

## Practice

## Graphing Other Trigonometric Functions

Find each value by referring to the graphs of the trigonometric functions.

1.  $\tan\left(-\frac{3\pi}{2}\right)$

undefined

2.  $\cot\left(\frac{3\pi}{2}\right)$

0

3.  $\sec 4\pi$

1

4.  $\csc\left(-\frac{7\pi}{2}\right)$

1

Find the values of  $\theta$  for which each equation is true.

5.  $\tan \theta = 0$

 $\pi n$ , where  $n$  is an integer

6.  $\cot \theta = 0$

 $\frac{\pi}{2}n$ , where  $n$  is an odd integer

7.  $\csc \theta = 1$

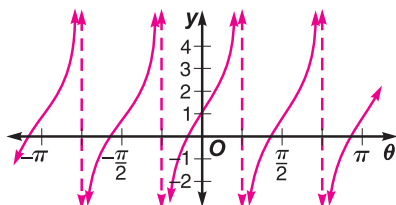
 $\frac{\pi}{2} + 2\pi n$ , where  $n$  is an integer

8.  $\sec \theta = -1$

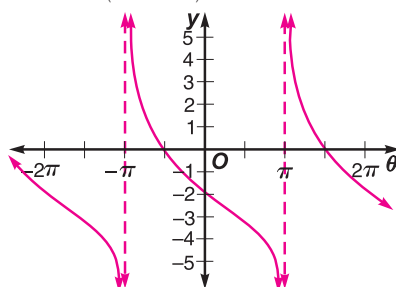
 $\pi n$ , where  $n$  is an odd integer

Graph each function.

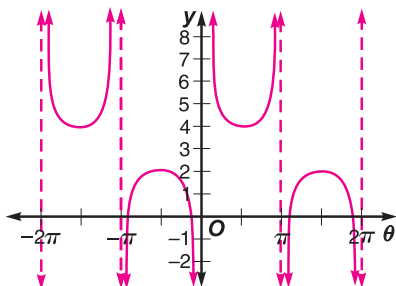
9.  $y = \tan(2\theta + \pi) + 1$



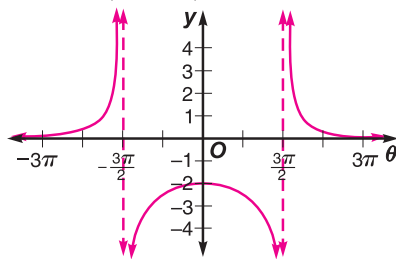
10.  $y = \cot\left(\frac{\theta}{2} - \frac{\pi}{2}\right) - 2$



11.  $y = \csc \theta + 3$



12.  $y = \sec\left(\frac{\theta}{3} + \pi\right) - 1$



## Reading

Technically,  $\sin^{-1} x$  is the angle  $\theta$  connected by the arc of a circle of radius 1 of an equation  $y = \sin \theta$  with the given coordinates  $(x, y)$ .

Practically speaking,  $\sin^{-1} x$  is a word as a calculator gives a value as a number. You can also graph a sine wave as a wave on a coordinate plane, but a calculator is based on the sine function. For a deeper understanding, read the following.

## a. Read the following.

The sine function has a period of  $2\pi$  in the sense of a wave. The graph of  $y = \sin \theta$  has its characteristic shape. In the region  $[-\frac{\pi}{2}, \frac{\pi}{2}]$ , the sine curve decreases from  $\frac{\pi}{2}$  to  $-\frac{\pi}{2}$  and then increases to  $\frac{\pi}{2}$ .

## b. Focus on the following.

The sine function has a period of  $2\pi$  in the sense of a wave. The graph of  $y = \sin 2x$  has its characteristic shape. The graph is shown. The period of the function is  $\pi$ . The graph is symmetric about the  $x$ -axis at  $x = \frac{\pi}{3}$  and  $x = \frac{2\pi}{3}$ . The maximum value of  $\sin 2x$  is 1.

Discuss the graph's shape.

Sample answer: The graph of  $y = x \sin x$  has the shape of a wave. It has a local maximum at  $y \approx -1.5$  and a local minimum at  $y \approx 1.5$  at the origin. The graph is symmetric about the  $x$ -axis at  $x = \pm 0.5$ . The graph has a period of  $2\pi$  and a peak of  $2.5$  at about  $x = 0.5$ .