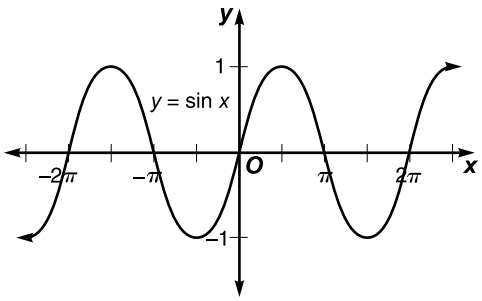
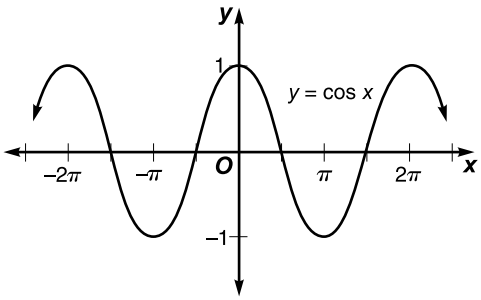
NAME _____ DATE _____ PERIOD _____

Study Guide

Graphing Sine and Cosine Functions

If the values of a function are the same for each given interval of the domain, the function is said to be **periodic.** Consider the graphs of $y = \sin x$ and $y = \cos x$ shown below. Notice that for both graphs the period is 2π and the range is from -1 to 1, inclusive.





Properties of the Graph of $y = \sin x$	Properties of the Graph of $y = \cos x$
The x-intercepts are located at πn, where n is an integer.	The x-intercepts are located at $\frac{\pi}{2} + \pi n$, where n is an integer.
The y-intercept is 0.	The y-intercept is 1.
The maximum values are $y = 1$ and occur when $x = \frac{\pi}{2} + 2\pi n$, when n is an integer.	The maximum values are $y = 1$ and occur when $x = \pi n$, where n is an even integer.
The minimum values are $y = -1$ and occur when $x = \frac{3\pi}{2} + 2\pi n$, where n is an integer.	The minimum values are $y = -1$ and occur when $x = \pi n$, where n is an odd integer.

Example 1 **Find $\sin \frac{7\pi}{2}$ by referring to the graph of the sine function.**

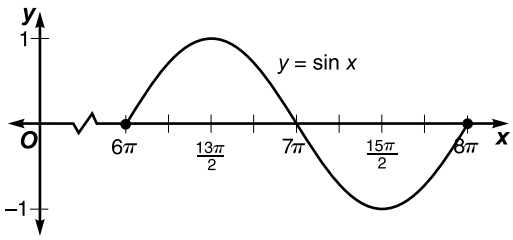
The period of the sine function is 2π. Since $\frac{7\pi}{2} > 2\pi$, rewrite $\frac{7\pi}{2}$ as a sum involving 2π.

$\frac{7\pi}{2} = 2\pi(1) + \frac{3\pi}{2}$ *This is a form of* $\frac{3\pi}{2} + 2\pi n$.

So, $\sin \frac{7\pi}{2} = \sin \frac{3\pi}{2}$ or -1.

Example 2 **Find the values of θ for which $\cos \theta = 0$ is true.**

Since $\cos \theta = 0$ indicates the x-intercepts of the cosine function, $\cos \theta = 0$ if $\theta = \frac{\pi}{2} + \pi n$, where n is an integer.

Example 3 **Graph $y = \sin x$ for $6\pi \le x \le 8\pi$.**

The graph crosses the x-axis at 6π, 7π, and 8π. Its maximum value of 1 is at $x = \frac{13\pi}{2}$, and its minimum value of -1 is at $x = \frac{15\pi}{2}$. Use this information to sketch the graph.