5.10.17

Translation of Sine and Cosine Graphs

Springboard 34.5

Amplitude, Period, and translations of sine and cosine graphs

Warmup

1)Graph $y = 2sin3x$

$Identify\ the\ amplitude, midline, and\ period.$

2)Graph $y = -2cos2x$

$Identify\ the\ amplitude, midline, and\ period.$

3)What are some differences between sine and cosine graphs?

$$y = a\sin(b\,\theta - h) + k$$

Amplitude: Half of the difference between the maximum and minimum values of a sine or cosine function. It is always positive!

$$y = acos\theta$$
$$y = asin\theta$$

|a|=amplitude.

I Try:
Find the amplitude of $y = 20cos\theta$

Identify |a|	a=

We Try:
Find the amplitude of $y = -10sin\theta$
$Find\ the\ amplitude\ of\ y = cos\theta$

Period: The length of the interval of the function.

$The\ period\ for\ \ y = \sin b\theta\ and\ y = \cos b\theta\ \ is\ \frac{2\pi}{b}, where\ b > 0.$

IF no b assume b=1

I Try:

Find the period of $y = cos2\theta$.

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

We Try:

Find the period of $y = cos\pi\theta$.

Identify b	

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

You Try solo:

Find the period of $y = cos\frac{7\pi}{6}\theta$.

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

You Try SOLO

Find the amplitude and period of $y = -3sin\frac{\pi}{6}\theta$.

Vertical translation and horizontal translations

$$y = \sin b(\theta - h) + k$$
$$y = \cos\ \mathrm{b}(\theta - h) + k$$
$$vertical\ shift\ up\ for + k.$$
$$vertical\ shift\ down\ for - k$$

I do:
Graph $y = sin\theta + 3$

Identify the period, midline, and amplitude	
Graph the shape	
Add in the 4 points	

We do:

Graph $y = 2cos4\theta - 1$

Identify the period, midline, and amplitude	
Graph the shape	
Add in the points	

We do:

Graph $y = -3sin\theta - 2$

Identify the period, midline, and amplitude	
Graph the shape	
Add in the points	

Phase Shift: The horizontal translation of sine and cosine graphs

$y = \sin b(\theta - h)\ and\ y = \cos b(\theta - h)\ , b > 0.$

Phase shift is $\frac{h}{b}$.

$-h\ shifts\ right$

$+h\ shift\ left.$

Your springboard book writes the functions a different way.

$$y = sinb\left(\theta - \frac{h}{b}\right)$$

I do:

Find the phase shift of $y = \cos(\theta - \pi)$

Graph the function.

Identify b and h	$b =$ $h =$
Phase shift = $\frac{h}{b}$	
Graph the parent function	

We do.

Find the phase shift of $y = 5\sin 2(\vartheta - \pi) + 3$

Graph the function.

Identify b and h	$b =$ $h =$
Phase shift = $\frac{h}{b}$	
Graph the parent function	
Apply transformations	

We do.

Find the phase shift of $y = -2\cos 3(\theta + \pi) - 4$

Graph the function.

Identify b and h	$b =$ $h =$
Phase shift = $\frac{h}{b}$	
Graph the parent function	
Apply Transformations	

We do.

Find the phase shift of $y = -2\sin 3\left(\theta + \frac{\pi}{3}\right) + 1$

Graph the function.

Identify b and h	$b =$ $h =$
Phase shift = $\frac{h}{b}$	
Graph the parent function	
Apply Transformations	

Exit Slip

Identify the

Amplitude, Phase Shift, Vertical Translation, and Period.

Graph the function.

$y = 3\sin(\theta - \pi) + 2$