

# Unit 8

## Learning Target 2

I can write the equation of a trigonometric function given a graph.

### Writing Equations for Sine and Cosine Graphs

- 1) Determine if it is **sine** or **cosine**
- 2) Find the midline (x-axis/zeros)
- 3) Use the midline to determine the amplitude (**flipped**)
- 4) Determine the period --> find **B**  $p = \frac{2\pi}{b}$
- 5) Look for any shifts  
**vertical shifts** -> midline is above or below the x-axis  
**phase shifts** -> graph does not start at the y-axis

$$\text{Sine} \\ y = A \sin B(x \pm C) \pm D$$

$$\text{Cosine} \\ y = A \cos B(x \pm C) \pm D$$

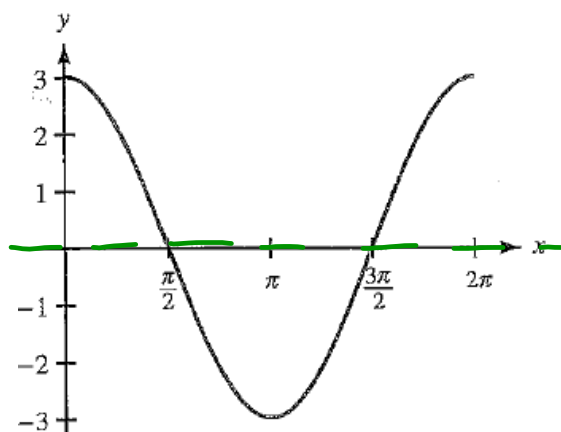
Sine

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

Cosine

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

1.) sine or cosine?

 $A = 3$   
 Amplitude: 3
 $B = 1$   
 Period:  $2\pi$   $\frac{P}{1} = \frac{2\pi}{B}$ 
 $C = \pi$   
 Horizontal Shift: 0
 $D = 0$   
 Vertical Shift: 0
Equation:  $y = 3 \cos(x)$ Domain:  $(-\infty, \infty)$ Range:  $[-3, 3]$ 

2.) sine or cosine?

Amplitude: 3  $A=3$  <sup>flip so</sup>

Period:  $\pi$   $B=2$   
 $C = -\pi/4$

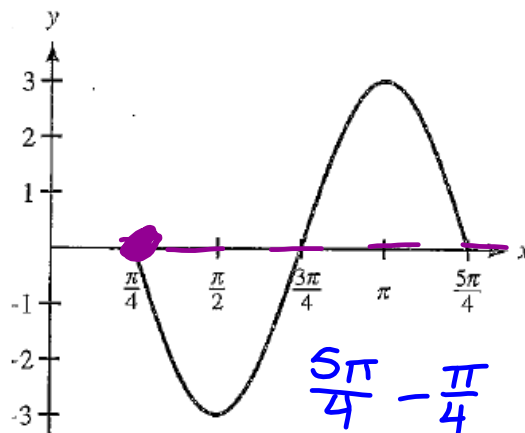
Horizontal Shift: R  $\pi/4$

Vertical Shift: 0  $D=0$

Equation:  $y = -3 \sin 2(x - \pi/4)$

Domain:  $(-\infty, \infty)$

Range:  $[-3, 3]$



$\frac{5\pi}{4} - \frac{\pi}{4}$   
 $p = \frac{2\pi}{B}$   
 ~~$\frac{\pi}{1} = \frac{2\pi}{B}$~~   
 ~~$\frac{B\pi}{\pi} = \frac{2\pi}{\pi}$~~   
 $B = 2$

3.) sine or cosine?

Amplitude: 3  $A=3$

Period:  $\pi$   $B=2$

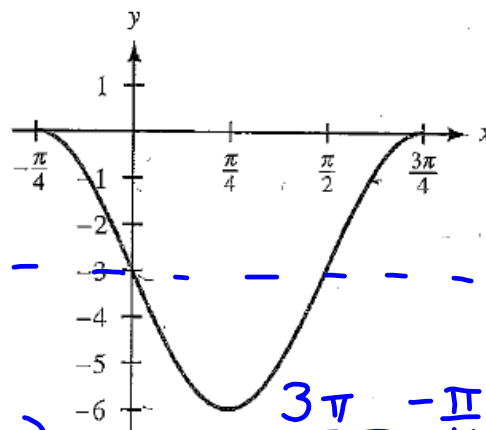
Horizontal Shift: left  $\pi/4$   $C = \pi/4$

Vertical Shift: down 3  $D = -3$

Equation:  $y = 3 \cos 2(x + \pi/4) - 3$

Domain: \_\_\_\_\_

Range: \_\_\_\_\_



$\frac{3\pi}{4} - \frac{\pi}{4}$   
 $\frac{3\pi}{4} + \frac{\pi}{4}$   
 $\frac{4\pi \div 2}{4 \div 2} = \frac{2\pi}{2}$   
 $= \pi$

Write equations for sine/cosine given the following changes to the parent graph.

4.) Cosine

Amplitude: 7  $A = 7$

Period:  $\frac{\pi \cdot 2}{3 \cdot 2} = \frac{2\pi}{6}$   $B = 6$

Horizontal shift: left  $\frac{\pi}{16}$   $C = +\frac{\pi}{16}$

Vertical shift: down 3  $D = -3$

$$\begin{array}{l} \cancel{A = 2\pi} \\ \cancel{B} \\ \frac{6\pi}{\pi} = \frac{\pi B}{\pi} \\ 6 = B \end{array}$$

$$y = 7 \cos 6 \left( x + \frac{\pi}{16} \right) - 3$$

Equation: \_\_\_\_\_

5.) Sine

Amplitude: 4  $A = 4$

Period:  $\frac{1}{2}$  the original  $B = 2$

Vertical shift: down 2  $D = -2$

$$y = 4 \sin 2(x) - 2$$

Equation: \_\_\_\_\_

