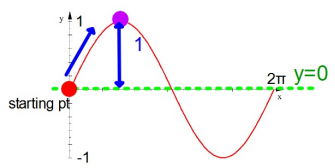
Thursday, May 7, 2020

Sec 7-5

Transformations of the Sine Function

Stretches and Shrinks

Remember the important characteristics of the Parent Sine Function: $y = \sin x$



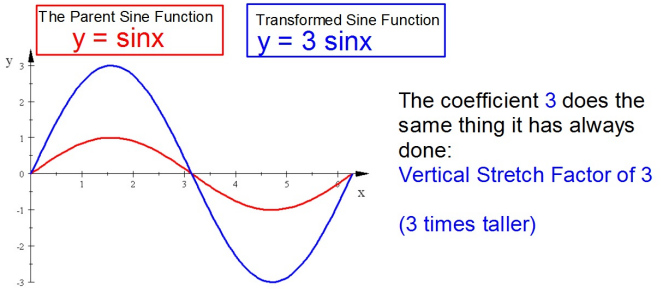
Eq of Midline: $y = 0$

Amplitude= 1

Period= 2π

Starting pt: On the midline going up to a max.

Stretches and Shrinks of the Parent Sine function.

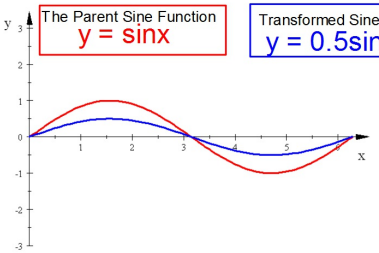


The coefficient 3 does the same thing it has always done:
Vertical Stretch Factor of 3

(3 times taller)

The Parent Sine Function
y = sinx

Transformed Sine Function
y = 0.5sinx

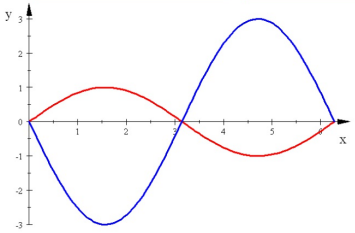


The coefficient 0.5 does the same thing it has always done:
Vertical Shrink Factor of 0.5

(half as tall)

The Parent Sine Function
y = sinx

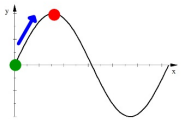
Transformed Sine Function
y = -3sinx



The coefficient -3 does the same thing it has always done:
Upside Down and Vertical Stretch Factor of 3

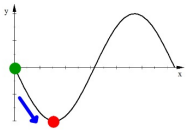
(upside down and 3 times taller)

Remember, the Parent Sine Function starts on the midline and goes up to a maximum.



this would represent a positive coefficient a in the eq: y = aSinx

An upside down Sine Function will also start on the midline but will then go down to a minimum.



this would represent a negative coefficient a in the eq: y = aSinx

Can you have a negative Amplitude?

No, since amplitude is a distance, it can't be negative.

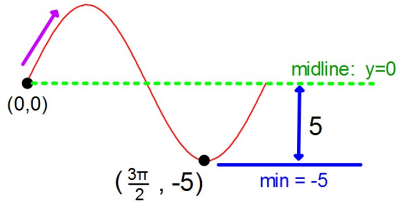
$y = a\sin x$

Amplitude = |a|

If a<0 then there is an x-axis reflection.
Upside down

the graph will start on the midline and go DOWN to a minimum.

1. Given this graph find the value of a for the equation y = aSinx

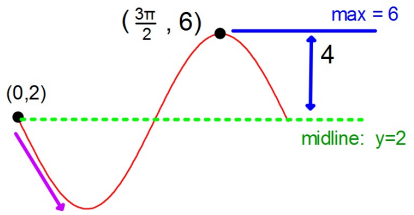


Amplitude = 5

The graph starts on the midline and goes up to a max just like the Parent Function, so a is POS.

Therefore, a = +5

2. Given this graph find the value of a for the equation y = aSinx



Amplitude = 4

The graph starts on the midline and goes down to a min which means that it is upside down, so a is NEG.

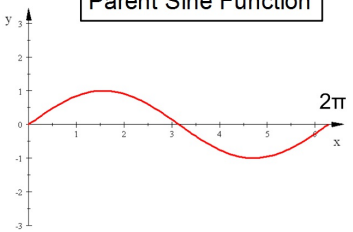
Therefore, a = - 4

Horizontal Stretches and Shrinks.

y = Sinbx

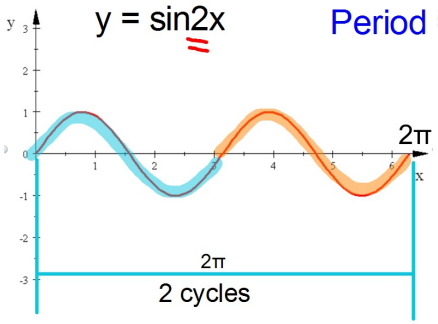
y = sinx Period = 2π

Parent Sine Function



$y = \sin 2x$

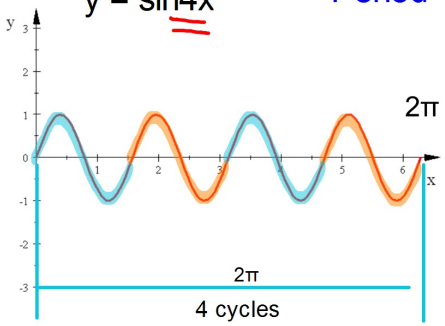
Period $= \frac{2\pi}{2} = \pi$



Period is half of what it used to be.

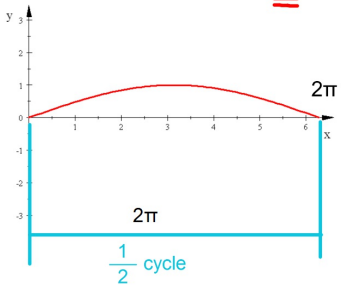
$y = \sin 4x$

Period $= \frac{2\pi}{4} = \frac{\pi}{2}$



Period is one-fourth of what it used to be.

$y = \sin \frac{x}{2} \rightarrow y = \sin \frac{1}{2}x$



Period $= \frac{2\pi}{\frac{1}{2}}$

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

Period is twice what it used to be.

$y = a\sin x$

a: Vertical Stretch/Shrink Factor.

Amplitude = $|a|$

$y = \sin bx$

b: Horizontal Stretch/Shrink Factor.

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

Find the amplitude and period for each Sine Function:

1. $y = 7\sin 5x$ (a = 7, b = 5)

Amplitude= 7

Period= $\frac{2\pi}{5}$

2. $y = -4\sin\left(\frac{x}{3}\right)$ (a = −4, b = $\frac{1}{3}$)

Amplitude= 4 = |a|

Period= $\frac{2\pi}{\frac{1}{3}}$

$= 2\pi \cdot \frac{3}{1} = \boxed{6\pi}$

$y = a\sin bx$

a: Amplitude = |a| Vertical Stretch/Shrink Factor

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

b: (used to find the) Period = $\frac{2\pi}{b}$ Horizontal Stretch/Shrink Factor

You can now finish the remainder of Practice #25.

This practice will be due on Saturday, May 9 by 10:00pm