

Acceleration of gravity: $g = 10 \text{ m/s}^2$
 $v = \Delta d / \Delta t$ $a = \Delta v / \Delta t$ $v_f = a * t$ $h = 5 * t^2$ $F = ma$ $W = mg$
 $Ft = \Delta(mv)$ **Momentum** = mv **net momentum** before collision = **net momentum** after collision
Work = Force * Distance **Power = Work/time** **KE = $\frac{1}{2} mv^2$** **PE = mgh**

Multiple Choice

Chapter 9

- ___ 1. A straight line about which rotation takes place is called:
 - a. the axis
 - b. the circumference
 - c. the tangent
 - d. the radius

- ___ 2. Which is correct to say? The earth
 - a. rotates around the sun
 - b. revolves around the sun

- ___ 3. Which is correct to say? The earth
 - a. rotates on its axis
 - b. revolves on its axis

- ___ 4. Consider two horses on a merry-go-round. Horse A is near the inner rail while horse B is on the outside rail. Which horse has the greater rotational speed?
 - a. A b. B c. both the same

- ___ 5. Consider two horses on a merry-go-round. Horse A is near the inner rail while horse B is on the outside rail. Which horse has the greater linear/tangential speed?
 - a. A b. B c. both the same

- ___ 6. Consider two horses on a merry-go-round. Horse A is near the inner rail while horse B is on the outside rail. Which horse makes more rotations in a given time?
 - a. A b. B c. both the same

- ___ 7. A tin can whirled at the end of a string moves in a circle because:
 - a. once the can starts moving in a circle, this is its natural tendency
 - b. the can continually pulls on the string
 - c. there is a force on the can pulling it outward
 - d. the string pulls inward on the can

- ___ 8. If you whirl a can on the end of a string and the string suddenly breaks, the can will:
 - a. fly off along a radius of the circle
 - b. fly inward toward you
 - c. spiral away from your hand
 - d. fly off at a tangent to the circular path

- ___ 9. A bug walks from the outer edge of a moving turntable toward the center. The turntable is moving at constant speed. As the bug walks inward, its rotational speed
 - a. increases b. decreases c. does not change.

- ___ 10. A ladybug is on the bottom of a can which is being whirled in a horizontal circle at the end of a string. Since the ladybug, like the can, is moving in a circle, there must be a force on the ladybug making her move in a circle. What exerts this force?
 - a. your hand b. the string c. the bottom of the can d. gravity e. the tendency of the ladybug to leave the circle

- ___ 11. A ladybug is on the bottom of a can which is being whirled in a horizontal circle at the end of a string. The ladybug feels an outward force pushing her against the bottom of the can. What is the source of this force?
 - a. your hand b. the string c. the bottom of the can d. gravity e. nothing, it's a fictitious force.

- ___ 12. When a car turns a corner
 - a. it is pushed inward by the road which provides the centripetal force
 - b. it is pulled away from the center by centrifugal force
 - c. no force is required because it is not accelerating
 - d. the force of the tires on the road provide the needed centripetal force

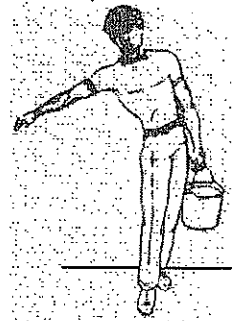
- ___ 13. When you attempt to turn a corner on an icy road, you may skid off the road. Why is this?

- a. the road cannot provide enough centripetal force to keep you on the road
- b. the centrifugal force of the car is too large
- c. both reasons
- d. neither reason

- ___ 14. Centrifugal forces are an apparent reality to observers in a "frame of reference" that is
 a. rotating b. at rest c. moving in a straight line at a constant speed d. none of these
- ___ 15. Much of the water in clothes is removed during the spin cycle of a washing machine because
 a. a centrifugal force acts on the clothes to push them away from the water
 b. a centripetal force acts on the water and pushes the water away from the clothes
 c. the inertia of the water results in the water tangentially leaving the rotating drum through the holes in the side.
 d. the rotation of the tub pushes the water out

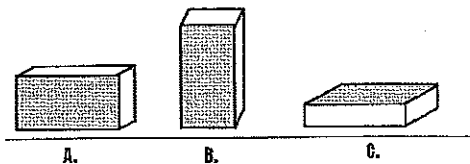
Chapter 10

- ___ 16. The place where all the weight of an object seems to be concentrated is called the
 a. center of gravity
 b. condition of stability
 c. center of mass
 d. center of equilibrium
- ___ 17. A double decker bus is least stable when
 a. all the passengers are on the top level
 b. all the passengers are on the bottom level
 c. the passengers fill both levels
 d. the bus is empty
- ___ 18. You tend to hold your free arm away from your body when you hold a heavy bucket in one hand. This is because doing this
 a. lowers your center of gravity
 b. raises your center of gravity
 c. shifts your center of gravity so it is over the bucket
 d. shifts your center of gravity so it remains over your feet
- ___ 19. The center of gravity of a doughnut is
 a. in the hole
 b. spread over all the doughnut
 c. a doughnut has not center of gravity
- ___ 20. A soda can is in neutral equilibrium when it is:
 a. balanced on its rim
 b. standing upright
 c. lying on its side
- ___ 21. A passenger who has to stand in a bumpy bus often spreads her feet apart. She does this to
 a. lower her center of gravity
 b. raise her center of gravity
 c. make her base of support smaller
 d. make her base of support larger
- ___ 22. A coin balanced on its edge is in what kind of equilibrium?
 a. unstable b. stable c. neutral
- ___ 23. If a hoop is rolled along a level floor, the center of gravity of the hoop
 a. changes position within the hoop
 b. moves in a circular path
 c. moves in a straight line
 d. is located on the rim of the hoop
- ___ 24. If an object is in stable equilibrium, any displacement will
 a. lower its center of gravity
 b. raise its center of gravity
 c. increase its mass
 d. none of these



25. If you stand with your back against a wall, you find you cannot bend over to pick up something because
- your center of gravity moves forward so it's not longer over your feet
 - the momentum of your upper body pulls you over
 - your vertical and horizontal motions are independent
 - your muscles are not strong enough

26. The diagram to the right shows three possible ways that a rectangular piece of wood can be placed on a table. Which is the most stable?
- a. A b. B c. C



27. The diagram to the right shows three possible ways that a rectangular piece of wood can be placed on a table. Which is the least stable?
- a. A b. B c. C

28. You are the passenger in a car that does a sharp left turn. You feel yourself moving to the right. You would say this is because of
- the centripetal force acting on you
 - the centrifugal force acting on you
 - your inertia

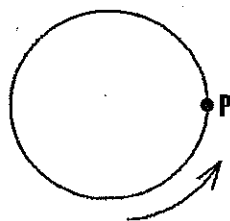
29. You are the passenger in a car that does a sharp left turn. You feel yourself moving to the right. Someone outside the car would say this is because of
- the centripetal force acting on you
 - the centrifugal force acting on you
 - your inertia

30. Which one(s) of these contribute to the stability of an object?
- a. low center of gravity b. high center of gravity c. narrow base d. wide base

31. If an object is in unstable equilibrium, and "tipping" of the object will
- a. lower its center of gravity b. raise its center of gravity c. increase its mass d. none of these

Questions

29. An object is moving at a counterclockwise at a constant speed. At point P draw and label vectors for the velocity, acceleration and force.



30. Describe how the stability of an automobile can be increased in terms of its center of gravity.