

$$\frac{13\pi}{3} - \frac{6 \cdot 2\pi}{3}$$
$$\frac{7\pi}{3} - \frac{6 \cdot 2\pi}{3}$$
$$\frac{\pi}{3}$$

$$\cos(-3\pi)$$

$$-3\pi + 2\pi$$
$$-\pi + 2\pi$$
$$\pi$$

$$\sin \theta = \frac{\sqrt{3}}{2}$$

$$\theta = \frac{\pi}{3}, \frac{2\pi}{3}$$

$$60^\circ, 120^\circ$$

$$\tan \theta = \frac{\sqrt{3}}{3}$$

$$\frac{1}{\sqrt{3}}$$

$$\frac{1}{2\sqrt{3}}$$

$$\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$$

$$\frac{1}{\sqrt{3}} \frac{\sqrt{3}}{\sqrt{3}}$$

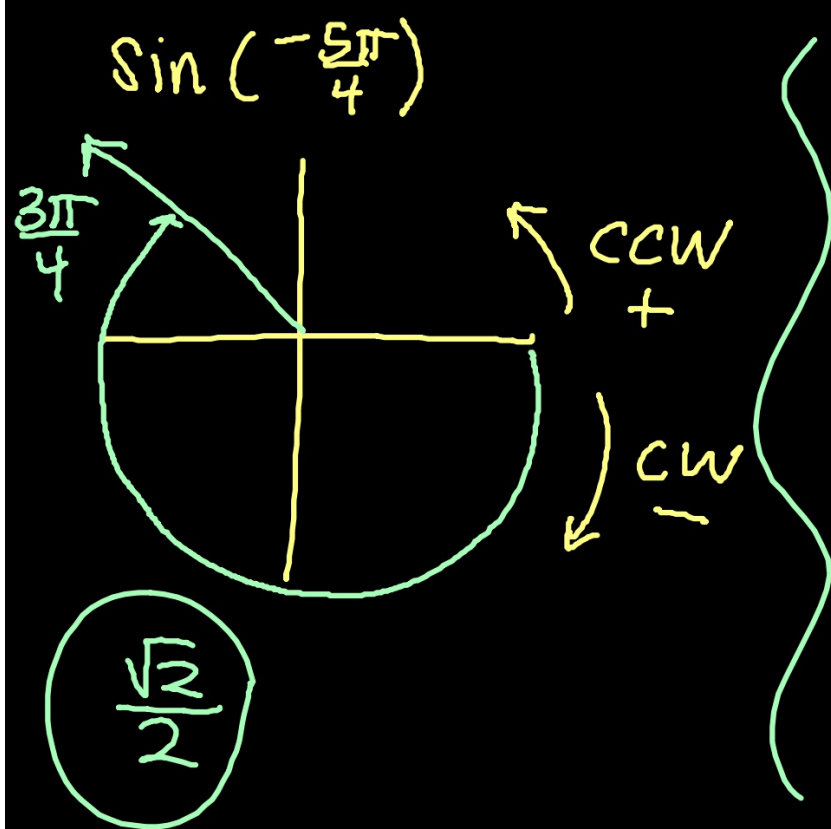
$$\frac{\sqrt{3}}{3}$$

$$\frac{\pi}{6}, \frac{7\pi}{6}$$

$$30^\circ, 210^\circ$$

$$\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$$

$$\sqrt{3}$$



$$\csc\theta = 0 \quad \frac{1}{y}$$

$$\sin\theta = \frac{1}{0}$$

$$\sin\theta = \text{undef.}$$

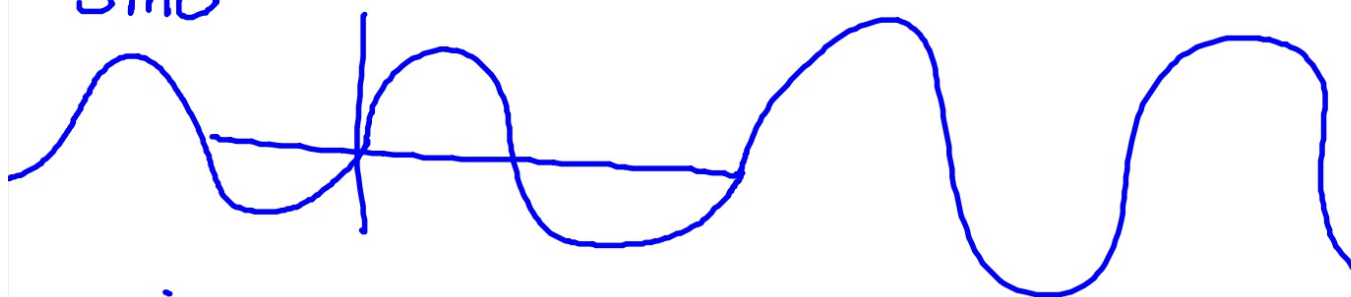
Never

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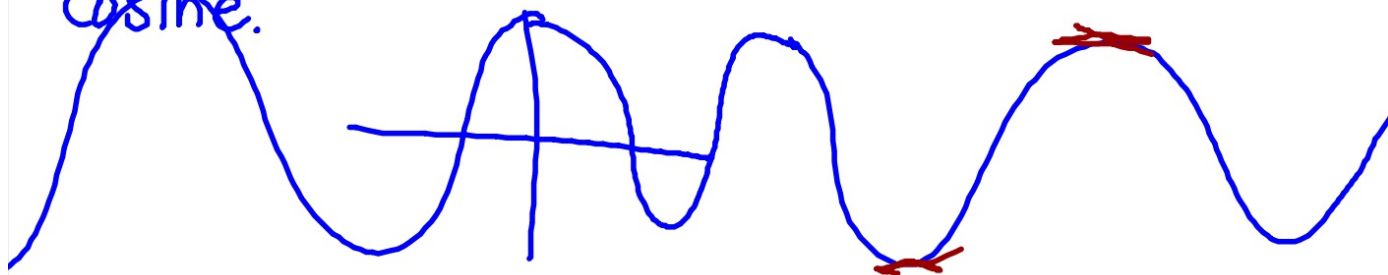
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Graphs of Trigonometric Functions: Day 1

Sine



Cosine.



To graph:

$$y = d \pm a \sin(bx + c)$$

$$y = d \pm a \cos(bx + c)$$

$d \rightarrow$  vs  $\rightarrow$  middle

$a \rightarrow$  amplitude  $\rightarrow A = |a|$

$\hookrightarrow \frac{1}{2}$  the dist from max to min

• the dist from middle to max  
or middle to min

period: distance for one cycle  
of the wave

$$P = \frac{2\pi}{|b|} \quad \text{end - beginning}$$

Phase shift / horizontal shift

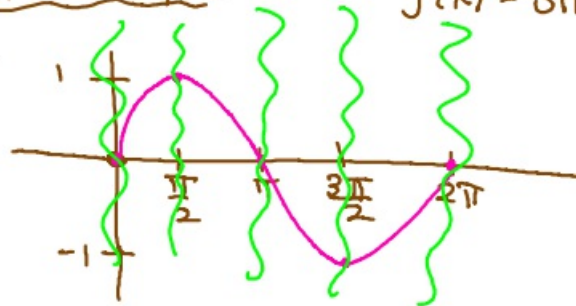
$$bx + c = 0 \quad PS = -\frac{c}{b}$$

starting point  $\rightarrow$  1<sup>st</sup> x-coord

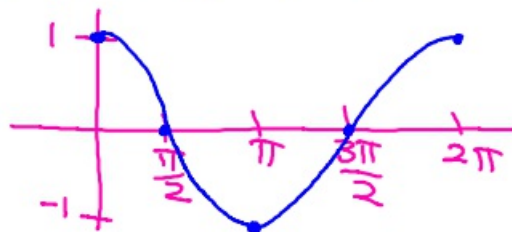
Mother Graphs

$$f(x) = \sin x$$

sine



cosine  $f(x) = \cos x$



Ex Graph. State all important info.

A.  $y = 3 - 5 \sin(6x - 3\pi)$  MLMHM

$a = -5$   $b = 6$   $c = -3\pi$   $d = 3$

Amplitude

$|A| = |-5| = 5$

Period  $P = \frac{2\pi}{|b|} = \frac{2\pi}{6} = \frac{\pi}{3}$

PS (start)

$bx + c = 0$

$6x - 3\pi = 0$

$6x = 3\pi$

$x = \frac{\pi}{2}$

$PS = -\frac{c}{b}$

$PS = \frac{3\pi}{6}$

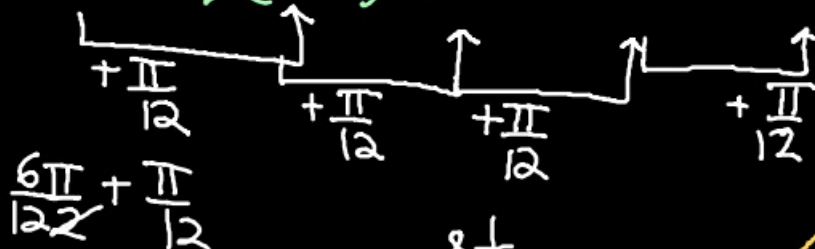
$PS = \frac{\pi}{2}$

distance btwn key points

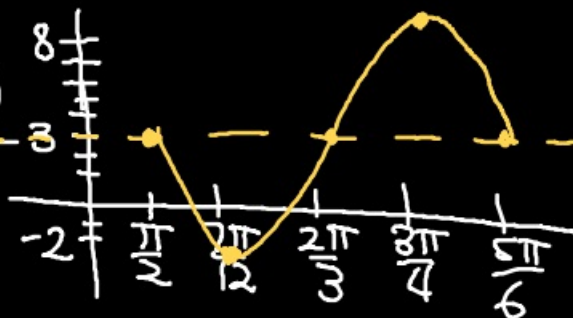
$\frac{P}{4} = \frac{\frac{\pi}{3}}{4} = \frac{\pi}{3} \cdot \frac{1}{4} = \frac{\pi}{12}$

Key points

$(\frac{\pi}{2}, 3)$   $(\frac{2\pi}{3}, -2)$   $(\frac{2\pi}{3}, 3)$   $(\frac{3\pi}{4}, -2)$   $(\frac{5\pi}{6}, 3)$



The Graph 😊



$$B. y = -2 + \cos\left(x - \frac{\pi}{4}\right)$$

$$a=1 \quad b=1 \quad c=-\frac{\pi}{4} \quad d=-2$$

$$A = |1| = 1$$

$$P = \frac{2\pi}{|1|} = 2\pi$$

$$\frac{P}{4} = \frac{2\pi}{4} = \frac{\pi}{2}$$

PS:  $bx + c = 0$   
 $x - \frac{\pi}{4} = 0$   
 $x = \frac{\pi}{4}$

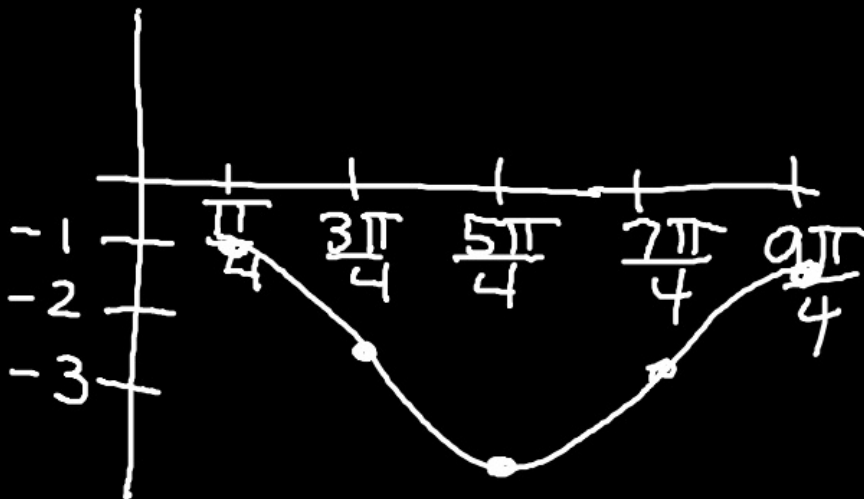
$$\left(\frac{\pi}{4}, -1\right) \quad H = M + A$$

$$\left(\frac{3\pi}{4}, -2\right) \quad M = d$$

$$\left(\frac{5\pi}{4}, -3\right) \quad L = M - A$$

$$\left(\frac{7\pi}{4}, -2\right) \quad M = d$$

$$\left(\frac{9\pi}{4}, -1\right) \quad H$$



## Patterns

pos. sine: M H M L M

neg. sine: M L M H M

pos. cosine: H M L M H

neg cosine: L M H M L



- To graph a secant  $\rightarrow$  pretend it's cosine & then place <sup>vertical</sup> asymptotes at the middle & draw opposite curve.
- To graph a cosecant  $\rightarrow$  pretend it's sine & follow directions above
- These have No amplitude
- These have fewer key points.
- These have VA

C.  $y = 4 - 2 \csc(x + \frac{\pi}{3})$

$y = 4 - 2 \sin(x + \frac{\pi}{3})$

$a = -2 \quad b = 1 \quad c = \frac{\pi}{3} \quad d = 4$

$A = |-2| = 2$

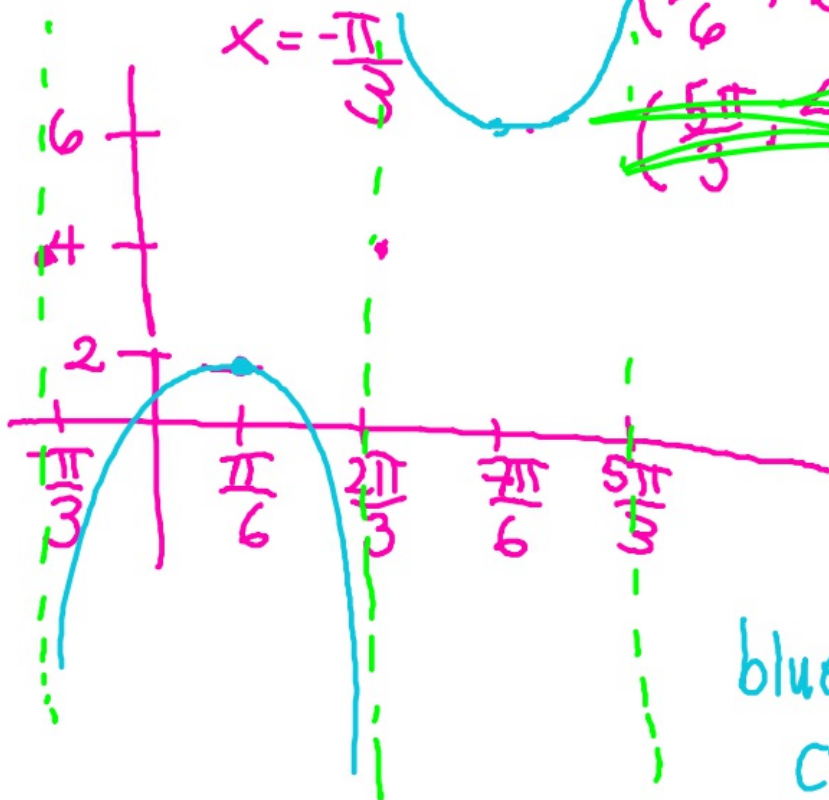
$P = \frac{2\pi}{|b|} = \frac{2\pi}{1} = 2\pi$

$\frac{P}{4} = \frac{2\pi}{4} = \frac{\pi}{2}$

PS: start x-coord

$x + \frac{\pi}{3} = 0$

$x = -\frac{\pi}{3}$



KP

~~$(-\frac{\pi}{3}, 4) M$~~

$(\frac{\pi}{6}, 2) L$

~~$(\frac{2\pi}{3}, 4) M$~~

$(\frac{7\pi}{6}, 6) H$

~~$(\frac{5\pi}{3}, 4) M$~~

VA

$x = -\frac{\pi}{3}$

$x = \frac{2\pi}{3}$

$x = \frac{5\pi}{3}$

blue/green  
csc curve