Name _____ Date _____ Period_____

1. A particle travels in a circular path and point *P* is at the center of the circle.

(*a*) If the particle's linear momentum is doubled without changing the radius of the circle, how is the magnitude of its angular momentum about *P* affected?

(*b*) If the radius of the circle is doubled but the speed of the particle is unchanged, how is the magnitude of its angular momentum about *P* affected?

2. One way to tell if an egg is hardboiled or uncooked without breaking the egg is to lay the egg flat on a hard surface and try to spin it. A hardboiled egg will spin easily, while an uncooked egg will not. However, once spinning, the uncooked egg will do something unusual; if you stop it with your finger, it may start spinning again. Explain the difference in the behavior of the two types of eggs.

3. The angular momentum of the propeller of a small single-engine airplane points forward. The propeller rotates clockwise if viewed from behind.

(*a*) Just after liftoff, as the nose of the plane tilts upward, the airplane tends to veer to one side. To which side does it tend to veer and why?

(*b*) If the plane is flying horizontally and suddenly turns to the right, does the nose of the plane tend to veer upward or downward? Why?

4. You are sitting on a spinning piano stool with your arms folded.

(*a*)When you extend your arms out to the side, what happens to your kinetic energy? What is the cause of this change?

(*b*) Explain what happens to your moment of inertia, angular speed and angular momentum as you extend your arms.

5. A 2.0-kg particle moves directly eastward at a constant speed of 4.5 m/s along an east-west line.

(*a*) What is its angular momentum (including direction) about a point that lies 6.0 m north of the line?

(*b*) What is its angular momentum (including direction) about a point that lies 6.0 m south of the line?

(*c*) What is its angular momentum (including direction) about a point that lies 6.0 m directly east of the particle?