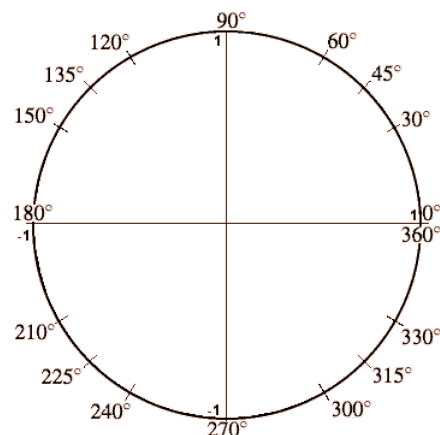


# Angles

- The figure to the right shows our favorite angles in degrees. Convert each of these to radians!

You will eventually memorize this picture...



- Complete the table below relating rotation amounts to degrees and radians.  
(It may help to look at your answer to the previous question, but you should think about how to solve without a picture also.)

Rotation	1	1/2	1/4	1/6	1/8	1/12	3/4	5/6	7/8	11/12
Degrees										
Radians										

- Convert the following angles to equivalent (coterminal) angles in degrees  $0^\circ \leq \theta < 360^\circ$ .

Angle	750°	640°	-120°	840°	855°
Equivalent					

- Convert the following angles to equivalent (coterminal) angles in radians  $0 \leq \theta < 2\pi$ .

Angle	$\frac{13\pi}{3}$	$\frac{201\pi}{4}$	$\frac{-11\pi}{6}$	$\frac{7\pi}{2}$	$31\pi$
Equivalent					

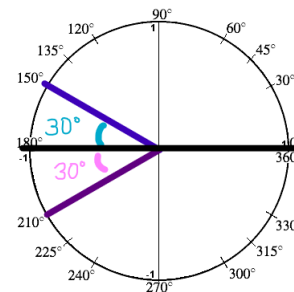
- Convert the following angles between degrees and radians. (Give exact answers.)

Degrees	360°	1°	21°			
Radians				$\pi$	1	0.3

You should get used to converting... advanced math is much easier in radians, but average people prefer answers in degrees.

6. The **reference angle** for  $\theta$  is the angle between the terminal side (in standard position) and the x-axis.

For example, the reference angles for  $150^\circ$  and  $210^\circ$  are both  $30^\circ$  (as shown by the picture to the right).



Give reference angles for the following.

Write reference angles using the same system (degrees/radians) as the original angle.

Angle	$225^\circ$	$330^\circ$	$120^\circ$	$-150^\circ$	$240^\circ$
Reference					

Angle	$\frac{3\pi}{4}$	$\frac{2\pi}{3}$	$\frac{7\pi}{8}$	$-\frac{5\pi}{6}$	$\frac{11\pi}{12}$
Reference					

7. State the quadrants for the given angles (QI, QII, QIII, QIV).

Angle	$225^\circ$	$330^\circ$	$120^\circ$	$-150^\circ$	$240^\circ$
Quadrant					

Angle	$\frac{3\pi}{4}$	$\frac{2\pi}{3}$	$\frac{7\pi}{8}$	$-\frac{5\pi}{6}$	$\frac{11\pi}{12}$
Quadrant					

8. Suppose a circle has radius 5.

(a) What is the arc length cut out by an angle of  $15^\circ$ ?

(b) What is the arc length cut out by an angle of  $\frac{\pi}{11}$ ?