6.4 Transformations of Trigometric Functions

A general function:

$$y = af(k(x - d)) + c$$

a - vert. stretch k - horizontal stretch

d - left/right shift c - up/down shift

A general "trig" function:

$$y = a\sin(k(x - d)) + c$$

a - amplitude k - period factor $\left(T = \frac{2\pi}{k}\right)$

d - phase shift c - vert. displacement → equ^n of rest axis

So... a specific trig function:

$$y = 2\sin(3(x - \pi)) - 1$$

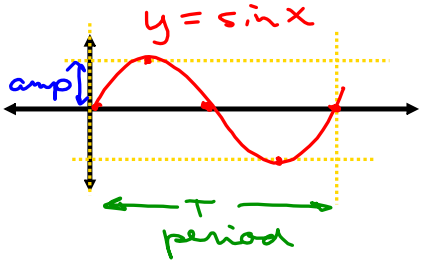
amplitude - 2 period - $\frac{2\pi}{3}$ or 120°

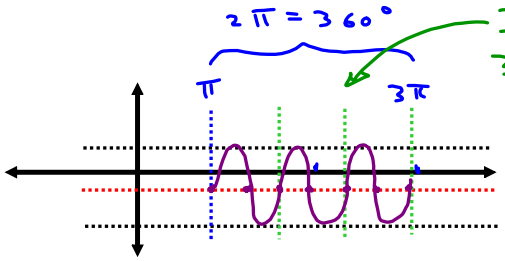
phase shift - $\pi \rightarrow$ axis - $y = -1$

k must be factored from the phase shift

Graphing using the "BOX" method:

what we have to remember:





① find max/mins / rest axis

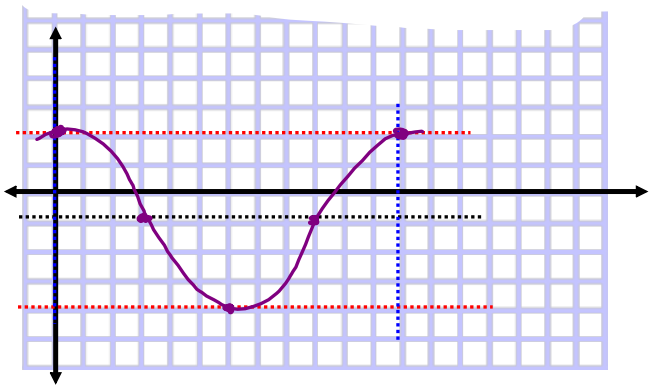
② phase shift → left side of box = π to the right

③ period → right side of box measured from ②

④ plot key pts.

Example 1: Graph y = 3cos(x) - 1

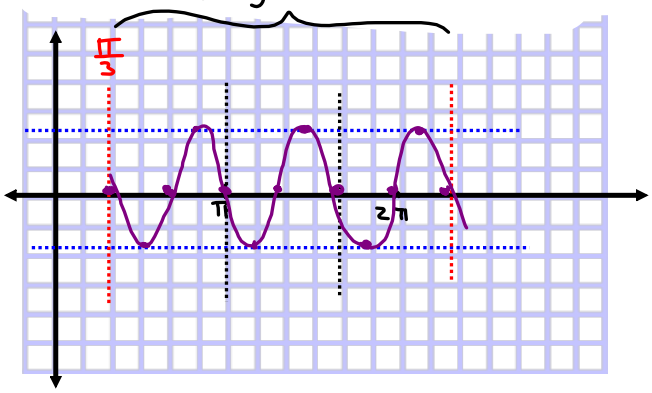
amp = 3
no phase shift
$T = 2\pi$
V.D = −1



Example 2: Graph $y = -2\sin\left(3\left(x - \frac{\pi}{3}\right)\right)$

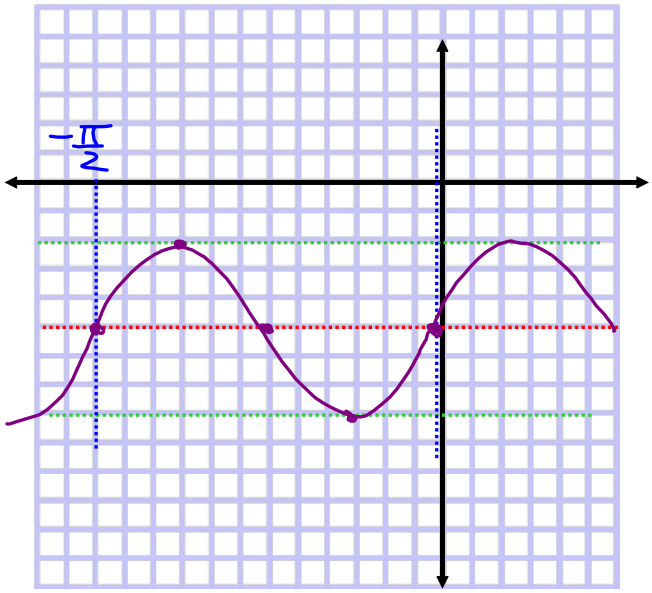
- amp 2
- vert. reflection means sin begins by going down
- no vert. displ.
- phase shift $\frac{\pi}{3}$ →
- $T = \frac{2\pi}{3}$

3 cycles fit in 2π



Example 3: Graph $y = 3\sin\left(4\left(x + \frac{\pi}{2}\right)\right) - 5$

- rest axis $y = -5$
- amp $= 3$
- phase shift $\frac{\pi}{2}$ left
- $T = \frac{2\pi}{4} = \frac{\pi}{2}$



Homefun: Pg. 343 # 1, 6, 8cf, 9, 11, 14

Now... GO! You must!