Precalculus Name_____ per____
Worksheet Angular/Linear Velocity Problems

1. **Ferris Wheel Problem**. Dan Druff and Ella Funt are riding on a Ferris wheel. Dan observes that it takes 20 seconds to make a complete revolution. Their seat is 25 feet from the axle of the wheel.

a) What is their angular velocity in revolutions per minute? In degrees per minute? In radians per minute?

b) What is the linear velocity?

2. **David and Goliath Problem.** David puts a rock in his sling and starts whirling it around. He realizes that in order for the rock to reach Goliath, it must leave the sling at a speed of 60 feet per second. He swings the sling in a circular path of radius 4 feet. What must the angular velocity be in order for David to achieve his objective?

3. **Lawn Mower Blade Problem**. In order for a lawn mower blade to cut grass, it must strike the grass with a speed of at least 900 inches per second.

a) If the innermost part of the cutting edge is 6 inches from the center of the blade, how many radians per second must the blade turn? How many revolutions per minute is this?

b) The blade has a diameter of 19 inches. If the outermost tip of the blade hits a rock while turning as in part (a), how fast could the rock be hurled from the mower?

4. **Lawn Mower Cord Problem.** Yank Hardy pulls the cord on his power mower. In order for the engine to start, the pulley must turn at 180 revolutions per minute. The pulley has a radius of 0.2 feet.

a) At how many radians per second must the pulley turn?

b) How fast must Yank pull the cord to start the mower?

c) When Yank pulls this hard, what is the angular velocity of the center of the pulley?

5. **Train Problem.** A train wheel has a diameter of 30 inches to the rim, which rests on the track. The flange, which keeps the wheel from slipping off the track, projects 1 inch beyond the rim. When the train is traveling 60 mph, what is the linear velocity of a point on the outer edge of the flange?

6. **Pulley Problem #1** A small pulley 6 cm in diameter is connected by a belt to a larger pulley 15 cm in diameter. The small pulley is turning at 120 rpm.

a) Find the angular velocity of the small pulley in radians per second.

b) Find the linear velocity of the rim of the small pulley.

c) What is the linear velocity of the rim of the large pulley?

d) Find the angular velocity of the large pulley in rad/ sec.

e) How many rpm is the large pulley turning?

7. **Pulley Problem #2.** A large pulley 20 cm in diameter drives a small pulley 6 cm in diameter by a belt that goes over the rim of each. The large pulley has an angular velocity of 150 rad/min.

a) What is the linear velocity of the large pulley's rim?

b) What is the linear velocity of the small pulley's rim?

c) What is the angular velocity of the small pulley?

8. **Gear Problem #1.** A small gear of radius 3 cm is turning with an angular velocity of 20 radians per second. It drives a large gear of radius 15 cm.

a) What is the linear velocity of the teeth on the large gear?

b) What is the angular velocity of the teeth on the large gear?

c) What is the angular velocity of a point at the center of the large gear?

9. **Gear Problem #2.** A large gear of diameter 30 cm is revolving at 45 rpm. It drives a small gear of diameter 8 cm.

a) At how many radians per minute is the large gear turning?

b) What is the linear velocity of the teeth on the large gear?

c) What is the linear velocity of the teeth on the small gear?

d) At how many radians per minute is the small gear turning?

e) At how many revolutions per minute is the small gear turning?