

Name: Key Date: _____ Period: _____ Assignment # _____

9.4B WS - Graphing Sine & Cosine (Putting it All Together)

$$y = a \sin b(x - h) + k \quad \text{and} \quad y = a \cos b(x - h) + k$$

Fill in the blanks and graph the function over the interval $-2\pi \leq x \leq 2\pi$. Draw in horizontal lines to represent the midline and maximum and minimum values of the graph.

1. $y = \sin 2x + 3$

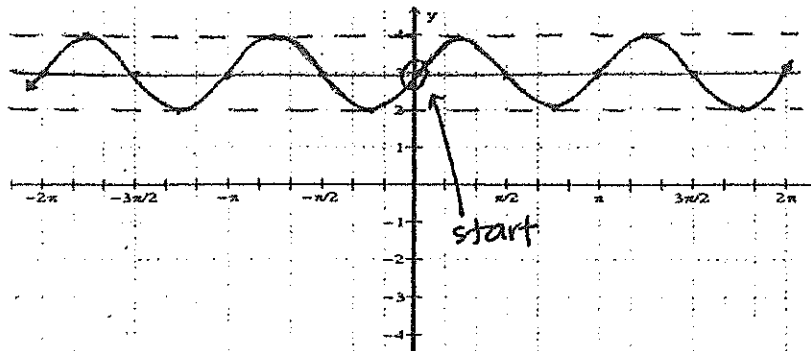
Amplitude: 1

Period: π

Phase shift: none

Vertical shift: up 3

Range: $\{2 \leq y \leq 4\}$



horizontal shrink by a factor of $\frac{1}{2}$;
shift 3 units up.

2. $y = 2 \cos\left(x - \frac{\pi}{2}\right)$

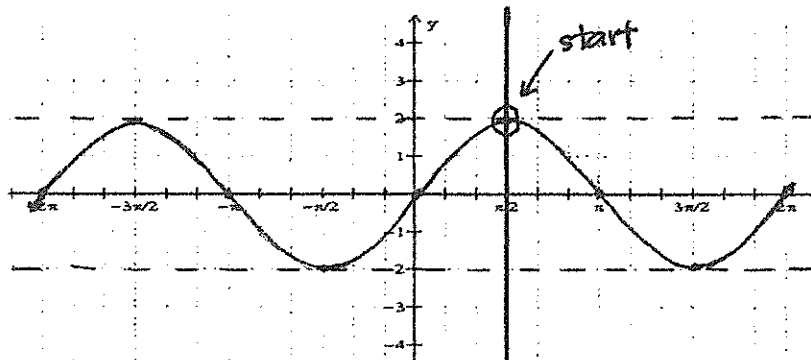
Amplitude: 2

Period: 2π

Phase shift: right $\frac{\pi}{2}$

Vertical shift: none

Range: $\{-2 \leq y \leq 2\}$



vertical stretch by a factor of 2; shift $\frac{\pi}{2}$ units right

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

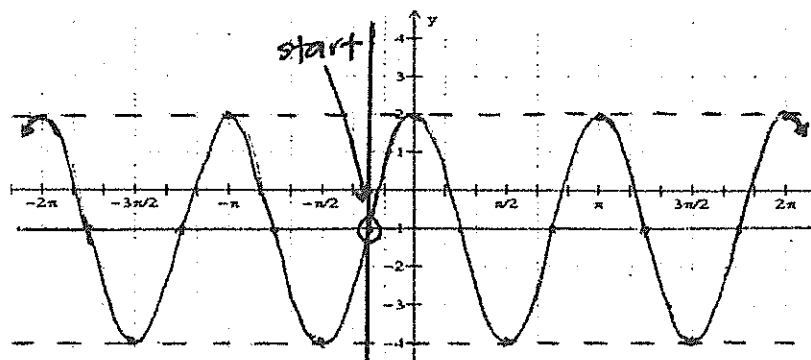
Amplitude: 3

Period: π

Phase shift: left $\frac{\pi}{4}$

Vertical shift: down 1

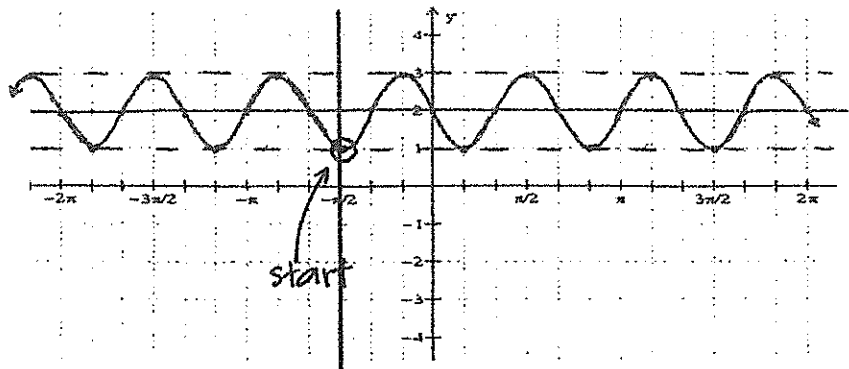
Range: $\{-4 \leq y \leq 2\}$



vertical stretch by a factor of 3; horizontal shrink by a factor of $\frac{1}{2}$; shift $\frac{\pi}{4}$ units left and 1 unit down.

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

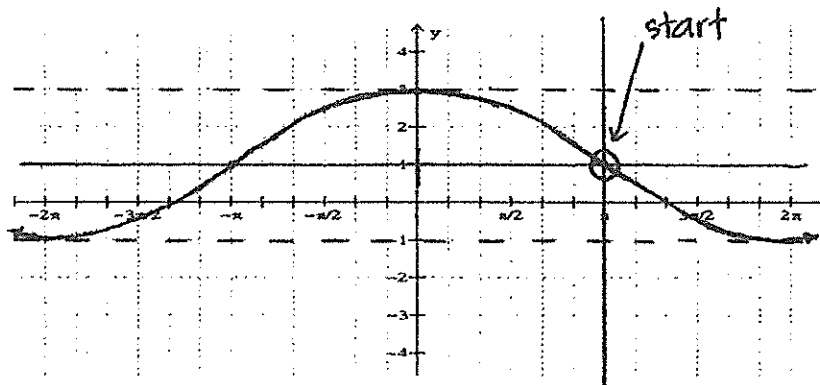
Amplitude: 1
 Period: $\frac{2\pi}{3}$
 Phase shift: left $\frac{\pi}{2}$
 Vertical shift: up 2
 Range: $[1 \leq y \leq 3]$



Reflect across midline; horizontal shrink by a factor of $\frac{1}{3}$; shift $\frac{\pi}{2}$ units left and 2 units up.

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

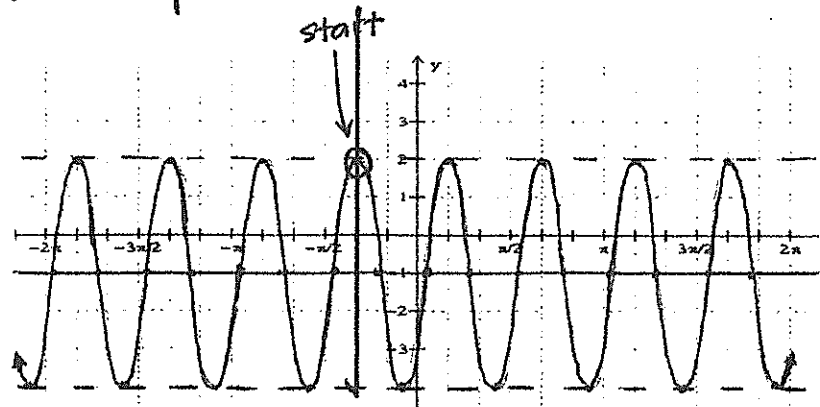
Amplitude: 2
 Period: 4π
 Phase shift: right π
 Vertical shift: up 1
 Range: $[-1 \leq y \leq 3]$



Reflect across midline; vertical stretch by a factor of 2; horizontal stretch by a factor of 2; shift π units right and 1 unit up.

6. $y = 3\cos 4\left(x + \frac{\pi}{3}\right) - 1$

Amplitude: 3
 Period: $\frac{\pi}{2}$
 Phase shift: left $\frac{\pi}{3}$
 Vertical shift: down 1
 Range: $[-4 \leq y \leq 2]$



Vertical stretch by a factor of 3; horizontal shrink by a factor of $\frac{1}{4}$; shift $\frac{\pi}{3}$ units left and 1 unit down.