Answer on Question #60763 – Math – Algebra

Question

Right now dealing with transformations of sine and cosine functions. Here's the equation I'm stumped on:

F (x)=3 cos (4 pi x - (pi/2)) - 2

I'm trying to put this into the form:

A cos [B (x - C)] + D

But I can't figure out how to factor the

(4 pi x - (pi/2)) into the form [B(x - C)].

I'm confused because if B is 4pi, and the period is (2pi/B), wouldn't I end up with a pi-less period? I haven't encountered that yet.

Also, if the phase shift is C/B, wouldn't I also end up with a pi-less phase shift?

Solution

We have got an expression

$$F(x) = 3cos\left(4\pi x - \frac{\pi}{2}\right) - 2.$$
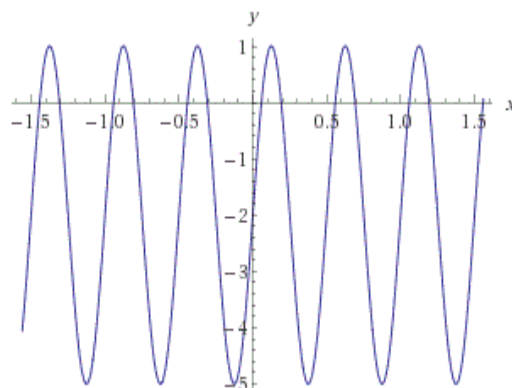
Let's rewrite it in other form.

First of all,

$$cos\left(4\pi x - \frac{\pi}{2}\right) = cos\left(-\left(\frac{\pi}{2} - 4\pi x\right)\right) = cos\left(\frac{\pi}{2} - 4\pi x\right) = sin(4\pi x).$$

So, we have

$$F(x) = 3cos\left(4\pi x - \frac{\pi}{2}\right) - 2 = 3sin(4\pi x) - 2.$$

The graph of F(x) is given below.

The period of $sin(4\pi x)$, $3sin(4\pi x)$, $3sin(4\pi x) - 2$ is $\frac{2\pi}{4\pi} = \frac{1}{2}$, hence the period of $cos\left(4\pi x - \frac{\pi}{2}\right)$, $3cos\left(4\pi x - \frac{\pi}{2}\right) - 2$ will also be $\frac{2\pi}{4\pi} = \frac{1}{2}$. You will end up with a pi-less period. Also, if the phase shift is C/B, you will end up with a pi-less phase shift and it's Ok.