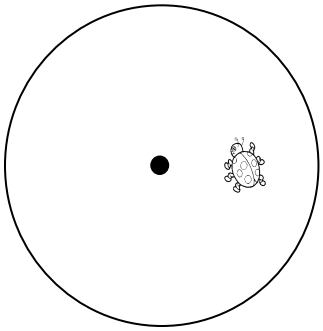
Name_____

Date _____ **Pd**____

Unit I: Worksheet 5

1. A ladybug is resting on a 0.5 meter radius turntable that is rotating with a period of 2 seconds. The ladybug is halfway between the center and the edge.



a. What is the tangential distance travelled by the ladybug in one revolution?

b. What is the tangential velocity of the ladybug?

c. What is the angular distance traveled by the ladybug after one revolution?

d. What is the angular velocity of the ladybug?

The ladybug slowly walks out towards the edge of the turntable.

e. How do the *tangential* distance and velocity change when the ladybug is out at the edge of the turntable? Explain your reasoning.

f. How do the *angular* distance and velocity change when the ladybug is out at the edge of the turntable? Explain your reasoning.

Use the angular equivalences of the kinematic equations to solve the following problems:

Kinematic Equations	Angular Kinematic Equations
$x = x_0 + v_0t + \frac{1}{2}at^2$	$\theta = \theta_0 + \omega_0t + \frac{1}{2}\alpha t^2$
$v = v_0 + at$	$\omega = \omega_0 + \alpha t$
$a = (\Delta v)/t$	$\alpha = (\Delta \omega)/t$
$v^2 = v_0^2 + 2a\Delta x$	$\omega^2 = \omega_0^2 + 2\alpha(\Delta\theta)$

2. A bicycle wheel is rotating with an angular velocity of 15 rad/s. The brakes are applied and the wheel comes to a stop. During the braking process, the wheel rotates an angular distance of 15 radians. Calculate the angular acceleration of the wheel.

3. A car is speeding down the freeway. The car's tires have an angular velocity of 50 rad/s. As the car accelerates, the wheels have an angular acceleration of 0.8 rad/s^2. Calculate the final angular velocity of the wheels after the car has accelerated for 10 seconds.

4. A compact disc has a radius of 6 cm. As the cd player powers up, the disc has an angular acceleration of 1.2 rad/s^2. The disc is at full speed after 3 seconds.

    a. Calculate the angular velocity of the disc once it is at full speed.

A mark is made with a pen on the edge of the disc.

    b. Calculate how many radians will the mark have traveled while powering up from rest to full speed.

    c. Calculate how far in *meters* will the mark have traveled while powering up from rest to full speed.