7.6: Equations of Sine & Cosine

$y = a \cdot \sin bx + d$

- a: amplitude $= |a|$ *make it positive!!!
- b: period $= \frac{2\pi}{b}$
- d: vertical shift $= +d \rightarrow$ up, $= -d \rightarrow$ down

frequency = reciprocal of period (flip fraction)

Determine amplitude, period, frequency, & vertical shift

Ex 1) $y = 6\cos 10x - 8$

$a = 6$, $b = 10$, $d = -8$

amp $= |6|$

amp = 6

period $= \frac{2\pi}{10}$ ($\div 2 = 1$, $\div 2 = 5$)

period $= \frac{\pi}{5}$

freq $= \frac{5}{\pi}$

V.S = down 8

Ex 2) $y = -1\cos \frac{1}{3}x + 4$

$a = -1$, $b = \frac{1}{3}$, $d = 4$

amp $= |-1|$

amp = 1

period $= \frac{2\pi}{1/3}$

period $= \frac{2\pi}{1} \cdot \frac{3}{1}$

period $= 6\pi$

frequency $= \frac{1}{6\pi}$

VS = up 4

°Ex 3) Write a cosine function with amplitude 7, period $\frac{\pi}{11}$, and vertical shift up 2

$y = a \cdot \cos bx + d$

$a: 7, -7$

$b: 22$

$d: +2$

$\text{period} = \frac{2\pi}{b}$

$\frac{\pi}{11} = \frac{2\pi}{b}$

$\frac{b\pi}{\pi} = \frac{22\pi}{\pi}$

$b = 22$

$y = 7\cos 22x + 2$

$y = -7\cos 22x + 2$