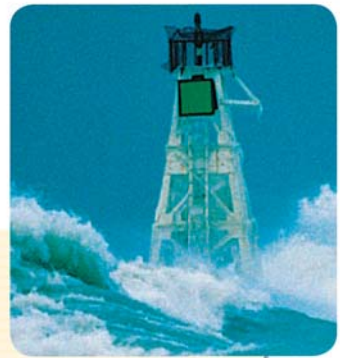
14.1 Graph Sine, Cosine, and Tangent Functions

TEKS *a.3, a.5, 2A.1.A; P.1.A*



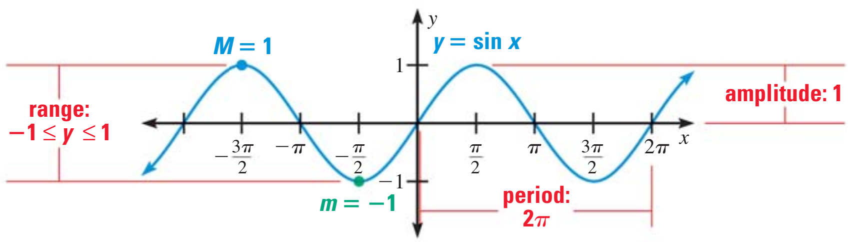
Before You evaluated sine, cosine, and tangent functions.

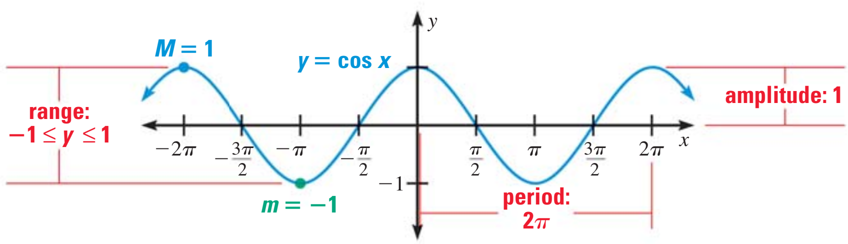
Now You will graph sine, cosine, and tangent functions.

Why? So you can model oscillating motion, as in Ex. 31.

Key Vocabulary
- amplitude
- periodic function
- cycle
- period
- frequency

In this lesson, you will learn to graph functions of the form $y = a \sin bx$ and $y = a \cos bx$ where a and b are positive constants and x is in radian measure. The graphs of all sine and cosine functions are related to the graphs of the parent functions $y = \sin x$ and $y = \cos x$, which are shown below.





KEY CONCEPT *For Your Notebook*

Characteristics of $y = \sin x$ and $y = \cos x$

- The domain of each function is all real numbers.
- The range of each function is $-1 \le y \le 1$. Therefore, the minimum value of each function is $m = -1$ and the maximum value is $M = 1$.
- The **amplitude** of each function's graph is half the difference of the maximum M and the minimum m, or $\frac{1}{2}(M - m) = \frac{1}{2}[1 - (-1)] = 1$.
- Each function is **periodic**, which means that its graph has a repeating pattern. The shortest repeating portion of the graph is called a **cycle**. The horizontal length of each cycle is called the **period**. Each graph shown above has a period of 2π.
- The x-intercepts for $y = \sin x$ occur when $x = 0, \pm\pi, \pm 2\pi, \pm 3\pi, \ldots$.
- The x-intercepts for $y = \cos x$ occur when $x = \pm\frac{\pi}{2}, \pm\frac{3\pi}{2}, \pm\frac{5\pi}{2}, \pm\frac{7\pi}{2}, \ldots$.