L2 - Graphing Sine and Cosine Functions
MCR3U
Jensen

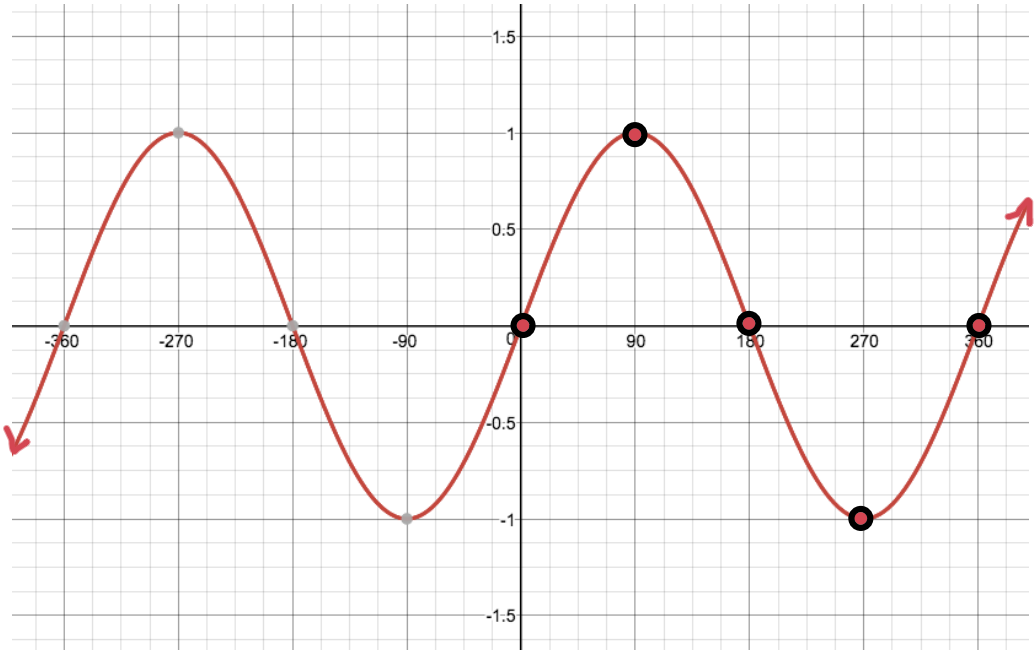
Section 1: Graphing Sine and Cosine

DESMOS demonstration

To graph sine and cosine, we will be using a Cartesian plane that has angles for x values.

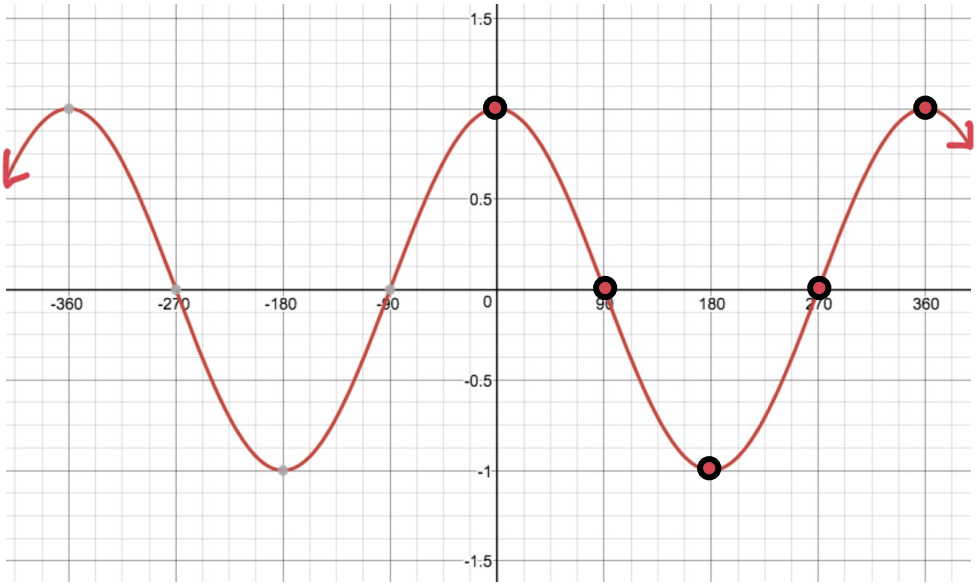
Example 1: Complete the following table of values for the function $f(x) = \sin(x)$. Use special triangles, the unit circle, or a calculator to find values for the function at $30°$ intervals. Use the table to graph the function.

x	$f(x)$
0	**0**
30	0.5
60	$\frac{\sqrt{3}}{2} \sim 0.87$
90	**1**
120	$\frac{\sqrt{3}}{2} \sim 0.87$
150	0.5
180	**0**
210	-0.5
240	$-\frac{\sqrt{3}}{2} \sim -0.87$
270	**-1**
300	$-\frac{\sqrt{3}}{2} \sim -0.87$
330	-0.5
360	**0**



Example 2: Complete the following table of values for the function $f(x) = \cos(x)$. Use special triangles, the unit circle, or a calculator to find values for the function at $30°$ intervals. Use the table to graph the function.

x	$f(x)$
0	**1**
30	$\frac{\sqrt{3}}{2} \sim 0.87$
60	0.5
90	**0**
120	-0.5
150	$-\frac{\sqrt{3}}{2} \sim -0.87$
180	$\mathbf{-1}$
210	$-\frac{\sqrt{3}}{2} \sim -0.87$
240	-0.5
270	**0**
300	0.5
330	$\frac{\sqrt{3}}{2} \sim 0.87$
360	**1**



Section 2: Properties of Sine and Cosine Functions

Domain: $\{X \in \mathbb{R}\}$

Range: $\{Y \in \mathbb{R} | -1 \leq y \leq 1\}$

Period: $360°$

Amplitude: $\frac{max-min}{2} = \frac{1-(-1)}{2} = 1\ unit$

Section 3: Transformations of the Sine and Cosine Functions

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

a	k	d	c
Vertical stretch or compression by a factor of a. Vertical reflection if $a < 0$ $\|a\| = amplitude$	Horizontal stretch or compression by a factor of $\frac{1}{k}$. Horizontal reflection if $k < 0$. $\frac{360}{\|k\|} = period$	Phase shift $d > 0; shift\ right$ $d < 0; shift\ left$	Vertical shift $c > 0; shift\ up$ $c < 0; shift\ down$

Example 3: For the function $y = 3\sin[2(\theta + 60°)] - 1$, state the…

Amplitude: $a = 3$	Period: $period = \frac{360}{\|k\|} = \frac{360}{2} = 180°$
Phase shift: $d = -60°$; Shift left $60°$	Vertical shift: $c = -1$; Shift down 1 unit
Max: $max = c + \|a\| = -1 + 3 = 2$ units	Min: $min = c - \|a\| = -1 - 3 = -4$ units