

6.4A: Trig Ratios in the Coordinate Plane

“I WILL...

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

Use the calculator to determine the trig functions.”

I. Definitions

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

1. $\text{SIN } \theta = \underline{\hspace{2cm}}$

2. $\text{COS } \theta = \underline{\hspace{2cm}}$

3. $\text{TAN } \theta = \underline{\hspace{2cm}}$

4. $\text{CSC } \theta = \underline{\hspace{2cm}}$

5. $\text{SEC } \theta = \underline{\hspace{2cm}}$

6. $\text{COT } \theta = \underline{\hspace{2cm}}$

B. To establish the radius, the equation is _____.

C. Think of “ASTC: All Students Take Calculus”

1. A: All points are always positive in Quadrant I

2. S: Sine points are positive in Quadrant II

3. T: Tan points are positive in Quadrant III

4. C: Cosine points are positive in Quadrant IV

II. Steps in Evaluating Functions with a Given Point

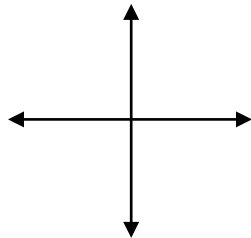
A. Draw a picture from a coordinate plane

B. Identify and plot the point onto the coordinate plane

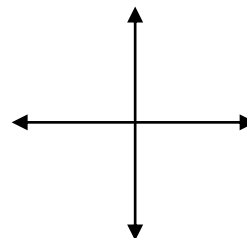
C. Determine the missing side using the radius equation

D. Use Trigonometric Functions to solve

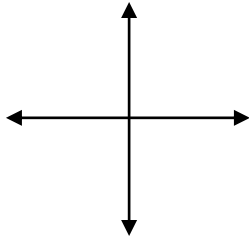
Ex 1: Let $(3, 4)$ be a point on the terminal side of θ . Determine the value of the six trigonometric functions for θ .



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



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



II. Finding the Exact Value Without a Calculator

- A. Make sure the calculator is set in RADIAN mode
- B. Apply all three trig functions
- C. Determine which quadrant it belongs to identify the quadrant of the terminal side

Ex 3: Use a calculator, in radian mode, to find sin, cos, and tan of the quadrant of the terminal side for $-\frac{11}{5}\pi$

Ex 4: Use a calculator, in radian mode, to find sin, cos, and tan of the quadrant of the terminal side for 8 Radian

Your Turn: Use a calculator, in radian mode, to find sin, cos, and tan of the quadrant of the terminal side for -23π

Pg 452: 1-9 odd (List all 6 Trig Functions), 15-23 odd

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Exercises 6.4

Note: Unless stated otherwise, all angles are in standard position.

In Exercises 1–6, find $\sin t$, $\cos t$, and $\tan t$ when the terminal side of an angle of t radians passes through the given point.

1. $(2, 7)$ 2. $(-3, 2)$ 3. $(-5, -6)$
4. $(4, -3)$ 5. $(\sqrt{3}, -10)$ 6. $(-\pi, 2)$

In Exercises 7–10, find $\sin t$, $\cos t$, and $\tan t$ when the terminal side of an angle of t radians passes through the given point on the unit circle.

7. $\left(-\frac{2}{\sqrt{5}}, \frac{1}{\sqrt{5}}\right)$ 8. $\left(\frac{1}{\sqrt{10}}, -\frac{3}{\sqrt{10}}\right)$
9. $\left(\frac{3}{5}, -\frac{4}{5}\right)$ 10. $(0.6, -0.8)$

In Exercises 11–14, identify an angle $0 \leq t' \leq \pi$ that is coterminal with the given angle, and find the sine and cosine of the given angle.

11. $\frac{13\pi}{6}$ 12. $\frac{9\pi}{2}$ 13. 16π 14. $\frac{7\pi}{4}$

In Exercises 15–23,

- Use a calculator in radian mode to find the sine, cosine, and tangent of each number. Round your answers to four decimal places.
- Use the signs of the functions to identify the quadrant of the terminal side of an angle of t radians. If the terminal side lies on an axis, identify which axis and whether it is on the positive or negative side of the axis. Explain your reasoning.

15. $\frac{7\pi}{5}$ 16. 11 17. $-\frac{14\pi}{9}$
18. -23π 19. $\frac{10\pi}{3}$ 20. 6.4π
21. 9.5π 22. $\frac{\pi}{17}$ 23. -17