Math 4
U4 Trigonometry
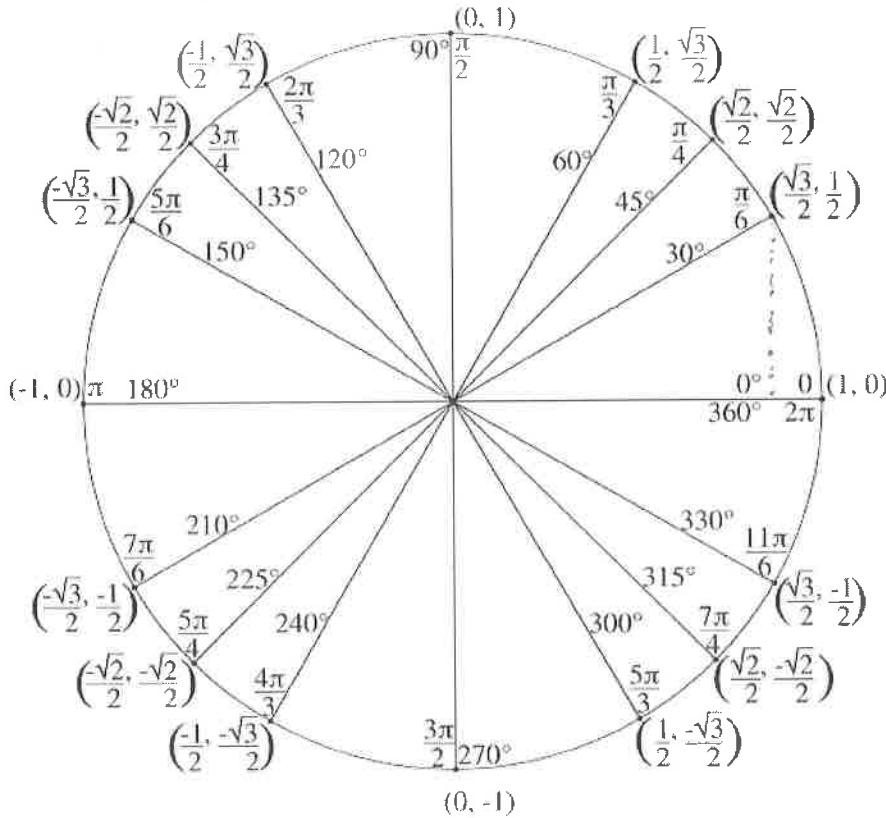
Review

Key

Name_____

Date_____

To be successful in this Unit, it is ABSOLUTELY NECESSARY that you can find the unit circle exact values of sine, cosine, and tangent. See the unit circle below:

- The equation of the unit circle is $x^2 + y^2 = 1$, meaning that the radius of the circle is $\underline{1}$ and the center is $\underline{(0,0)}$

- The coordinates of a point on the circle that is located at the intersection of the circle and angle θ, made with the **x-axis** and the terminal side of the angle is
  $$(\cos\theta, \sin\theta)$$

- $\tan\theta = \dfrac{\sin\theta}{\cos\theta}$. Also, $\tan\theta$ is the slope of the terminal side of angle θ

You will need to have a working knowledge of the values on this unit circle – the values of the coordinates and the values of the angles that lead to the coordinates. Notice I said *working knowledge*, not that you have to have the values memorized. If you *understand* the unit circle, you do not need to memorize all the values. **Take notes below as we develop what that means:**

Special right △s

30-60-90 : Long side $= \dfrac{\sqrt{3}}{2}$
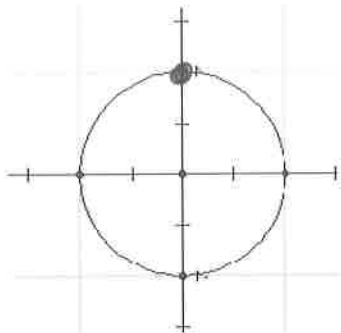
short : $\dfrac{1}{2}$

45-45-90 : Both sides : $\dfrac{1}{\sqrt{2}} = \dfrac{\sqrt{2}}{2}$

$\dfrac{1}{\sqrt{2}} \cdot \dfrac{\sqrt{2}}{\sqrt{2}} = \dfrac{\sqrt{2}}{\sqrt{2}^2} = \dfrac{\sqrt{2}}{2}$
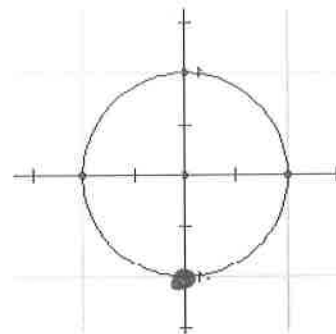
Find the values of the following expressions. Locate the given angle in each circle. Do NOT use a calculator. Your answers should be exact values. The radius of each circle is 1.

1. $\cancel{\cos}\left(\dfrac{\pi}{2}\right) = 0$
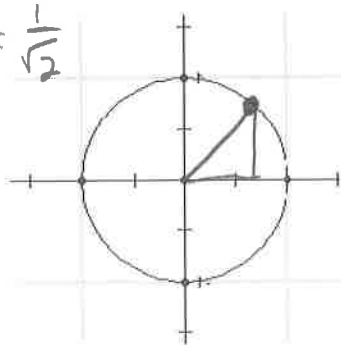
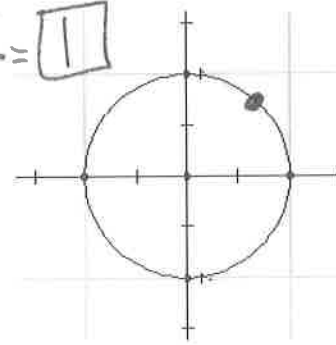   Half of π

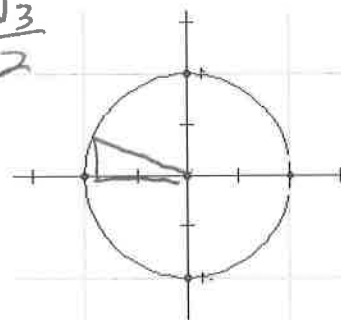 $\rightarrow \pi$ is half of circle

2. $\sin\left(\dfrac{3\pi}{2}\right) = -1$

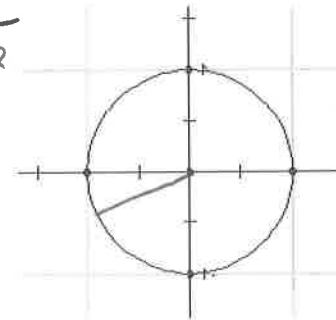3. $\cos\left(\dfrac{\pi}{4}\right) = \dfrac{\sqrt{2}}{2} = \dfrac{1}{\sqrt{2}}$

4. $\tan\left(\dfrac{\pi}{4}\right) = \dfrac{\frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}} = \boxed{1}$
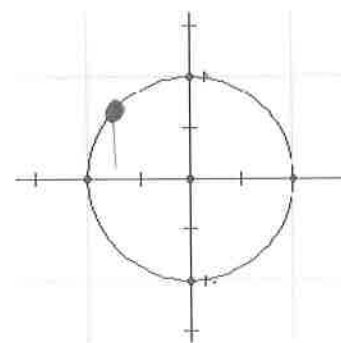
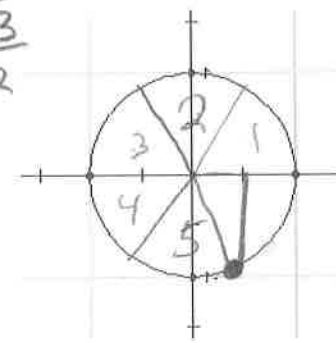5. $\cos\left(\dfrac{5\pi}{6}\right) = -\dfrac{\sqrt{3}}{2}$

6. $\sin\left(\dfrac{7\pi}{6}\right) = -\dfrac{1}{2}$

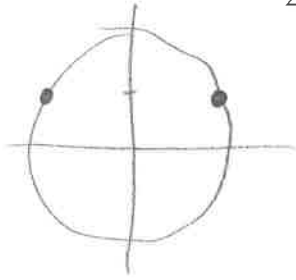7. $\sin\left(\dfrac{3\pi}{4}\right) = \dfrac{\sqrt{2}}{2}$

8. $\sin\left(\dfrac{5\pi}{3}\right) = -\dfrac{\sqrt{3}}{2}$

Solve the following equations using the unit circle. Give all solutions found in one rotation around the unit circle (called *primary value solutions*) Give your answer in radians.
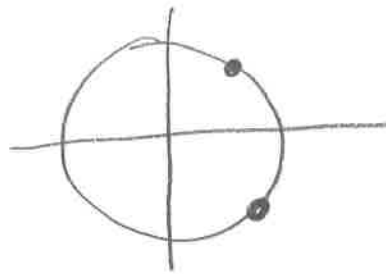
9. $\sin x = \dfrac{1}{2}$

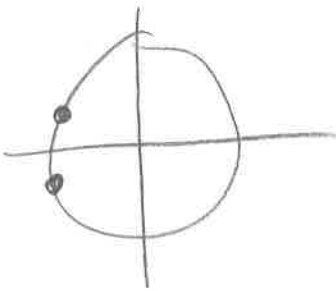$$x = \dfrac{\pi}{6} \quad \& \quad \dfrac{5\pi}{6}$$

10. $\cos x = \dfrac{1}{\sqrt{2}} = \dfrac{\sqrt{2}}{2}$

$$x = \dfrac{\pi}{4} \quad \& \quad \dfrac{7\pi}{4}$$

11. $\cos x = -\dfrac{\sqrt{3}}{2}$

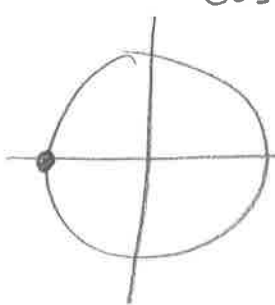$$x = \dfrac{5\pi}{6} \quad \& \quad \dfrac{7\pi}{6}$$

12. $\tan x = -1$

$$x = \dfrac{3\pi}{4} \quad \& \quad \dfrac{7\pi}{4}$$
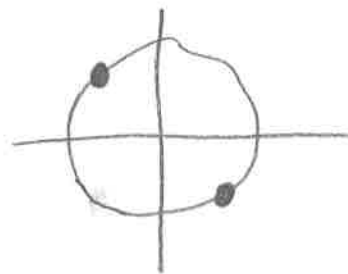
13. $\cos x + 1 = 0$
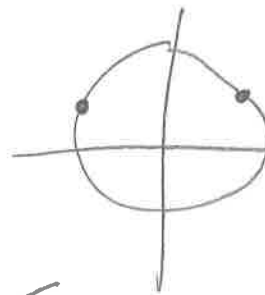
$$\cos x = -1$$

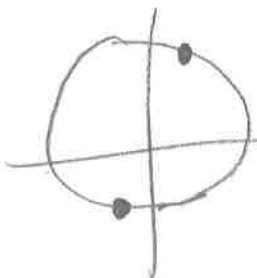$$x = \pi$$

14. $2\sin x - 1 = 0$

$$2\sin x = 1$$

$$\sin x = \dfrac{1}{2}$$

$$x = \dfrac{\pi}{6} \quad \& \quad \dfrac{5\pi}{6}$$

15. $\tan x - \sqrt{3} = 0$

$$\tan x = \sqrt{3} \rightarrow \dfrac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} \quad \text{or} \quad \dfrac{-\frac{\sqrt{3}}{2}}{-\frac{1}{2}}$$

$$x = \dfrac{\pi}{3} \quad \& \quad x = \dfrac{4\pi}{3}$$