

4-3 Trigonometric Functions on the Unit Circle

The given point lies on the terminal side of an angle θ in standard position. Find the values of the six trigonometric functions of θ .

1. (3, 4)

ANSWER:

$$\sin \theta = \frac{4}{5}, \cos \theta = \frac{3}{5}, \tan \theta = \frac{4}{3}, \csc \theta = \frac{5}{4}, \sec \theta = \frac{5}{3}, \cot \theta = \frac{3}{4}$$

2. (-6, 6)

ANSWER:

$$\sin \theta = \frac{\sqrt{2}}{2}, \cos \theta = -\frac{\sqrt{2}}{2}, \tan \theta = -1,$$

$$\csc \theta = \sqrt{2}, \sec \theta = -\sqrt{2}, \cot \theta = -1$$

3. (-4, -3)

ANSWER:

$$\sin \theta = -\frac{3}{5}, \cos \theta = -\frac{4}{5}, \tan \theta = \frac{3}{4},$$

$$\csc \theta = -\frac{5}{3}, \sec \theta = -\frac{5}{4}, \cot \theta = \frac{4}{3}$$

4. (2, 0)

ANSWER:

$\sin \theta = 0$, $\cos \theta = 1$, $\tan \theta = 0$, $\csc \theta$ is undefined, $\sec \theta = 1$, $\cot \theta$ is undefined.

5. (1, -8)

ANSWER:

$$\sin \theta = -\frac{8\sqrt{65}}{65}, \cos \theta = \frac{\sqrt{65}}{65}, \tan \theta = -8,$$

$$\csc \theta = -\frac{\sqrt{65}}{8}, \sec \theta = \sqrt{65}, \cot \theta = -\frac{1}{8}$$

6. (5, -3)

ANSWER:

$$\sin \theta = -\frac{3\sqrt{34}}{34}, \cos \theta = \frac{5\sqrt{34}}{34}, \tan \theta = -\frac{3}{5},$$

$$\csc \theta = -\frac{\sqrt{34}}{3}, \sec \theta = \frac{\sqrt{34}}{5}, \cot \theta = -\frac{5}{3}$$

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7. $(-8, 15)$

ANSWER:

$$\sin\theta = \frac{15}{17}, \cos\theta = -\frac{8}{17}, \tan\theta = -\frac{15}{8},$$

$$\csc\theta = \frac{17}{15}, \sec\theta = -\frac{17}{8}, \cot\theta = -\frac{8}{15}$$

8. $(-1, -2)$

ANSWER:

$$\sin\theta = -\frac{2\sqrt{5}}{5}, \cos\theta = -\frac{\sqrt{5}}{5}, \tan\theta = 2,$$

$$\csc\theta = -\frac{\sqrt{5}}{2}, \sec\theta = -\sqrt{5}, \cot\theta = \frac{1}{2}$$

Find the exact value of each trigonometric function, if defined. If not defined, write *undefined*.

9. $\sin \frac{\pi}{2}$

ANSWER:

1

10. $\tan 2\pi$

ANSWER:

0

11. $\cot (-180^\circ)$

ANSWER:

undefined

12. $\csc 270^\circ$

ANSWER:

-1

13. $\cos (-270^\circ)$

ANSWER:

0

14. $\sec 180^\circ$

ANSWER:

-1

15. $\tan \pi$

ANSWER:

0

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16. $\sec\left(-\frac{\pi}{2}\right)$

ANSWER:

undefined