8.6 Combining Transformations part 1

$$y = a f(b(x-c)) + d$$

vert. st/comp $|a|$

$a < 0$ reflect x axis

$\boxed{\text{amplitude}}$

hor. st/comp $\frac{1}{|b|}$

$b < 0$ reflect y axis

period → sin, cos → $\frac{2\pi}{b}$

trans hor ↔

trans vert. ↕

ex. 1 $\quad y = 3 \sin 2\left(x - \frac{\pi}{3}\right) + 2$

$a = 3$ amplitude

find the period $\frac{2\pi}{b} = \frac{2\pi}{2} = \pi$

right $\frac{\pi}{3}$

up 2

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

— graph — use key points — start, middle, end

— max, min points

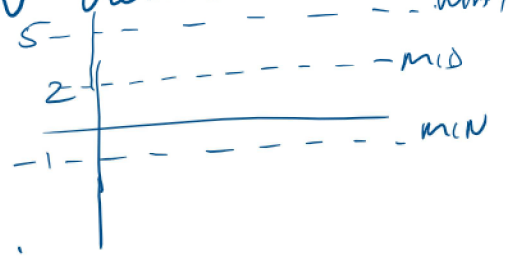
Know $a = 3$ amp. $\quad b = 2$ period $\frac{2\pi}{2} = \pi$ $\quad c = \frac{\pi}{3}$ → $\quad d = 2$ ↑

start with $d = 2 \Longrightarrow$ MIDLINE

use $amp = 3$ to get MAX / MIN values

$2 + 3 = 5$

$2 - 3 = -1$



now start and end cycle by using

$$0 \le b(x-c) \le 2\pi$$

solve for x

$$\frac{0}{2} \le \frac{2\left(x - \frac{\pi}{3}\right)}{2} \le \frac{2\pi}{2}$$

$\div$ all by 2

$$0 \le x - \cancel{\frac{\pi}{3}} \le \pi + \frac{\pi}{3}$$

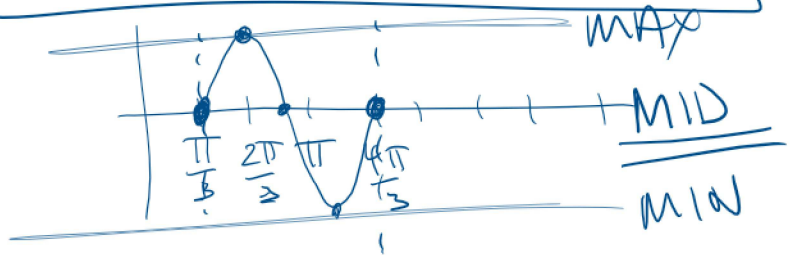
$+\frac{\pi}{3}$ to all

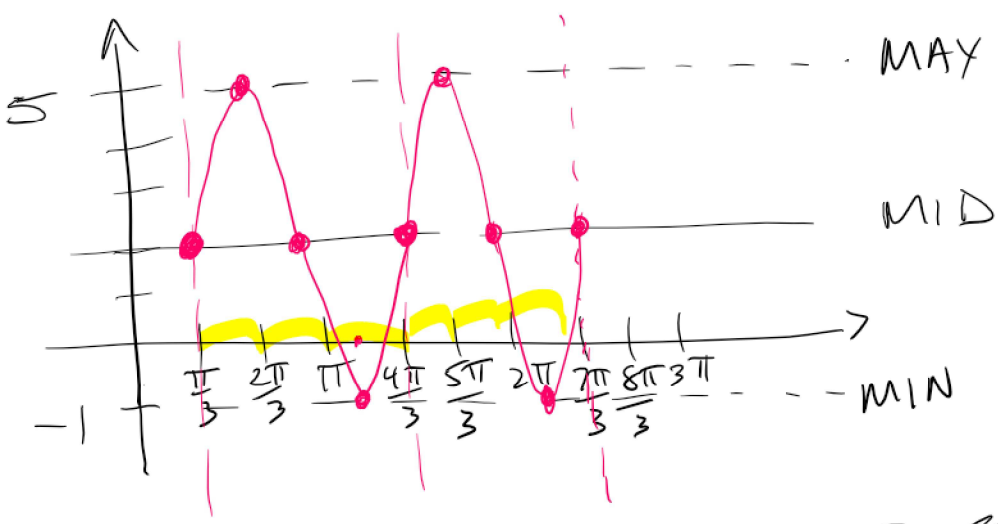
$+\frac{\pi}{3}$ $\quad$ $+\cancel{\frac{\pi}{3}}$

$$\frac{3\pi}{3} + \frac{\pi}{3} = \frac{4\pi}{3}$$

$$\boxed{\frac{\pi}{3} \le x \le \frac{4\pi}{3}}$$

ONE cycle





sin

Col 4 2-5 & 9a

p586 #3-5, 8a, 9a