H. Trigonometry		Name
Pd		Date
· ~	<u>Linear and Angular Speed Worksheet</u>	
man merel and a stable short has been been	- ttings 22 rmm or 15 rmm /rovolutio	nc nor minutal

DJ L-Boogie has a turntable that has two settings, 33 rpm or 45 rpm (revolutions per minute).

1. When the turntable is set at 33 revolutions per minute (rpm), what is its angular speed in radians per minute?

+ = 33.37 = 66T rad/min

2. When the turntable is set at 45 rpm, what is its angular speed in radians per minute?

+ 45.21 got rad/min

While a record is spinning, a ladybug lands on the turntable 10 inches from the center.

3. What is the linear speed (in inches per minute) of the ladybug when the turntable is set to:

a) 33 rpm

**b)** 45 rpm

10 - 662 2073.45 inches/min

10.9000 1 8837, 43 inches/min

4. The ladybug crawls towards the middle and is now 3 inches from the center, what is the linear speed (in inches per minute) of the ladybug when the turntable is set to:

a) 33 rpm

**b)** 45 rpm

3 + 6677 622.04 inches/min/ 1848.23 inches/min

5. Convert the speed of the bug in problem 3 at 33 rpm to miles per hour.  $\frac{2073.45 \text{ inghes}}{1 \text{ min}} = \frac{60 \text{ m/n}}{1 \text{ hr}} = \frac{144}{13 \text{ inghe}} = \frac{134407}{63360} = \frac{10.96 \text{ mph}}{63360}$ 

6. Convert the speed of the bug in problem 4 at 45 rpm to miles per hou

848.23 inches 60 m/n 1406t 1mile = 50893.8 = [80 mph]

1m/n 1ha laingles 5380 ft

7. A 16mm diameter shaft rotates at 1,500 rps (revolutions per second). Find the speed of a particle on its surface (to the nearest meter per second). Linear Speed

r + 8.1500 (31) mm. Imeter = 75.4 meters/sec

8	3. An earth satellite travels in a circular orbit at $20,000$ mph. If the radius of the orbit is 4,300 mi, what angular versions.	elocity
(	in radians per hour, to one decimal place) is generated?	

T = 20000 m

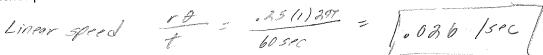
9. The earth revolves about the sun in an orbit that is approximately circular with a radius of  $9.3 \times 10^7$  mi. The radius of orbit sweeps out an angle with what exact angular velocity (in radians per hour)? How fast (to the nearest hundred miles per hour) is the earth traveling around its orbit. Hint: it takes the earth 365 days to complete its orbit.

Angular = + = 30 - 1 duy = 300 = 1 - 1 radians/hr.

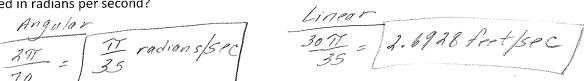
$$\frac{t}{t} = \frac{2\pi}{365dys}$$

Linear = 9.3 × 10 Timiles = [66705.05 mph]

10. The second hand on Mr. Incredible's watch is .25 inches long. How fast is the tip of the second hand moving? Give your answer in inches per second.



11. A neighborhood carnival has a Ferris wheel whose radius is 30 feet. You measure the time it takes for one revolution to be 70 seconds. What is the linear speed (in feet per second) of this Ferris wheel? What is the angular speed in radians per second?



12. A spin balancer rotates the wheel of a car at 480 revolutions per minute. If the diameter of the wheel is 26 inches, what road speed is being tested? Express your answer in miles per hour. At how many revolutions per minute should the balancer be set to test a road speed of 80 miles per hour?

See Attached

13. A Ford Expedition comes standard with tires that have a diameter of 25 inches. If the owner decided to upgrade to tires with a diameter of 30 inches without having the onboard computer updated, how fast will the Expedition actually be traveling when the speedometer reads 75 mph?

See Attached

Linear (mph) rt = 13/20)(480) in 60min 1ft 1mile t 1min 1he 18in 5380 fo The 12 in 5284 ft = 37.12 mph 80 mites. 1he. 5280ft. 12in = 36 min The 60 min I mite 1ft 94480 in 261 x in 84480 = 2617 X 2617 3617 1.1034, 26 rotations/min

(13) 35 in Som.

75 mph > linear speed

find the of rotations

first convert knear Spreed to inches

75 mites 588 st. 18in

4752000 in/hr

Linear = F

4752000 in = 12.5(2m) x in

4753000 in = 3511 x in

X = 605.04.343 rotations/hr

30 in diam 15 (89) 16 05 04 843) in

1815130, 2977 in 18th Imile 5880 ft

89.99

[ = 90 mph ]