

Precalculus Homework

Name Key

4.5 Worksheet #2-Writing Equations of Sine and Cosine Functions

(* Answers can vary for P.S. and Function)

Examine the graph below and determine the amplitude, period, phase shift, and vertical shift of each using COSINE as the parent function. Then write an equation of the function.

Reflected + P.S. = $\frac{3\pi}{4}$
 $y = -5 \cos 2(x - \frac{3\pi}{4})$
 $y = -5 \cos (2x - \frac{3\pi}{2})$

1.

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

$y = a \cos b(x - \frac{c}{b}) + d$
 $y = 5 \cos 2(x - \frac{\pi}{4})$
 $y = 5 \cos (2x - \frac{\pi}{2})$

Amplitude: 5
 Period: π
 Phase Shift: $\frac{\pi}{4}$
 Vertical Shift: 0
 Function: $y = 5 \cos (2x - \frac{\pi}{2})$

2. Reflected + P.S. = π

$y = -2 \cos 1(x - \pi) + 1$
 $y = -2 \cos (x - \pi) + 1$

Per = $\frac{2\pi}{b}$
 $2\pi = \frac{2\pi}{b}$
 $b = 1$

Amplitude: 2
 Period: 2π
 Phase Shift: 0
 Vertical Shift: 1
 Function: $y = 2 \cos x + 1$

Examine the graph below and determine the amplitude, period, phase shift, and vertical shift of each using SINE as the parent function. Then write an equation of the function.

3.

OR: $y = -2 \sin \frac{1}{3}(x - \frac{3\pi}{2}) + 3$
 $y = -2 \sin (\frac{1}{3}x - \frac{\pi}{2}) + 3$

Reflected
 P.S. = $\frac{3\pi}{2}$

Per = $\frac{2\pi}{b}$
 $6\pi = \frac{2\pi}{b}$
 $b = \frac{1}{3}$

$y = 2 \sin \frac{1}{3}(x - \frac{3\pi}{2}) + 3$

Amplitude: 2
 Period: 6π
 Phase Shift: $\frac{3\pi}{2}$
 Vertical Shift: 3
 Function: $y = 2 \sin (\frac{1}{3}x - \frac{3\pi}{2}) + 3$

4.

$\frac{2\pi}{5} = \frac{2\pi}{b}$
 $b = 5$

$y = \frac{1}{2} \sin 5(x - \frac{\pi}{5})$
 $y = \frac{1}{2} \sin (5x - \pi)$

Amplitude: $\frac{1}{2}$
 Period: $\frac{2\pi}{5}$
 Phase Shift: $\frac{\pi}{5}$
 Vertical Shift: 0
 Function: $y = \frac{1}{2} \sin (5x - \pi)$

OR
 $y = -\frac{1}{2} \sin 5x$
 (0 P.S.) + Reflected

Identify the amplitude, period, phase shift and vertical shift of the following trig functions.

<p>5. $y = -10 \cos\left(\frac{x}{6}\right)$ Per = $\frac{2\pi}{\frac{1}{6}}$ $= \frac{2\pi}{\frac{1}{6}}$ $= 12\pi$</p> <p>Amplitude: <u>10</u> Period: <u>12π</u> Phase Shift: <u>0</u> Vertical Shift: <u>0</u></p>	<p>6. $y = 5 - 2 \sin\left(\frac{2x}{3}\right)$ $y = -2 \sin\left(\frac{2x}{3}\right) + 5$</p> <p>Amplitude: <u>2</u> Per = $\frac{2\pi}{\frac{2}{3}}$ Period: <u>3π</u> = $2\pi \left(\frac{3}{2}\right)$ Phase Shift: <u>0</u> = 3π Vertical Shift: <u>5</u></p>
<p>7. $y = 3 \cos(6x + \pi)$ $y = 3 \cos 6\left(x + \frac{\pi}{6}\right)$</p> <p>Amplitude: <u>3</u> Per = $\frac{2\pi}{6} = \frac{\pi}{3}$ Period: <u>$\frac{\pi}{3}$</u> P.S.: $6x + \pi = 0$ Phase Shift: <u>$-\frac{\pi}{6}$</u> $6x = -\pi$ Vertical Shift: <u>0</u> $x = -\frac{\pi}{6}$</p>	<p>8. $y = -4 \sin\left(\frac{2}{3}x - \frac{\pi}{3}\right)$ $y = -4 \sin \frac{2}{3}\left(x - \frac{\pi}{2}\right)$</p> <p>Amplitude: <u>4</u> Per = $\frac{2\pi}{\frac{2}{3}} = 2\pi \left(\frac{3}{2}\right)$ Period: <u>3π</u> P.S.: $\frac{2}{3}x - \frac{\pi}{3} = 0$ Phase Shift: <u>$\frac{\pi}{2}$</u> $\frac{2}{3}x = \frac{\pi}{3}$ Vertical Shift: <u>0</u> $x = \frac{\pi}{2} \cdot \frac{3}{2}$</p>

Given the following information about each trig function, write a possible equation for each.

<p>9. Sine Function amplitude = $\frac{1}{2}$ Per = $\frac{2\pi}{\frac{1}{3}}$ $\frac{\pi}{3} = \frac{2\pi}{b}$ period = $\frac{\pi}{3}$ $b = 6$ vertical shift = -4</p> <p>$y = \frac{1}{2} \sin 6(x-0) - 4$ $y = \frac{1}{2} \sin 6x - 4$</p>	<p>10. Sine Function Per = $\frac{2\pi}{\frac{1}{2}}$ amplitude = 7 $4\pi = \frac{2\pi}{b}$ period = 4π $\frac{1}{2} = b$ phase shift = $-\frac{\pi}{3}$</p> <p>$y = 7 \sin \frac{1}{2}\left(x + \frac{\pi}{3}\right)$ $y = 7 \sin\left(\frac{1}{2}x + \frac{\pi}{6}\right)$</p>
<p>11. Cosine Function amplitude = 1 Per = $\frac{2\pi}{1}$ period = 2π $2\pi = \frac{2\pi}{b}$ phase shift = $\frac{5\pi}{6}$ $1 = b$ vertical shift = 3</p> <p>$y = 1 \cos 1\left(x - \frac{5\pi}{6}\right) + 3$ $y = \cos\left(x - \frac{5\pi}{6}\right) + 3$</p>	<p>12. Cosine Function Per = $\frac{2\pi}{2}$ amplitude = 3 $\pi = \frac{2\pi}{b}$ period = π $2 = b$ phase shift = $-\pi$ vertical shift = -1.5</p> <p>$y = 3 \cos 2(x + \pi) - 1.5$ $y = 3 \cos(2x + 2\pi) - 1.5$</p>