14) A torque acting on an object tends to produce 14) _____

A) equilibrium.
B) rotation.
C) linear motion.
D) velocity.
E) a center of gravity.

15) If you place a pipe over the end of a wrench when trying to rotate a stubborn bolt, effectively making the wrench handle twice as long, you'll multiply the torque by 15) _____

A) two. B) four. C) eight.

16) A ball gains speed while rolling down a hill due mainly to 16) _____

A) its rotational inertia. B) its angular acceleration.
C) a balanced torque. D) an unbalanced torque.

17) To rotate a stubborn screw, it is best to use a screwdriver that has a 17) _____

A) wide handle. B) long handle.
C) smooth handle. D) none of the above

18) On a balanced seesaw, a boy three times as heavy as his partner sits 18) _____

A) less than 1/3 the distance from the fulcrum.
B) 1/3 the distance from the fulcrum.
C) more than 1/3 the distance from the fulcrum.

19) The famous Leaning Tower of Pisa doesn't topple over because its center of gravity is 19) _____
A) relatively low for such a tall building.
B) stabilized by its structure.
C) displaced from its center.
D) above a place of support.
E) in the same place as its center of mass.

20) If Earth rotated more slowly about its axis, your weight would 20) _____
A) increase. B) decrease. C) stay the same. D) be zero.

21) A 1–kg rock is suspended from the tip of a horizontal meterstick at the 0–cm mark so that the meterstick barely balances like a seesaw when its fulcrum is at the 25–cm mark. From this information, the mass of the meterstick is 21) _____
A) 1/4 kg.
B) 1/2 kg.
C) 3/4 kg.
D) 1 kg.
E) none of the above

22) You can safely stand on the overhanging end of a heavy plank that rests on a table. How much overhang depends on your mass and the plank's mass. If you can stand on the end of a plank that overhangs the edge of the supporting table 1/4 its total length, how massive is the plank compared to your mass? 22) _____
A) 1/2
B) the same
C) 1 and 1/2 times
D) twice
E) 4 times

23) Centrifugal forces are an apparent reality to observers in a reference frame that is 23) _____
A) moving at constant velocity.
B) an inertial reference frame.
C) at rest.
D) rotating.
E) none of the above

24) Centripetal force does no work on a circularly–moving object because 24) _____
A) no change in energy occurs.
B) rotational energy transfers to kinetic energy.
C) centripetal force has no component in the direction of motion.
D) none of the above.

25) Multiple the equation for linear momentum by radial distance *r* and you have 25) _____
A) rotational kinetic energy.
B) angular momentum.
C) rotational inertia.

26) When a twirling ice skater brings her arms inward, her rotational speed 26) _____
A) decreases. B) remains the same. C) increases.

27) The chef at the infamous Fattening Tower of Pizza tosses a spinning disk of uncooked pizza dough into the air. The disk becomes wider during its flight, while its rotational speed 27) _____

A) remains constant. B) quickens. C) slows.

28) When you do somersaults, you'll more easily rotate when your body is 28) _____

A) straight with both arms above your head.
B) straight with both arms at your sides.
C) curled into a ball shape.
D) no difference

29) As a huge rotating cloud of particles in space gravitate together forming an increasingly dense ball, it shrinks in size and 29) _____

A) rotates slower. B) rotates at the same speed.
C) rotates faster. D) cannot rotate.

30) As you crawl toward the edge of a large freely–rotating horizontal turntable in a carnival funhouse, the angular momentum of you and the turntable 30) _____

A) decreases.
B) increases.
C) remains the same, but the revolutions per minute decrease.
D) decreases in direct proportion to your decrease in revolutions per minute.
E) none of these

1) B
2) A
3) C
4) A
5) C
6) B
7) B
8) A
9) C
10) A
11) B
12) B
13) D
14) B
15) A
16) D
17) A
18) B
19) D
20) A
21) D
22) B
23) D
24) C
25) B
26) C
27) C
28) C
29) C
30) C