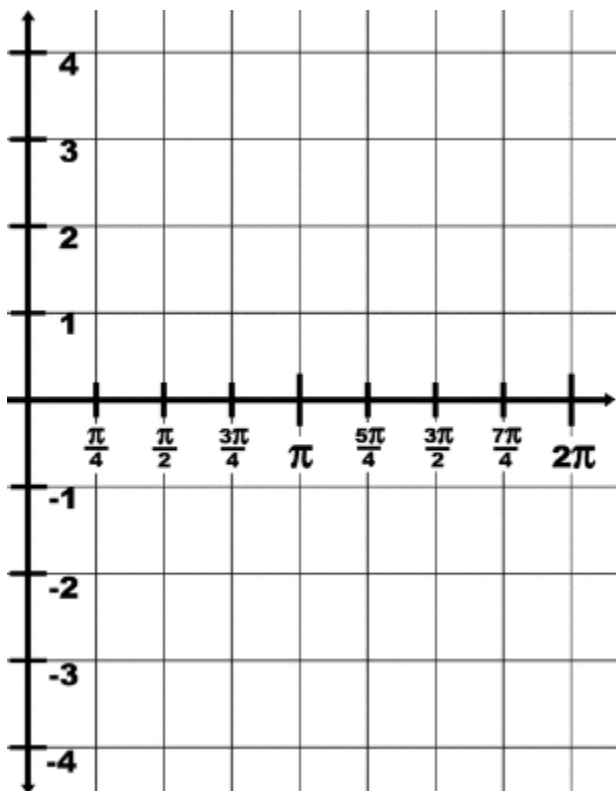**Vocabulary:**

Periodic Function _____

Amplitude _____

Midline _____

Example 1: Graph $y = sin\ (x)$ from 0 to 2π

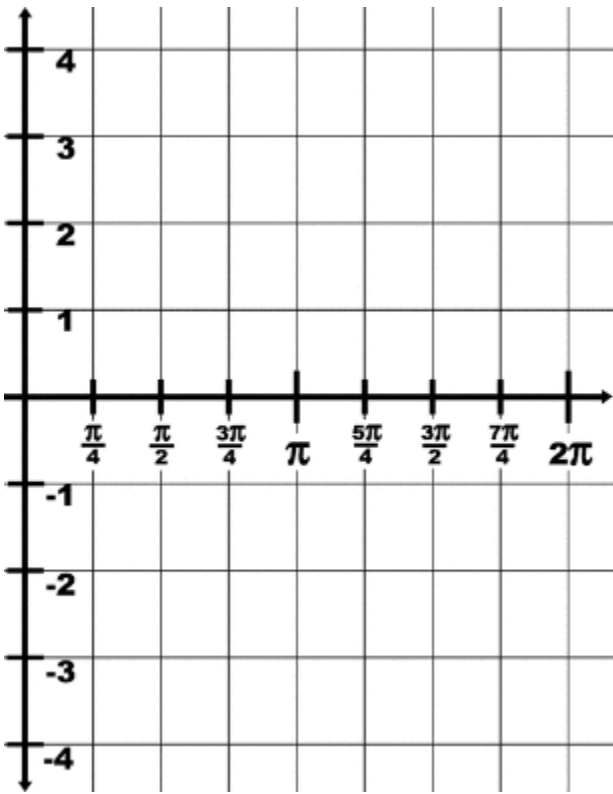| Radians (x)	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{11\pi}{6}$	2π
sin(x) in radical													
sin(x) - rounded 2 decimals													

Amplitude _____

Midline _____

Domain _____

Range _____

Period _____

Example 2: Graph $y = \cos(x)$ from 0 to 2π

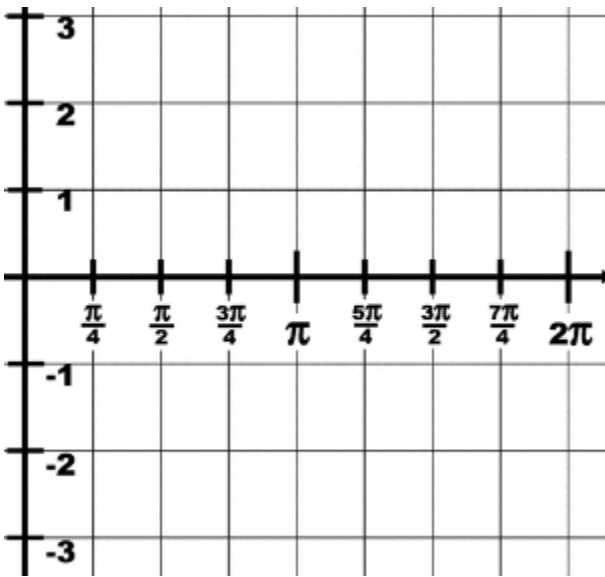| Radians (x)	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{11\pi}{6}$	2π
cos(x) in radical													
cos(x)- rounded 2 decimals													

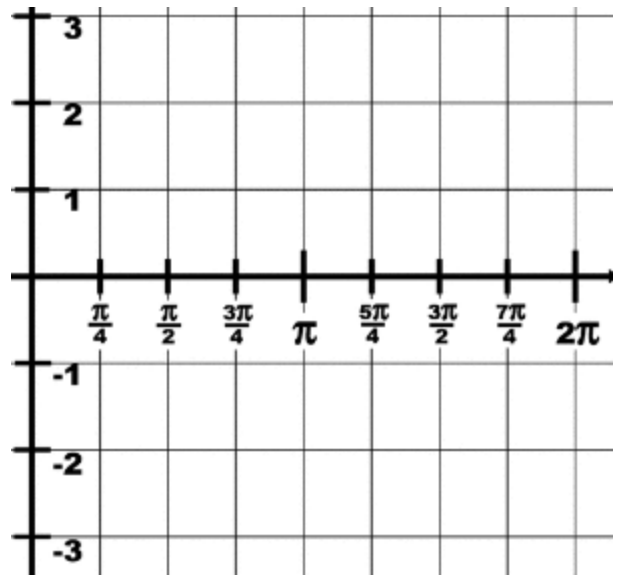Amplitude _____

Midline _____

Domain _____

Range _____

Period _____

How does this graph compare to the graph of sin (x)?

Transformations of Sine & Cosine Graphs

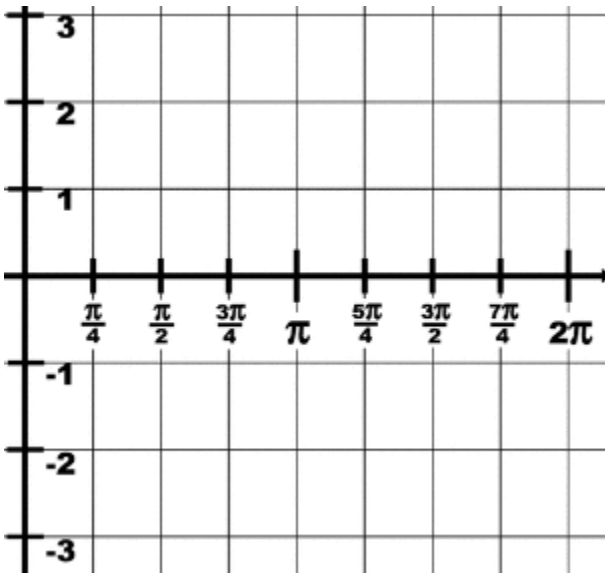**Example 3:** $y = -sin\ (x)$ from 0 to 2π

$$\frac{\pi}{4} \quad \frac{\pi}{2} \quad \frac{3\pi}{4} \quad \pi \quad \frac{5\pi}{4} \quad \frac{3\pi}{2} \quad \frac{7\pi}{4} \quad 2\pi$$

Example 4: Graph $y = -cos\ (x)$ from 0 to 2π

$$\frac{\pi}{4} \quad \frac{\pi}{2} \quad \frac{3\pi}{4} \quad \pi \quad \frac{5\pi}{4} \quad \frac{3\pi}{2} \quad \frac{7\pi}{4} \quad 2\pi$$

Rule:

Example 5: $y = sin\ (x)+4$ from 0 to 2π

$$\frac{\pi}{4} \quad \frac{\pi}{2} \quad \frac{3\pi}{4} \quad \pi \quad \frac{5\pi}{4} \quad \frac{3\pi}{2} \quad \frac{7\pi}{4} \quad 2\pi$$

Example 6: Graph $y = cos\ (x)+3$ from 0 to 2π

$$\frac{\pi}{4} \quad \frac{\pi}{2} \quad \frac{3\pi}{4} \quad \pi \quad \frac{5\pi}{4} \quad \frac{3\pi}{2} \quad \frac{7\pi}{4} \quad 2\pi$$

Example 7: $y = sin\ (x)-1$ from 0 to 2π

$$
\begin{array}{c}
3 \\
2 \\
1 \\
\hline
\frac{\pi}{4}\quad \frac{\pi}{2}\quad \frac{3\pi}{4}\quad \pi\quad \frac{5\pi}{4}\quad \frac{3\pi}{2}\quad \frac{7\pi}{4}\quad 2\pi \\
-1 \\
-2 \\
-3
\end{array}
$$

Example 8: Graph $y = cos\ (x)-2$ from 0 to 2π

$$
\begin{array}{c}
3 \\
2 \\
1 \\
\hline
\frac{\pi}{4}\quad \frac{\pi}{2}\quad \frac{3\pi}{4}\quad \pi\quad \frac{5\pi}{4}\quad \frac{3\pi}{2}\quad \frac{7\pi}{4}\quad 2\pi \\
-1 \\
-2 \\
-3
\end{array}
$$
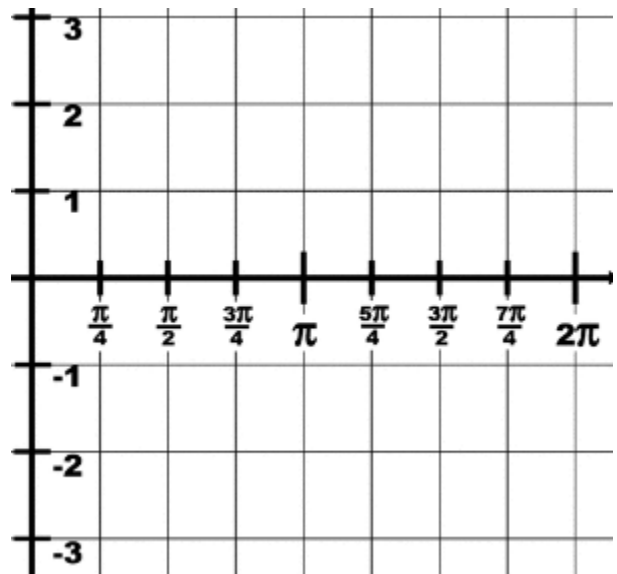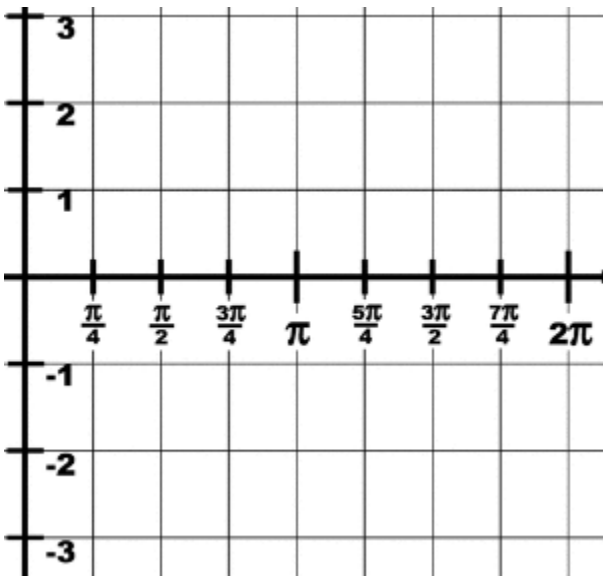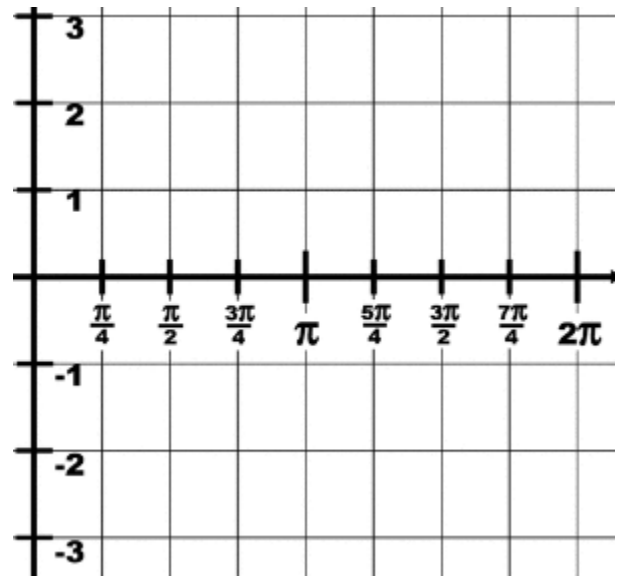
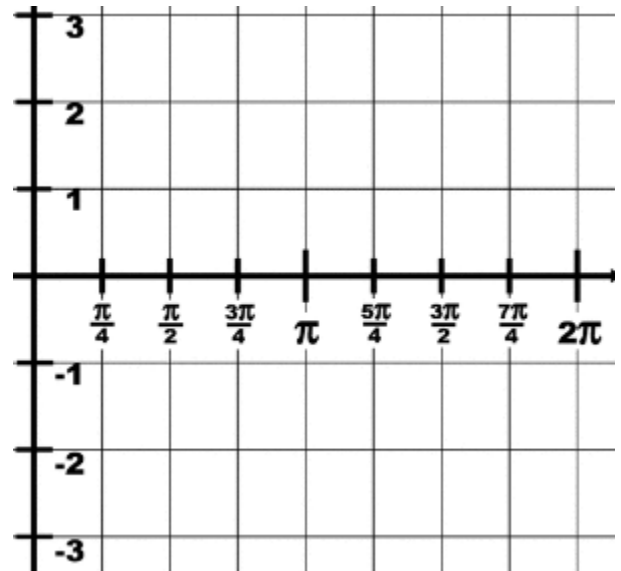**Rule:**

In general, $y = sinx + k$ and $y = cosx + k$ moves the graph _____ and the midline is _____. And the

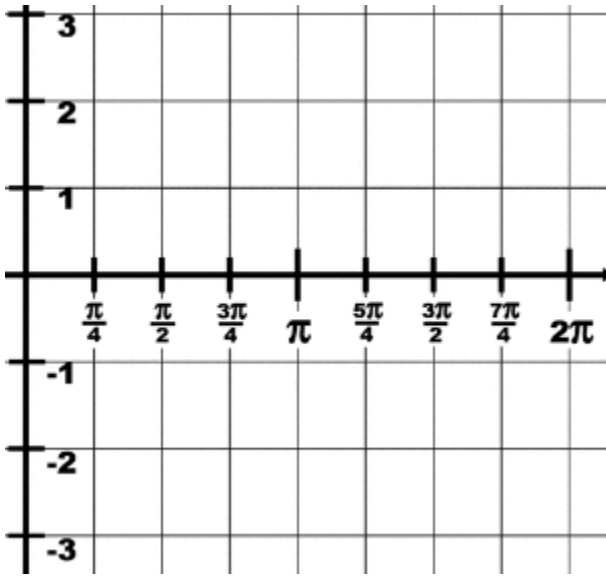curves $y = sinx - k$ and $y = cosx - k$ moves the graph _____ and the midline is _____.
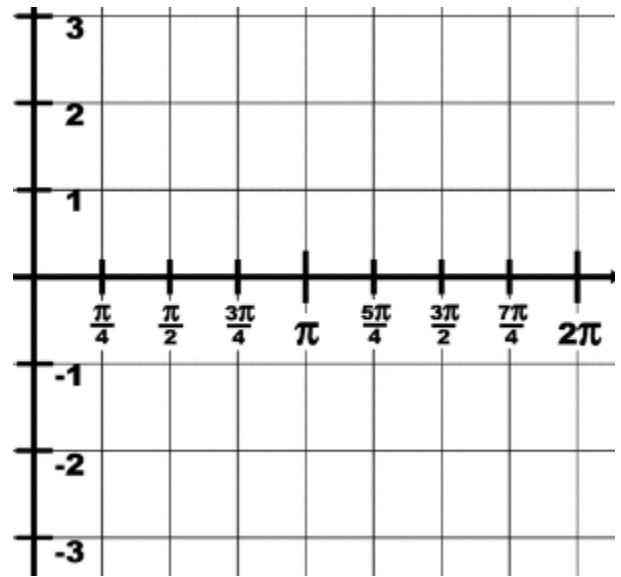
Example 9: $y = 2cos\ (x)$ from 0 to 2π

$$
\begin{array}{c}
3 \\
2 \\
1 \\
\hline
\frac{\pi}{4}\quad \frac{\pi}{2}\quad \frac{3\pi}{4}\quad \pi\quad \frac{5\pi}{4}\quad \frac{3\pi}{2}\quad \frac{7\pi}{4}\quad 2\pi \\
-1 \\
-2 \\
-3
\end{array}
$$

Example 10: Graph $y = 0.5cos\ (x)$ from 0 to 2π

$$
\begin{array}{c}
3 \\
2 \\
1 \\
\hline
\frac{\pi}{4}\quad \frac{\pi}{2}\quad \frac{3\pi}{4}\quad \pi\quad \frac{5\pi}{4}\quad \frac{3\pi}{2}\quad \frac{7\pi}{4}\quad 2\pi \\
-1 \\
-2 \\
-3
\end{array}
$$
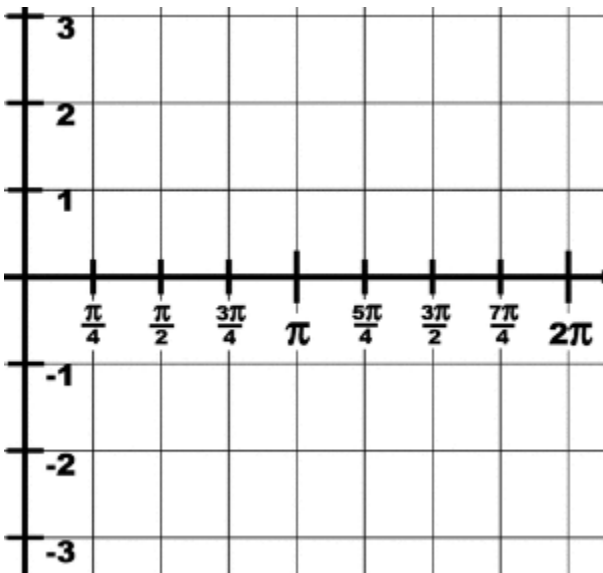
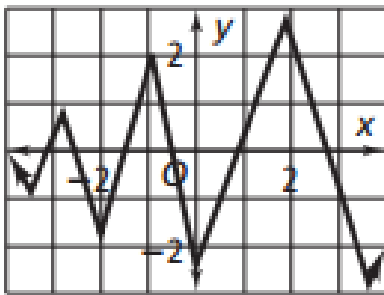**Example 11:** $y = 4\sin(x)$ from 0 to 2π

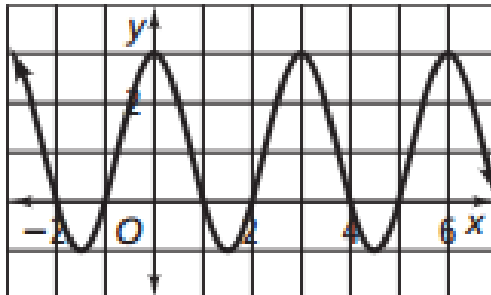**Example 12:** Graph $y = -3\sin(x)$ from 0 to 2π

Rule:

In general, multiplying by A in $y = A\sin x$ and $y = A\cos x$ changes the _____. And if A is negative, the graph will also _____.

Example 13: Determine if each function is periodic. Circle YES or NO.
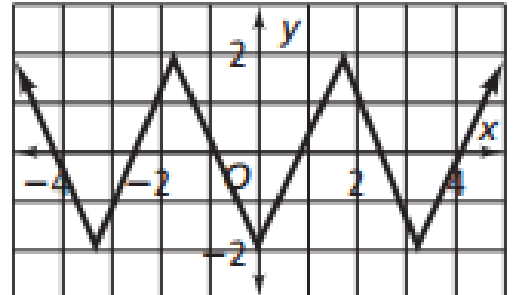
YES / NO   YES / NO   YES / NO