

Critical Thinking Items

6.1 Angle of Rotation and Angular Velocity 10.

When the radius of the circular path of rotational motion increases, what happens to the arc length for a given angle of rotation?

- a. The arc length is directly proportional to the radius of the circular path, and it increases with the radius.
- b. The arc length is inversely proportional to the radius of the circular path, and it decreases with the radius.
- c. The arc length is directly proportional to the radius of the circular path, and it decreases with the radius.
- d. The arc length is inversely proportional to the radius of the circular path, and it increases with the radius.

11.

Consider a CD spinning clockwise. What is the sum of the instantaneous velocities of two points on both ends of its diameter?

- a. $2v$
- b. $\frac{v}{2}$
- c. $-v$
- d. 0

6.2 Uniform Circular Motion 12.

What are the directions of the velocity and acceleration of an object in uniform circular motion?

- a. Velocity is tangential, and acceleration is radially outward.
- b. Velocity is tangential, and acceleration is radially inward.
- c. Velocity is radially outward, and acceleration is tangential.
- d. Velocity is radially inward, and acceleration is tangential.

13.

Suppose you have an object tied to a rope and are rotating it over your head in uniform circular motion. If you increase the length of the rope, would you have to apply more or less force to maintain the same speed?

- a. More force is required, because the force is inversely proportional to the radius of the circular orbit.
- b. More force is required because the force is directly proportional to the radius of the circular orbit.
- c. Less force is required because the force is inversely proportional to the radius of the circular orbit.
- d. Less force is required because the force is directly proportional to the radius of the circular orbit.

6.3 Rotational Motion 14.

Consider two spinning tops with different radii. Both have the same linear instantaneous velocities at their edges. Which top has a higher angular velocity?

- a. the top with the smaller radius because the radius of curvature is inversely proportional to the angular velocity
- b. the top with the smaller radius because the radius of curvature is directly proportional to the angular velocity
- c. the top with the larger radius because the radius of curvature is inversely proportional to the angular velocity
- d. The top with the larger radius because the radius of curvature is directly proportional to the angular velocity

15.

A person tries to lift a stone by using a lever. If the lever arm is constant and the mass of the stone increases, what is true of the torque necessary to lift it?

- a. It increases, because the torque is directly proportional to the mass of the body.
- b. It increases because the torque is inversely proportional to the mass of the body.
- c. It decreases because the torque is directly proportional to the mass of the body.
- d. It decreases, because the torque is inversely proportional to the mass of the body.