# Rotational Dynamics Conceptually

**Questions**

1. How do the clockwise and counterclockwise torques compare in a balanced system? In other words, which is greater? Explain.
2. What is the law of inertia for rotation?
3. On what two quantities does rotational inertia depend on?
4. What is the effect of adding a weight to the end of a baseball bat used for practice swings?
5. Why is it easier to swing your legs back and forth when they are bent?
6. How can a person vary his or her rotational inertia?
7. What motion does the torque produced by Earth's gravity impart to a vertically spinning bicycle wheel supported at only one end of its axle?
8. Distinguish between rotational speed and rotational velocity.
9. Consider two rotating bicycle wheels, one filled with air, the other filled with water. Which would be more difficult to stop rotating? Explain.
10. The most popular gyroscope around is a Frisbee-flying disk. What is one function, besides being a place for gripping and catching, of its somewhat thicker curved rim?
11. When is angular momentum conserved?
12. If a skater who is spinning pulls her arms in so as to reduce her rotational inertia to half, by how much will her rate of spin increase?
13. About which axis of the human body is rotation the easiest? About which axis of the body is rotation the most difficult?
14. Distinguish between linear and rotational speed.
15. If the rotational speed of a platform is doubled, how does the rotational speed anywhere on the platform change? How does the linear speed anywhere change? Explain.
16. If the rotational speed on a platform is unchanged but your distance from the center is doubled, what happens to your rotational speed? What happens to your linear speed? Explain.
17. If you replace the regular tires on your car with tires of larger diameter, how will your speedometer reading change? Explain.
18. Larry and Annie cycle at the same speed. The tires on Larry's bike are larger diameter than those on Annie's bike. Which, if either, has the greatest rotational speed? The greatest linear speed? Explain.
19. Why do people with long legs generally walk with a slower stride than people with short legs?
20. Explain why a solid disk will always beat a hoop if they are both rolled down an incline.
21. A basketball player wishes to balance a ball on his fingertip. Why is it easier to balance a spinning ball as opposed to a stationary one? Explain using the ideas in this lesson.
22. What is the law of inertia for rotating systems in terms of angular momentum?
23. What does it mean to say that angular momentum is conserved?