

Revisiting the Graphs of the Sine and Cosine Functions...which is which?

What do you remember about even and odd functions?

Sep 23-2:17 PM

28, 30, 23

$f(x) = 2 \cos 2x$ $a=2$ $\text{period} = \frac{2\pi}{2} = \pi$

$g(x) = -\cos 4x$ Reflect $\text{period} = \frac{2\pi}{4} = \frac{\pi}{2}$

Sep 9-10:47 AM

Transformations!

For the functions $f(x) = a \sin bx$, $f(x) = a \cos bx$

The **amplitude** (half the distance between the max and min values) is:

$|a|$

The **period** (how long it takes to complete one cycle) is:

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

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Examples

Give the amplitude and period of each of the following functions

$f(x) = -4 \sin \frac{x}{4}$ $a = |-4| = 4$ $\text{Period} = \frac{2\pi}{\frac{1}{4}} = 8\pi$

$g(x) = \frac{1}{2} \cos 6\pi x$ $a = |\frac{1}{2}| = \frac{1}{2}$ $\text{period} = \frac{2\pi}{6\pi} = \frac{1}{3}$

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Translations (shifting)

Q: How do the graphs of the following functions differ? How are they the same?
 $y = a \sin bx$, $y = a \sin(bx - c)$

opposite

****To find the endpoints of one cycle, we solve these two equations:**

$bx - c = 0$ $bx - c = 2\pi$

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Example
 Analyze the graph of $y = \frac{1}{2} \sin(x - \frac{\pi}{3})$

Amplitude = $\frac{1}{2}$
 Rt $\frac{\pi}{3}$

Endpt
 $x - \frac{\pi}{3} = 0$
 $x = \frac{\pi}{3}$

$x - \frac{\pi}{3} = 2\pi$
 $x = \frac{7\pi}{3}$

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Try Exercise #43, p. 305...

$y = \sin(x - \frac{\pi}{4})$

Amp = 1
 period = 2π
 Shift Rt $\frac{\pi}{4}$

Endpts
 $x - \frac{\pi}{4} = 0$ $x - \frac{\pi}{4} = 2\pi$
 $x = \frac{\pi}{4}$ $x = \frac{9\pi}{4}$

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Q: How do we get vertical translations (shifts)?
A: *up + down + or - outside*

Example
 Analyze the graph of the function; then use a graphing calculator to verify your results.

$y = 2 + 3 \cos 2x$

$a = 3$
 period = $\frac{2\pi}{2} = \pi$
 up 2

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Find a, b, and c such that your function matches the given graph.

$$y = a \sin(bx - c)$$

$$a=3 \quad y = 3 \sin\left(2x - \frac{\pi}{3}\right)$$

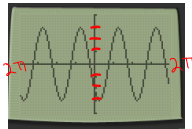
or

$$y = 3 \sin\left(2x + \frac{\pi}{6}\right)$$

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

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

$$b = 2$$



HOMWORK

...now we're viewing sine and cosine like modern mathematicians...sorry, Archimedes!

4.5b (Four assignments due tomorrow):

15, 21, 29, 33, 43, 61-67 (odd)

7th unit circle quiz tomorrow

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