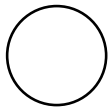
Trig 1.1 part 2 Angular Motion and Linear speed

You will learn to:

Determine the angular velocity of an object.

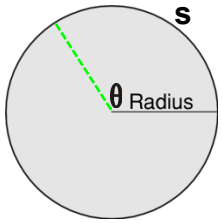
Determine the linear velocity of an object.

Find the area of a sector of a circle.



Arc Length and Speed in Circular Motion

$s = r\theta$ WHY?



ω Angular speed (*omega*) = $\frac{central\ angle}{time} = \frac{\theta}{t}$

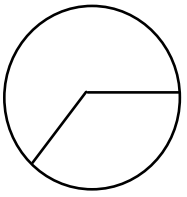
v Linear speed (*velocity*) = $\frac{arc-length}{time} = \frac{s}{t}$

$v = r\omega$

v *linear velocity*

r *radius*

ω *angular velocity*



Think about a flea on the end of a six-inch second hand on a wall clock.

There are many ways to talk about how fast he is going:

RPM: How many revolutions per minute does he make?

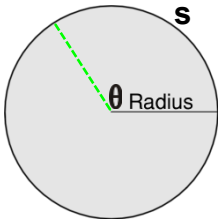
How many revolutions per hour?

ω What is his angular velocity in radians per hour?

v What is his linear velocity in inches per hour?

If he moves in two inches toward the center staying on the second hand, which of these will change? What will the new values be?

A Sector of a Circle



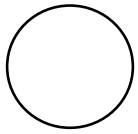
The area inside the circle and inside the angle is called a sector of a circle. it is like a slice of pie.

The area of a sector is $A_{sector} = \frac{1}{2} r^2 \theta$

Where r is the radius and the angle is in radians.

Let's think of a Rainbird sprinkler watering a large field. The sprinkler takes 15 seconds to go back and forth. It is set for 150 degrees of coverage and the spray reaches out 70 feet.

What is the angular velocity of the sprinkler?



What is the linear velocity of the bird flying back and forth at the end of the water stream?

How much area will it water?

How fast are you going when sitting in a seat on a 25-foot Ferris Wheel which makes 5 rotations each minute?