Thursday, May 14, 2020

Graph of the Cosine Function -

Vertical Translation

Remember that Sinx and Cosx have

- The same Amplitude: Amp = 1
- The same Midline: y=0
- The same Period: Period = 2π

The just start in a different spot and what we picture as one cycle of each is a different shape

Starting points for the Parent Functions.

y = Sinx

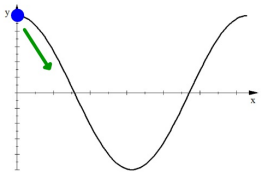
Starts on the midline then goes up.

y = Cosx

Starts at a maximum.

Y = aCosbx

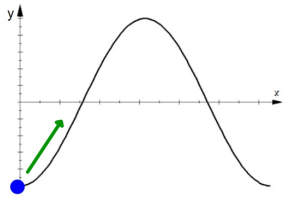
The starting point for the Parent Cosine Function is:
at a Maximum.



a is positive

Y = aCosbx

If you start at a Minimum
then the graph is upside down.



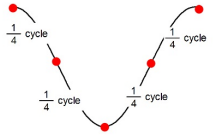
a is negative

Typical cycles for y = aCosx:

a is Positive

a is Negative

Every cycle of a Cos curve can also be broken into fourths:



Finding the period, amplitude, and midline is the **SAME** for y=cosx as it was for y=sinx.

y = acosbx

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

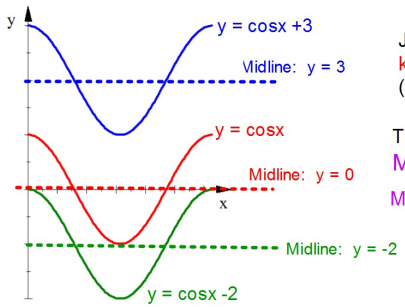
a<0 is an x-axis reflection (upside down)

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

Graphs of y = Cosx ± k

Vertical Translations

Below are the graphs of y = cosx ± k



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

This translation changes the MIDLINE.

Midline: y = k

y = aCos(bx) + k

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

b Leads to the Period = 2π/b - Horiz stretch or shrink

k Vert translation - Equation of the Midline - y = k

Use the given description to write the equation of the transformed Cosine function in the following form: y = aCos(bx) + k

1. 5 times taller, x-axis reflection, midline is y= -4, and the period = 14π

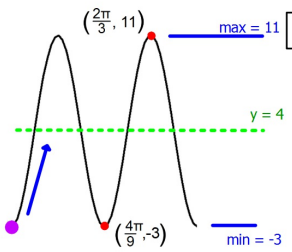
a = -5

k = -4

b = $\frac{2\pi}{\text{period}} = \frac{2\pi}{14\pi} = \frac{1}{7}$

EQ: $y = -5\cos\left(\frac{1}{7}x\right) - 4$ or $-5\cos\frac{x}{7} - 4$

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



a: $\text{amp} = \frac{\max - \min}{2} = \frac{11-(-3)}{2} = \frac{14}{2} = 7$

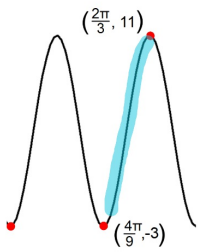
Since graph starts a min and goes up **a** is Neg.

a = -7

k: $y = \frac{\max + \min}{2} = \frac{11+(-3)}{2} = \frac{8}{2} = 4$

k = 4

b: total width $= \frac{2\pi}{3} - \frac{4\pi}{9} = \frac{6\pi}{9} - \frac{4\pi}{9} = \frac{2\pi}{9}$



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

$\text{Period} = \frac{\text{total width}}{\text{\# cycles}} = \frac{\frac{2\pi}{9}}{\frac{1}{2}} = \frac{2\pi}{9} \cdot 2 = \frac{4\pi}{9}$

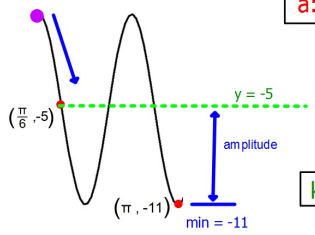
$b = \frac{2\pi}{\text{period}} = \frac{2\pi}{\frac{4\pi}{9}} = 2\pi \cdot \frac{9}{4\pi} = \frac{9}{2}$

b = $\frac{9}{2}$

a = -7 **b = $\frac{9}{2}$** **k = 4**

EQ: $y = -7\cos\left(\frac{9}{2}x\right) + 4$ or $-7\cos\frac{9x}{2} + 4$

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



a: Amplitude = distance from midline to min.

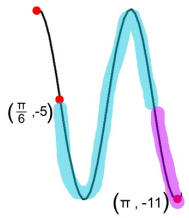
Amp = -5 - (-11) = 6

Since graph starts a max and goes down **a** is Pos.

a = 6

k: Midline: y = -5

k = -5



b: total width $= \pi - \frac{\pi}{6} = \frac{6\pi}{6} - \frac{\pi}{6} = \frac{5\pi}{6}$

cycles $= 1\frac{1}{4} = \frac{5}{4}$

Period $= \frac{\text{total width}}{\text{\# cycles}} = \frac{\frac{5\pi}{6}}{\frac{5}{4}} = \frac{5\pi}{6} \cdot \frac{4}{5} = \frac{2\pi}{3}$

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

b = 3

a = 6 **b** = 3 **k** = -5

EQ: $y = 6\cos 3x - 5$

You can now complete the rest of Practice #27

Practice #27 will be due on Saturday, May 16 by 10:00pm