

ROTATIONAL MOTION ENERGY AND ANGULAR MOMENTUM

1.) A hoop and a solid disk both have the same radius and mass and negligible thickness. Assume that they are both rotating with the same constant angular speed. Which has the higher rotational kinetic energy?

- a. the hoop
- b. the disk
- c. They both have the same rotational kinetic energy.
- d. impossible to determine

2.) A ball rolls without slipping down incline A, starting from rest. At the same time, a box starts from rest and slides down incline B, which is identical to incline A except it is frictionless. Which has a larger translational speed at the bottom of the ramp?

- a. They have the same translational speed at the bottom of the ramp.
- b. the ball
- c. the box
- d. It is impossible to determine.

3.) Consider a solid sphere and a hollow sphere of the same radius, both made of material with the same density. They are both rotating on their axes with the same angular speed. Which one has the higher angular momentum?

- a. the solid sphere
- b. the hollow sphere
- c. They both have the same angular momentum.
- d. It is impossible to determine.

4.) A skater rotates quickly on the ice. He pushes his arms out. What happens to his angular speed?

- a. It increases.
- b. It decreases.
- c. It stays the same.
- d. It is impossible to determine.

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6.) If global warming were to occur over the next century, it is likely that some polar ice would melt, causing more water to be distributed evenly all over the earth. What would happen to the length of the day as a result of this?

- a. It would increase.
- b. It would decrease.
- c. Nothing, it would stay the same.
- d. It is impossible to tell.

7.) A popular demonstration involves a professor, initially motionless, standing on a low-friction turntable and holding a bicycle wheel that is spinning horizontally. What happens when the professor flips the bicycle wheel so that it is spinning in the other direction?

- a. She starts to spin in the same direction as the initial direction of the bicycle wheel.
- b. She starts to spin in the bicycle wheel's new spin direction.
- c. She remains stationary.
- d. It is impossible to tell because it depends on how fast the bicycle wheel initially spins.

8.) Someone hits a tether ball to make it spin around a pole. The cord that attaches the tether ball to the central pole then winds around the pole. What happens to the angular speed of the tether ball during this process?

- a. It decreases.
- b. It increases.
- c. It remains constant.
- d. It cannot be determined.

9.) If the torque acting on an object about a certain axis is zero, what can we say about the angular momentum of this object with respect to this axis?

- a. It is zero.
- b. It is constant.
- c. It can never be zero.
- d. Nothing, angular momentum has nothing to do with torque.

a, c, a, b, b, a, a, b, b