Objective: Combine Transformation

**Transformations of the Form** $y = a \sin b(x - h) + k$ and $y = a \cos b(x - h) + k$.

We can combine transformations and determine the parameters in the equations, $y = a \sin b(x - h) + k$ and $y = a \cos b(x - h) + k$.

The graph shows a transformation of the function $y = \sin x$. Since the overall height is 3 we have $a = 1.5$. Since the period is $p = \pi$ we have $b = \frac{2\pi}{\pi} = 2$.

The midline, $y = 1$, helps us to see the horizontal shift $h = \frac{\pi}{4}$ and the vertical shift $k = 1$.

To complete the analysis, then, we have the equation $y = 1.5 \sin 2\left(x - \frac{\pi}{4}\right) + 1$.

Note that we could also write this as a transformation of $y = \cos x$ by noting that the right shift is for cosine is $h = \frac{\pi}{2}$.

So we also have the equation, $y = 1.5 \cos 2\left(x - \frac{\pi}{2}\right) + 1$.

We can check both of these results with the graphing calculator.