

Evaluating Trigonometric Functions  
Precalculus

Name: Key  
Date: \_\_\_\_\_

Use the given values to evaluate the remaining trigonometric functions.

1)  $\sin \theta = \frac{2}{5}$   $0^\circ < \theta < 90^\circ$  Q1

$$\begin{aligned} x^2 + y^2 &= r^2 \\ x^2 + 2^2 &= 5^2 \\ x^2 + 4 &= 25 \quad x^2 = 21 \quad x = \sqrt{21} \end{aligned}$$

$x = \sqrt{21}$   $y = 2$   $r = 5$

$+$   $\sin \theta = \frac{2}{5}$   $+$   $\csc \theta = \frac{5}{2}$

$+$   $\cos \theta = \frac{\sqrt{21}}{5}$   $+$   $\sec \theta = \frac{5\sqrt{21}}{21}$

$+$   $\tan \theta = \frac{2}{\sqrt{21}} = \frac{2\sqrt{21}}{21}$   $+$   $\cot \theta = \frac{\sqrt{21}}{2}$

2)  $\tan \theta = \frac{\sqrt{3}}{4}$   $0 < \theta < \frac{\pi}{2}$  Q1

$$\begin{aligned} x^2 + y^2 &= r^2 \\ 4^2 + (\sqrt{3})^2 &= r^2 \quad \sqrt{19} \neq \sqrt{12} \quad r = \sqrt{19} \\ 16 + 3 &= r^2 \end{aligned}$$

$x = 4$   $y = \sqrt{3}$   $r = \sqrt{19}$

$+$   $\sin \theta = \frac{\sqrt{3}}{\sqrt{19}} = \frac{\sqrt{57}}{19}$   $+$   $\csc \theta = \frac{\sqrt{19}}{\sqrt{3}} = \frac{\sqrt{57}}{3}$

$+$   $\cos \theta = \frac{4}{\sqrt{19}} = \frac{4\sqrt{19}}{19}$   $+$   $\sec \theta = \frac{\sqrt{19}}{4}$

$+$   $\tan \theta = \frac{\sqrt{3}}{4}$   $+$   $\cot \theta = \frac{4\sqrt{3}}{3}$

3)  $\sin \theta = \frac{1}{4}$   $0 < \theta < \frac{\pi}{2}$  Q1

$$\begin{aligned} x^2 + y^2 &= r^2 \\ x^2 + 1^2 &= 4^2 \\ x^2 + 1 &= 16 \quad \sqrt{x^2} = \sqrt{15} \end{aligned}$$

$x = \sqrt{15}$   $y = 1$   $r = 4$

$\sin \theta = \frac{1}{4}$   $\csc \theta = \frac{4}{1}$

$\cos \theta = \frac{\sqrt{15}}{4}$   $\sec \theta = \frac{4\sqrt{15}}{15}$

$\tan \theta = \frac{1}{\sqrt{15}} = \frac{\sqrt{15}}{15}$   $\cot \theta = \sqrt{15}$

4)  $\cos \theta = -\frac{2}{3}$   $90^\circ < \theta < 180^\circ$  Q2

$$\begin{aligned} x^2 + y^2 &= r^2 \\ (-2)^2 + y^2 &= 3^2 \\ 4 + y^2 &= 9 \quad \sqrt{42} \neq \sqrt{5} \end{aligned}$$

$x = -2$   $y = \sqrt{5}$   $r = 3$

$+$   $\sin \theta = \frac{\sqrt{5}}{3}$   $+$   $\csc \theta = \frac{3\sqrt{5}}{5}$

$-$   $\cos \theta = \frac{-2}{3}$   $-$   $\sec \theta = \frac{-3}{2}$

$-$   $\tan \theta = \frac{-\sqrt{5}}{2}$   $-$   $\cot \theta = \frac{-2\sqrt{5}}{5}$

5)  $\csc \theta = \frac{\sqrt{11}}{3}$   $\frac{\pi}{2} < \theta < \pi$  Q2

$$\begin{aligned} x^2 + y^2 &= r^2 \\ x^2 + 3^2 &= (\sqrt{11})^2 \\ x^2 + 9 &= 11 \\ x &= \sqrt{2} \end{aligned}$$

$x = \sqrt{2}$   $y = 3$   $r = \sqrt{11}$

$+$   $\sin \theta = \frac{3}{\sqrt{11}} = \frac{3\sqrt{11}}{11}$   $+$   $\csc \theta = \frac{\sqrt{11}}{3}$

$-$   $\cos \theta = \frac{\sqrt{2}}{\sqrt{11}} = \frac{\sqrt{22}}{11}$   $-$   $\sec \theta = \frac{\sqrt{22}}{2}$

$-$   $\tan \theta = \frac{-3}{\sqrt{2}} = \frac{-3\sqrt{2}}{2}$   $-$   $\cot \theta = \frac{\sqrt{2}}{3}$

6)  $\sec \theta = -\frac{5}{4}$   $90^\circ < \theta < 180^\circ$  Q2

$$\begin{aligned} x^2 + y^2 &= r^2 \\ (-4)^2 + y^2 &= 5^2 \quad \sqrt{42} \neq \sqrt{9} \\ 16 + y^2 &= 25 \quad y = 3 \end{aligned}$$

$x = -4$   $y = 3$   $r = 5$

$+$   $\sin \theta = \frac{3}{5}$   $+$   $\csc \theta = \frac{5}{3}$

$-$   $\cos \theta = \frac{-4}{5}$   $-$   $\sec \theta = \frac{-5}{4}$

$-$   $\tan \theta = \frac{-3}{4}$   $-$   $\cot \theta = \frac{-4}{3}$

$$7) \sin \theta = -\frac{1}{3} \quad 180^\circ < \theta < 270^\circ \quad Q3$$

$$8) \tan \theta = \frac{2}{3} \quad \pi < \theta < \frac{3\pi}{2} \quad Q3$$

$$\begin{aligned} x^2 + y^2 &= r^2 \\ x^2 + (-1)^2 &= 3^2 & x = \sqrt{8} = 2\sqrt{2} \\ x^2 + 1 &= 9 \\ -1 & \quad -1 \end{aligned}$$

$$\begin{aligned} x^2 + y^2 &= r^2 \\ 2^2 + 3^2 &= 1^2 \\ r &= \sqrt{13} \end{aligned}$$

$$x = 2\sqrt{2} \quad y = -1 \quad r = 3$$

$$x = 3 \quad y = 2 \quad r = \sqrt{13}$$

$$- \sin \theta = \frac{-1}{3} \quad -\csc \theta = \frac{-3}{1}$$

$$- \sin \theta = \frac{2}{\sqrt{13}} = \frac{2\sqrt{13}}{13} \quad -\csc \theta = \frac{-\sqrt{13}}{2}$$

$$- \cos \theta = \frac{2\sqrt{2}}{3} \quad -\sec \theta = \frac{-3\sqrt{2}}{4}$$

$$- \cos \theta = \frac{3}{\sqrt{13}} = \frac{-3\sqrt{13}}{13} \quad \sec \theta = \frac{-\sqrt{13}}{3}$$

$$+ \tan \theta = \frac{1}{2\sqrt{2}} = \frac{\sqrt{2}}{4} \quad \cot \theta = \frac{4}{1} = 2\sqrt{2}$$

$$+ \tan \theta = \frac{2}{3} \quad \cot \theta = \frac{3}{2}$$

$$9) \sec \theta = -\frac{7}{5} \quad 180^\circ < \theta < 270^\circ \quad Q3$$

$$10) \cos \theta = \frac{1}{8} \quad \frac{3\pi}{2} < \theta < 2\pi \quad Q4$$

$$\begin{aligned} x^2 + y^2 &= r^2 \\ (-5)^2 + 4^2 &= 7^2 & r = 2\sqrt{6} \\ \sqrt{4^2} &= \sqrt{24} \end{aligned}$$

$$\begin{aligned} x^2 + y^2 &= r^2 \\ 1^2 + 4^2 &= 8^2 & y = 3\sqrt{7} \\ \sqrt{4^2} &= \sqrt{63} \end{aligned}$$

$$x = -5 \quad y = 2\sqrt{6} \quad r = 7$$

$$x = 1 \quad y = 3\sqrt{7} \quad r = 8$$

$$- \sin \theta = \frac{-2\sqrt{6}}{7} \quad -\csc \theta = \frac{-7\sqrt{6}}{12}$$

$$- \sin \theta = \frac{-3\sqrt{7}}{8} \quad -\csc \theta = \frac{-8\sqrt{7}}{21}$$

$$- \cos \theta = \frac{5}{7} \quad -\sec \theta = \frac{-7}{5}$$

$$+ \cos \theta = \frac{1}{8} \quad +\sec \theta = \frac{8}{1}$$

$$+ \tan \theta = \frac{2\sqrt{6}}{5} \quad +\cot \theta = \frac{5\sqrt{6}}{12}$$

$$- \tan \theta = \frac{-3\sqrt{7}}{1} \quad -\cot \theta = \frac{-\sqrt{7}}{21}$$

$$11) \cot \theta = -\frac{4}{3} \quad 270^\circ < \theta < 360^\circ \quad Q4$$

$$12) \cot \theta = -\frac{8}{1} \quad \frac{3\pi}{2} < \theta < 2\pi \quad Q4$$

$$\begin{aligned} x^2 + y^2 &= r^2 \\ (-4)^2 + 3^2 &= 5^2 \\ 16 + 9 &= 12 & \sqrt{25} = \sqrt{12} \quad r = 5 \end{aligned}$$

$$\begin{aligned} x^2 + y^2 &= r^2 \\ (-8)^2 + 1^2 &= 1^2 \\ \sqrt{64} &= 1 \end{aligned}$$

$$x = -4 \quad y = 3 \quad r = 5$$

$$x = -8 \quad y = 1 \quad r = \sqrt{65}$$

$$- \sin \theta = \frac{-3}{5} \quad -\csc \theta = \frac{-5}{3}$$

$$- \sin \theta = \frac{-1}{\sqrt{65}} = \frac{-\sqrt{65}}{65} \quad -\csc \theta = \frac{-\sqrt{65}}{1}$$

$$+ \cos \theta = \frac{4}{5} \quad +\sec \theta = \frac{5}{4}$$

$$+ \cos \theta = \frac{-8}{\sqrt{65}} = \frac{-8\sqrt{65}}{65} \quad +\sec \theta = \frac{\sqrt{65}}{-8}$$

$$- \tan \theta = \frac{-3}{4} \quad -\cot \theta = \frac{-4}{3}$$

$$- \tan \theta = \frac{-1}{8} \quad -\cot \theta = \frac{-8}{1}$$