

5.3 Investigate Transformations of Sine and Cosine Functions**BLM 5-7**

- State the amplitude, period, phase shift, and vertical shift of each function.
 - $y = 3\sin[2(x - 30^\circ)] + 1$
 - $y = \frac{1}{2}\cos[3(x - 45^\circ)]$
 - $y = \frac{3}{5}\sin\left[\frac{1}{2}(x + 30^\circ)\right] - 2$
 - $y = 2\cos[4(x - 60^\circ)] + 4$
- Write the equation of a sine function with the following properties.
 - amplitude 2, period 360° , phase shift 30° to the right, and vertical shift down 2
 - amplitude 1, period 180° , no phase shift, and vertical shift up 3
 - amplitude $\frac{1}{3}$, period 120° , phase shift 15° to the left, and vertical shift down 1
- Write the equation of a cosine function with the following properties.
 - amplitude 3, period 180° , phase shift 30° to the right, and vertical shift up 2
 - amplitude 5, period 270° , phase shift 45° to the left, and no vertical shift
 - amplitude $\frac{3}{4}$, period 60° , no phase shift, and a vertical shift down 3
- Without using a table of values, create a sketch of the function $y = 3\sin(x - 60^\circ) + 1$ for two cycles.
- Without using a table of values, create a sketch of the function $y = \frac{1}{2}\cos\left[\frac{1}{2}(x - 30^\circ)\right] - 2$ for two cycles.
- The graphs of $y = \sin x$ and $y = \cos x$ have two points of intersection from 0° to 360° .
 - Without graphing, determine the number of points of intersection the graphs of $y = \sin 2x$ and $y = \cos 2x$ have. Include an explanation of how you arrived at your answer.
 - Create a sketch to illustrate this.
 - Without graphing, determine the number of points of intersection the graphs of $y = \sin 3x$ and $y = \cos 3x$ have. Include an explanation of how you arrived at your answer.
 - Create a sketch to illustrate this.
 - Use the results of parts a) and c) to determine an expression for the number of points of intersection for the functions $y = \sin kx$ and $y = \cos kx$.
- Would changing the amplitude of the graphs in question 6 affect the results of the number of points of intersection? Explain.
- Would introducing the same phase shift to all functions in question 6 affect the results of the number of points of intersection? Explain.

