

We know:

$$A \text{ trig}(B(x-C)) + D$$

v. str
mult. y-vals
("amplitude")

h. str/comp
div x-vals

h. shift
add/subtr
x-vals

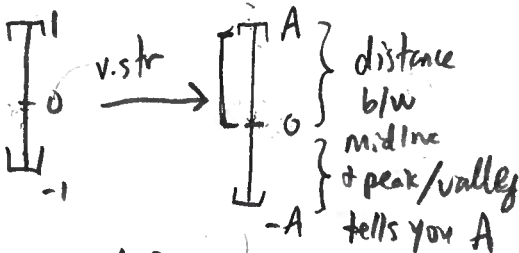
v. shift
add/subtr
to y-vals

$$\sin(x) \sim \text{per} = 2\pi$$

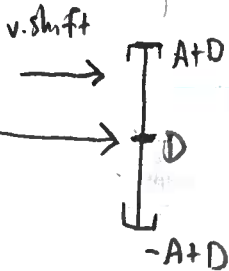
$$\sin(Bx) \sim \text{per} = \frac{2\pi}{B}$$

Observations:

vertical:



y-value of the midline tells you D

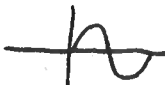


"phase shift"

for

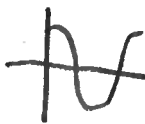
decide

sine



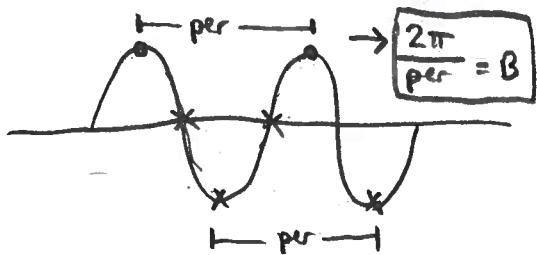
=> horiz shift should make it "start" at x=0 at height 0 (or midline)

cosine



=> horiz shift should make it "start" at x=0 at height 1 (or highest value)

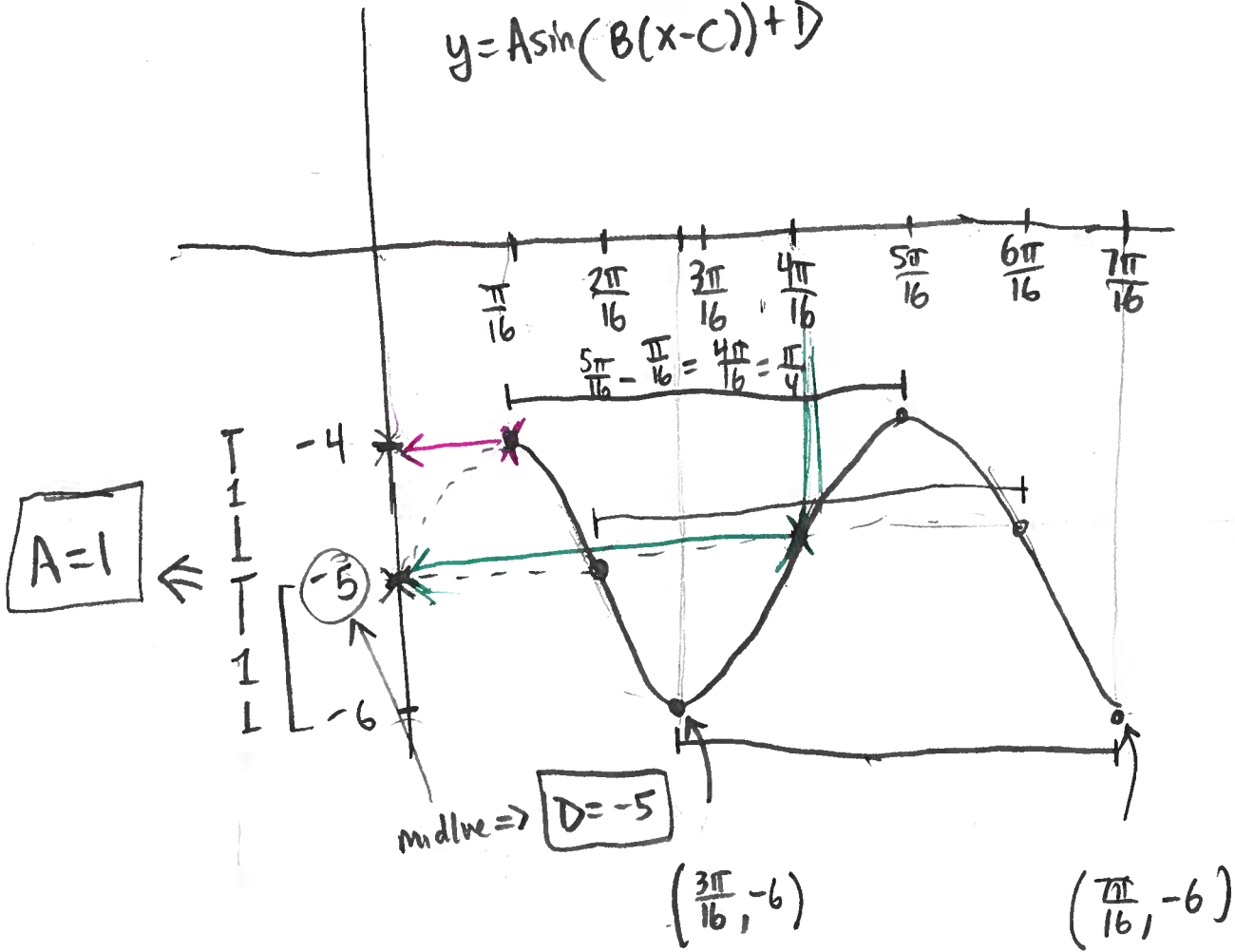
$$\text{per} = \frac{2\pi}{B} \rightarrow \frac{1}{\text{per}} = \frac{B}{2\pi}$$



$$y = A \cos(B(x-C)) + D$$

OR

$$y = A \sin(B(x-C)) + D$$



$$2 = \frac{4}{2} = \frac{6}{3}$$

$$\text{period} = \frac{7\pi}{16} - \frac{3\pi}{16} = \frac{4\pi}{16} = \frac{\pi}{4}$$

$$\text{per} = \frac{2\pi}{B}$$

$$\frac{\pi}{4} = \frac{2\pi}{B} \rightarrow \frac{4}{\pi} = \frac{B}{2\pi} \rightarrow B = \frac{8\pi}{\pi} = 8$$

Write as sine: had a horiz shift of $\frac{\pi}{4}$ to right
 "x - $\frac{\pi}{4}$ " \Rightarrow $C = \frac{\pi}{4}$

"phase shift of $\frac{\pi}{4}$ "
 "of $-\frac{\pi}{4}$ "

$$\Rightarrow y = \sin\left(8\left(x - \frac{\pi}{4}\right)\right) - 5$$

Write as cosine: had horiz shift of $\frac{\pi}{16}$ to right

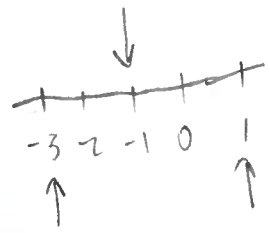
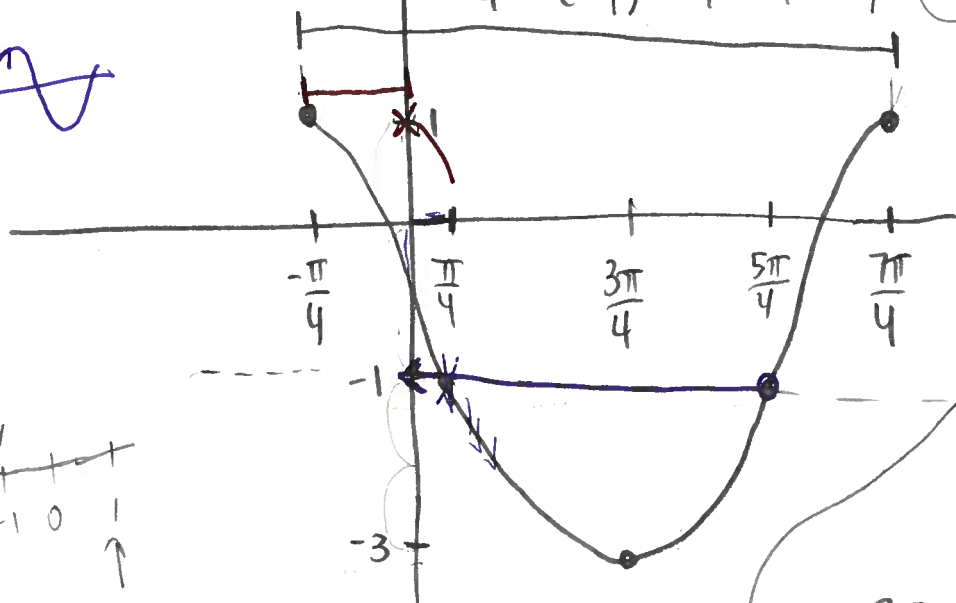
"x - $\frac{\pi}{16}$ " \Rightarrow $C = \frac{\pi}{16}$

"phase shift of $\frac{\pi}{16}$ "

$$y = \cos\left(8\left(x - \frac{\pi}{16}\right)\right) - 5$$

3

$$\frac{\pi}{4} - (-\frac{\pi}{4}) = \frac{7\pi}{4} + \frac{\pi}{4} = \frac{8\pi}{4} = 2\pi$$



$$\frac{1 + (-3)}{2} = \frac{-2}{2} = -1 \checkmark$$

Amp: $2 = A$
V. shift: $D = -1$

$$\text{per} = \frac{2\pi}{B}$$

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

$$\frac{1}{2\pi} = \frac{B}{2\pi}$$

$$B = 1$$

As sine: horiz shift right by $\frac{5\pi}{4}$

" $x - \frac{5\pi}{4}$ " \rightarrow phase shift
 $D = \frac{5\pi}{4}$

$$2 \sin\left(x - \frac{5\pi}{4}\right) - 1$$

As cosine: horiz shift left by $\frac{\pi}{4}$

" $x + \frac{\pi}{4}$ " = " $x - (-\frac{\pi}{4})$ " \rightarrow phase shift
 $D = -\frac{\pi}{4}$

$$2 \cos\left(x + \frac{\pi}{4}\right) - 1$$