Notes

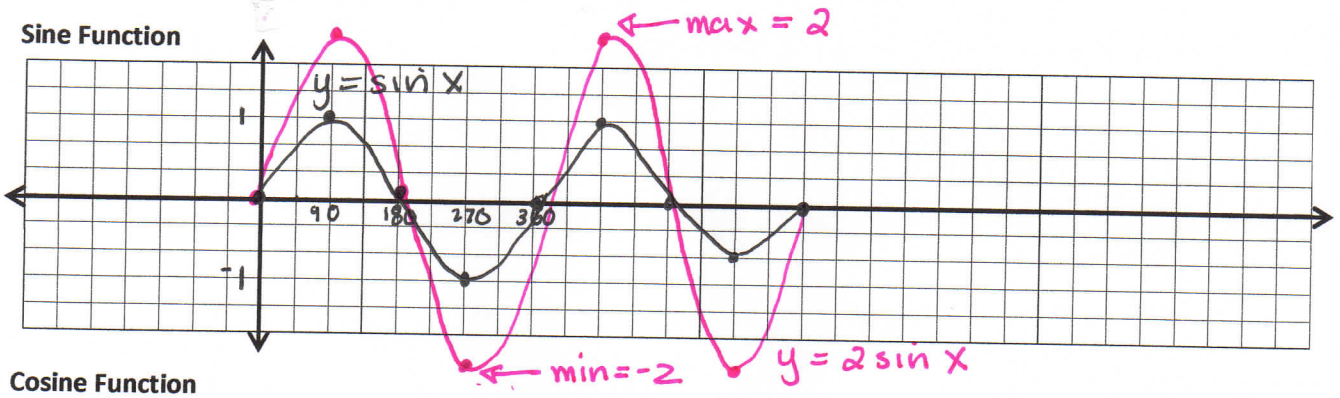
Trig Transformations: Stretches/Compressions of Functions

Graphing Parent Functions:

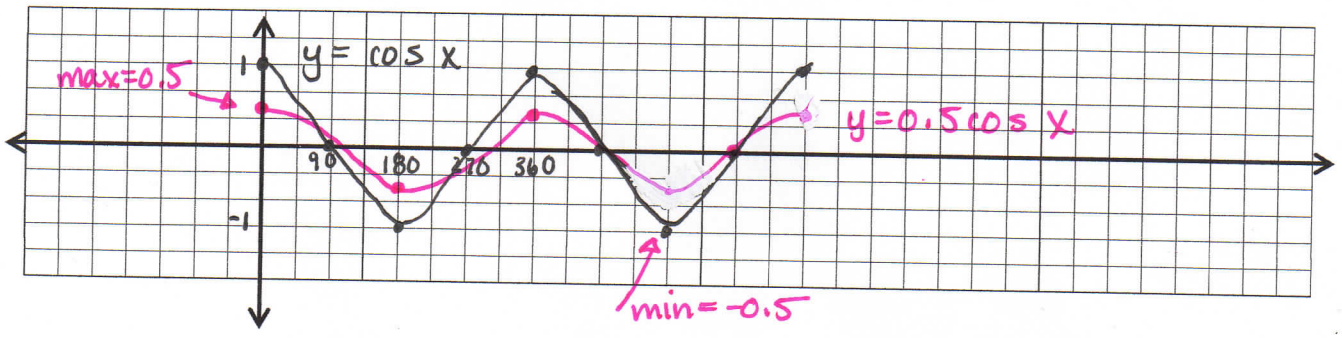
The simplest way to sketch the parent function for sine or cosine is to use 5 key points at 90° intervals (0°, 90°, 180°, 270°, 360°).

x-value	sin x	cos x
0°	0	1
90°	1	0
180°	0	-1
270°	-1	0
360°	0	1

Sine Function



Cosine Function



Vertical Stretches & Compressions:

For the functions f(x) = a sin x and f(x) = a cos x the graphs are stretched in the y direction if a > 1 OR a < -1 and compressed in the y direction if -1 < a < 1.

Example 1: 2sinx

Transformation:

vertical stretch by factor of 2

x 2

x-value	y = sin x	2 sin x
0°	0	0
90°	1	2
180°	0	0
270°	-1	-2
360°	0	0

* Graph above *

Example 2: 0.5cosx

Transformation:

vertical compression by factor of 0.5

x .5

x-value	cos x	0.5 cos x
0°	1	.5
90°	0	0
180°	-1	-.5
270°	0	0
360°	1	.5

Trig Transformations: Stretches/Compressions of Functions

Horizontal Stretches and Compressions

Functions of the form $y = \sin Kx$

Period = $\frac{360°}{K}$ ← K value.

One complete cycle occurs in the period. Five key points divide the cycle into four sections.

Example 1: f(x) = sin3x ← K value

Transformation:
horizontally compressed by $\frac{1}{3}$

Period = $\frac{360}{3} = 120°$
↑ K value.

Five key points:

Zeros: occur at 0° and 120° and half way between at 60°.

Maximum of 1 occurs at 30° (90° ÷ 3)

Minimum of -1 occurs at 90° (270° ÷ 3)

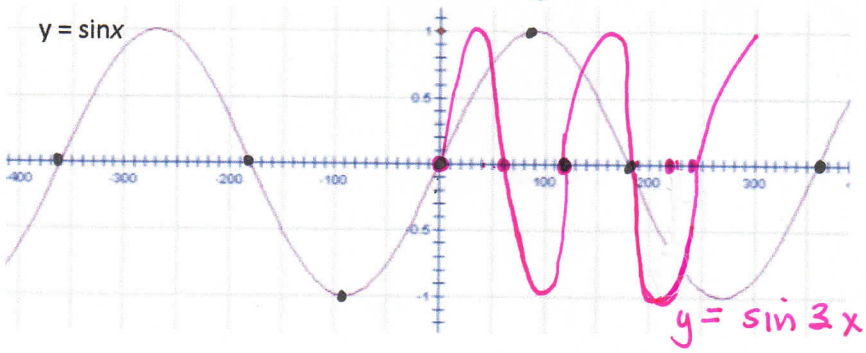
OR

Table of Values

Keep the y-values the same from the parent **sin *x*** graph and multiply x-values by 1/3.

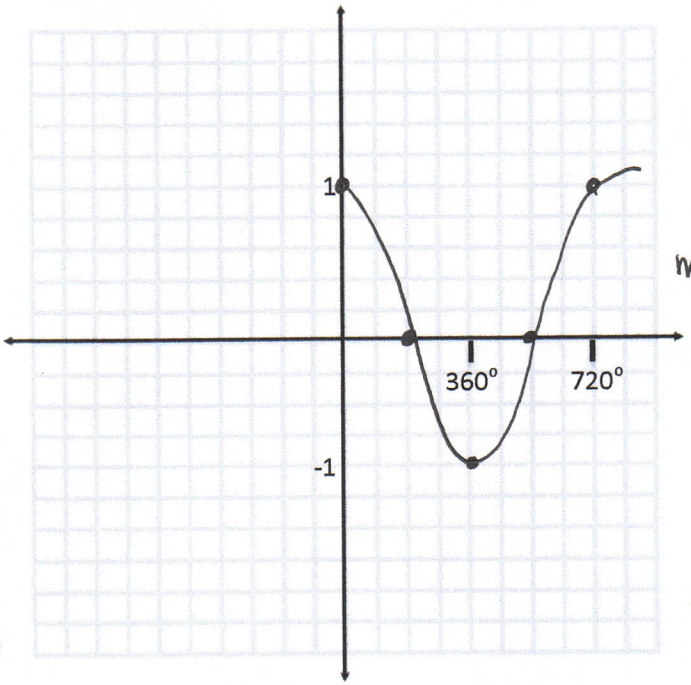
y = sin *x*	*x*-value	Multiply x by 1/3
0	0°	0
1	90°	30°
0	180°	60°
-1	270°	90°
0	360°	120°

↑ divide by 3. Graph below!



Trig Transformations: Stretches/Compressions of Functions

EXAMPLE 2: $f(x) = \cos \frac{1}{2}x$ ← k value.



Period: $\frac{360°}{\frac{1}{2}} = 360° \times \frac{2}{1} = 720°$

Zeros: Parent: 90° and 270°
mult. by 2. → 180° and 540°

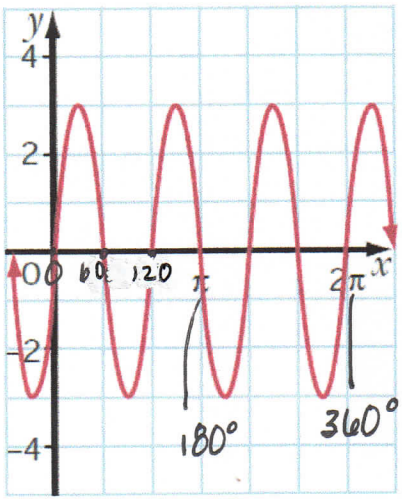
Maximum: 1 at 0° and 720°
(beginning and end of cycle).

Minimum: −1 at 360°
(halfway b/w period).

TOV
mult. x values by 2.

y	x
1	0°
0	180°
−1	360°
0	540°
1	720°

EXAMPLE 3: Determine the equation for the sine function.



$y = a \sin kx$

$k = \frac{360}{Period}$

$K = \frac{360}{120}$

$K = 3$

Period = 120°

max value = 3

min value = −3

∴ a = 3

equation $\boxed{y = 3\sin(3x)}$