PRE-CALCULUS / TRIGONOMETRY **Name** ______________________________

4-2 The Unit Circle

Objective:

a. Identify a unit circle and describe its relationship to real numbers;
b. Evaluate trigonometric functions using the unit circle;
c. Use the domain and period to evaluate sine and cosine functions.

RECALL from 4-3.

Sines, Cosines, and Tangents of Special Angles

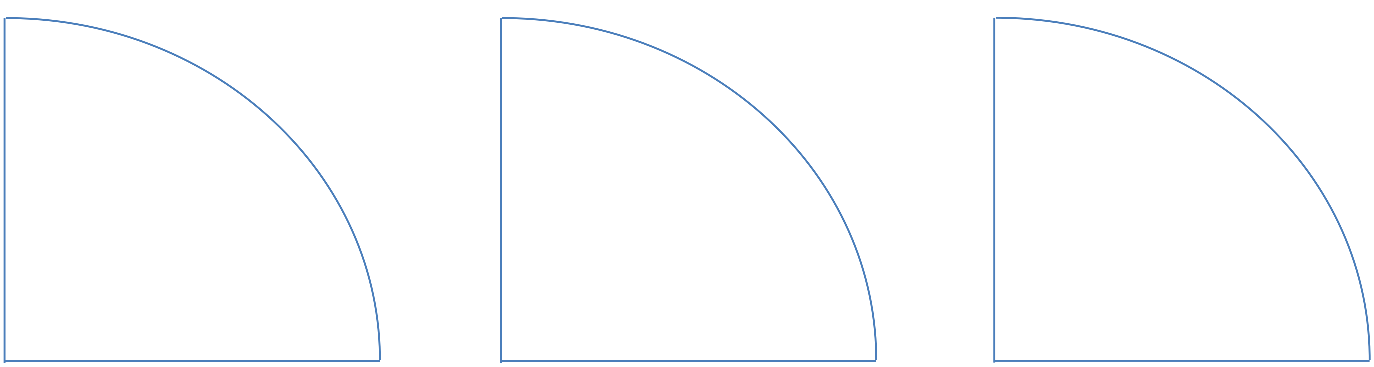
$\sin 30^\circ = \sin \frac{\pi}{6} = \frac{1}{2}$ $\cos 30^\circ = \cos \frac{\pi}{6} = \frac{\sqrt{3}}{2}$ $\tan 30^\circ = \tan \frac{\pi}{6} = \frac{\sqrt{3}}{3}$

$\sin 45^\circ = \sin \frac{\pi}{4} = \frac{\sqrt{2}}{2}$ $\cos 45^\circ = \cos \frac{\pi}{4} = \frac{\sqrt{2}}{2}$ $\tan 45^\circ = \tan \frac{\pi}{4} = 1$

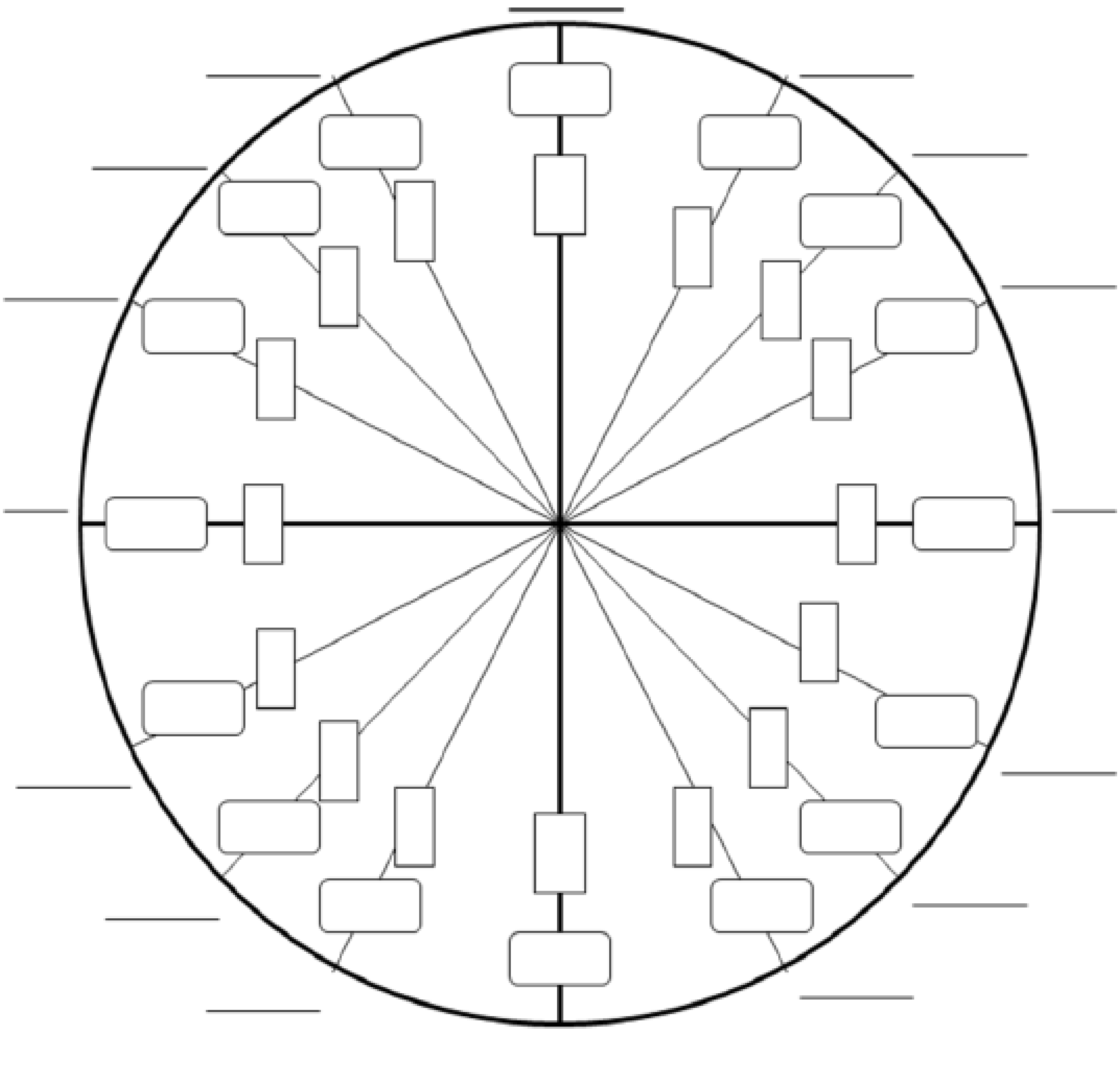
$\sin 60^\circ = \sin \frac{\pi}{3} = \frac{\sqrt{3}}{2}$ $\cos 60^\circ = \cos \frac{\pi}{3} = \frac{1}{2}$ $\tan 60^\circ = \tan \frac{\pi}{3} = \sqrt{3}$

From the Pythagorean Trigonometric identity, we know that ______________________________,
and the equation of a circle is __________________________ ∴ x = _________ and y = _______.

The Unit Circle (Quadrant I)



The Unit Circle



We can use the unit circle to evaluate the six trigonometric functions at real numbers.

Example:

1) $\theta = \frac{\pi}{6}$

2) $\theta = \frac{4\pi}{3}$

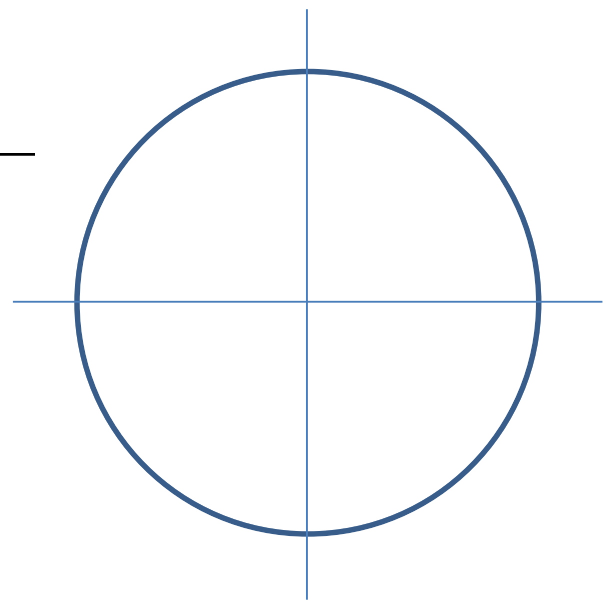
PRACTICE: Evaluate the six trigonometric functions at the given angle.

1) $\theta = \frac{5\pi}{6}$

2) $\theta = -\frac{\pi}{3}$

3) $\theta = -\frac{9\pi}{2}$

Periodic Functions: Sine and Cosine



Domain of sine and cosine = ____________

Range of sine = ___________

Range of cosine = ___________

What happens if we add 2π to the angle?

Definition of Periodic Function

A function f is **periodic** if there exists a positive real number c such that

for all Θ in the domain of f. The smallest number c for which f is periodic is called the **period** of f.

Examples:

1) Evaluate $\sin \frac{13\pi}{6}$

2) Evaluate $\cos -\frac{7\pi}{2}$