Lesson 14–1

Example 1 Graph Trigonometric Functions

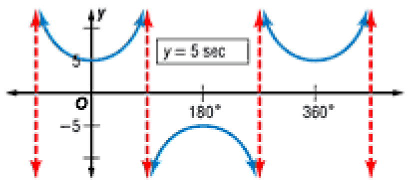
Find the amplitude and period of each function. Then graph the function.

a. $y = 5 \sec \theta$

Since the secant function does not have a maximum or minimum value, it has no amplitude.

Since the angle is 1θ or θ, the period of this function is 360° or 2π radians.

Each value of the function is five times the value for the function $y = \sec \theta$. Use this information and the period to graph the function.



b. $y = 4 \cos \frac{1}{2}\theta$

First, find the amplitude.

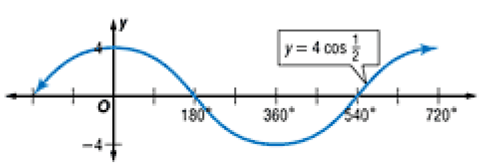
$|a| = |4|$ The coefficient of $4 \cos \frac{1}{2}\theta$ is 4.

Next, find the period.

$$\frac{360^\circ}{|b|} = \frac{360^\circ}{\left|\frac{1}{2}\right|} \qquad b = \frac{1}{2}$$

$$= 720^\circ$$

Use the amplitude and period to graph the function.



c. $y = 2 \tan \frac{1}{4} \theta$

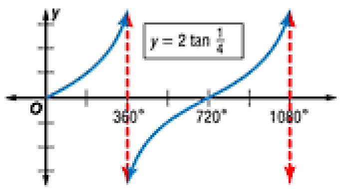
Since the tangent function has no maximum or minimum value, it has no amplitude.

Find the period. The period of the tangent function is 180° or π radians.

$$\frac{180^\circ}{|b|} = \frac{180^\circ}{\left|\frac{1}{4}\right|} \qquad b = \frac{1}{4}$$

$$= 720^\circ$$

Use the amplitude and period to graph the function.



Example 2 Use Trigonometric Functions

MANUFACTURING A manufacturing company is experimenting with a slightly stretchy thin wire. This wire vibrates consistently a total of 5.5 inches. It reaches a horizontal equilibrium halfway between its highest and lowest points. The wire reaches equilibrium once every 15 seconds.

a. Write a function to represent the height *h* of the wire. Assume that the wire is at its highest point at *t* = 0.

Since the wire is at its highest point at $t = 0$, use a cosine function to model the movement of the wire. The amplitude of the wire is 5.5 inches, so $a = \frac{5.5}{2}$ or 2.75.

By examining the graph of a cosine function, you can see that it crosses the horizontal axis at a distance that is one–half of the period. Since the wire reaches equilibrium every 15 seconds, the period will be 2(15) or 30. Find the value of *b*.

$b = \frac{2\pi}{30}$ or $\frac{\pi}{15}$ Solve for *b*.

Thus, an equation to represent the height of the wire is $h = 2.75 \cos \frac{\pi}{15} t$.

b. Graph the function for the wire.