

Learning Target(s): I am able to translate and/or reflect the graphs of sine, cosines, and tangent functions. I am able to identify the horizontal and vertical shifts, amplitude, frequency, and period of a translated and/or reflected graph of sine, cosine, and tangent function.

14.2 Notes- Part 1: Graph Sine, Cosine, and Tangent Functions

Translations of Sine and Cosine Graphs

$$y = a \cos b(x - h) + k$$

$$\text{amplitude} = |a| \quad \text{Period} = \frac{2\pi}{|b|}$$

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

$$\text{amplitude} = |a| \quad \text{Period} = \frac{2\pi}{|b|}$$

Translations of Tan Graphs

$$y = a \tan b(x - h) + k$$

$$\text{amplitude} = |a| \quad \text{Period} = \frac{\pi}{|b|}$$

$h \rightarrow$ horizontal shift y-axis, (-) shifts left, (+) shifts right

$k \rightarrow$ vertical shift x-axis, (-) shifts down, (+) shifts up

Steps:

Step 1: Identify the amplitude

Step 2: Identify the period

Step 3: Draw the general sin, cos, or tan curve and label the amplitude and period.

Step 4: Identify the horizontal shift (h) "liar"

Step 5: Identify the vertical shift k

Step 6: Shift left or right h units (changes the y axis)

Step 7: Shift up or down k units (changes the x axis)

Ex. 1

Graph $y = 3 \sin(2x + 1)$

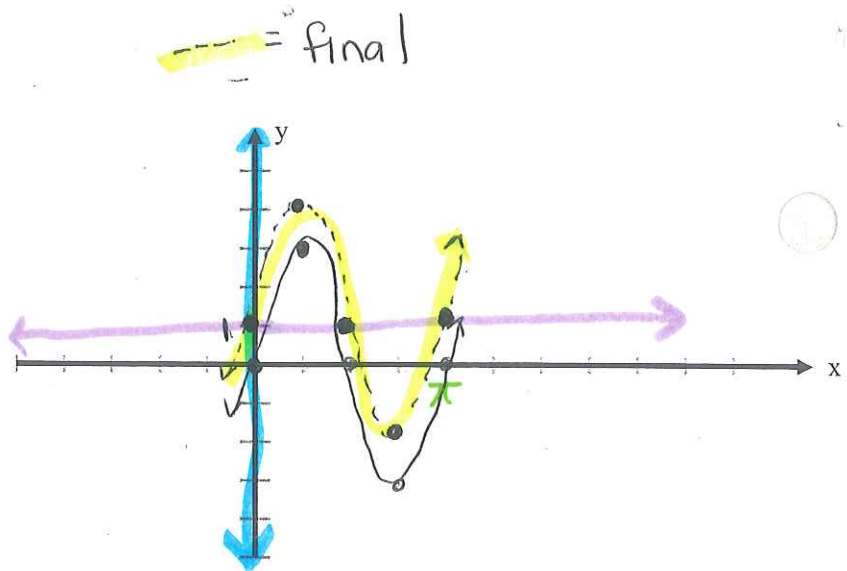
$a = 3$ period = $\frac{2\pi}{2} = \pi$

sin starts at 0

$h = 0$

$k = 1$

move your points to your axes



Ex. 2

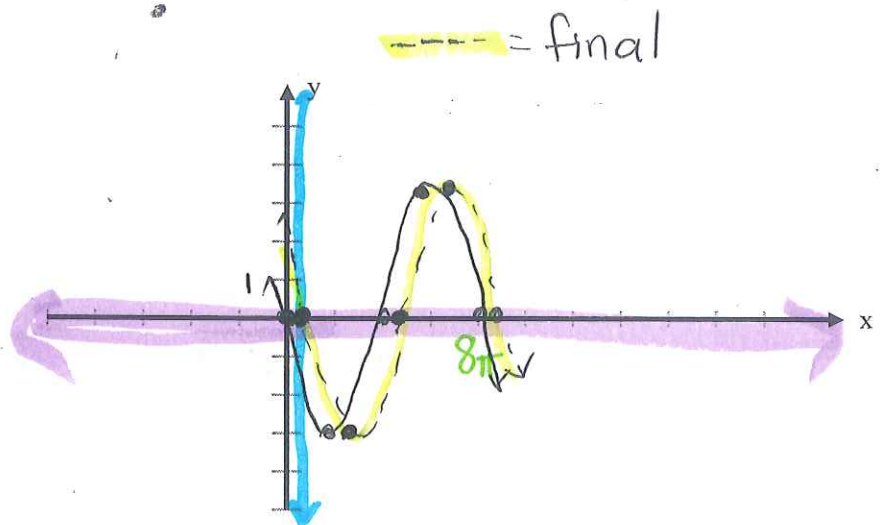
Graph $y = -3 \sin\left(\frac{1}{4}\left(x - \frac{\pi}{4}\right)\right)$

$a = -3$ $b = \frac{1}{4}$ Period $\frac{2\pi}{1/4} = 8\pi$

sin starts at 0

$h = \frac{\pi}{4}$ right

$k = 0$



Ex. 3

Graph $y = -2 \cos(x + \pi) - 1$

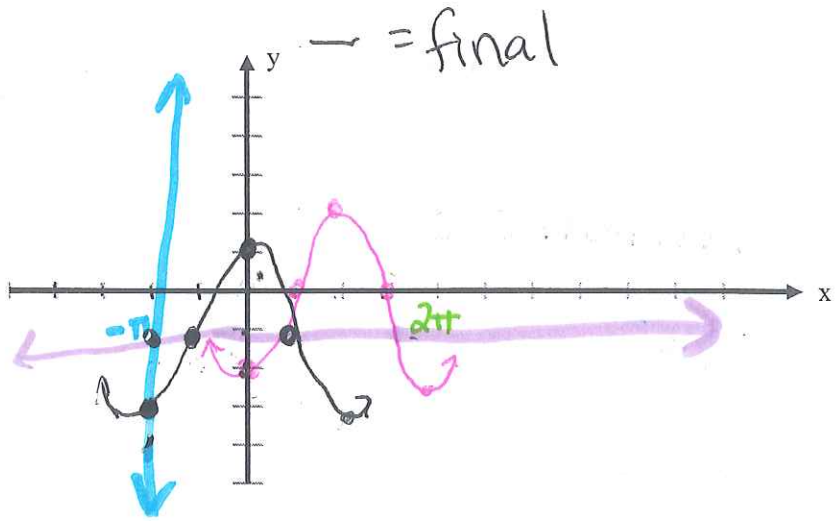
$a = -2$ $b = -1$ $\text{period} = 2\pi$

cos starts at a

$h = -\pi$ left

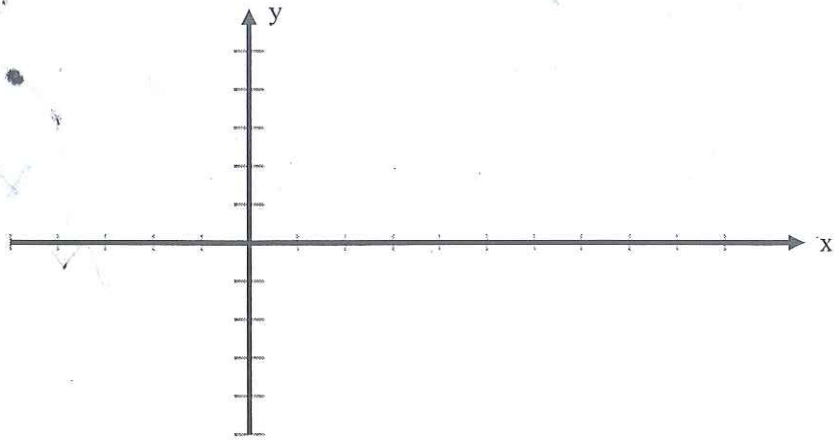
$k = -1$

left 2 tickmarks
down 1



Try it!

2. Graph $y = 5 \cos 2(x - 3\pi)$



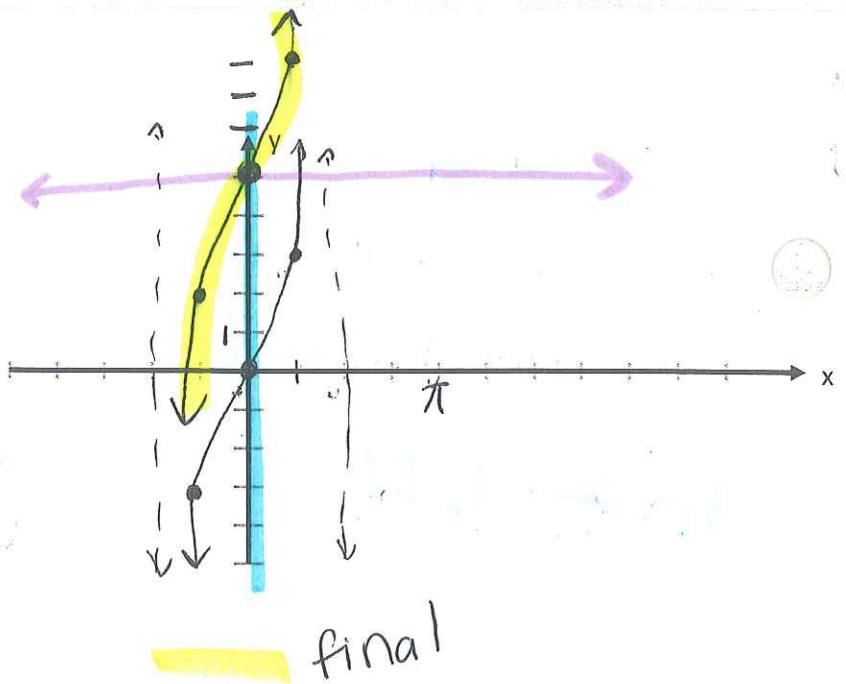
Ex. 4

Graph $y = 3 \tan x + 5$

$a=3$ $b=1$ period $\frac{\pi}{1} = \pi$
tan starts at 0

$h=0$

$k=5$



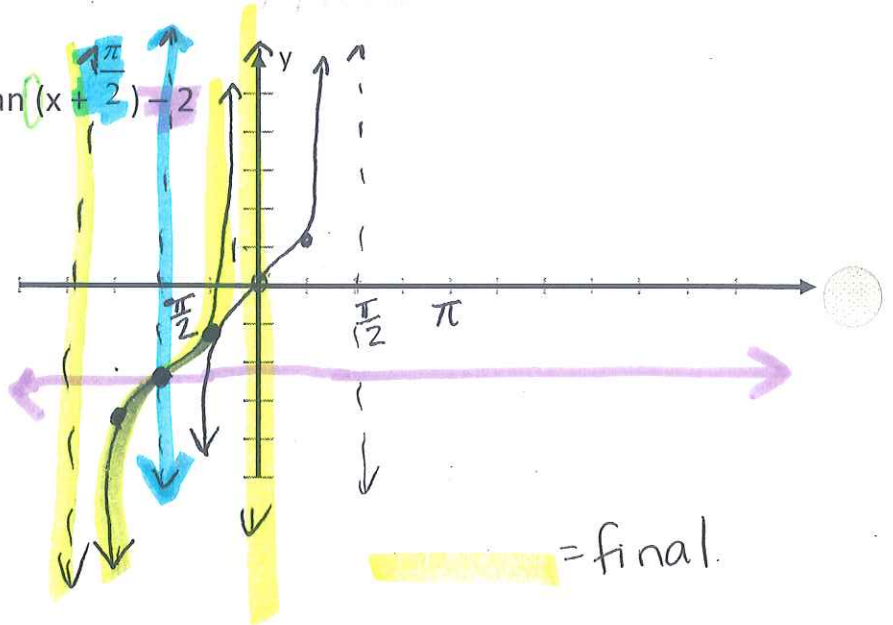
Ex. 5

Graph one period of the function $y = \tan(x + \frac{\pi}{2}) - 2$

$a=1$ $b=1$ period π

$h = -\frac{\pi}{2}$

$k = -2$



Try it!

3. Graph one period of the function $y = -\tan 2x - 3$

$a=-1$ $b=2$ $\frac{\pi}{2}$ period

$h=0$

$k=-3$

