**Lady Bug Revolution Activity**

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_

**Instructions: *Go to*** [***http://phet.colorado.edu/simulations/sims.php?sim=Ladybug\_Revolution***](http://phet.colorado.edu/simulations/sims.php?sim=Ladybug_Revolution) ***and launch the app found there. (You could also search for “Ladybug Revolution” to find the app.) Be sure to answer all parts of each question, answer questions marked “C.S.” in complete sentences, and show all work for calculations. Answer in a separate document or piece of paper. I will collect this tomorrow.***

1. Use your notes, the book, or the internet to define angular (aka rotational) velocity. (C.S.)
2. Place both the ladybug and the beetle on the turntable and start it spinning. Look at the vector arrows coming from the ladybug. A) What direction is her acceleration? B) What direction is her velocity?
3. Which variable (acceleration or velocity) could be characterized as *tangential*? Which could be characterized as *centripetal*?
4. Click on the rotation. Type 180 in for angular velocity (ω) and click “go”. This will make the turntable turn at a rate of 180o per second. Look at the vector arrows coming from the ladybug. Her accelerations always points where? What about her velocity? *Why* do you think this is? (feel free to use google) (C.S.)
5. Experiment with changing to location of the ladybug and beetle on the wheel. How does position relative to the center of the wheel affect the angular velocity?
6. Click on the ruler box at the bottom left of the screen. A) How long is the ruler? (Always include units!) B) How wide is each band of color on the turntable?
7. On the lower left, change “show graphs” to “ϴ, ω, v”. Place the ladybug a known distance from the axis (center) of the turntable. A) Record the ladybug’s tangential velocity (V1). Place the beetle twice as far from the axis. B) Record the beetle’s tangential velocity as V2. C) Move the beetle three times as far from the axis. C) Record the beetle‘s tangential velocity as V3. D) Explain how the radius (distance from the axis of the turntable) affects the tangential velocity? (C.S.)
8. A) Record the bugs’ tangential velocities. Double the angular velocity to 360o/s and record the new tangential velocities. How does doubling the angular velocity affect the velocity of the bugs? (C.S.)
9. Since the angular velocity is currently 360o/s, the period T is 1 rotation/s. A) Using the equation v = 2πr/T, calculate the tangential velocity the beetle would have if you moved him to the edge of the turntable (a radius of 4 m from the axis). B) Move the beetle to r = 4 m and record his tangential velocity.
10. Find the centripetal acceleration ac of the beetle. If the huge beetle has a mass of 8.0 kg, D) What is the average centripetal force Fc on the beetle?
11. If the ladybug has a mass of 6.0 kg and is at a distance r = 1 m, find her A) velocity, B) centripetal acceleration, and C) centripetal force.