

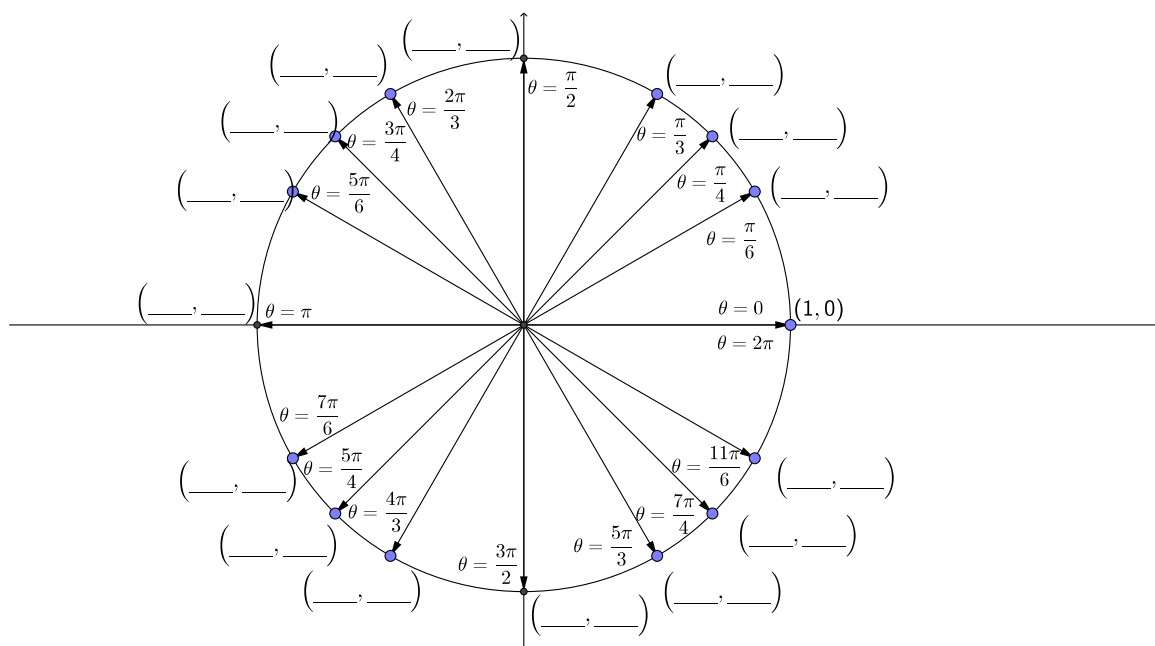
## Chapter 3.1: Angles & The Unit Circle

### Expected Skills:

- Be able to sketch a standard position angle expressed in either degree or radian measurement.
- Be able to convert between degree and radian measurement.
- Be able to label points on the unit circle corresponding to angles of  $30^\circ$ ,  $45^\circ$ ,  $60^\circ$ , and related angles.
- Be able to label points on the unit circle corresponding to the quadrantal angles.
- Be able to find the length of a circular arc and the area of a sector of a circle.

### Practice Problems:

1. Label all of the indicated points on the unit circle, shown below. Also, convert all of the angles from radian measurement to degree measurement.



2. Convert the following angles from degrees to radians. Sketch each angle in standard position (i.e., with the initial side on the positive  $x$ -axis).

- (a)  $115^\circ$
- (b)  $-150^\circ$
- (c)  $63^\circ$
- (d)  $400^\circ$

3. Convert the following angles from radians to degrees.

- (a)  $\frac{\pi}{9}$
- (b)  $\frac{2\pi}{3}$
- (c)  $\frac{\pi}{4}$
- (d)  $-\frac{\pi}{6}$

4. Determine the quadrant in which the terminal side of each angle lies.  
(Each angle is measured in radians)

- (a)  $\frac{\pi}{5}$
- (b)  $\frac{11\pi}{8}$
- (c)  $-\frac{\pi}{12}$

5. Find the length of the arc on a circle of the given radius intercepted by the given central angle.

- (a) radius: 9 feet; central angle:  $\frac{23\pi}{36}$  radians.
- (b) radius: 20 centimeters; central angle:  $75^\circ$

6. Find the area of the sector of the circle with given radius and central angle.

- (a) radius: 12 millimeters; central angle:  $\frac{\pi}{7}$  radians
- (b) radius:  $\frac{2}{3}$  inches; central angle:  $63^\circ$

7. A sprinkler system on a farm is set to spray water over a distance of 20 meters and to rotate through an angle of  $140^\circ$ . Find the area of the region irrigated by the sprinkler.