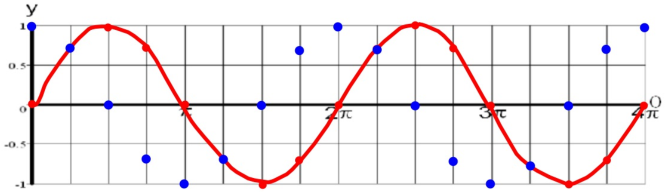
1. Coordinates of points on the Sine Function are graphed below in red.

θ	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	π	$\frac{5\pi}{4}$	$\frac{3\pi}{2}$	$\frac{7\pi}{4}$	2π	$\frac{9\pi}{4}$	$\frac{5\pi}{2}$	$\frac{11\pi}{4}$	3π	$\frac{13\pi}{4}$	$\frac{7\pi}{2}$	$\frac{15\pi}{4}$	4π
Sinθ	0	0.71	1	0.71	0	−0.71	−1	−0.71	0	0.71	1	0.71	0	−0.71	−1	−0.71	0

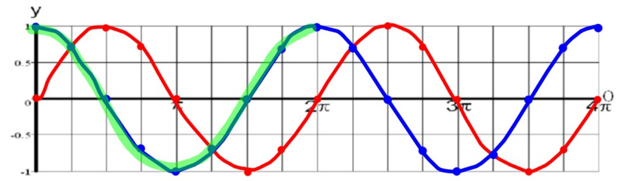
2. Fill out the table for Cos (round decimals to the nearest hundredth) and plot.

θ	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	π	$\frac{5\pi}{4}$	$\frac{3\pi}{2}$	$\frac{7\pi}{4}$	2π	$\frac{9\pi}{4}$	$\frac{5\pi}{2}$	$\frac{11\pi}{4}$	3π	$\frac{13\pi}{4}$	$\frac{7\pi}{2}$	$\frac{15\pi}{4}$	4π
Cosθ	1	0.71	0	-0.71	-1	-0.71	0	0.71	1	0.71	0	-0.71	-1	-0.71	0	0.71	1



2. Fill out the table for Cos (round decimals to the nearest hundredth) and plot.

θ	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	π	$\frac{5\pi}{4}$	$\frac{3\pi}{2}$	$\frac{7\pi}{4}$	2π	$\frac{9\pi}{4}$	$\frac{5\pi}{2}$	$\frac{11\pi}{4}$	3π	$\frac{13\pi}{4}$	$\frac{7\pi}{2}$	$\frac{15\pi}{4}$	4π
Cosθ	1	0.71	0	-0.71	-1	-0.71	0	0.71	1	0.71	0	-0.71	-1	-0.71	0	0.71	1

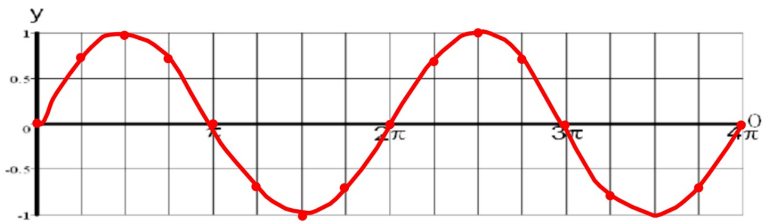


y = Sinθ

y = Cosθ

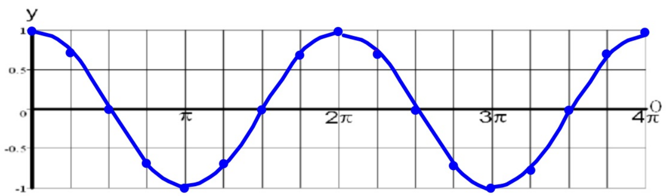
Period = 2π   Amplitude = 1   Eq Midline: y=0

The Parent Function: y = Sinx



Amplitude= 1   Eq of Midline: y = 0   Period= 2π

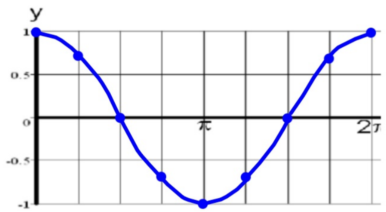
The Parent Function: y = Cosx



Amplitude= 1   Eq of Midline: y = 0   Period= 2π

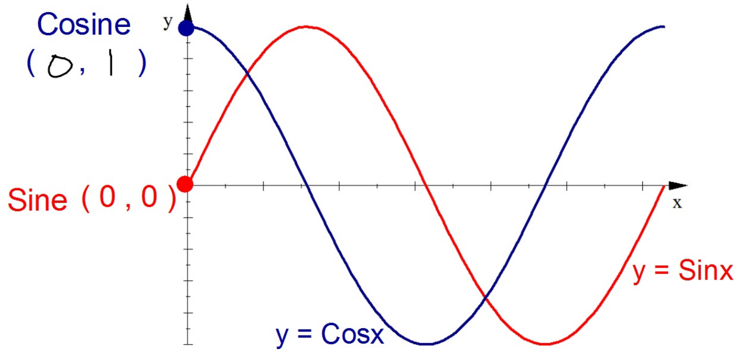
One cycle of the parent Sine function looks like a sideways "S".

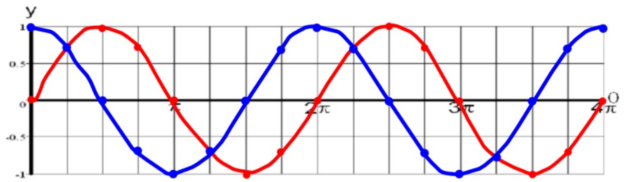
What does one period of the parent Cosine function look like?



Looks similar to a
Parabola that opens up.

The "Starting Point" for the Parent Sine and Cosine Functions:





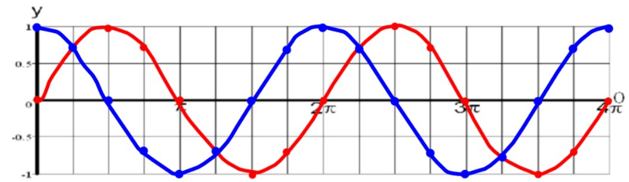
y = Sinθ

y = Cosθ

How are the graphs of Cosx and Sinx of the SAME?

They have the same Period, Amplitude, and Midline.

They also have the same overall shape.



y = Sinθ

y = Cosθ

How are the graphs of Cosx and Sinx of the DIFFERENT?

Their "starting" points are different.

Section 13-5: The Cosine Function

A graph of the x-coordinates of the points as you move around the Unit Circle.

A graph of the horizontal distance to the right and left from the origin on the Unit Circle.

If you know the Sine Function, then

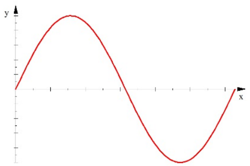
you know the Cosine Function!!

Starting points and direction for the Parent Functions.

y = Sinx
Starts on the midline then goes up.

y = Cosx
Starts at a maximum.

Y = aSin(b(x ± h)) ± k

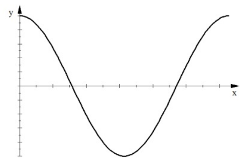


The starting point for the Parent Sine Function is:

on the Midline and goes Up as you move to the right

If you start on the Midline and go Down as you move to the right then the graph is upside down and a is negative in the equation.

Y = aCos(b(x ± h)) ± k



The starting point for the Parent Cosine Function is:

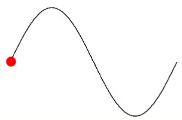
at a Maximum.

If you start at a Minimum then the graph is upside down and a is negative in the equation.

Starting points for y = aSin/Cosx

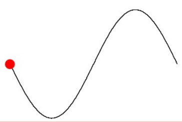
Sine Graphs

Positive a



Starts on the Midline and goes UP

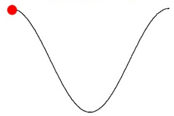
Negative a



Starts on the Midline and goes DOWN

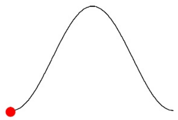
Cosine Graphs

Positive a

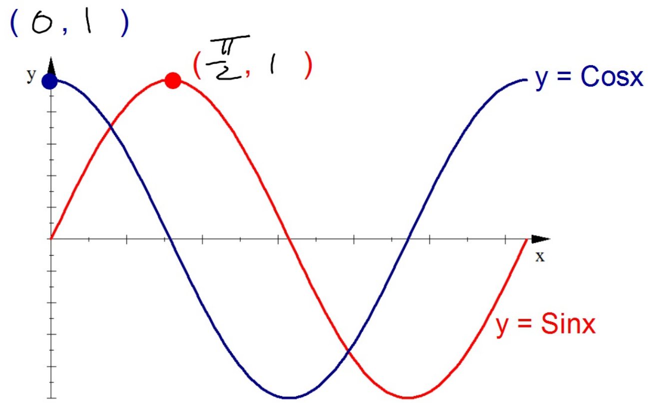


Starts at a Max

Negative a



Starts at a Min



ALSO

y=Sinx and y=Cosx are horizontal translations of each other.

To get the Sinx you translate Cosx π/2 to the right
Sinx = Cos(x-π/2)

To get the Cosx you translate Sinx π/2 to the left
Cosx = Sin(x+π/2)

y = asinbx

|a| = Amplitude (vertical Stretch or Shrink factor)

a<0 is an x-axis reflection (upside down)

$$\text{Period} = \frac{2\pi}{b} \longrightarrow b = \frac{2\pi}{\text{Period}}$$

$y = a\cos bx$

$|a|$ = Amplitude (vertical Stretch or Shrink factor)

$a<0$ is an x-axis reflection (upside down)

Period = $\frac{2\pi}{b}$ → $b = \frac{2\pi}{\text{Period}}$

This is all the SAME as it is for Sine

Graph one period of this Cosine Function. Label the coordinates of all maximums, minimums, and pts on the midline.

$y = 10\cos 12x$

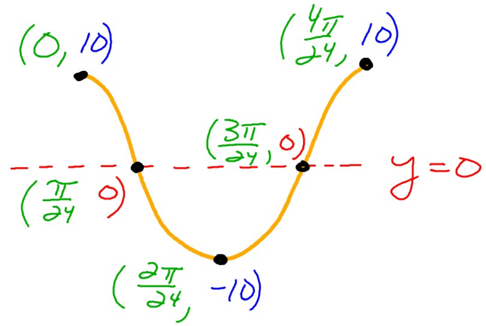
Amplitude = 10

NOT upside down

midline: $y=0$

period $= \frac{2\pi}{12} = \frac{\pi}{6}$

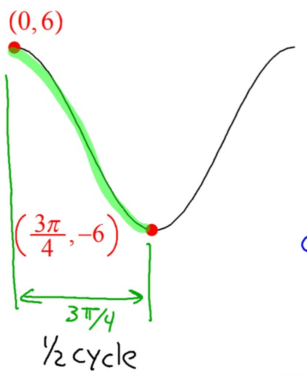
¼ period $= \frac{\pi}{6}\cdot\frac{1}{4} = \frac{\pi}{24}$



Just as we did for Sinx if we find one-fourth of the period we can find all the x-coordinates by starting with the first x-coordinate and adding one-fourth of the period to get to the next x-coordinate. Repeatedly adding one-fourth of the period will will move you from any x-coordinate to the next one.

Write the equation of this Cosine Function.

EQ:



Amplitude: $\frac{6--6}{2} = \frac{12}{2} = 6$

midline: $y = \frac{6+-6}{2} = 0$

period $= \frac{\frac{3\pi}{4}}{\frac{1}{2}} = \frac{3\pi}{4}\cdot\frac{2}{1} = \frac{3\pi}{2}$

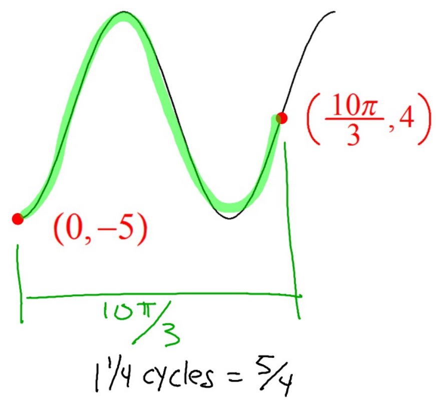
$a = 6$ (NOT upside down)

$K=0$

$b = \frac{2\pi}{\frac{3\pi}{2}} = 2\pi\cdot\frac{2}{3\pi} = \frac{4}{3}$

EQ: $y = 6\cos\frac{4x}{3}$

Write the equation of this Cosine Function.



Amplitude: $4--5=9$

midline: $y=4$

period $= \frac{\frac{10\pi}{3}}{\frac{5}{4}} = \frac{10\pi}{3}\cdot\frac{4}{5} = \frac{8\pi}{3}$

$a = -9$ [upside down - STARTS AT A MIN]

$K=4$

$b = \frac{2\pi}{\frac{8\pi}{3}} = 2\pi\cdot\frac{3}{8\pi} = \frac{3}{4}$

EQ: $-9\cos\frac{3x}{4} + 4$