

## 14-2 Translations and Reflections


trig. std. 4.0

$$y = a \sin b(x-h) + k \quad h = \text{horizontal shift}$$

$$y = a \cos b(x-h) + k \quad k = \text{vertical shift}$$

$$y = a \tan b(x-h) + k \quad \text{if } a < 0, \text{ reflect graph over the line } y = k$$

$$Y = a|x-h| + K$$

$x = |x|$  

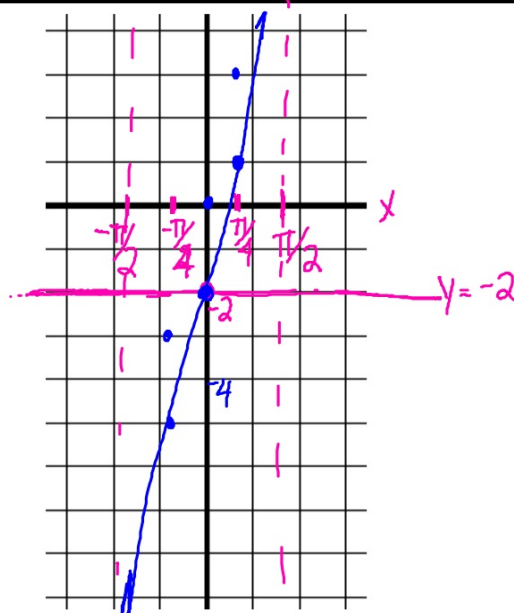
ex. 1

$$y = -2 + 3 \tan x$$

$$y = 3 \tan x - 2$$

$$p: \pi = \pi$$

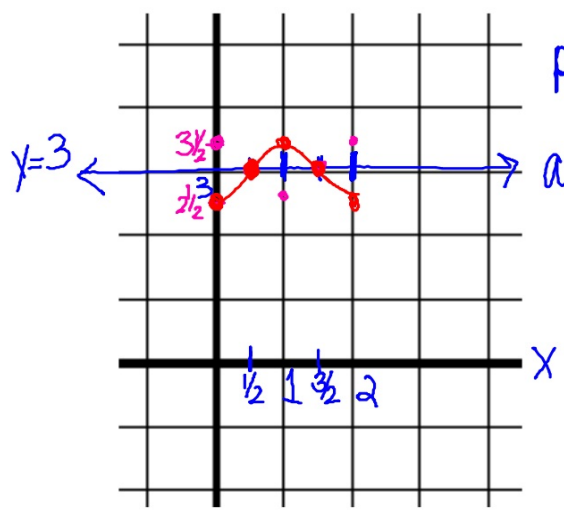
$$\neq a = \neq 3$$



ex. 2

$$y = 3 - \frac{1}{2} \cos \pi x$$

$$y = -\frac{1}{2} \cos \pi x + 3$$

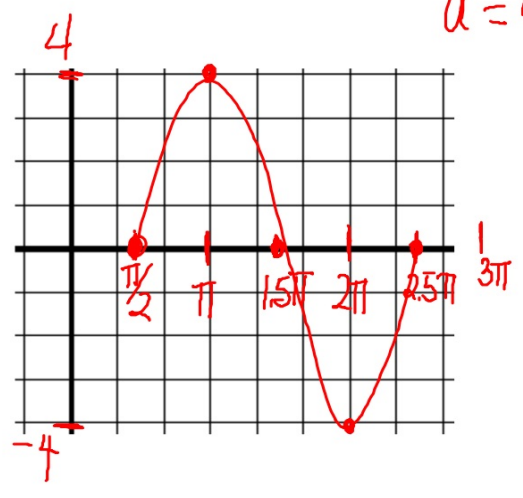


$\uparrow 3$   
 $per = \frac{2\pi}{\pi} = 2$   
 $a = |-\frac{1}{2}| = \frac{1}{2}$   
 flip

ex. 3

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

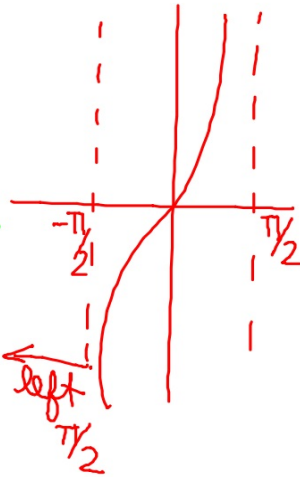
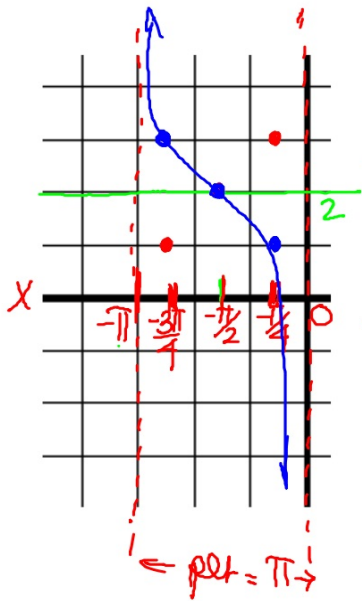
$\frac{\pi}{2}$  R+  
 per  $2\pi$   
 $a = 4$



ex. 4

$$y = 2 - \tan\left(x + \frac{\pi}{2}\right)$$

$$y = -\tan\left(x + \frac{\pi}{2}\right) + 2$$



horiz. shift  $-\pi/2$   
left

vert shift up 2

per =  $\pi$

$\pm a = \pm 1$

flip