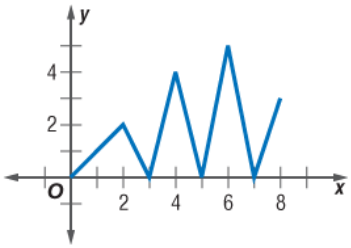
Lesson 6-3

Example 1

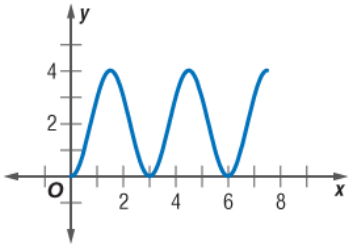
Determine if each function is periodic. If so, state the period.

a.



The values of the function do not repeat. The function is not periodic.

b.



The values of the function repeat for each interval of 3 units. The function is periodic and the period is 3.

Example 2

Find sin $\frac{11\pi}{4}$ by referring to the graph of the sine function.

Because the period of the sine function is 2π and $\frac{11\pi}{4} > 2\pi$, rewrite $\frac{11\pi}{4}$ as a sum involving 2π.

$\frac{11\pi}{4} = 2\pi + \frac{3\pi}{4}$

So, $\frac{11\pi}{4} = \sin \frac{3\pi}{4}$ or $\frac{\sqrt{2}}{2}$.

Example 3

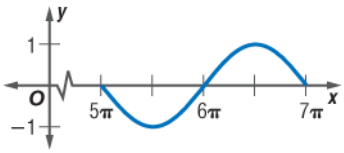
Find the values of θ for which $\sin \theta = 1$ is true.

Looking at the graph of the sine function, $\sin \theta = 1$ if $\theta = \frac{n\pi}{2}$, where n is … -7, -3, 1, 5, … .

Example 4

Graph $y = \sin x$ for $5\pi \le x \le 7\pi$.

The graph crosses the x-axis at 5π, 6π, and 7π. It has its maximum value of 1 at $x = \frac{13\pi}{2}$, and its minimum value of -1 at $x = \frac{11\pi}{2}$. Use this information to sketch the graph.



Example 5

METEOROLOGY **The average monthly temperatures for a city demonstrate a repetitious behavior. The model which describes the average monthly temperatures for Baltimore, Maryland, is given by $y = 54.4 + 22.5 \sin \left[\frac{\pi}{6}(t - 4)\right]$. In this equation, t denotes the month with January represented by $t = 1$. Find the average temperature for Baltimore, Maryland, for month 10.**

Month 10 is October of the first year. To find the average temperature of this month, substitute this value into the equation.

$y = 54.4 + 22.5 \sin \left[\frac{\pi}{6}(t - 4)\right]$

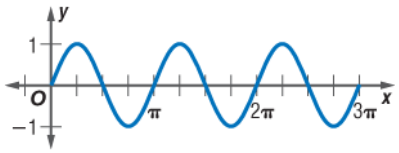
$y = 54.4 + 22.5 \sin \left[\frac{\pi}{6}(10 - 4)\right]$

$y = 54.4 + 22.5 \sin \pi$
$y = 54.4 + 22.5 (0)$
$y = 54.4$

In October, the average monthly temperature for Baltimore is 54.4°.

Example 6

Determine whether the graph represents $y = \sin x$, $y = \cos x$, or neither.



The maximum value of 1 occurs at $\frac{\pi}{4}$, $\frac{5\pi}{4}$, and $\frac{9\pi}{4}$.

The minimum value of –1 occurs at $\frac{3\pi}{4}$, $\frac{7\pi}{4}$, and $\frac{11\pi}{4}$.

The x-intercepts are 0, $\frac{\pi}{2}$, π, $\frac{3\pi}{2}$, 2π, $\frac{5\pi}{2}$, and 3π.

This graph does not follow the characteristics of either the sine or the cosine graph. It represents neither of the graphs.