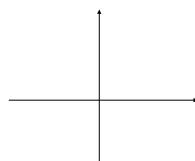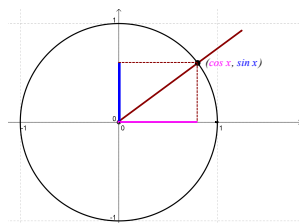# 1.5 ~ Graphs of Sine and Cosine Functions

In this lesson you will:
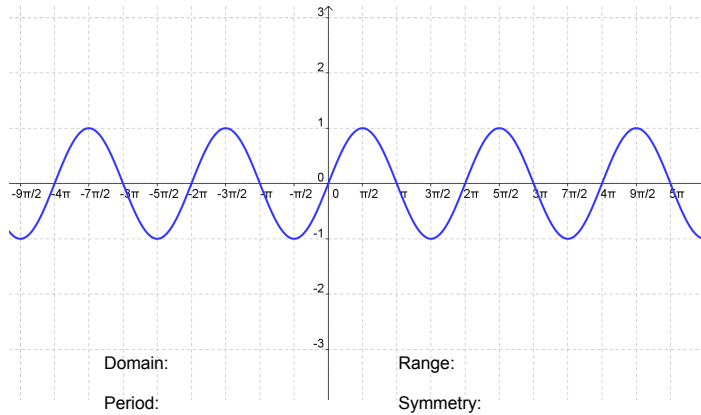
- Sketch the graphs of basic sine and cosine functions.

- Use amplitude and period to help sketch graphs.
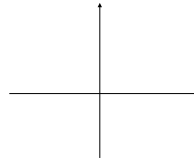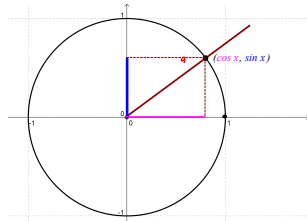
- Sketch translations of these functions.

f(x) = sin x

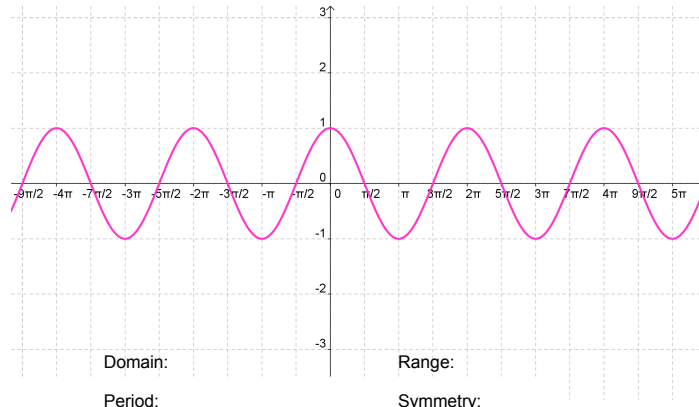http://tube.geogebra.org/student/m45354?mobile=true

Graph of $f(x) = \sin x$

Domain:	Range:
Period:	Symmetry:

$f(x) = \cos x$

$(\cos x,\ \sin x)$

Graph of $f(x) = \cos x$

Domain: Range:
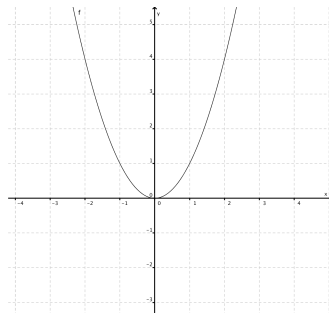
Period: Symmetry:

How can you graph $y = 2 \sin(x - \frac{\pi}{3}) + 1$?

This is a transformation of the basic $y = \sin x$ curve.

It may help to remember transformations to one of the algebraic functions.

How does the graph of $y = -3(x+2)^2 - 1$ relate to the graph of $y = x^2$?

In general, remember the effect of a, h and k on the graph of $y = x^2$.

$y = a(x-h)^2 + k$

$y = a\ sin(bx+c)+d$

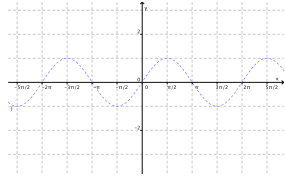What effect do a, b, c and d have on the graph of trigonometric functions?
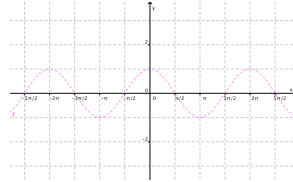
Let's look at it one part at a time:

$y = a\ sin\ x$

Amplitude: |a|

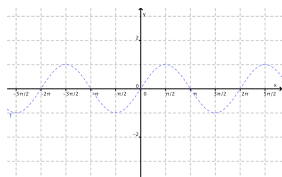Example 1: Graph each of these.

$y = 3sin\ x$

$y = -2cos\ x$

$y = sin(bx)$

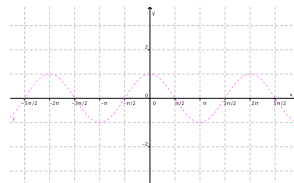Period =

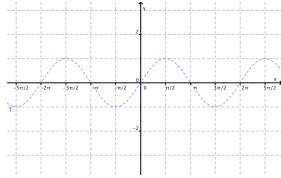Example 2: Graph each of these.

$y = sin(2x)$

$y = cos(\frac{1}{2}x)$

$y = sin(x-c)$
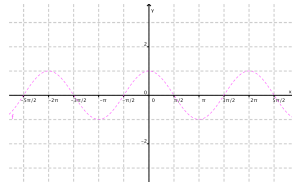
Horizontal shift =

Example 3: Graph each of these.
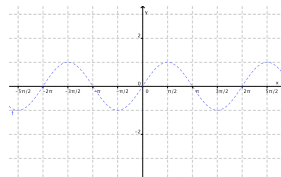
$y = sin(x+\pi)$

$y = cos(x - \dfrac{\pi}{2})$

$y = sin(bx - c)$

Period =

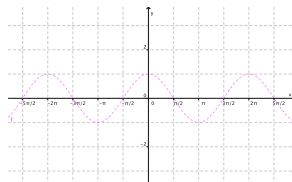Horizontal shift =

Example 3: Graph each of these.

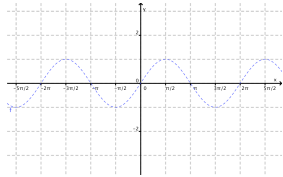$y = sin(2x - \pi)$

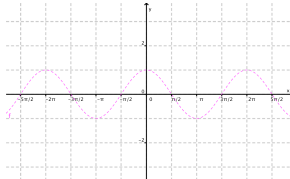$y = cos((\dfrac{1}{2}) x + \dfrac{\pi}{2})$

$$y = sin(x) + d = sin\ x + d$$

Vertical Shift :

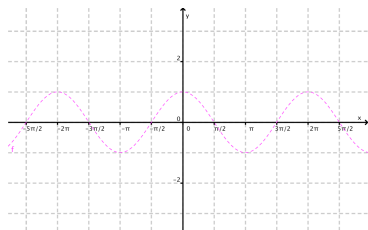Example 4: Graph each of these.

$y = sin\ x - 2$

$y = cos\ x + 1$

So, when we graph a sine or cosine function there are these things to consider:

Amplitude
Period
Phase shift (horizontal)
Vertical shift

Example 5: Sketch this function.

$y = 3\ cos(2x - \pi) + 1$

Amplitude

Period

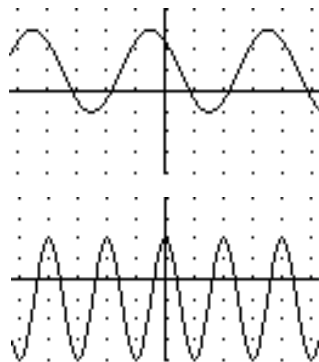Phase shift (horizontal)

Vertical shift

Example 6: Look at each of these graphs and write an equation in the form of

$y = a\,sin(b(x\text{-}h))\text{+}k$ $or\ y = a\,cos(b(x\text{-}h)) + k$

x-axis tic marks = $\frac{\pi}{2}$, y-axis tic marks = 1

Here are some applets in case you want to play with the transformation variables.

 ://www.analyzemath.com/trigonometry/sine.htm

http://tube.geogebra.org/student/m45354?mobile=true