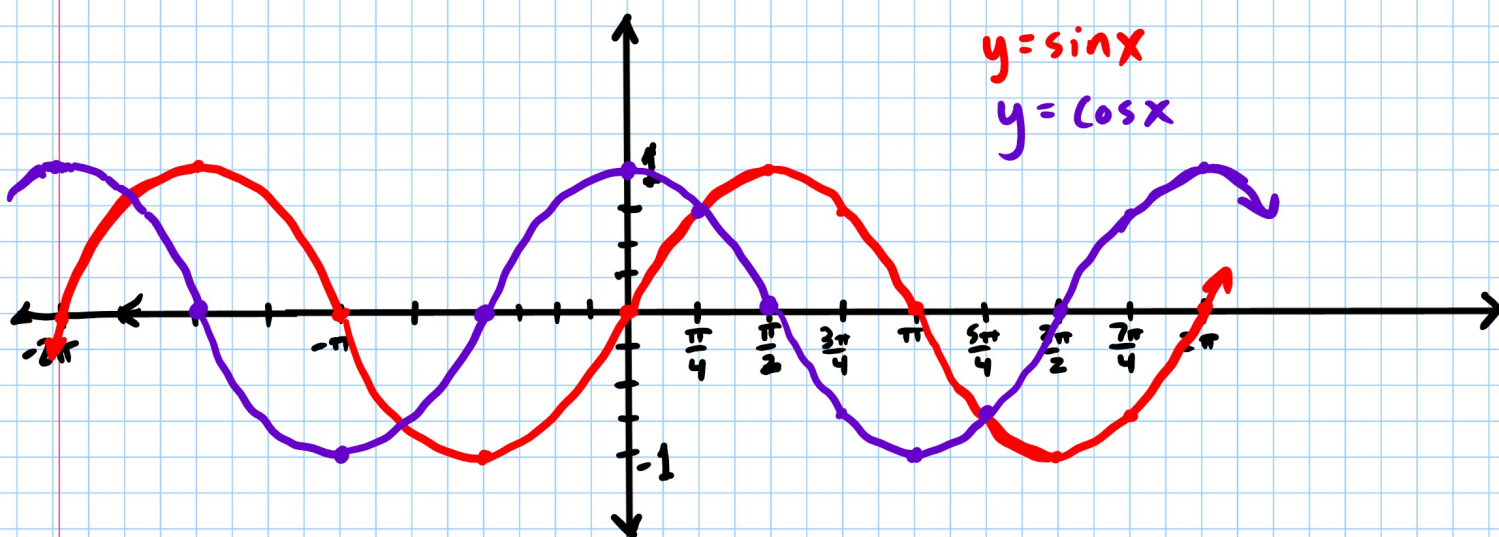


WARMUP - Put your calculator in radian mode and fill in the chart with decimals to the nearest 100th.

Angle, θ	$\sin \theta$	$\cos \theta$
0	0	1
$\frac{\pi}{4}$	0.71	0.71
$\frac{\pi}{2}$	1	0
$\frac{3\pi}{4}$	0.71	-0.71
π	0	-1
$\frac{5\pi}{4}$	-0.71	-0.71
$\frac{3\pi}{2}$	-1	0
$\frac{7\pi}{4}$	-0.71	0.71
2π	0	1



KEY POINTS of $y = \sin x$: $(0, 0)$, $(\frac{\pi}{2}, 1)$, $(\pi, 0)$, $(\frac{3\pi}{2}, -1)$, $(2\pi, 0)$

KEY POINTS of $y = \cos x$: $(0, 1)$, $(\frac{\pi}{2}, 0)$, $(\pi, -1)$, $(\frac{3\pi}{2}, 0)$, $(2\pi, 1)$

Characteristics: for $\sin x$ and $\cos x$

$$D = (-\infty, \infty) \quad R = [-1, 1]$$

$$\text{Period} = 2\pi$$

Review:

$f(x-h) \Rightarrow$ Right h units

$f(x+h) \Rightarrow$ Left h units

$f(x)+k \Rightarrow$ Up k units

$f(x)-k \Rightarrow$ Down k units

$a f(x) \Rightarrow$ Multiply the y by a

ex: Graph $y = 3 \cos\left(x - \frac{\pi}{4}\right)$

Right $\frac{\pi}{4}$ units
add $\frac{\pi}{4}$ to x

multiply y by 3

$(0, 1) \rightarrow \left(\frac{\pi}{4}, 3\right)$
 $\left(\frac{\pi}{2}, 0\right) \rightarrow \left(\frac{3\pi}{4}, 0\right)$
 $(\pi, -1) \rightarrow \left(\frac{5\pi}{4}, -3\right)$
 $\left(\frac{3\pi}{2}, 0\right) \rightarrow \left(\frac{7\pi}{4}, 0\right)$
 $(2\pi, 1) \rightarrow \left(\frac{9\pi}{4}, 3\right)$

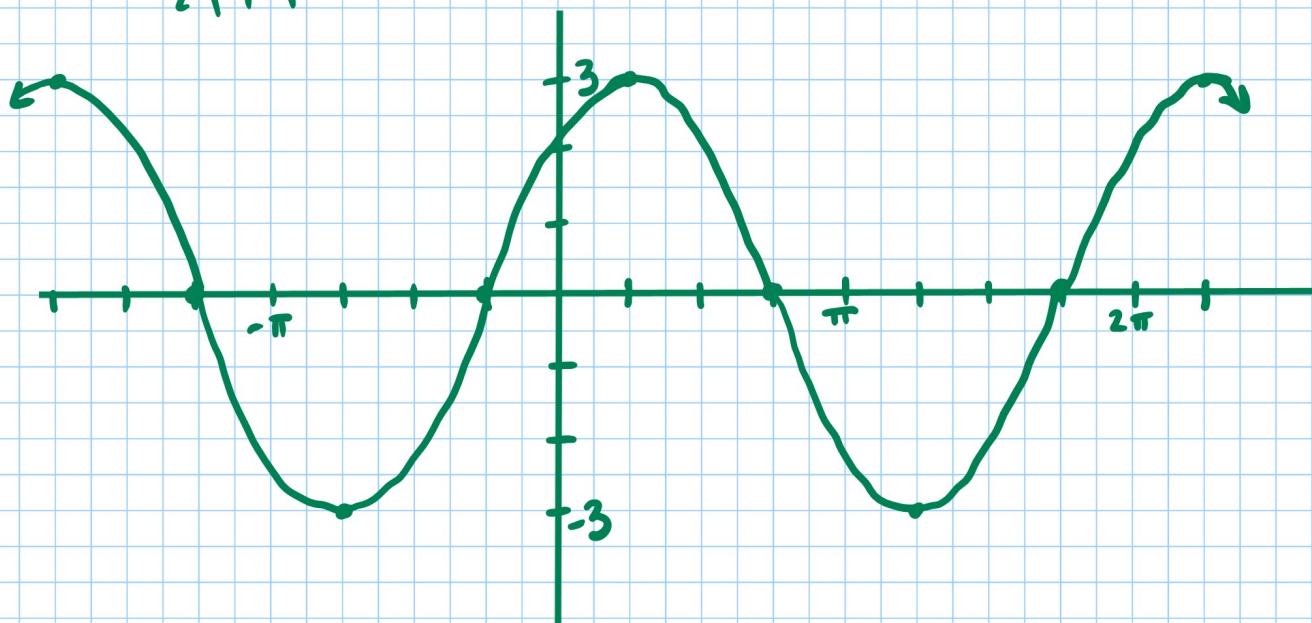
$+\frac{\pi}{4}$ to x multiply y by 3

$$y = x^2$$

$$y = 3x^2$$

x	y	$3x^2$
-2	4	12
-1	1	3
0	0	0
1	1	3
2	4	12

$$\frac{2}{2} \cdot \frac{\pi}{2} + \frac{\pi}{4} = \frac{2\pi}{4} + \frac{\pi}{4}$$



TRY: $y = -2 \sin\left(x - \frac{\pi}{2}\right)$

add. $\frac{\pi}{2}$ to x

mult y by -2

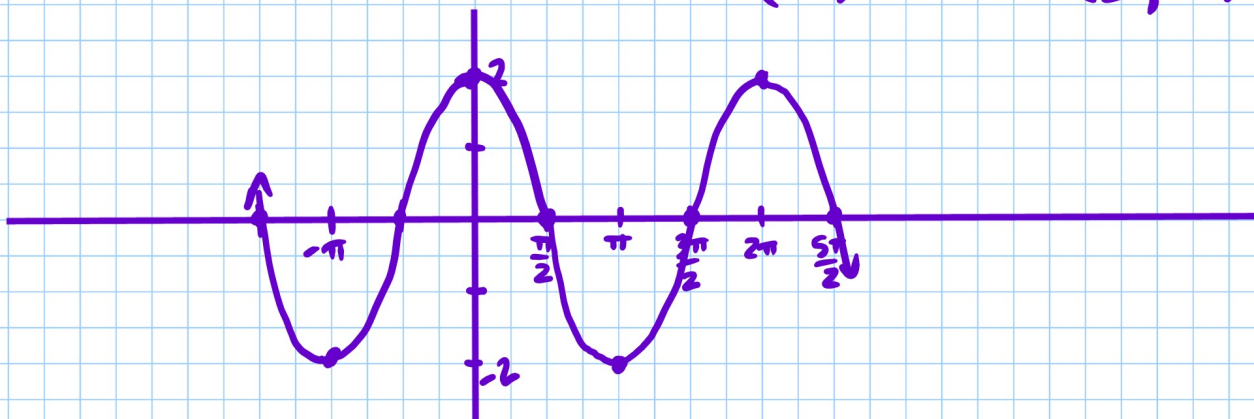
$$(0,0) \rightarrow \left(\frac{\pi}{2}, 0\right)$$

$$\left(\frac{\pi}{2}, 1\right) \rightarrow (\pi, -2)$$

$$(\pi, 0) \rightarrow \left(\frac{3\pi}{2}, 0\right)$$

$$\left(\frac{3\pi}{2}, -1\right) \rightarrow (2\pi, 2)$$

$$(2\pi, 0) \rightarrow \left(\frac{5\pi}{2}, 0\right)$$



TRY: $y = \sin\left(x + \frac{\pi}{2}\right) - 3$

subtract $\frac{\pi}{2}$ from x

subtract 3 from y

$$(0,0) \rightarrow \left(-\frac{\pi}{2}, -3\right)$$

$$\left(\frac{\pi}{2}, 1\right) \rightarrow (0, -2)$$

$$(\pi, 0) \rightarrow \left(\frac{\pi}{2}, -3\right)$$

$$\left(\frac{3\pi}{2}, -1\right) \rightarrow (\pi, -4)$$

$$(2\pi, 0) \rightarrow \left(\frac{3\pi}{2}, -3\right)$$

