

## Vocab

- Periodic function - graph has repeating pattern
- Amplitude - half the difference between max & min
- Period - horizontal length of a cycle - repeating pattern
- Frequency - reciprocal of period  
# of cycles per unit of time.

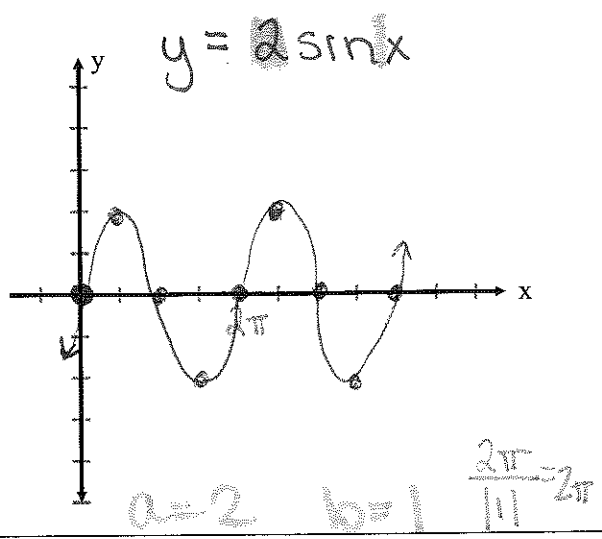
## Sin & Cos Characteristics

1. Domain:  $\mathbb{R}$
2. Range:  $-a \leq y \leq a$
3. Amplitude:  $\frac{1}{2}$  between  
| max & min
4. Each function is periodic

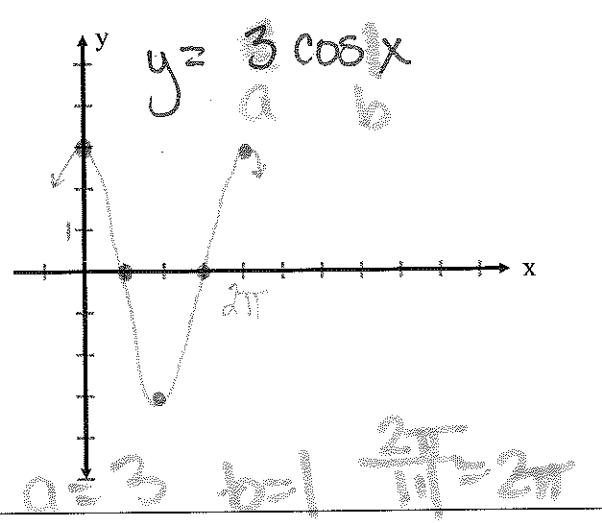
## Characteristics of tan

1. No amplitude - no max or min
2. shrink  $|a| < 1$   
stretch  $|a| > 1$
3. Period =  $\frac{\pi}{|b|}$
4. Asymptotes at  $\frac{1}{2}$  period

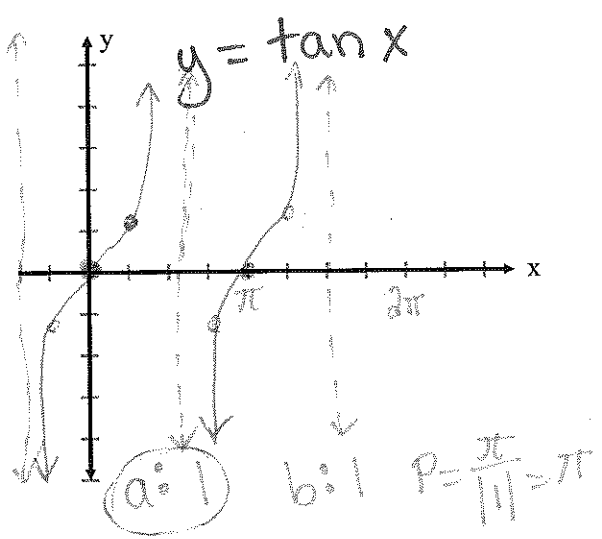
o  
a/



a  
|a|

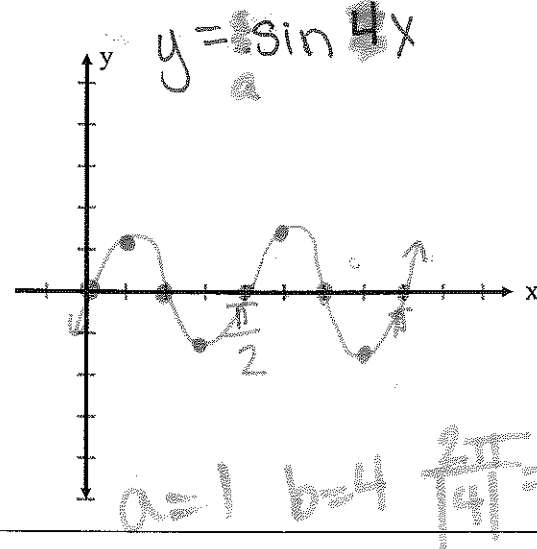
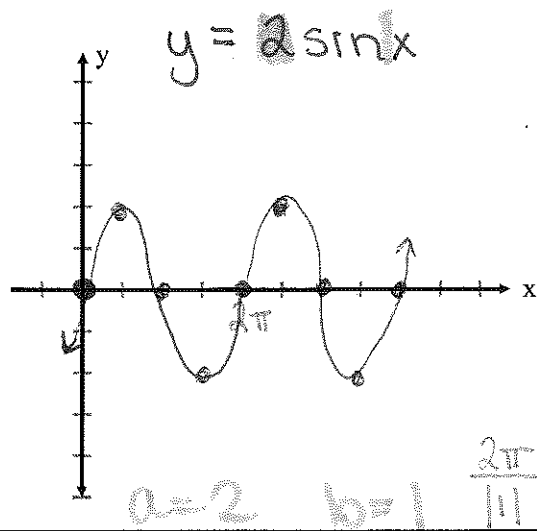


x  
o  
the period



$$y = a \sin bx$$

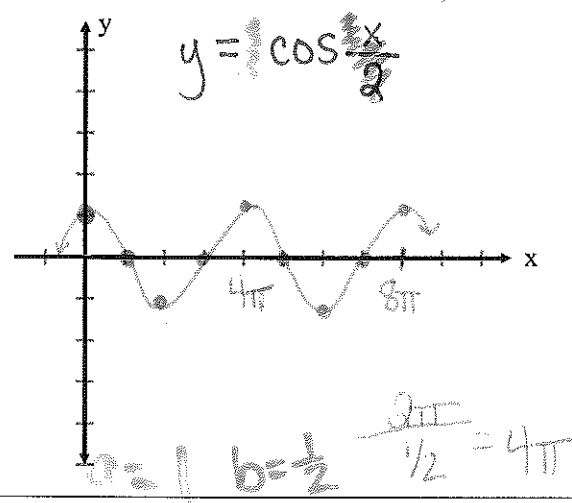
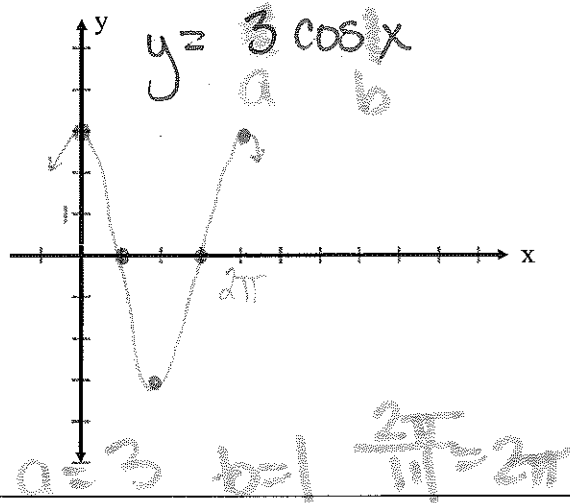
- ① sin starts at 0
- ② amplitude =  $|a|$
- ③ Period =  $\frac{2\pi}{|b|}$



always count 4 tick marks & put period.

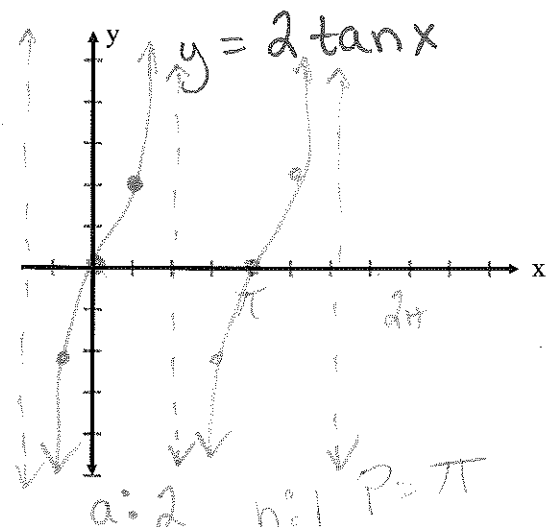
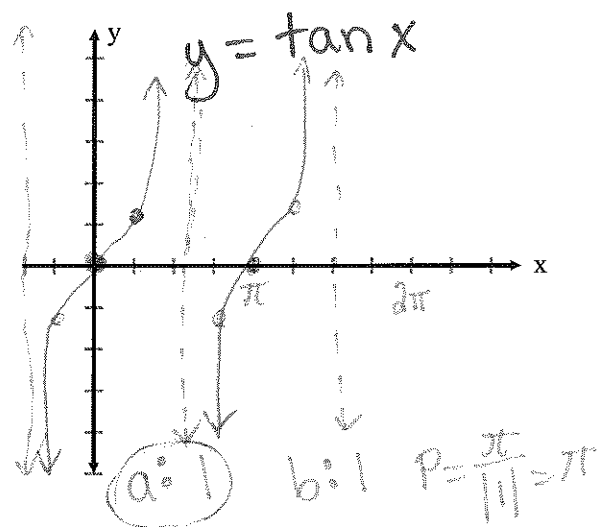
$$y = a \cos bx$$

- ① cos starts at a
- ② amplitude =  $|a|$
- ③ Period =  $\frac{2\pi}{|b|}$

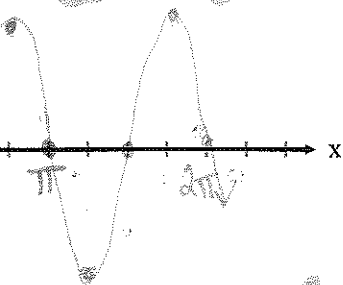


$$y = a \tan bx$$

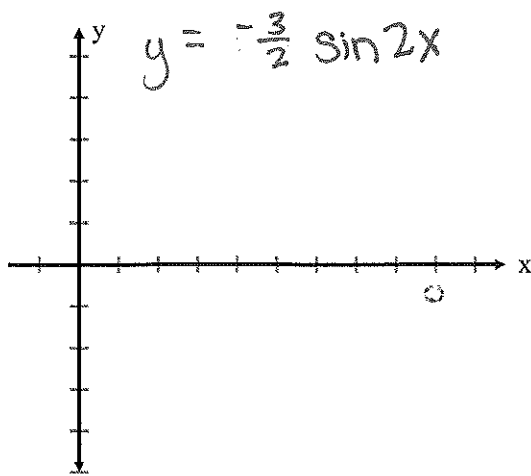
- ① tan starts at 0
- ② Period =  $\frac{\pi}{|b|}$
- ③ Asymptotes  $\frac{1}{2}$  the period



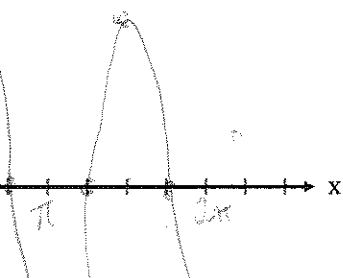
$$y = -3 \sin 2x$$



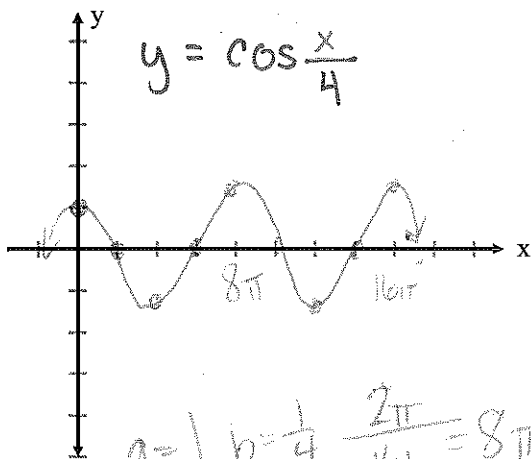
$$-3 \quad b=2 \quad \frac{2\pi}{|2|} = \pi$$



$$y = -4 \cos 2x$$

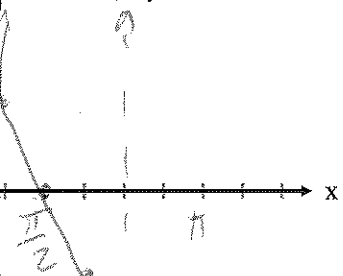


$$-4 \quad b=2 \quad \frac{2\pi}{2} = \pi$$

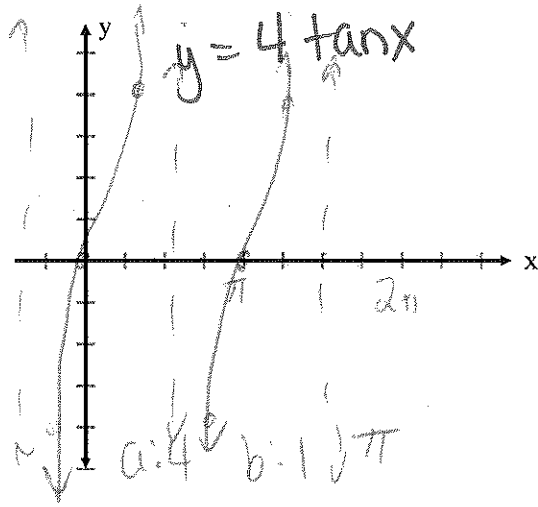


$$a=1 \quad b=1/4 \quad \frac{2\pi}{1/4} = 8\pi$$

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



$$b=2 \quad \frac{\pi}{2}$$



$$a:4 \quad b:1 \quad \pi$$