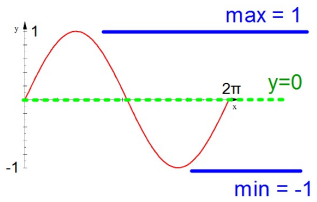
Tuesday, May 12, 2020

Sec 7-5

Transformations of the Sine Function

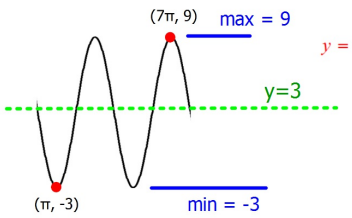
Vertical Translations

Below is the graph of the Parent Sine Function:
y = sinx



Eq of Midline: y = 0

Find the equation of the midline of this Sine function.

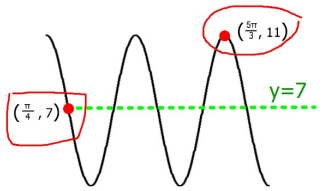


Eq of the midline:

$$y = \frac{\max + \min}{2} = \frac{9 + (-3)}{2} = \frac{6}{2} = 3$$

y=3

Find the equation of the midline of this Sine function.



Eq of the midline:

Since the point $(\frac{\pi}{4}, 7)$ is on the midline this leads directly to the equation of the midline:

y=7

From previous chapters:

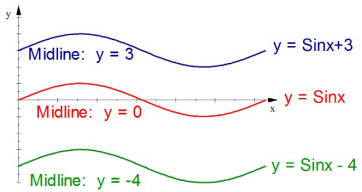
$y = ax^2 + k$

a = Vertical Stretch or Shrink Factor
if a<0 x-axis reflection

k = Vertical Translation

Graphs of $y = \text{Sin}x \pm k$

Below are the graphs of $y = \text{sin}x \pm k$



Just like every other time,
k moves the graph up or down
(Vertical Translation)

This translation changes the
MIDLINE.

Midline: y = k

$y = a\text{Sin}(bx) + k$

a Amplitude = |a| - Vert strecth or shrink.
Also x-axis reflection if negative

b Leads to the Period = $2\pi/b$ - Horiz stretch or shrink

k Equation of the Midline - Vert translation
y = k

Use the given description to write the equation of the transformed Sine function in the following form: $y = a\sin(bx) + k$

1. 8 times taller, x-axis reflection, midline is y= 3, and the period = $\frac{4\pi}{3}$

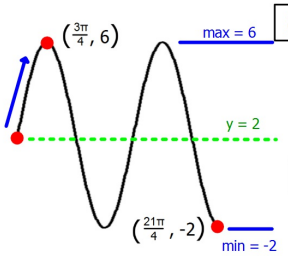
a = -8

k = 3

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

EQ: $y = -8\sin\frac{3x}{2} + 3$

Use the given graph to write the equation of the transformed Sine function in the following form: $y = a\sin(bx) + k$



a:

Amp = $\frac{\max - \min}{2} = \frac{6-(-2)}{2} = \frac{8}{2} = 4$

Since graph starts on the midline and goes up to a max **a** is Pos.

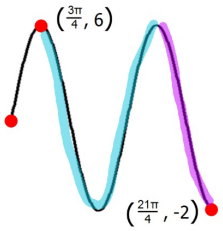
a = 4

k:

$y = \frac{\max + \min}{2} = \frac{6+(-2)}{2} = \frac{4}{2} = 2$

k = 2

Use the given graph to write the equation of the transformed Sine function in the following form: $y = a\sin(bx) + k$



b:

Total width = $\frac{21\pi}{4} - \frac{3\pi}{4} = \frac{18\pi}{4} = \frac{9\pi}{2}$

#cycles = $1\frac{1}{2} = \frac{3}{2}$

Period = $\frac{\text{total width}}{\text{\# cycles}} = \frac{\frac{9\pi}{2}}{\frac{3}{2}} = \frac{9\pi}{2} \cdot \frac{2}{3} = 3\pi$

b = $\frac{2\pi}{\text{period}} = \frac{2\pi}{3\pi} = \frac{2}{3}$

b = $\frac{2}{3}$

Equation:

a = 4

b = $\frac{2}{3}$

k = 2

$y = 4\sin\frac{2x}{3} + 2$

You can now complete the rest of Practice #26

Practice #26 will be due on Thursday, May 14 by 10:00pm