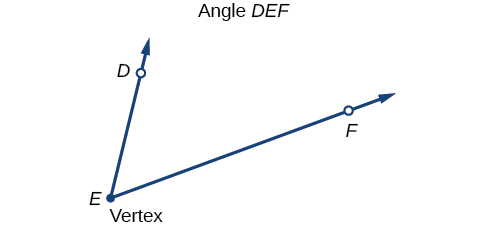
**7.1 – Angles**

**Drawing Angles in Standard Position**

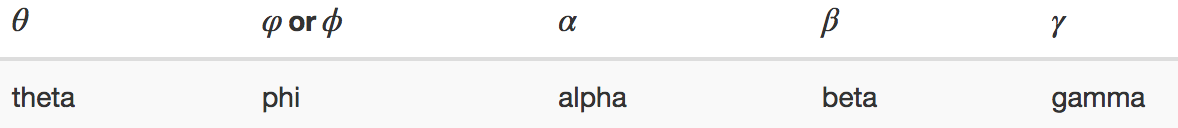
A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a directed line segment. It consists of one point on a line and all points extending in one direction from that point. The first point is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the ray.

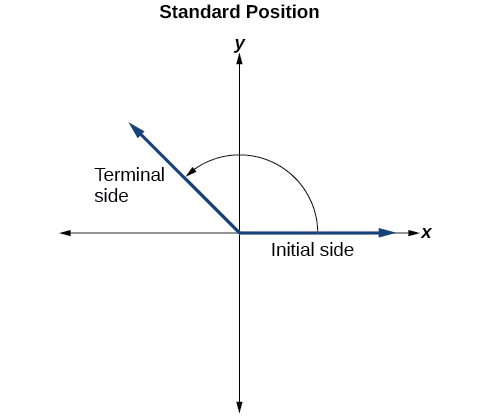
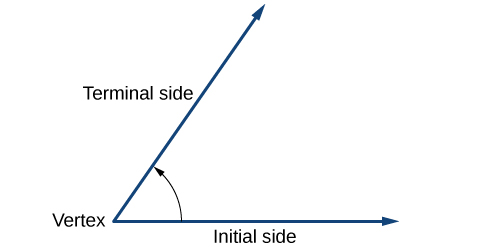
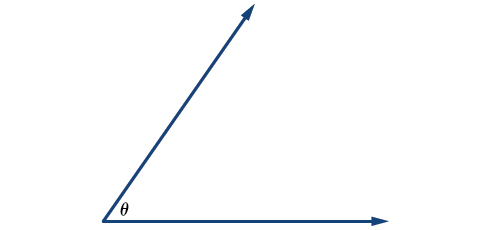




An \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the union of two rays having a common endpoint. The endpoint is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the angle, and the two rays are the sides of the angle.

Greek letter are often used as variables for the measure of an angle.

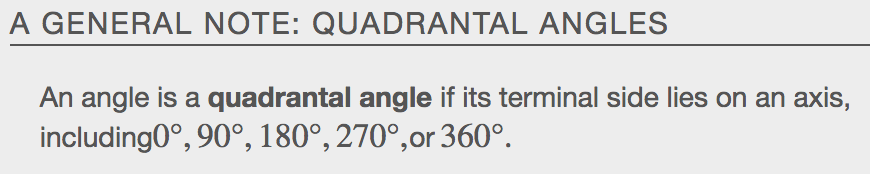


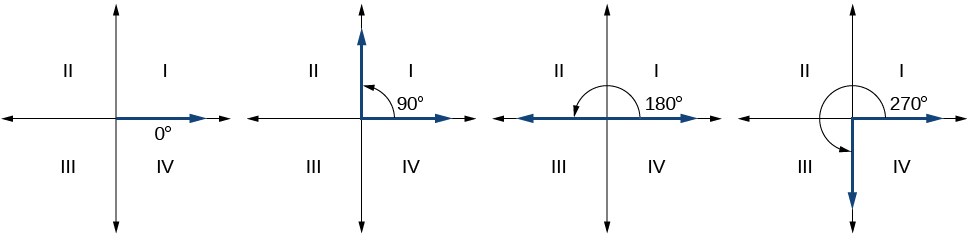


The measure of an angle is the amount of rotation from the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ side to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ side. Probably the most familiar unit of angle measurement is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. One degree is \_\_\_\_\_\_\_\_\_\_\_\_of a circular rotation, so a complete circular rotation contains 360 degrees. An angle measured in degrees should always include the unit “degrees” after the number, or include the degree symbol °. For example,90 degrees = 90°.

An angle is in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ position if its vertex is located at the origin, and its initial side extends along the positive *x*-axis.

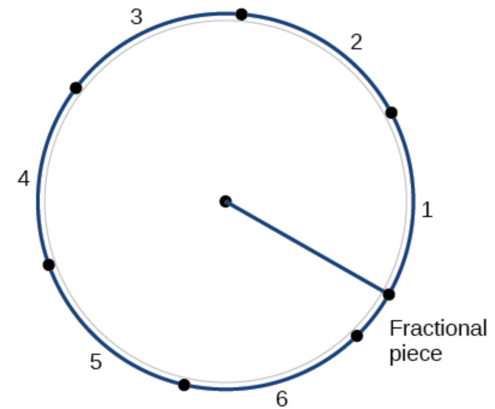
If the angle is measured in a counterclockwise direction from the initial side to the terminal side, the angle is said to be a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ angle. If the angle is measured in a clockwise direction, the angle is said to be a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ angle.





**Converting Between Degrees and Radians**

An \_\_\_\_\_\_\_\_\_\_\_\_\_ may be a portion of a full circle, a full circle, or more than a full circle, represented by more than one full rotation. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the arc around an entire circle is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of that circle.

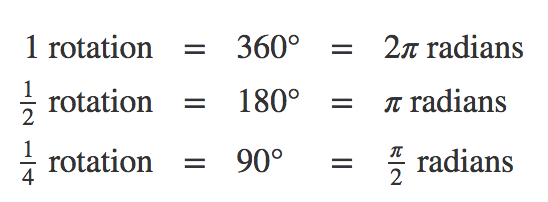
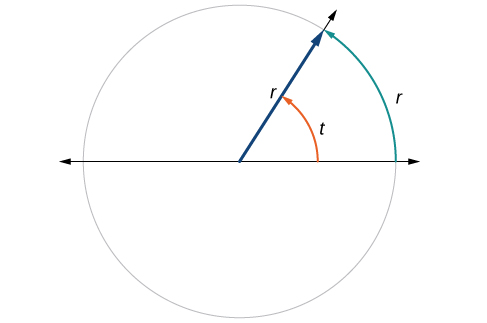


**The Circumference of a Circle**

That means that if we took a string as long as the radius and used it to measure consecutive lengths around the circumference, there would be room for six full string-lengths and a little more than a quarter of a seventh.

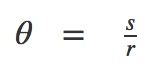
**What Is a Radian?**

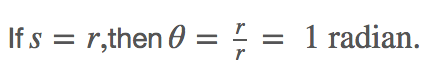
One \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the measure of a central angle of a circle that intercepts an arc equal in length to the radius of that circle. A central angle is an angle formed at the center of a circle by two radii. Because the total circumference equals \_\_\_\_\_\_\_times the \_\_\_\_\_\_\_\_\_\_\_, a full circular rotation is 2*π* radians.

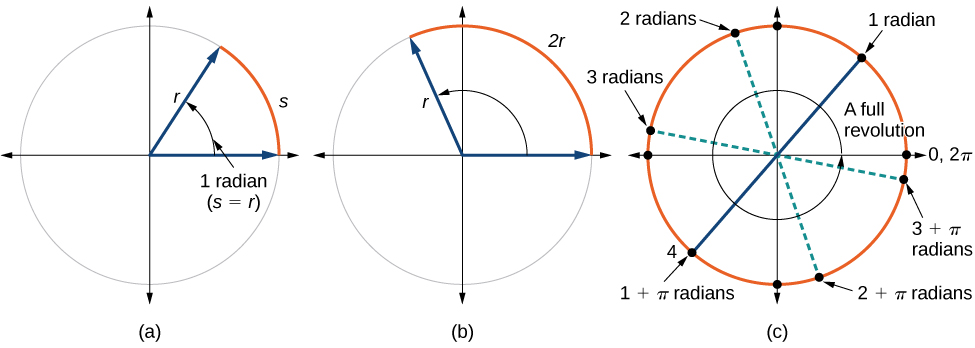


**Relating Arc Lengths to Radius**

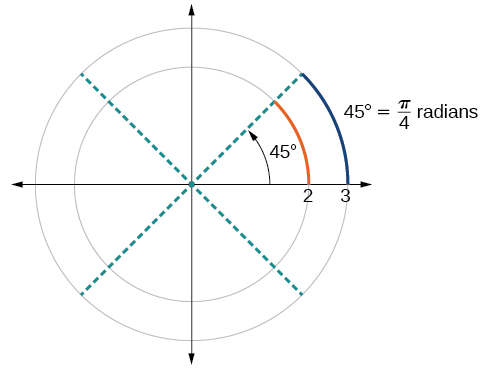
An \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, *s,* is the length of the curve along the arc of a circle.

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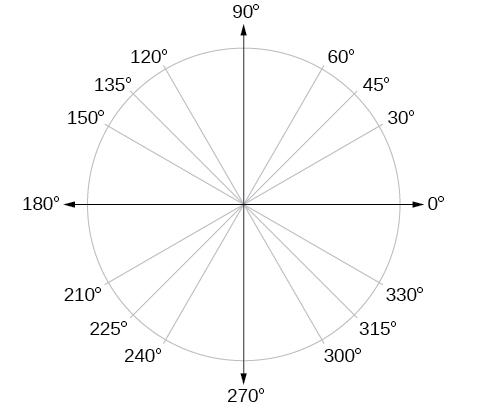
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**Ex.**



**Identifying Special Angles Measured in Radians**



**Ex.**

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**Converting Between Radians and Degrees**

Because degrees and radians both measure angles, we need to be able to convert between them. We can easily do so using a proportion where

θis the measure of the angle in degrees and

is the measure of the angle in radians.

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**Examples:**

Convert each radian measure to degrees.

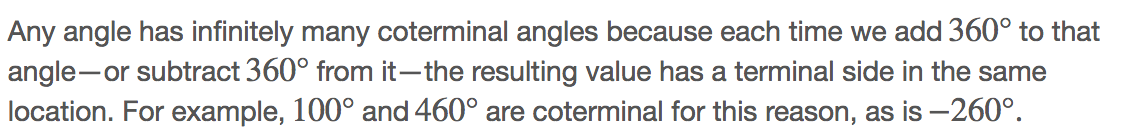
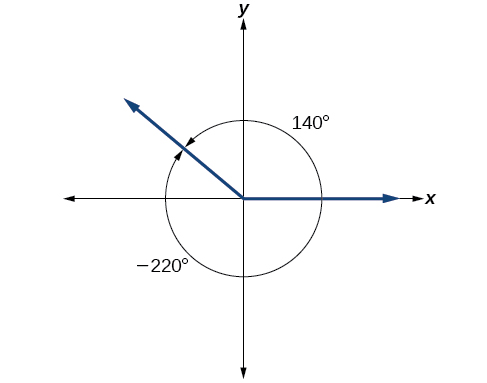
1. 2. 3 3.

Convert each degrees to radian measure.

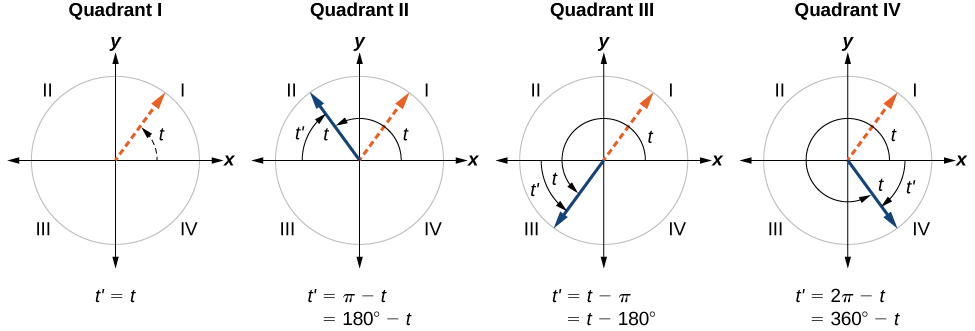
1. 15 deg 2. 126 deg 3. -75 deg

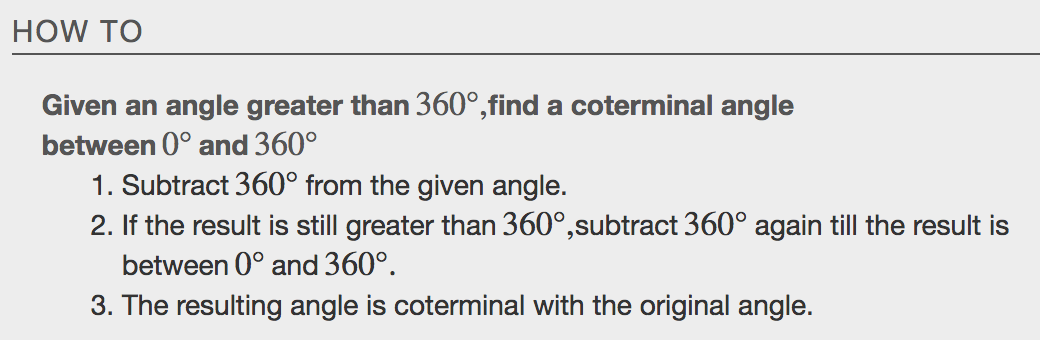
**Coterminal Angles**

If two angles in standard position have the same terminal side, they are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ angles.

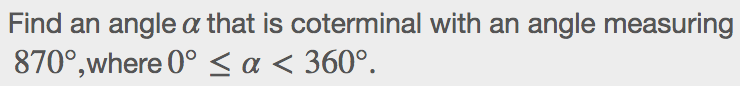


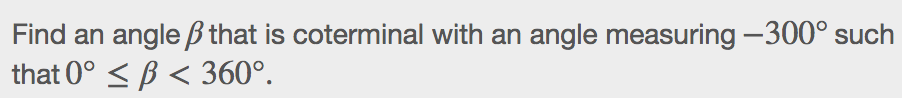
An angle’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ angle is the measure of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, acute angle *t* formed by the terminal side of the angle *t* and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ axis.



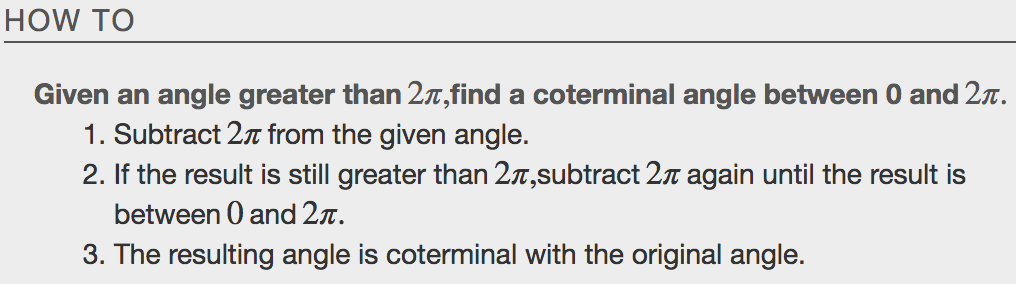
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**Examples**

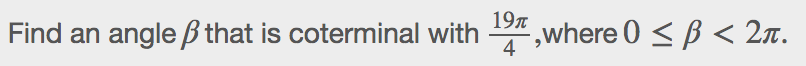
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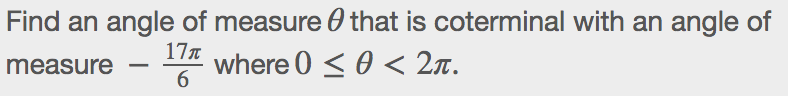
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**Finding Coterminal Angles Measured in Radians**

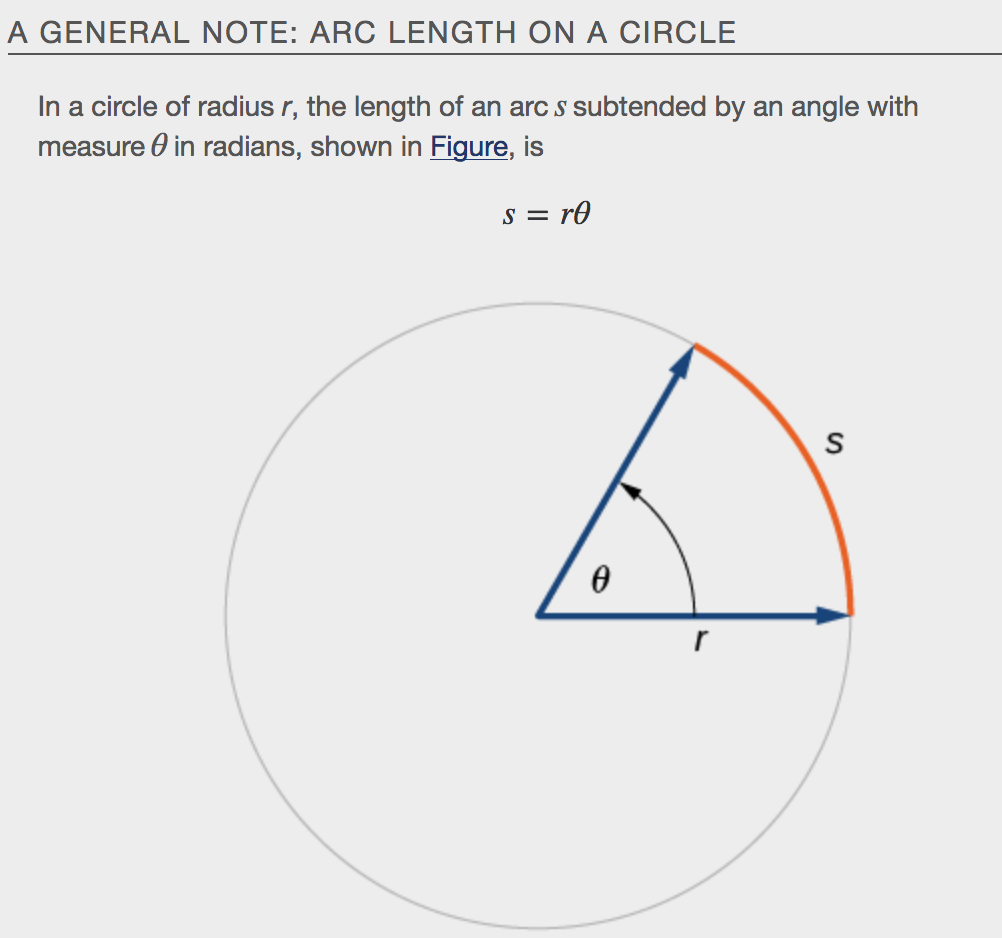
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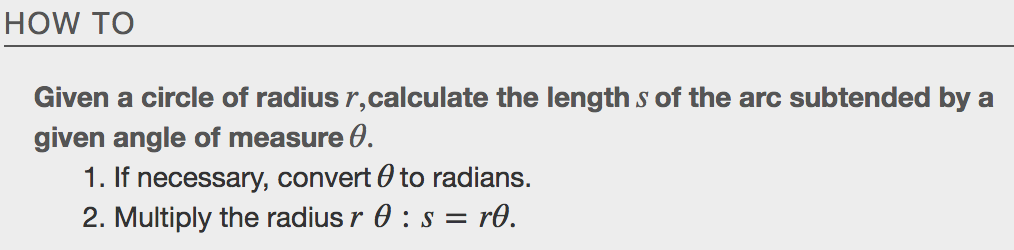
**Examples**

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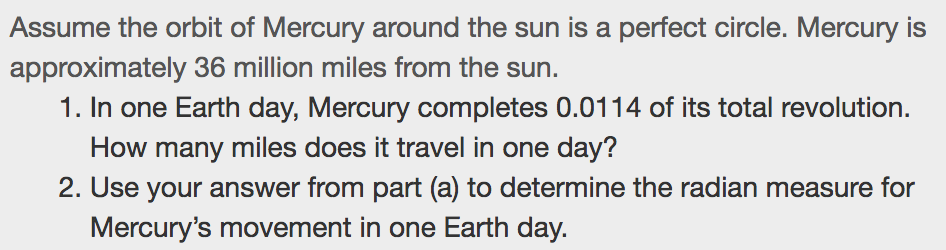
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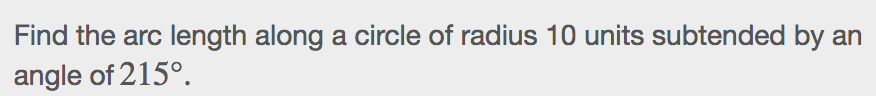
**Determining the Length of an Arc**

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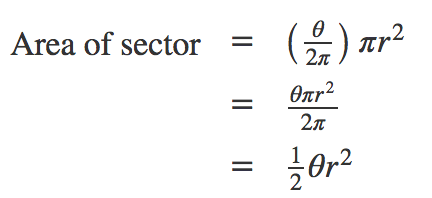
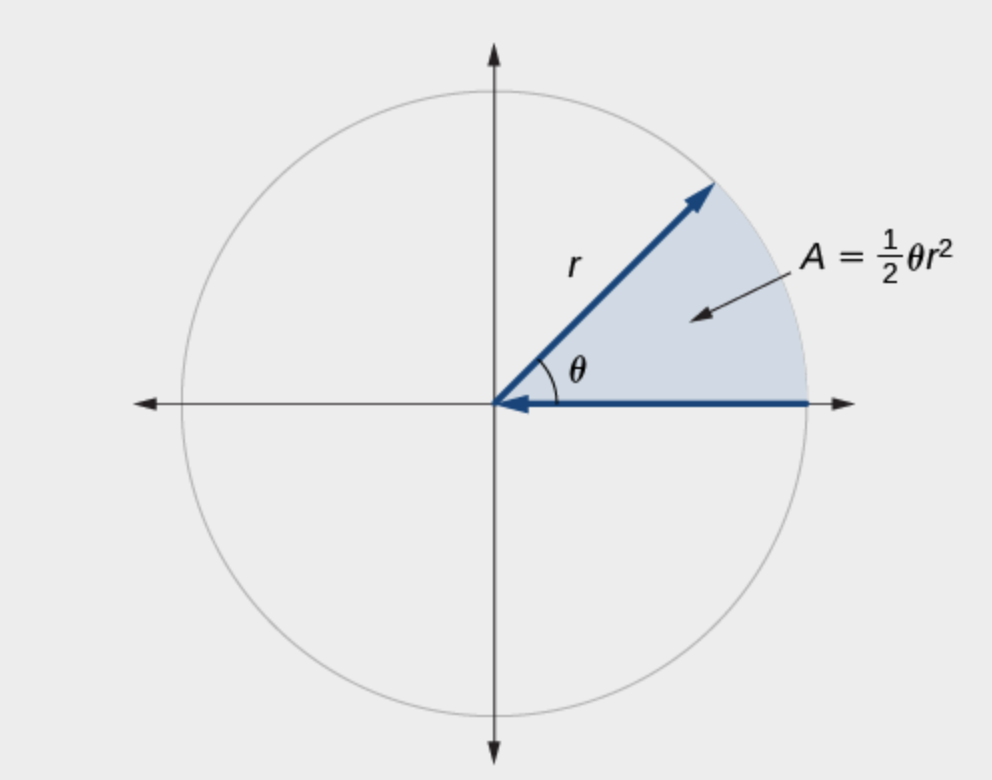
**Example**

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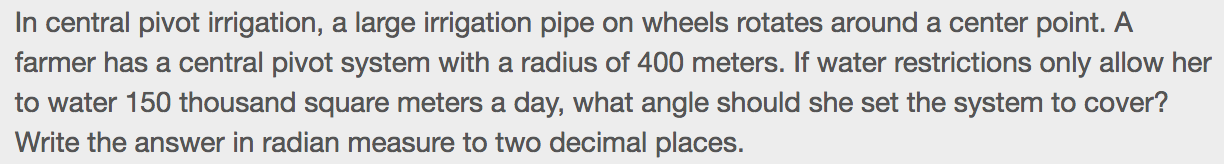
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**Finding the Area of a Sector**

In addition to arc length, we can also use angles to find the area of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a circle. A sector is a region of a circle bounded by two radii and the intercepted arc, like a slice of pizza or pie.

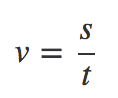
** **

**Example**

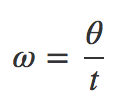
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**Use Linear and Angular Speed to Describe Motion on a Circular Path**

An object traveling in a circular path has two types of speed. **Linear speed** is speed along a straight path and can be determined by the distance it moves along (its displacement) in a given time interval.

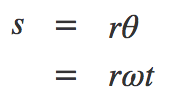
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Angular speed results from circular motion and can be determined by the angle through which a point rotates in a given time interval.

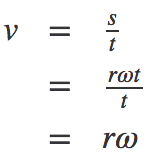
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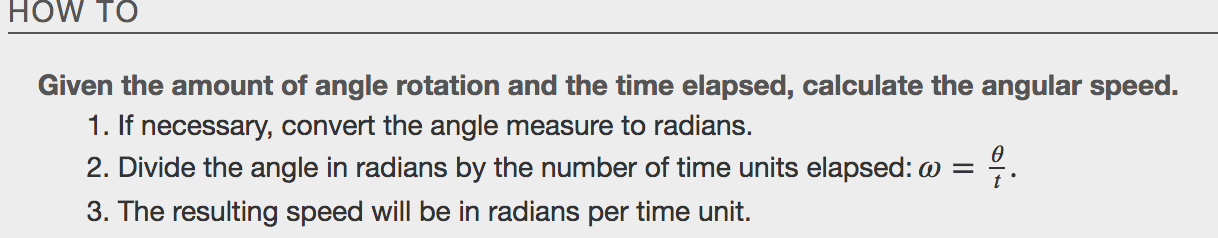
Combining the definition of angular speed with the arc length equation, *s*=*rθ*, we can find a relationship between angular and linear speeds. The angular speed equation can be solved for *θ*, giving *θ*=*ωt*.

Substituting this into the arc length equation gives:

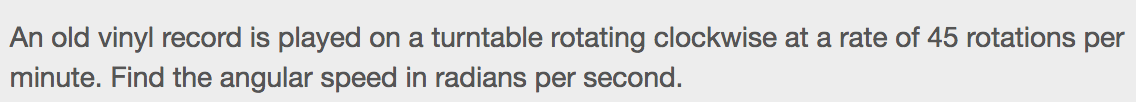


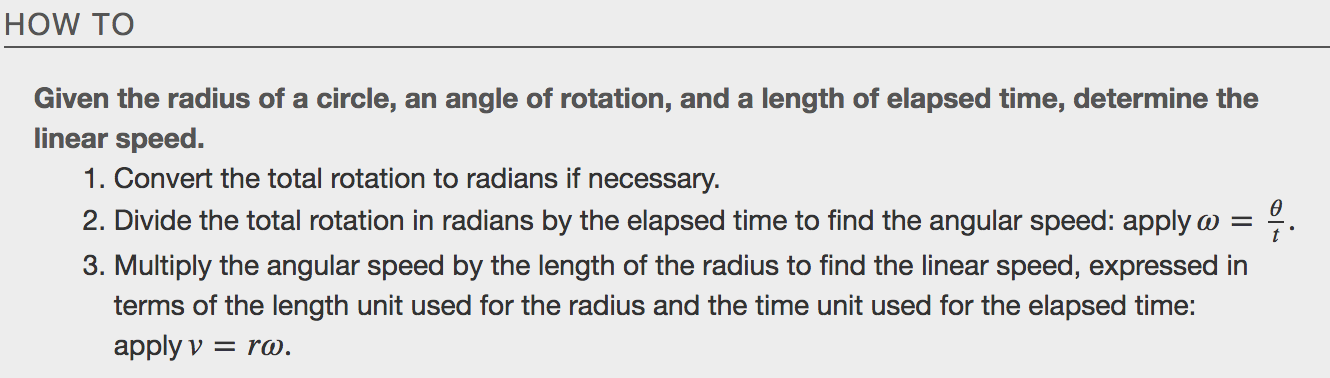
Substituting this into the linear speed equation gives:





Example





Example

