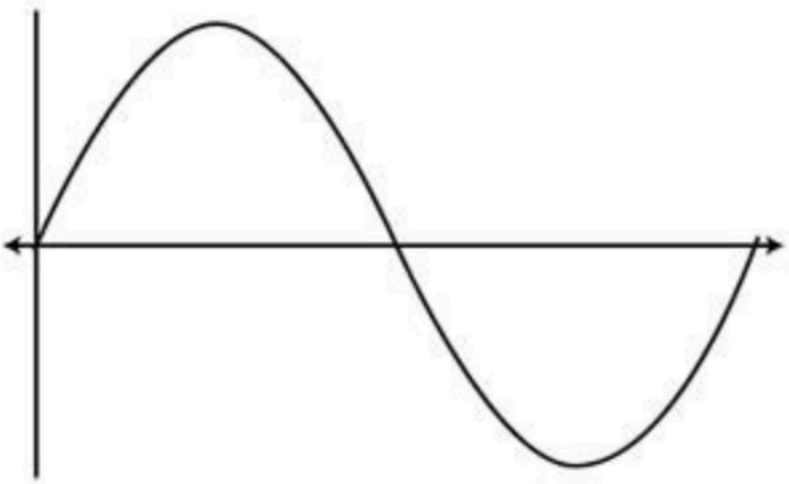
NAME: _____ PERIOD: ___

DATE: _____ PRE-CALCULUS

MR. MELLINA

UNIT 3: TRIGONOMETRIC GRAPHS

- *Lesson 1: Graphs of the Sine, Cosine, and Tangent Functions*
- *Lesson 2: Graphs of the Cosecant, Secant, and Cotangent Functions*
- *Lesson 3: Periodic Graphs and Amplitude*
- *Lesson 4: Periodic Graphs and Phase Shifts*
- *Lesson 5: Basic Trigonometric Identities*



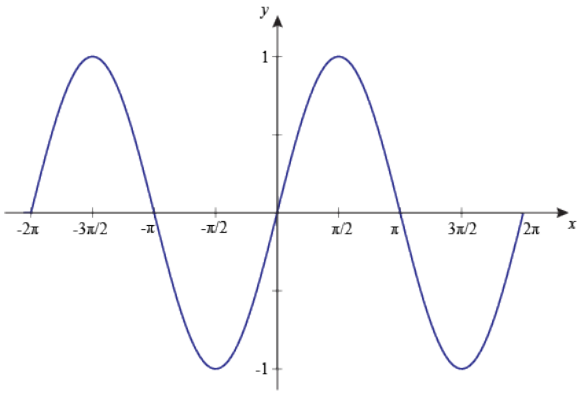
Lesson 1: Graphs of the Sine, Cosine, and Tangent

Objectives:

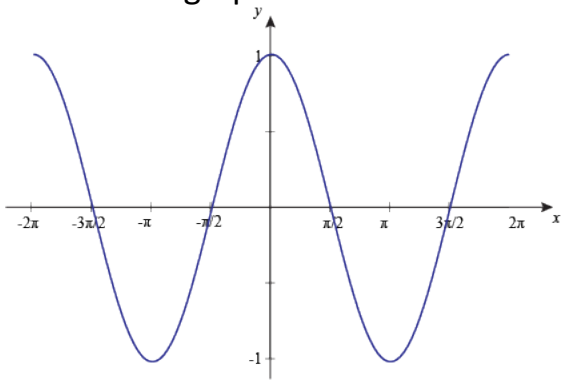
- *Graph the sine, cosine, and tangent functions.*
- *State all values in the domain of a basic trigonometric function that correspond to a given value of the range.*
- *Graph transformations of the sine, cosine, and tangent graphs.*

Warm Up 🔥

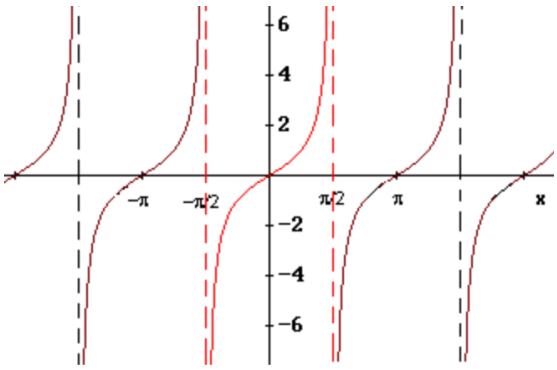
a. Use the graph of $\sin t$ to state all values of t for which $\sin t$ is -1.



b. Use the graph of $\cos t$ to state all values of t for which $\cos t$ is $\frac{1}{2}$.



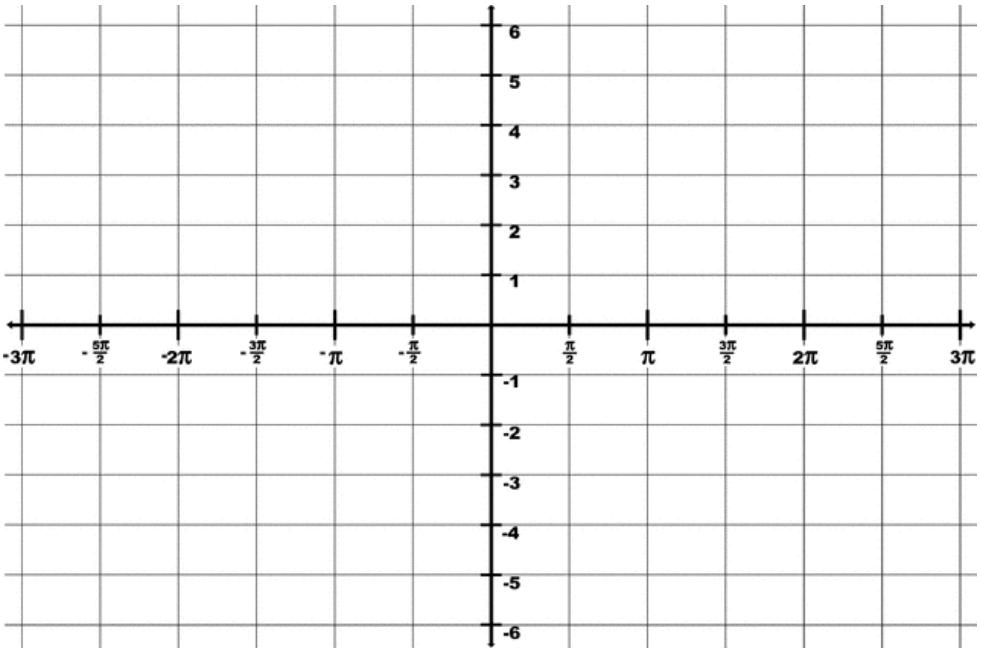
c. Use the graph of $\tan t$ to state all values of t for which $\tan t$ is -1.



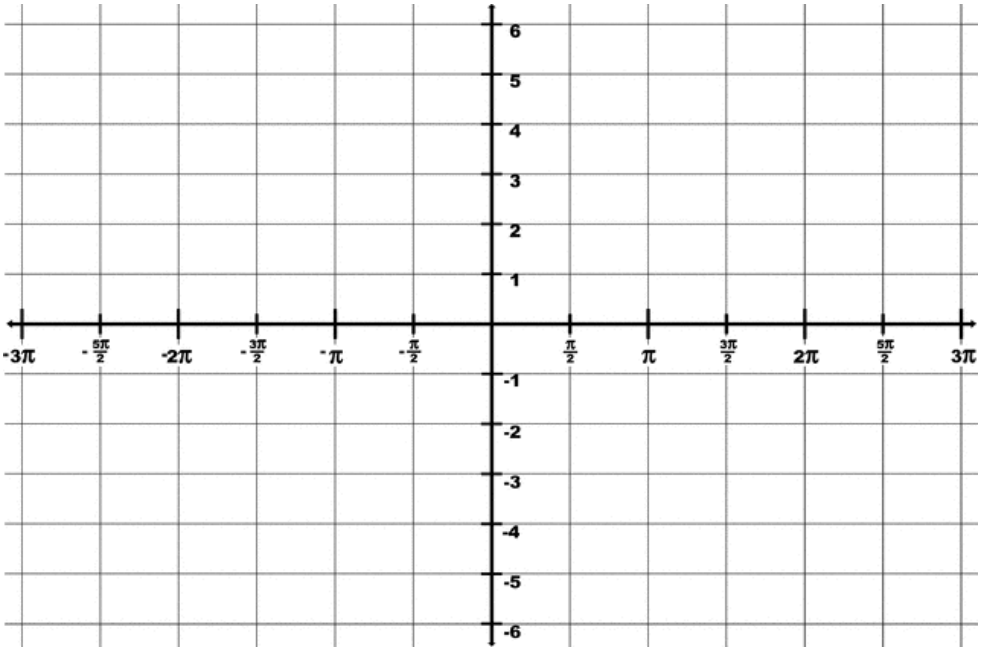
Example 1: Graphing

Graph the given function on the domain given and state the transformations from the parent function.

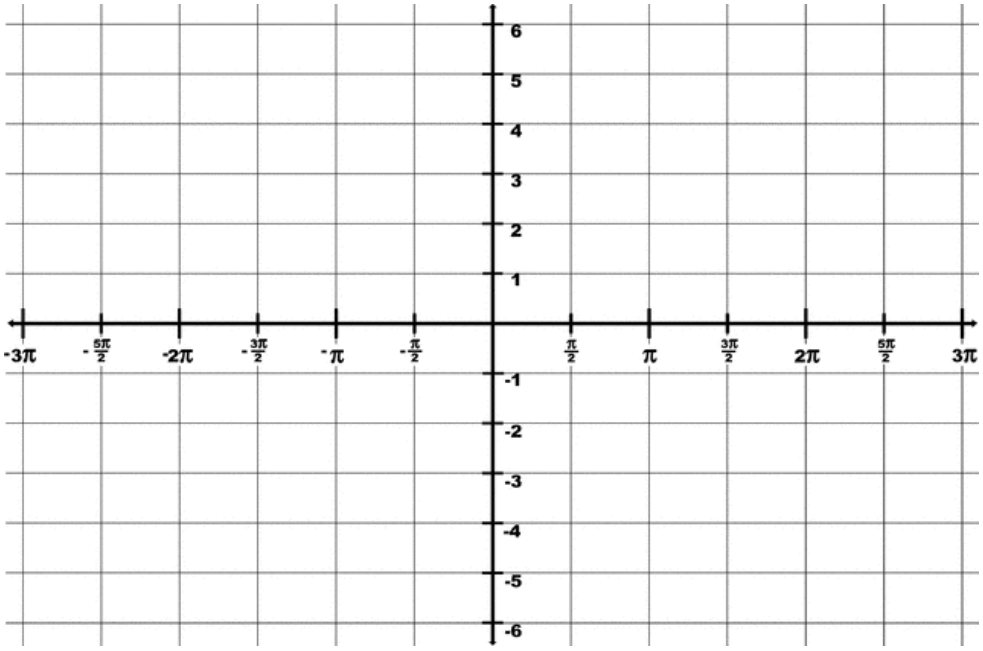
a. $f(x) = 4\cos x$ on $[0, 2\pi]$



b. $g(t) = -\frac{1}{2}\sin t$ on $[-2\pi, 2\pi]$



c. $h(t) = \tan t + 5$ on $[-3\pi, 3\pi]$



Example 2: Identifying Graphs

Match a graph to a function. Only one graph is possible for each function.

$h(t) = -2\tan t$

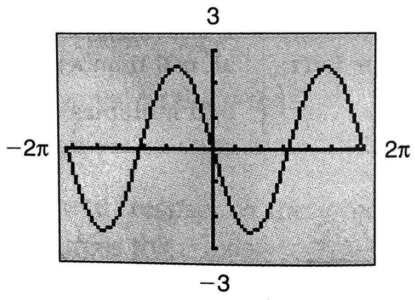
$g(t) = 2.5\cos t$

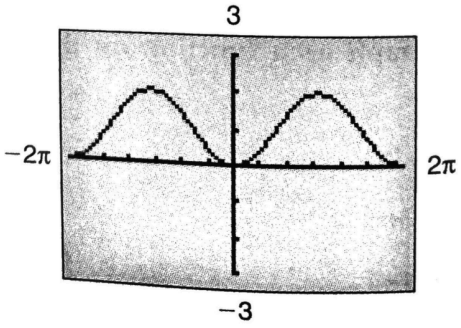
$h(t) = -\sin t + 1$

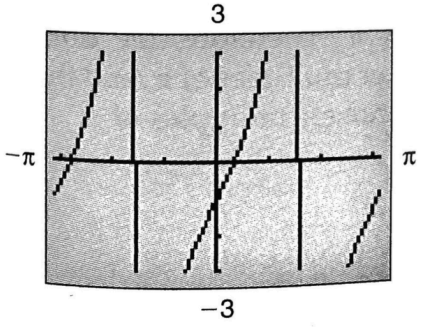
$f(t) = -2.5\sin t$

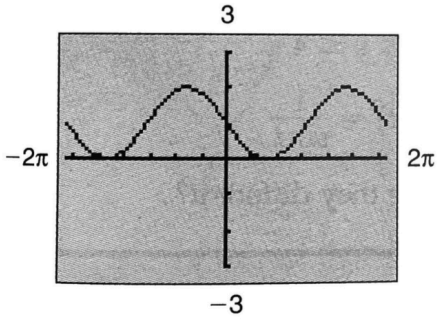
$g(t) = 3\tan t - 1$

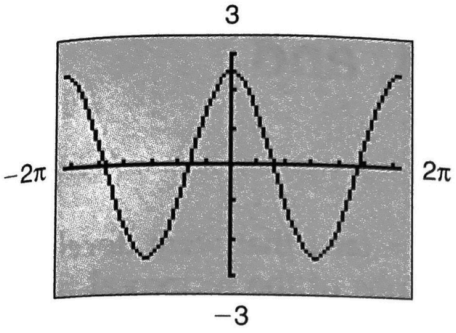
$f(t) = -\cos t + 1$

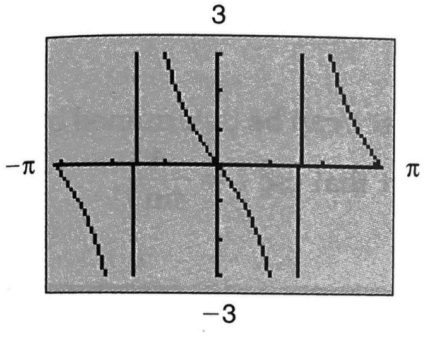












Lesson 2: Graphs of the Cosecant, Secant, and Cotangent Functions

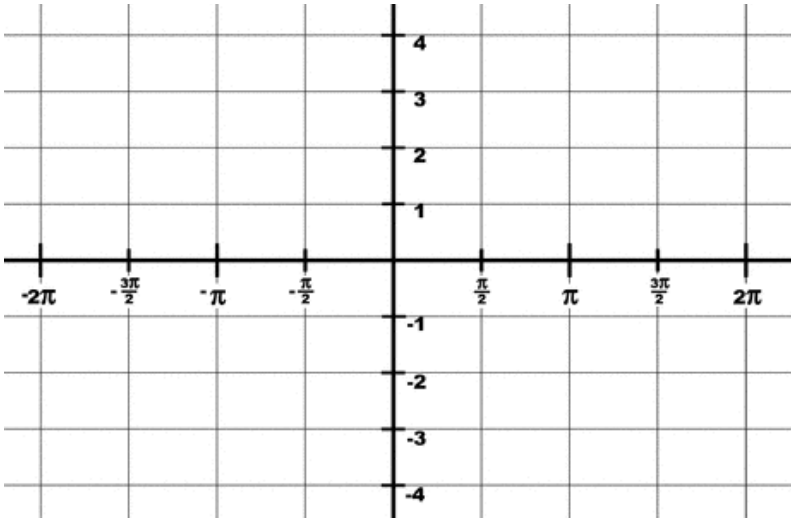
Objectives:

- *Graph the cosecant, secant, and cotangent functions.*
- *Graph transformations of the cosecant, secant, and cotangent graphs.*

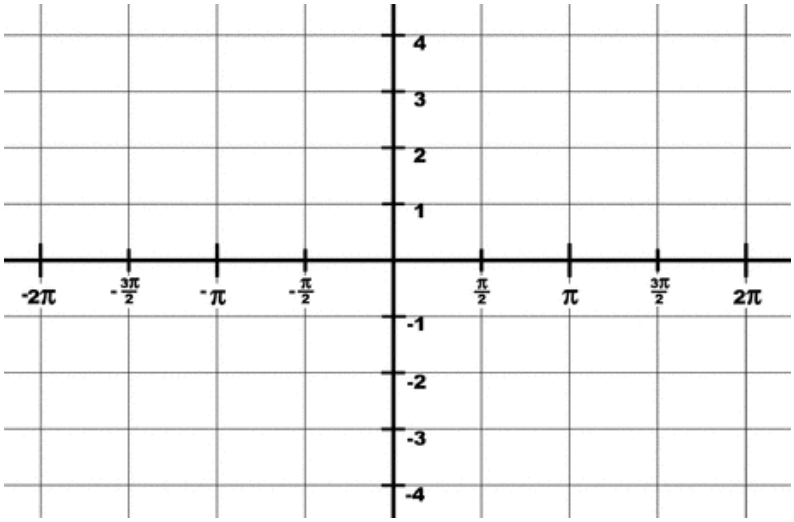
Warm Up 🔥

Use your graphing calculator to graph the two functions given on the same screen and sketch what you see on the given graph. Graph on $-2\pi \leq x \leq 2\pi$ and $-4 \leq y \leq 4$.

a. $f(t) = \sin t, g(t) = \frac{1}{\sin t}$



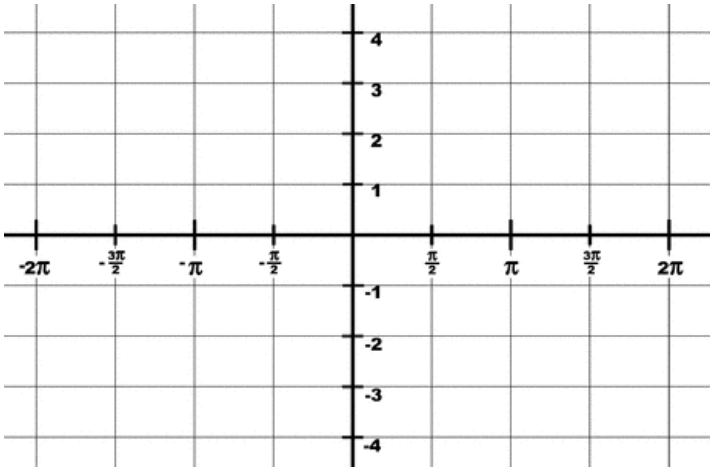
b. $f(t) = \cos t, g(t) = \frac{1}{\cos t}$



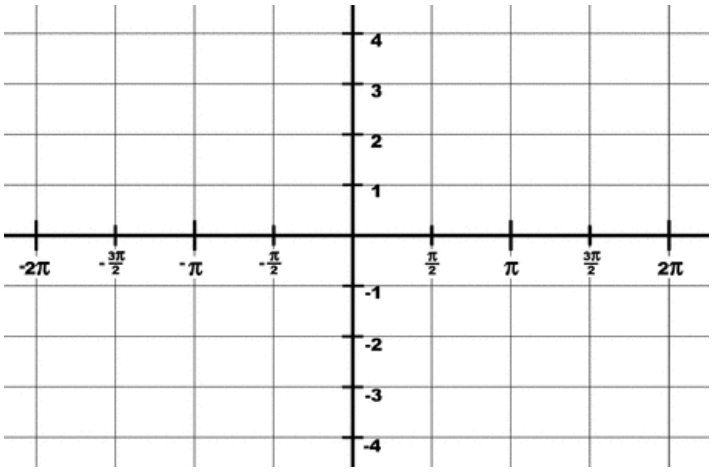
Example 1: Graphing Transformations

Graph on $-2\pi \leq t \leq 2\pi$

a. $h(t) = -3\csc t$



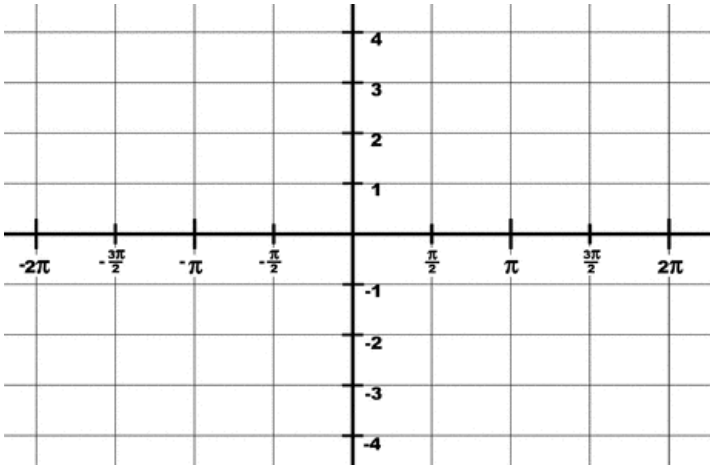
b. $g(t) = 2\sec t - 3$



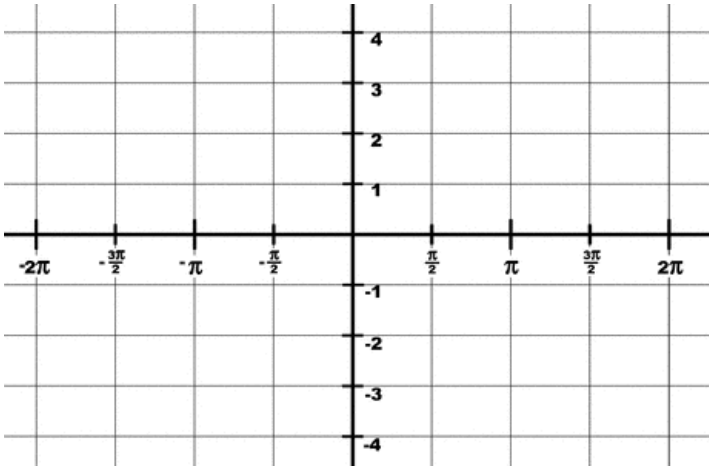
Example 2: Graphing Cotangent

Graph on $-2\pi \leq t \leq 2\pi$

a. $h(t) = \cot t$



b. $k(t) = -3\cot\left(t - \frac{\pi}{4}\right)$



Lesson 3: Periodic Graphs and Amplitude

Objectives:

- *State the period and amplitude (if any) given the function rule or the graph of a sine, cosine, or tangent function.*
- *Use the period and amplitude (if any) to sketch the graph of a sine, cosine, or tangent function.*

Warm Up 🔥

What does it mean for a function to be periodic?

Example 1: Determining Period

Determine the period of each function.

a. $k(t) = \cos 3t$

b. $f(t) = \sin\frac{t}{2}$

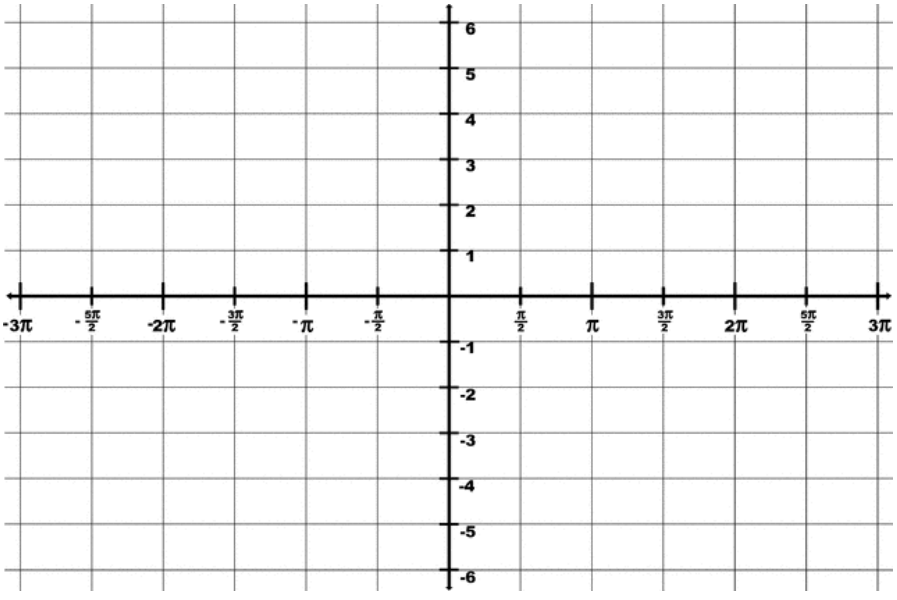
c. $k(t) = \tan 2t$

d. $f(t) = \tan\frac{t}{3}$

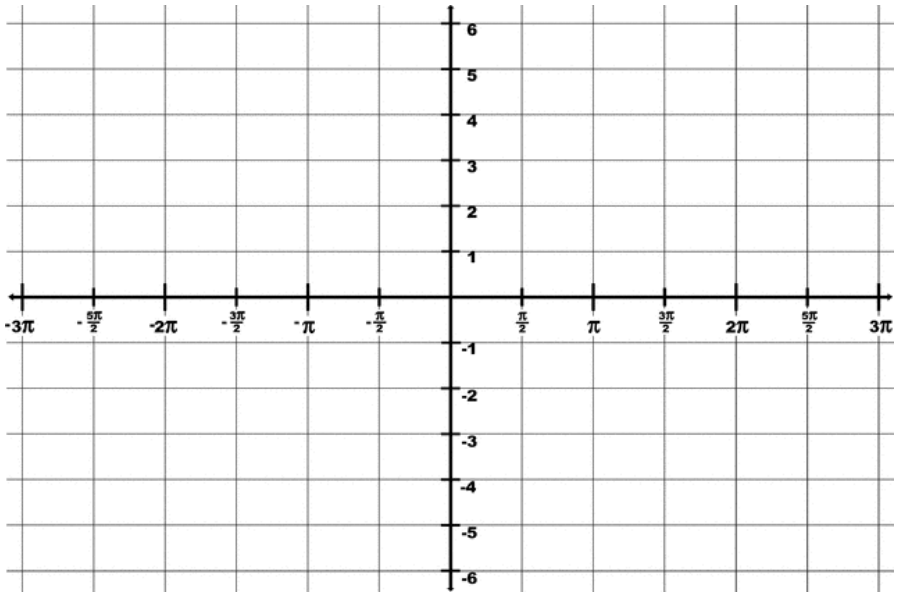
Example 2: Graphing Vertical and Horizontal Streches

Graph each function on $-2\pi \leq t \leq 2\pi$. Identify the period and amplitude.

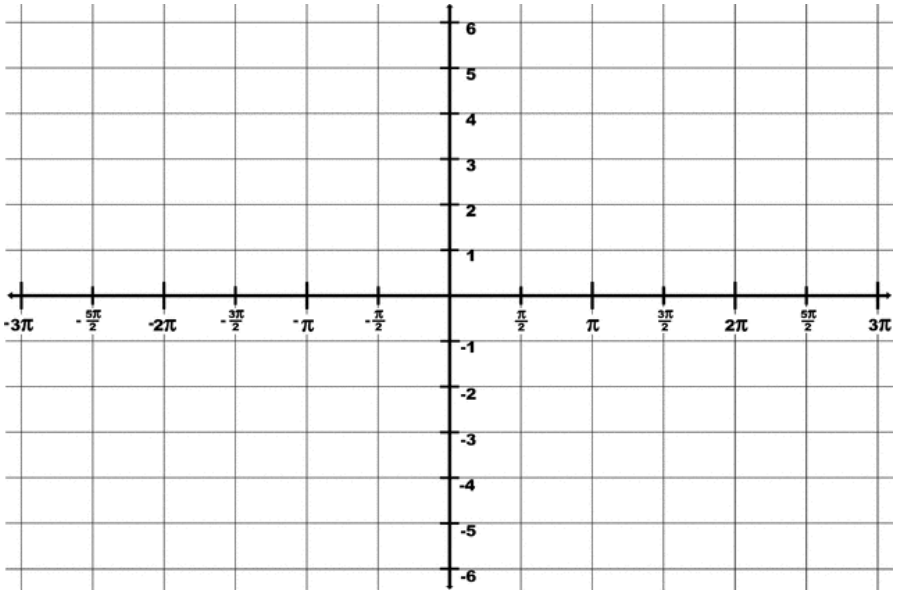
a. $g(t) = 7\cos 3t$



b. $h(t) = \frac{1}{3}\sin\frac{t}{2}$



c. $f(t) = -2\sin 4t$



Lesson 4: Periodic Graphs and Phase Shifts

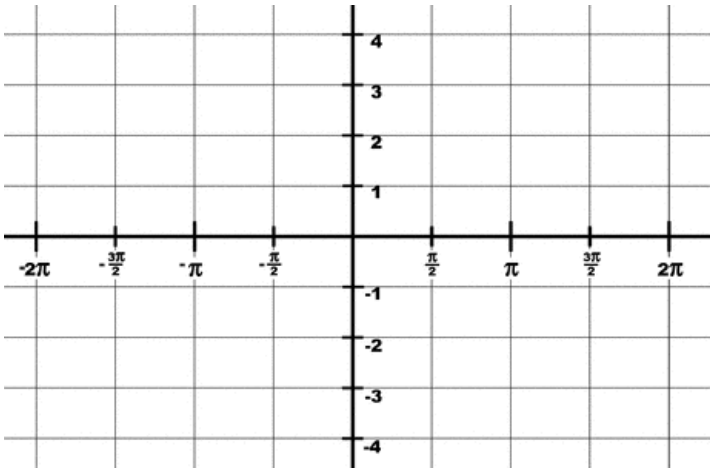
Objectives:

- *State the period and amplitude (if any) given the function rule or the graph of a sine, cosine, or tangent function.*
- *Use the period and amplitude (if any) to sketch the graph of a sine, cosine, or tangent function.*

Warm Up 🔥

Graph $-2\pi \leq t \leq 2\pi$.

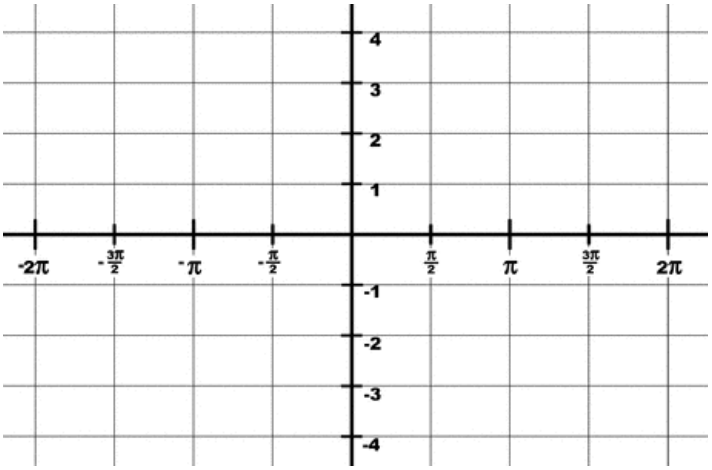
a. $k(t) = -2\cos t + 3$



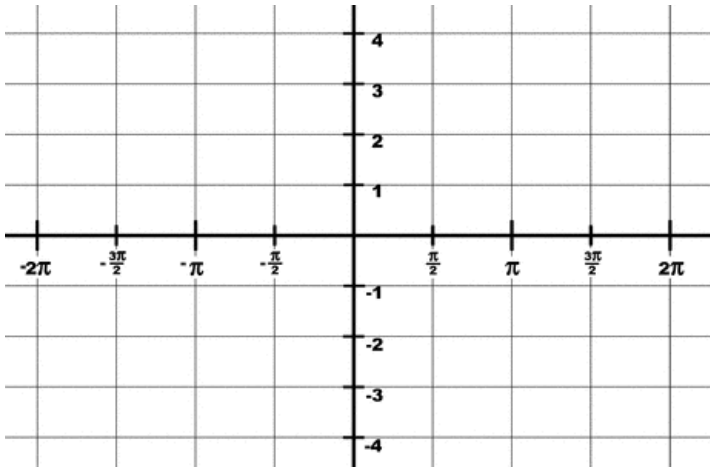
Example 1: Phase Shift

Graph each function on $-2\pi \leq t \leq 2\pi$. Identify the period, amplitude, and phase shift.

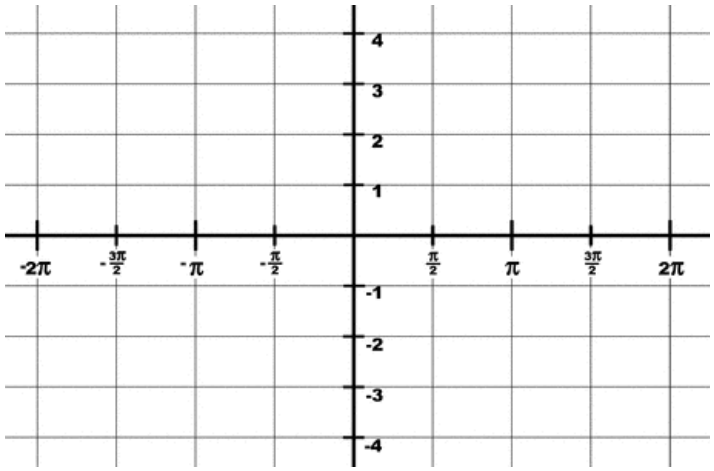
a. $g(t) = \sin\left(t + \frac{\pi}{2}\right)$



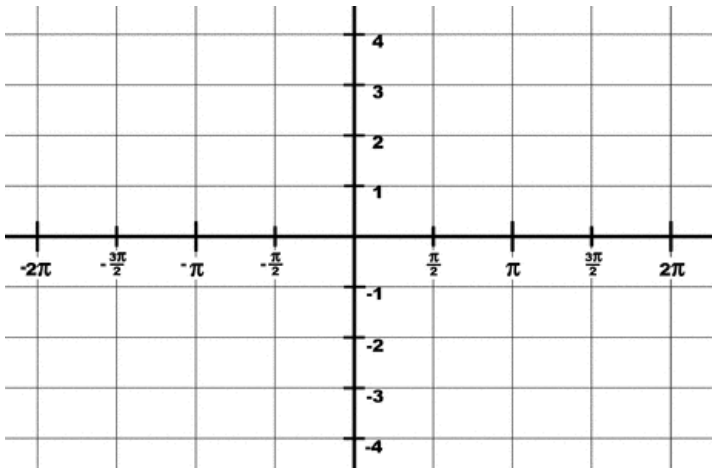
b. $h(t) = \cos\left(t - \frac{2\pi}{3}\right)$



c. $f(t) = 3\sin(2t + 5)$



d. $g(t) = 2\cos(3t - 4) - 1$



e. $f(t) = -4\sin\left(\frac{t}{2} + 1\right) + 3$