Algebra II/Trig B Name _____

Graphs of Sine, Cosine, and Tangent Functions (7.7a)
(No Shifts)
Module 3, Unit 7, Lesson 7

Graphing Sine Function

x	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{11\pi}{6}$	2π
$y = \sin x$													

Sketch a graph of $y = \sin x$ using the values provided above. Use the measurements on the unit circle as a guide.

Sine Function $y = A\sin(Bx)$

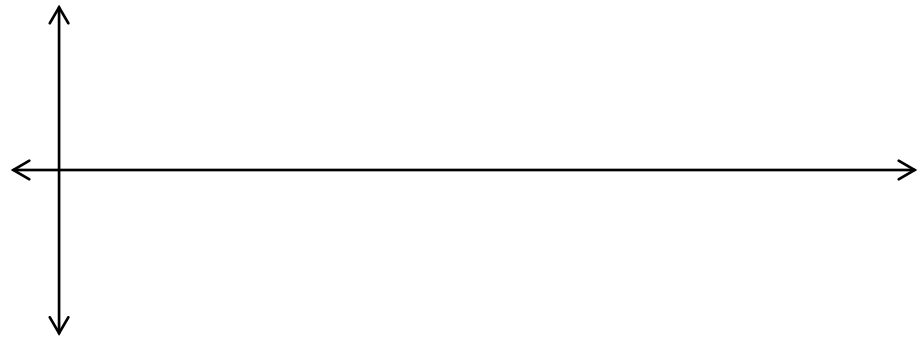
1. **amplitude** $|A|$ – the vertical distance of each wave
2. **period** $\frac{2\pi}{B}$ – how long it takes to complete one cycle

Steps for Graphing Sine

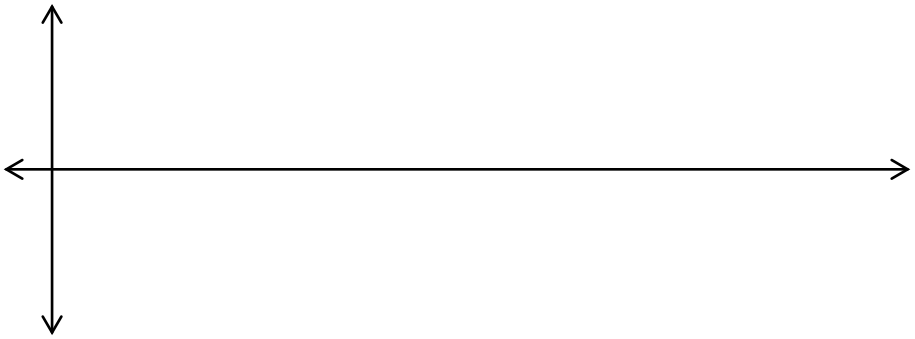
1. Identify the amplitude and the period.
2. Find the value of x for the five key points: i-M-i-m-i
   a. Interval = period x $\frac{1}{4}$
   b. Add $\left(\frac{period}{4}\right)$ to find successive values of x
3. Find the values of y for the five key points in step 2.
4. Connect the points in 3 with a smooth curve.

Example 1: Graph **two periods** of the following sine functions.

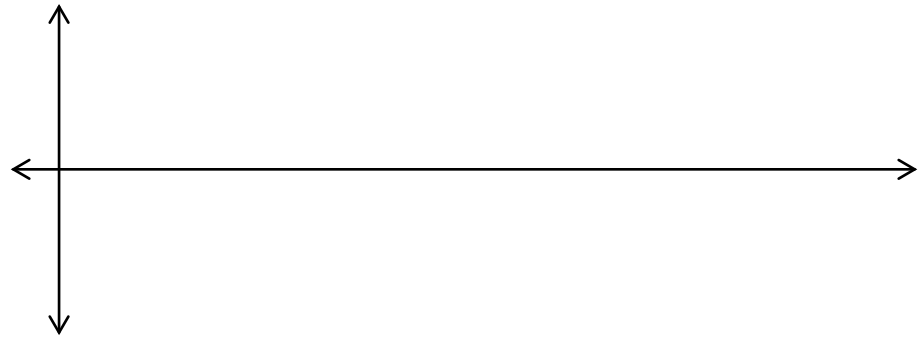
a. $y = 2\sin x$



b. $y = -\frac{1}{2}\sin x$



c. $y = \sin 2x$



d. $y = -4\sin\frac{1}{2}x$

Graphing Cosine Function

x	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{11\pi}{6}$	2π
$y = \cos x$													

Sketch a graph of $y = \cos x$ using the values provided above. Use the measurements on the unit circle as a guide.

Cosine Function $y = A\cos(Bx)$

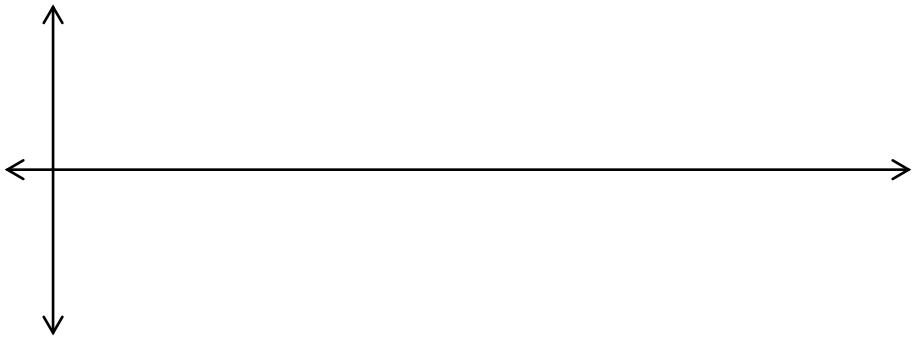
1. **amplitude** $|A|$ – the vertical distance of each wave
2. **period** $\frac{2\pi}{B}$ – how long it takes to complete one cycle

Steps for Graphing Cosine

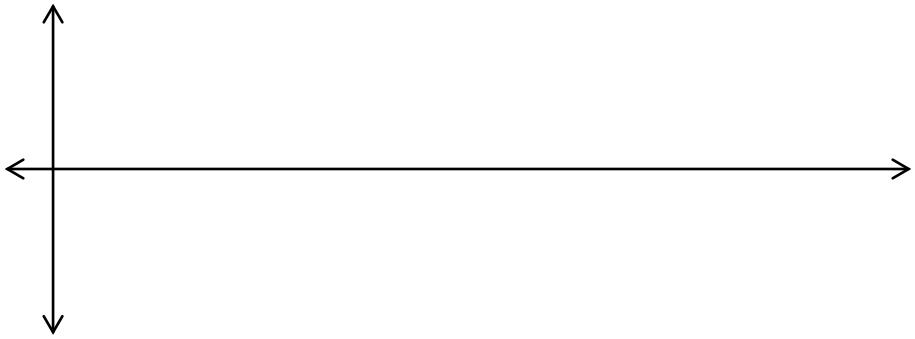
1. Identify the amplitude and the period.
2. Find the value of x for the five key points: M-i-m-i-M
   a. Interval = period x $\frac{1}{4}$
   b. Add $\left(\frac{period}{4}\right)$ to find successive values of x
3. Find the values of y for the five key points in step 2.
4. Connect the points in 3 with a smooth curve.

Example 2: Graph two periods of the cosine function.

a. $y = \cos \pi x$

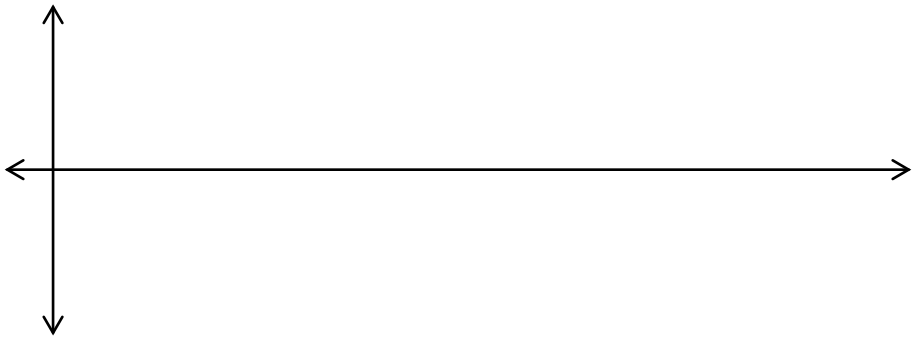


b. $y = -3\cos\frac{1}{2}x$



c. $y = -\frac{1}{2}\cos\frac{\pi}{3}x$

d. $y = 2\cos 2x$



Graphing Tangent Functions

x	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{5\pi}{4}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$
$y = \tan x$													

Sketch a graph of $y = \tan x$ using the values provided above.

Tangent Function $y = A \tan Bx$

1. **Period**: $\frac{\pi}{B}$
2. **Interval**: Period x $\frac{1}{4}$
3. **An x-intercept** occurs midway between each pair of consecutive asymptotes.
4. Critical points on the graph $\frac{1}{4}$ and $\frac{3}{4}$ of the way between consecutive asymptotes have y-coordinates of –A and A, respectively.

Graphing $y = A \tan(Bx)$

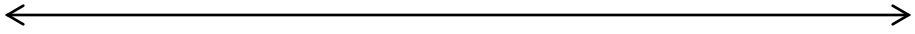
1. A pair of consecutive asymptotes can be found by solving the following for x.

$$Bx = -\frac{\pi}{2} \text{ and } Bx = \frac{\pi}{2}$$

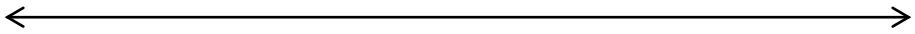
2. Identify an x-intercept, midway between the consecutive asymptotes.
3. Find the critical points on the graph $\frac{1}{4}$ and $\frac{3}{4}$ of the way between consecutive asymptotes. These points have y-coordinates –A and A, respectively.

Example 3: Graph two periods of the tangent function.

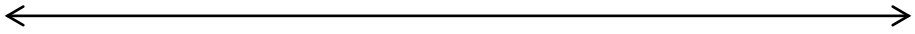
a. $y = 3\tan 2x$



b. $f(x) = 2\tan\frac{x}{2}$



c. $y = -\tan 2\pi x$



d. $f(x) = \frac{1}{3}\tan\frac{\pi}{2}x$