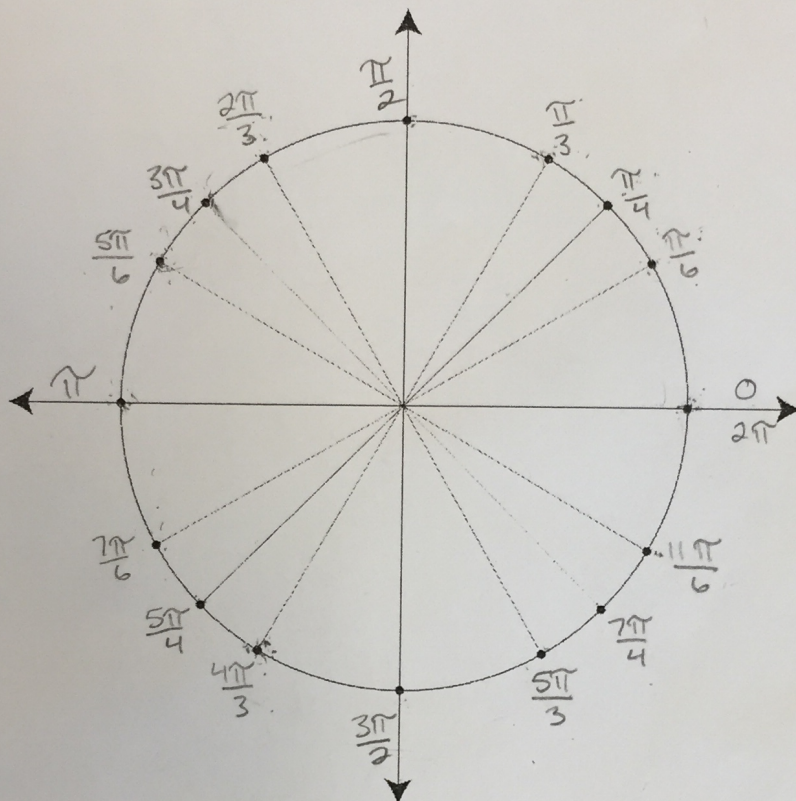


Unit Circle Angle Notes

Use the circle to locate all of the angles with the radian measures listed below.

$0, \frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{3\pi}{4}, \frac{5\pi}{6}, \pi, \frac{7\pi}{6}, \frac{5\pi}{4}, \frac{4\pi}{3}, \frac{3\pi}{2}, \frac{5\pi}{3}, \frac{7\pi}{4}, \frac{11\pi}{6}, 2\pi$



What if you go the other direction? When you move clockwise around the unit circle, starting at the standard position (positive x-axis), the angle measures are negative. For each part below, what is the positive angle that is **coterminal** (ends up at the same position on the circle) with the given negative angle?

For example, $-\frac{7\pi}{6}$ is coterminal with $\frac{5\pi}{6}$. (Verify this!)

- a. $-\frac{2\pi}{3}$ is coterminal with $\frac{4\pi}{3}$
- b. $-\frac{5\pi}{4}$ is coterminal with $\frac{3\pi}{4}$
- c. $-\frac{11\pi}{6}$ is coterminal with $\frac{\pi}{6}$

Angle measures can go beyond 2π as well. For example, $\frac{13\pi}{6}$ is coterminal with $\frac{\pi}{6}$. For each angle below, state the angle that is coterminal and between 0 and 2π .

a. $\frac{10\pi}{3} = 3\frac{1}{3}\pi$
is coterminal
with $\frac{4\pi}{3}$

b. $\frac{17\pi}{4} = 4\frac{1}{4}\pi$
is coterminal
with $\frac{\pi}{4}$

c. $-\frac{25\pi}{6} = -4\frac{1}{6}\pi$
is coterminal
with $\frac{11\pi}{6}$

Use the angle measures from the previous problem to make some observations about the unit circle. For each part below, a is an integer.

- a. Look at the angles that have measurements of the form $a\pi$. Where does the terminal ray of each of these angles intersect the circle?

The terminal ray of any angle in the form $a\pi$ intersects the circle at the x-axis.

- b. Look at the angles that have measurements of the form $\frac{a\pi}{2}$. Where does the terminal ray of each of these angles intersect the circle?

The terminal ray of any angle in the form $\frac{a\pi}{2}$ intersects the circle at the y-axis.

- c. Look at the angles that have measurements of the form $\frac{a\pi}{4}$. Where does the terminal ray of each of these angles intersect the circle?

The terminal ray of any angle in the form $\frac{a\pi}{4}$ intersects the circle in the center of each quadrant.

- d. Look at the angles that have measurements of the form $\frac{a\pi}{3}$. Which axis is the terminal ray of each of these angles closest to?

The terminal ray of any angle in the form $\frac{a\pi}{3}$ intersects the circle closer to the y-axis than the x-axis.

- e. Look at the angles that have measurements of the form $\frac{a\pi}{6}$. Which axis is the terminal ray of each of these angles closest to?

The terminal ray of any angle in the form $\frac{a\pi}{6}$ intersects the circle closer to the x-axis than the y-axis.