Pre-Calculus Honors
Supplemental Worksheet 4.4-4.5

Name: Key
Date: _____ Period: _____

**State the amplitude, period, phase shift and vertical shift for each of the following.**

1. $y = -3\sin\left(x + \frac{\pi}{3}\right) - 2$ $\frac{P}{4} = \frac{\pi}{2}$

| Amplitude: 3 | Period: $2\pi$ | Phase Shift: $-\pi/3$ | Vertical Shift: $-2$ |
|---|---|---|---|

Key Points: $\left(-\frac{\pi}{3}, -2\right)\left(\frac{\pi}{6}, -5\right)\left(\frac{2\pi}{3}, -2\right)\left(\frac{7\pi}{6}, 1\right)\left(\frac{5\pi}{3}, -2\right)$

2. $y = 4\sin\left(\frac{\pi}{2}x + \frac{\pi}{4}\right) + 1$ $\frac{P}{4} = 1$

| Amplitude: 4 | Period: 4 | Phase Shift: $-\frac{1}{2}$ | Vertical Shift: 1 |
|---|---|---|---|

Key Points: $\left(-\frac{1}{2}, 1\right)\left(\frac{1}{2}, 5\right)\left(\frac{3}{2}, 1\right)\left(\frac{5}{2}, -3\right)\left(\frac{7}{2}, 1\right)$

3. $y = \frac{1}{3}\sin(\pi x + 2) - 4$ $\frac{P}{4} = \frac{2}{4} = \frac{1}{2}$

| Amplitude: $\frac{1}{3}$ | Period: 2 | Phase Shift: $-\frac{2}{\pi}$ | Vertical Shift: $-4$ |
|---|---|---|---|

Key Points: $\left(-\frac{2}{\pi}, -4\right)\left(-\frac{2}{\pi}+\frac{1}{2}, -\frac{11}{3}\right)\left(-\frac{2}{\pi}+1, -4\right)\left(-\frac{2}{\pi}+\frac{3}{2}, -\frac{13}{3}\right)\left(-\frac{2}{\pi}+2, -4\right)$

**Write a sine function for each of the following.**

4. Amplitude = 2 Period = $3\pi$ Phase Shift = 0 Vertical Shift = 2

$3\pi = \frac{2\pi}{b}$, $b = \frac{2}{3}$ ; $0 = -\frac{C}{\frac{2}{3}}$, $C = 0$

$y = 2 \pm 2\sin\left(\frac{2}{3}x + 0\right)$

5. Amplitude = $\frac{1}{2}$ Period = $\frac{\pi}{6}$ Phase Shift = $\frac{\pi}{3}$ Vertical Shift = $-4$

$\frac{\pi}{6} = \frac{2\pi}{b}$, $\pi b = 12\pi$, $b = 12$ ; $-\frac{C}{12} = \frac{\pi}{3}$, $-3C = 12\pi$, $C = -4\pi$

$y = -4 \pm \frac{1}{2}\sin(12x - 4\pi)$

6. Amplitude = 4 Period = 4 Phase Shift = $-2$ Vertical Shift = 1

$4 = \frac{2\pi}{b}$, $b = \frac{\pi}{2}$ ; $-\frac{C}{\frac{\pi}{2}} = \frac{-2}{1}$, $C = \pi$

$y = 1 \pm 4\sin\left(\frac{\pi}{2}x + \pi\right)$

7. Amplitude = $\frac{1}{4}$ Period = $\frac{\pi}{4}$ Phase Shift = $\frac{\pi}{6}$ Vertical Shift = 3

$\frac{2\pi}{b} = \frac{\pi}{4}$, $8\pi = \pi b$, $b = 8$ ; $-\frac{C}{8} = \frac{\pi}{6}$, $-6C = 8\pi$, $C = -\frac{4}{3}\pi$

$y = 3 \pm \frac{1}{4}\sin\left(8x - \frac{4\pi}{3}\right)$

**Write a cosine function for each of the following.**

8. Amplitude = $\frac{1}{4}$ Period = $2\pi$ Phase Shift = $\frac{\pi}{3}$ Vertical Shift = 2

$\frac{2\pi}{b} = 2\pi$, $b = 1$ ; $-\frac{C}{1} = \frac{\pi}{3}$, $-3C = \pi$, $C = -\frac{\pi}{3}$

$y = 2 \pm \frac{1}{4}\cos\left(x - \frac{\pi}{3}\right)$