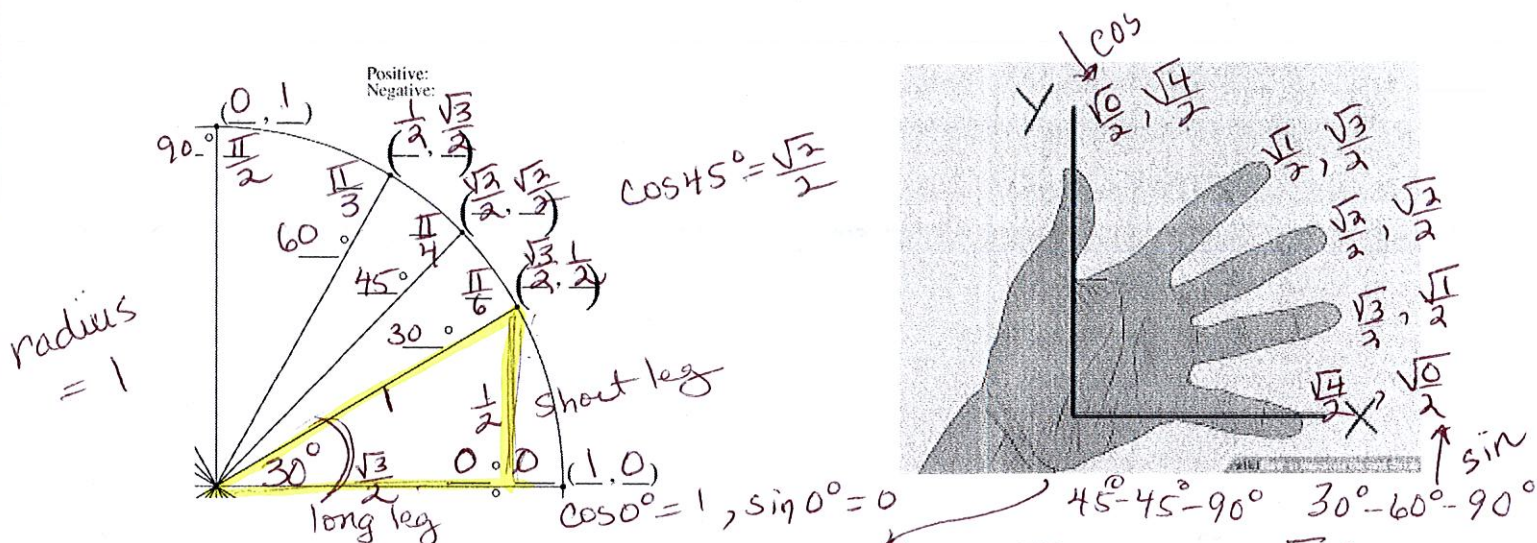


Important Things to Know About the Unit Circle

- You only need to memorize Quadrant I. The other three quadrants can be completed using reflections across the vertical and horizontal axes. You may use the "hand trick" to help you memorize.



- The unit circle is constructed from special right triangles. All short leg measures are $\frac{\sqrt{3}}{2}$, medium leg measures are $\frac{\sqrt{3}}{2}$, and long leg measures are $\frac{\sqrt{3}}{2}$.
- On the unit circle, the ordered pairs, (x, y) represent $(\cos \theta, \sin \theta)$. The tangent function can be evaluated using $\frac{y}{x}$ or $\frac{\sin \theta}{\cos \theta}$. The reciprocal functions are

$\sec \theta \rightarrow \frac{1}{\cos \theta}$ Since $\cos \theta = \frac{\text{adj}}{\text{hyp}}$ $\therefore \sec \theta = \frac{\text{hyp}}{\text{adj}}$	$\text{cosec} \theta \rightarrow \frac{1}{\sin \theta}$ Since $\sin \theta = \frac{\text{opp}}{\text{hyp}}$ $\therefore \text{csc} \theta = \frac{\text{hyp}}{\text{opp}}$	$\text{cotangent} \theta \rightarrow \frac{1}{\tan \theta}$ Since $\tan \theta = \frac{\text{opp}}{\text{adj}}$ $\therefore \cot \theta = \frac{\text{adj}}{\text{opp}}$
--	--	--

- There are a finite number of values possible when evaluating trig functions on the unit circle. Let's complete this table for Quadrant I:

θ (deg/rad)	$\cos \theta$	$\sin \theta$	$\tan \theta$ \sin/\cos	$\sec \theta$	$\csc \theta$	$\cot \theta$
$0^\circ, 0$	$\frac{1}{1}$	$\frac{0}{1}$	$\frac{0}{1} = 0$	1	$\frac{1}{0} \leftarrow \text{UND}$	$\frac{1}{0} \text{ UND}$
30°	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{3}$	$\frac{2\sqrt{3}}{3}$	2	$\sqrt{3}$
45°	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	1	$\sqrt{2}$	$\sqrt{2}$	1
60°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\sqrt{3}$	2	$\frac{2\sqrt{3}}{3}$	$\frac{\sqrt{3}}{3}$
90°	$\frac{0}{1}$	1	$\frac{1}{0} \text{ UND}$	UND	1	$\frac{0}{1} = 0$

Find the exact value of each trigonometric function.

$$1. \cos \frac{2\pi}{3} = -\frac{1}{2}$$

$$2. \tan \frac{2\pi}{3} = -\sqrt{3}$$

$$3. \cos \frac{5\pi}{3} = \frac{1}{2}$$

$$4. \cos \left(\frac{-5\pi}{3} \right) = \frac{1}{2}$$

$$5. \sin \frac{7\pi}{4} = -\frac{\sqrt{2}}{2}$$

$$6. \csc \frac{7\pi}{3} = \frac{2\sqrt{3}}{3}$$

cos \rightarrow sec

sin \rightarrow csc

$$7. \sec \left(\frac{-\pi}{3} \right) = 2$$

$\frac{1}{\cos 0}$

$$8. \cot \frac{3\pi}{2} = 0$$

$$9. \tan \frac{11\pi}{6} = -\frac{\sqrt{3}}{3}$$

$$10. \sin \frac{5\pi}{4} = -\frac{\sqrt{2}}{2}$$

$$11. \cot \frac{2\pi}{3} = -\frac{\sqrt{3}}{3}$$

$$12. \csc(-\pi)$$

$\frac{1}{\sin}$ UND

$$13. \sec \frac{7\pi}{6} = -\frac{2\sqrt{3}}{3}$$

$$14. \cos \left(\frac{-\pi}{2} \right) = 0$$

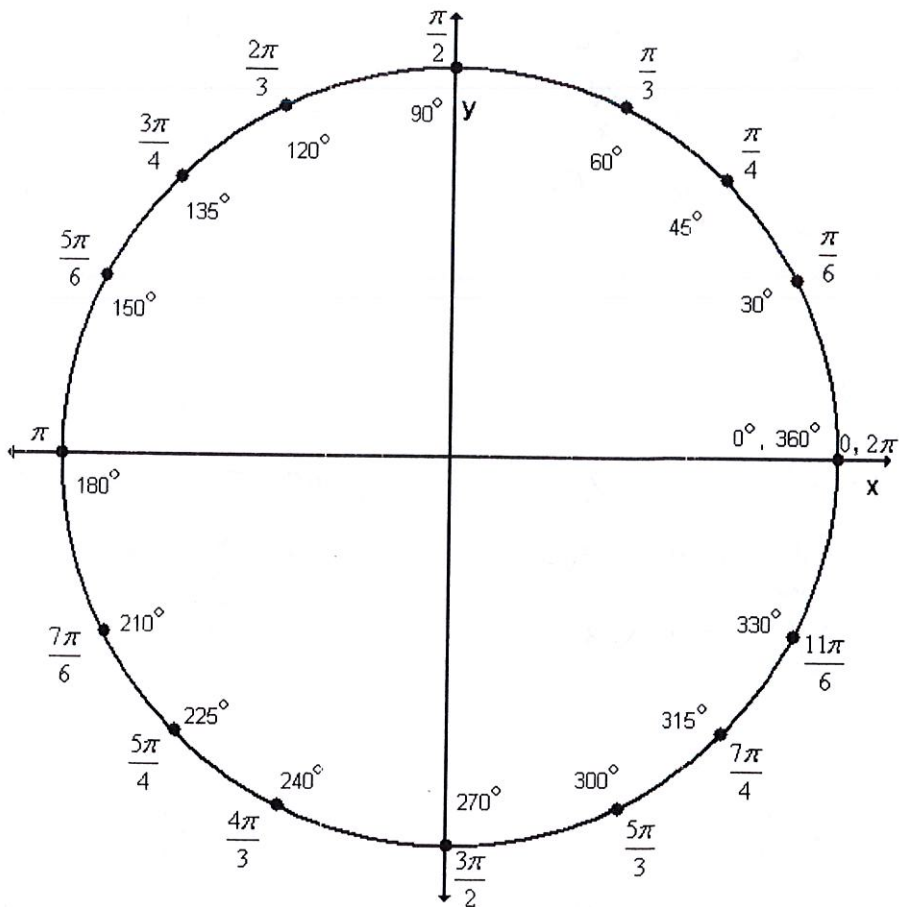
$$15. \tan 4\pi = 0$$

$$16. \cos 0 = 1$$

$$17. \tan \frac{5\pi}{4} = 1$$

$$18. \sin \left(\frac{-\pi}{6} \right) = -\frac{1}{2}$$

**UNIT 6 WORKSHEET 8
USING THE UNIT CIRCLE**



Use the unit circle above to find the exact value of each of the following. (Exact value means no decimal approximations.)

A) $\tan \frac{11\pi}{4} = -1$

B) $\cos \frac{5\pi}{3} = \frac{1}{2}$

C) $\cos(-\pi) = -1$

D) $\sin\left(-\frac{11\pi}{6}\right) = \frac{1}{2}$

E) $\tan\left(-\frac{10\pi}{3}\right) = -\sqrt{3}$

F) $\csc \frac{7\pi}{3} = \frac{2\sqrt{3}}{3}$

G) $\sec\left(\frac{16\pi}{3}\right) = -2$

H) $\cos\left(-\frac{11\pi}{3}\right) = \frac{1}{2}$

I) $\sin \frac{13\pi}{4} = -\frac{\sqrt{2}}{2}$

$$\frac{2}{\sqrt{3}}$$

$$\frac{-\frac{1}{2}}{\frac{\sqrt{3}}{2}} \rightarrow -\frac{\sqrt{3}}{3}$$

$$\frac{\frac{\sqrt{3}}{2}}{-\frac{1}{2}} \rightarrow -\sqrt{3}$$

$$\text{C) } \frac{11\pi}{6}$$

$$\begin{aligned}\sin \theta &= -\frac{1}{2} & \csc \theta &= -2 \\ \cos \theta &= \frac{\sqrt{3}}{2} & \sec \theta &= \frac{2\sqrt{3}}{3} \\ \tan \theta &= -\frac{\sqrt{3}}{3} & \cot \theta &= -\sqrt{3}\end{aligned}$$

$$\text{D) } \frac{-2\pi}{3}$$

$$\begin{aligned}\sin \theta &= -\frac{\sqrt{3}}{2} & \csc \theta &= -\frac{2\sqrt{3}}{3} \\ \cos \theta &= -\frac{1}{2} & \sec \theta &= -2 \\ \tan \theta &= \sqrt{3} & \cot \theta &= \frac{\sqrt{3}}{3}\end{aligned}$$

$$\text{E) } -150^\circ$$

$$\begin{aligned}\sin \theta &= -\frac{1}{2} & \csc \theta &= -2 \\ \cos \theta &= -\frac{\sqrt{3}}{2} & \sec \theta &= -\frac{2\sqrt{3}}{3} \\ \tan \theta &= \frac{\sqrt{3}}{3} & \cot \theta &= \sqrt{3}\end{aligned}$$

$$\text{F) } \frac{-5\pi}{6}$$

$$\begin{aligned}\sin \theta &= -\frac{1}{2} & \csc \theta &= -2 \\ \cos \theta &= \frac{\sqrt{3}}{2} & \sec \theta &= \frac{2\sqrt{3}}{3} \\ \tan \theta &= -\frac{\sqrt{3}}{3} & \cot \theta &= -\sqrt{3}\end{aligned}$$

$$\text{G) } \frac{5\pi}{4}$$

$$\begin{aligned}\sin \theta &= -\frac{\sqrt{2}}{2} & \csc \theta &= -\sqrt{2} \\ \cos \theta &= -\frac{\sqrt{2}}{2} & \sec \theta &= -\sqrt{2} \\ \tan \theta &= 1 & \cot \theta &= 1\end{aligned}$$

$$\text{H) } -\frac{10\pi}{3}$$

$$\begin{aligned}\sin \theta &= \frac{\sqrt{3}}{2} & \csc \theta &= \frac{2\sqrt{3}}{3} \\ \cos \theta &= -\frac{1}{2} & \sec \theta &= -2 \\ \tan \theta &= -\sqrt{3} & \cot \theta &= -\frac{\sqrt{3}}{3}\end{aligned}$$

$$\text{I) } 120^\circ$$

$$\begin{aligned}\sin \theta &= \frac{\sqrt{3}}{2} & \csc \theta &= \frac{2\sqrt{3}}{3} \\ \cos \theta &= -\frac{1}{2} & \sec \theta &= -2 \\ \tan \theta &= -\sqrt{3} & \cot \theta &= -\frac{\sqrt{3}}{3}\end{aligned}$$

$$\text{J) } \frac{-5\pi}{4}$$

$$\begin{aligned}\sin \theta &= -\frac{\sqrt{2}}{2} & \csc \theta &= -\sqrt{2} \\ \cos \theta &= \frac{\sqrt{2}}{2} & \sec \theta &= \sqrt{2} \\ \tan \theta &= -1 & \cot \theta &= -1\end{aligned}$$

$$J) \csc\left(-\frac{\pi}{6}\right) = -2$$

$$K) \tan(-3\pi) = 0$$

$$L) \cot\frac{3\pi}{2} = 0$$

$$M) \sec\left(-\frac{\pi}{3}\right) = 2$$

$$N) \cot\frac{3\pi}{4} = -1$$

$$O) \cot 20\pi = \text{UND}$$

$$P) \cos\left(-\frac{7\pi}{2}\right) = 0$$

$$Q) \sin\left(-\frac{21\pi}{4}\right) = \frac{\sqrt{2}}{2}$$

$$R) \cot 0 = \text{UND}$$

$$S) \sin(-4\pi) = 0$$

$$T) \cot\frac{17\pi}{3} = -\frac{\sqrt{3}}{3}$$

$$U) \cos\frac{4\pi}{3} = -\frac{1}{2}$$

V) Find all angles θ in the interval $[0, 2\pi)$ that satisfy the expression:
 $\sin\theta = \frac{\sqrt{3}}{2}$ $\theta = \frac{\pi}{3} \text{ and } \frac{2\pi}{3}$

answers must be consistent in form (radians)

W) Find all angles θ in the interval $[0, 2\pi)$ that satisfy the expression:
 $\sec\theta = -2$ $\theta = \frac{2\pi}{3} \text{ and } \frac{4\pi}{3}$

X) Find all angles θ in the interval $[0, 2\pi)$ that satisfy the expression:
 $\tan\theta = -1$ $\theta = \frac{3\pi}{4} \text{ and } \frac{7\pi}{4}$

Y) Find all angles θ in the interval $[0, 2\pi)$ that satisfy the expression:
 $\csc\theta = \text{undefined}$ $\theta = 0, \pi$

Look for where $\sin\theta = 0$

Trigo!

Fill in your Trigo card by using each of these values exactly one time:

$0, 1, -1, 2, -2, \frac{1}{2}, -\frac{1}{2}, \sqrt{2}, -\sqrt{2}, \sqrt{3}, -\sqrt{3}, \frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2},$

$\frac{\sqrt{3}}{2}, -\frac{\sqrt{3}}{2}, \frac{\sqrt{3}}{3}, -\frac{\sqrt{3}}{3}, \frac{2\sqrt{3}}{3}, -\frac{2\sqrt{3}}{3},$ undefined,

sin and csc, cos and sec, tan and cot, ALL, FREE

