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1. What is meant by tangential speed?
Ans. Tangential speed is the linear speed of the object, tangent to the curve.

2. Distinguish between tangential speed and rotational speed.
Ans. Rotational speed, often called angular velocity, is the rate at which an object rotates. The angular velocity of the crankshaft of an engine is measured in revolutions per minute, RPM. It is the number of rotations per unit time. The tangential speed is the linear speed of an object, tangent to the curve.

6. What is rotational inertia, and how does it compare to inertia as studied in previous chapters?
Ans. Rotational inertia, often called moment of inertia, is the sum of the products of an object's mass multiplied by their distance to the center of rotation squared. Inertia is the resistance an object has to a change in its velocity and only depends on the mass of an object.

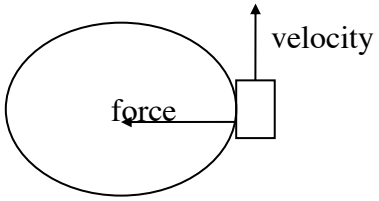
7. Inertia depends on mass; rotational inertia (better known as moment of inertia) depends on mass and something else. What?
Ans. Moment of inertia, 'I' depends on mass and its distance from the center of rotation. Notice that the distance is squared, so it has a much larger influence on an object's moment of inertia than mass does.

$$I = \sum md^2$$

13. What does a torque tend to do to an object.
Ans. Torque will change the angular velocity of on object. If it is not rotating, an unbalanced torque will make an object start to rotate. An unbalanced torque will also change the angular momentum of a system.

15. How do clockwise and counterclockwise torques compare when a system is balanced?
Ans. They are equal.

23. When you whirl a can at the end of a string in a circular path, what is the direction of the force that is exerted on the can?
Ans. The force is directed toward the center of the circle.



24. Is it an inward force or an outward force that is exerted on the cloths during the spin cycle of an automatic washer?
Ans. Inward force, known as the centripetal force applied to the cloths.

25. If the string breaks that holds a whirling can in its circular path, what kind of force causes it to move in a straight-line path-centripetal, centrifugal, or no force? What law of physics supports your answer?
Ans. No force. Newton's first law of motion.

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26. If you are not wearing a seat belt and you slide across your seat and slam against a door when the car rounds a curve, what kind of force is responsible-centripetal, centrifugal or no force?
Ans. No force was applied to you. The car had a centripetal force applied to it which caused the car to slide out from under you. Ask about this in class please.

29. Distinguish between linear momentum and angular momentum.
Ans. Linear momentum is the product of an object's mass times its velocity. Angular momentum is the product of an objects moment of inertia and its angular velocity. Angular momentum depends on the rate at which an object is rotating, its mass and the distance of the mass from the center of rotation.

31. What does it mean to say that angular momentum is conserved?
Ans. Unless an unbalanced torque is applied to an object, its total angular momentum will not change. Its moment of inertia and its angular velocity can change but they will change in such a way that the total angular momentum is constant.

$L = I\omega$; where $I \equiv \sum md^2$ and ω is the angular velocity of the object.

Extra In what direction should a force be applied to produce maximum torque?
Ans. At right angles to a line that radiates out from the center of the object.

Extra: Why is the linear speed greater for a horse on the outside of a merry-go round than for a horse closer to the center?
Ans. The horse on the outside of the merry-go-round has to go further in the same amount of time than the one on the inside.

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Extra: If you walk along the top of a fence, why does holding your arms out help you to keep your balance?
Ans. Holding your arms out increases your moment of inertia.

18. Is the net torque changed when a partner on a seesaw stands or hangs from her end instead of sitting?
Ans. Since torque is the product of perpendicular component of the force multiplied by the distance to the pivot, torque is not effected because neither one of these things changes.

38. When a long-range cannonball is fired toward the equator from a northern or southern latitude, it lands west of its intended target. Why?
Ans. Ask this one in class for + 1 point.

42. When you are in the front passenger seat of a car turning to the left, you may find yourself pressed against the right-side door. Why do you press against the door? Why does the door press against you? Does the correct answer involve a centrifugal force or Newton's laws of motion?
Ans. Ask this one in class for + 1 point.

Do Project # 1, pg. 144 for 1 point extra credit