L4 – 5.3 Transformations of Trig Functions
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Part 1: Transformation Properties

$y = a\sin[k(x-d)] + c$ Desmos Demonstration

a	k	d	c
Vertical stretch or compression by a factor of $\lvert a\rvert$. Vertical reflection if $a < 0$ $\lvert a\rvert = amplitude$	Horizontal stretch or compression by a factor of $\frac{1}{\lvert k\rvert}$. Horizontal reflection if $k < 0$. $\frac{2\pi}{\lvert k\rvert} = period$	Phase shift $d > 0; shift\ right$ $d < 0; shift\ left$	Vertical shift $c > 0; shift\ up$ $c < 0; shift\ down$

Example 1: For the function $y = 3\sin\left[\frac{1}{2}\left(\theta + \frac{\pi}{3}\right)\right] - 1$, state the…

Amplitude:	Period:
Phase shift:	Vertical shift:
Max:	Min:

Part 2: Given Equation → Graph Function

Example 2: Graph $y = 2\sin\left[2\left(x - \frac{\pi}{3}\right)\right] + 1$ using transformations. Then state the amplitude and period of the function.

$y = \sin x$	
x	y

$y = 2\sin\left[2\left(x - \frac{\pi}{3}\right)\right] + 1$	

Amplitude:

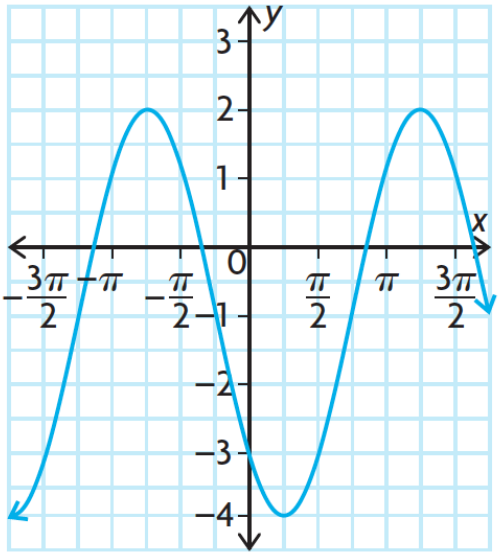
Period:

Part 3: Given the Graph → Write the Equation

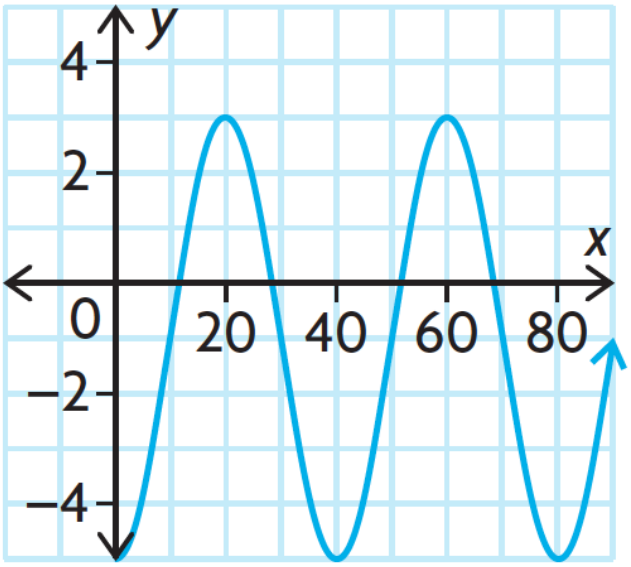
$y = a\sin[k(x - d)] + c$

a	k	d	c
Find the amplitude of the function:	Find the period (in radians) of the function using a starting point and ending point of a full cycle.	**for sin x:** x-coordinate of a rising mid-line. **for cos x:** x-coordinate of a maximum point.	Find the vertical shift OR (this finds the 'middle' of the function)

Example 3: Determine the equation of a sine and cosine function that describes the following graph



Example 4: Determine the equation of a sine and cosine function that describes the following graph

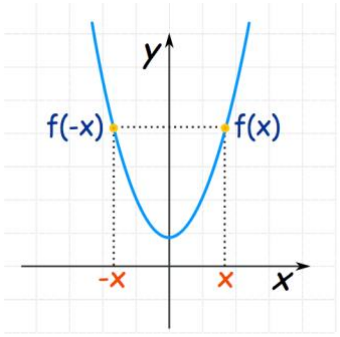
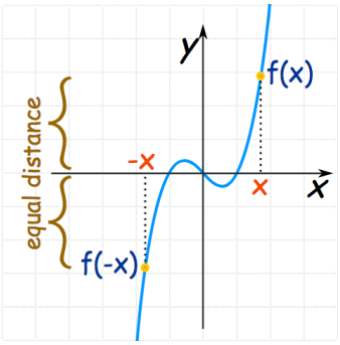
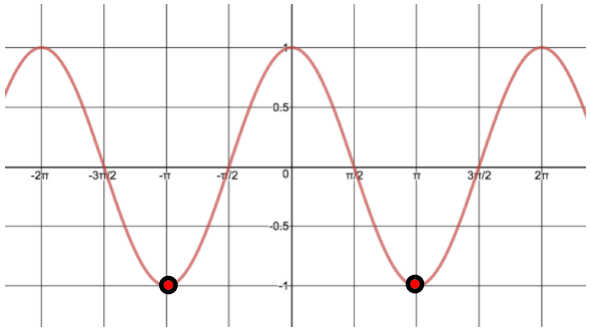
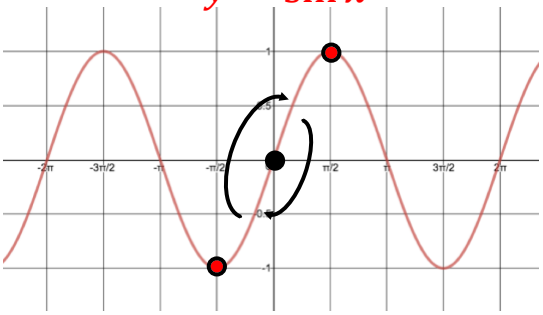
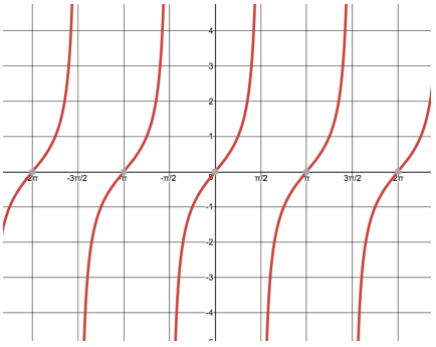


Example 5:

a) Create a sine function with an amplitude of 7, a period of π, a phase shift of $\frac{\pi}{4}$ right, and a vertical displacement of -3.

b) What would be the equation of a cosine function that represents the same graph as the sine function above?

Part 4: Even and Odd Functions

Even Functions	Odd Functions
EVEN FUNCTION if: Line symmetry over the _____	ODD FUNCTION if: Point symmetry about the _____
Rule: $f(-x) = f(x)$  	Rule: $-f(x) = f(-x)$ 
Example: $y = \cos x$  	Example: $y = \sin x$  $y = \tan x$ is also an odd function