

§4.4: Trig Functions in Any Angle

“I WILL...

Apply the six trig functions on the coordinate plane from a point”

I. Definitions

A. For  $\theta$  be an angle in standard position with any point  $(x, y)$

1.  $\sin \theta =$  \_\_\_\_\_
2.  $\cos \theta =$  \_\_\_\_\_
3.  $\tan \theta =$  \_\_\_\_\_
4.  $\csc \theta =$  \_\_\_\_\_
5.  $\sec \theta =$  \_\_\_\_\_
6.  $\cot \theta =$  \_\_\_\_\_

B. To establish the radius, the equation is  $r =$  \_\_\_\_\_

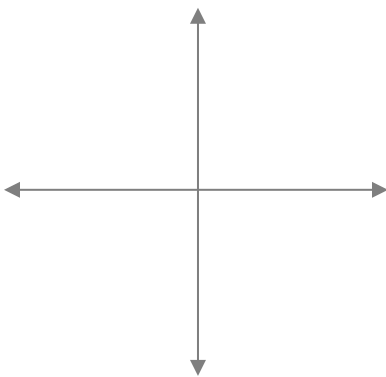
C. Think of “ASTC: A \_\_\_\_\_ S \_\_\_\_\_ T \_\_\_\_\_ C \_\_\_\_\_”

1. A: **A** \_\_\_\_\_ points are always positive in Quadrant I
2. S: **S** \_\_\_\_\_ points are positive in Quadrant II
3. T: **T** \_\_\_\_\_ points are positive in Quadrant III
4. C: **C** \_\_\_\_\_ points are positive in Quadrant IV

II. Steps in Evaluating Functions with a Given Point

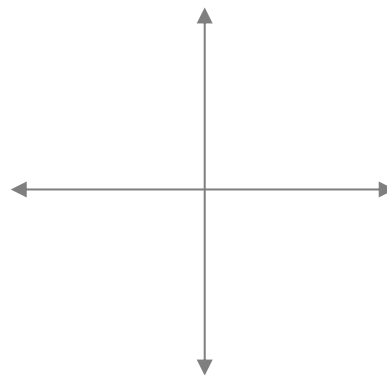
- A. Draw a picture from a coordinate plane
- B. Identify and plot the point onto the coordinate plane
- C. Determine the missing side using the radius equation
- D. Use Trigonometric Functions to solve

Ex 1: Let  $(3, 4)$  be a point on the terminal side of  $\theta$ . Determine the value of the six trigonometric functions for  $\theta$ .



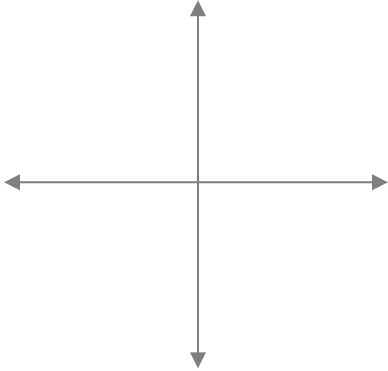
$$\begin{array}{ll} \sin \theta = \underline{\hspace{2cm}} & \csc \theta = \underline{\hspace{2cm}} \\ \cos \theta = \underline{\hspace{2cm}} & \sec \theta = \underline{\hspace{2cm}} \\ \tan \theta = \underline{\hspace{2cm}} & \cot \theta = \underline{\hspace{2cm}} \end{array}$$

Ex 2: Let  $\left(\frac{\sqrt{10}}{10}, -\frac{3\sqrt{10}}{10}\right)$  be a point on the terminal side of  $\theta$ . Determine the value of the six trigonometric functions for  $\theta$ .



$$\begin{array}{ll} \sin \theta = \underline{\hspace{2cm}} & \csc \theta = \underline{\hspace{2cm}} \\ \cos \theta = \underline{\hspace{2cm}} & \sec \theta = \underline{\hspace{2cm}} \\ \tan \theta = \underline{\hspace{2cm}} & \cot \theta = \underline{\hspace{2cm}} \end{array}$$

Your Turn: Let  $(1, -1)$  be a point on the terminal side of  $\theta$ . Determine the value of the six trigonometric functions for  $\theta$ .

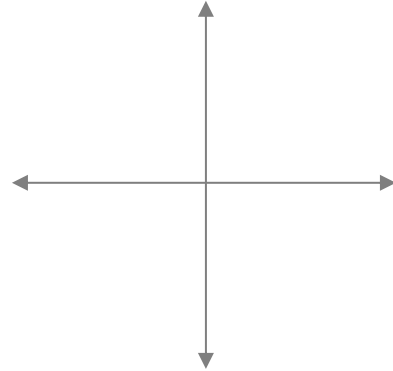


$$\sin \theta = \underline{\hspace{2cm}} \quad \csc \theta = \underline{\hspace{2cm}}$$

$$\cos \theta = \underline{\hspace{2cm}} \quad \sec \theta = \underline{\hspace{2cm}}$$

$$\tan \theta = \underline{\hspace{2cm}} \quad \cot \theta = \underline{\hspace{2cm}}$$

Ex 3: Let  $\theta$  be in Quadrant II. Given  $\sin \theta = \frac{1}{3}$ , determine the value of the six trigonometric functions for  $\theta$ .

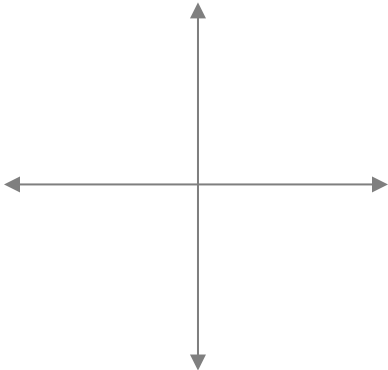


$$\sin \theta = \underline{\hspace{2cm}} \quad \csc \theta = \underline{\hspace{2cm}}$$

$$\cos \theta = \underline{\hspace{2cm}} \quad \sec \theta = \underline{\hspace{2cm}}$$

$$\tan \theta = \underline{\hspace{2cm}} \quad \cot \theta = \underline{\hspace{2cm}}$$

Ex 4: Let  $\cot \theta < 0$ . Given  $\csc \theta = 4$ , determine the value of the six trigonometric functions for  $\theta$ .

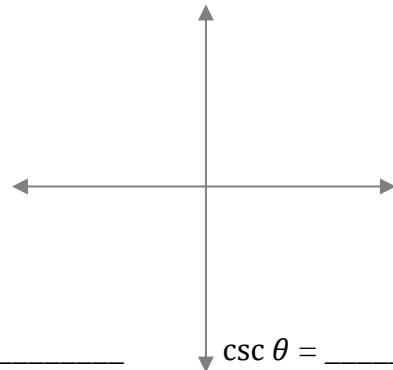


$$\sin \theta = \underline{\hspace{2cm}} \quad \csc \theta = \underline{\hspace{2cm}}$$

$$\cos \theta = \underline{\hspace{2cm}} \quad \sec \theta = \underline{\hspace{2cm}}$$

$$\tan \theta = \underline{\hspace{2cm}} \quad \cot \theta = \underline{\hspace{2cm}}$$

Ex 5: Given  $y = \frac{1}{3}x$  and  $\theta$  is in Quadrant III, determine the value of the six trigonometric functions for  $\theta$ .



$$\sin \theta = \underline{\hspace{2cm}} \quad \csc \theta = \underline{\hspace{2cm}}$$

$$\cos \theta = \underline{\hspace{2cm}} \quad \sec \theta = \underline{\hspace{2cm}}$$

$$\tan \theta = \underline{\hspace{2cm}} \quad \cot \theta = \underline{\hspace{2cm}}$$

Your Turn: Let  $\tan \theta > 0$ . Given  $\cos \theta = -\frac{2}{3}$ , determine the value of the six trigonometric functions for  $\theta$ .

$$\sin \theta = \underline{\hspace{2cm}} \quad \csc \theta = \underline{\hspace{2cm}}$$

$$\cos \theta = \underline{\hspace{2cm}} \quad \sec \theta = \underline{\hspace{2cm}}$$

$$\tan \theta = \underline{\hspace{2cm}} \quad \cot \theta = \underline{\hspace{2cm}}$$

