

We can graph any trigonometric function by transforming the base graph  $y = \sin \theta$  or  $x = \cos \theta$ :

$$f(x) = a \sin[k(x - d)] + c \quad \text{where: } a$$

$$g(x) = a \cos[k(x - d)] + c \quad k$$

$$d$$

$$c$$

Ex. Sketch one cycle for each function.

a)  $y = 2 \sin x$

b)  $y = \sin(x + 30^\circ)$

c)  $y = \cos x + 3$

d)  $y = -\cos 2x$

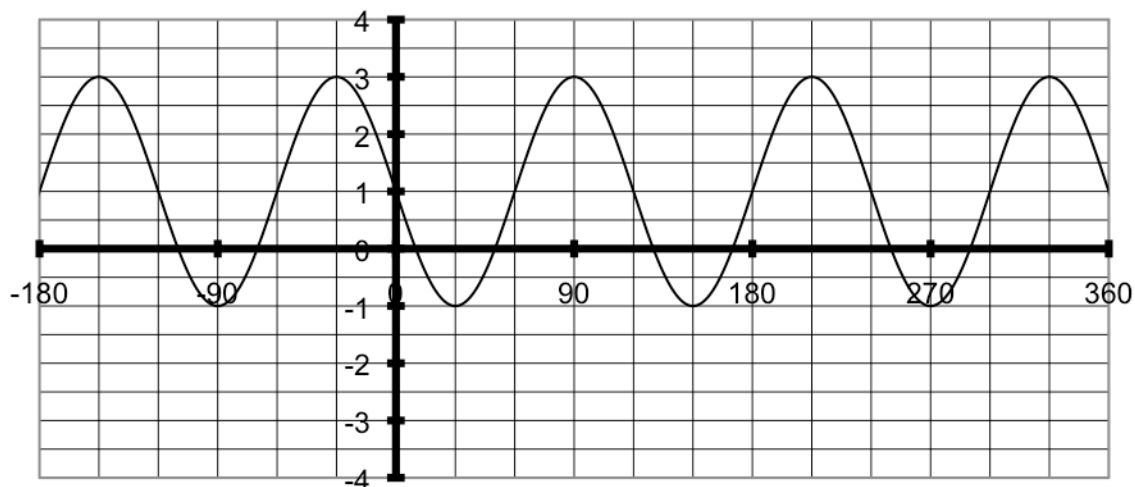
The period of a sine or cosine function is related to its horizontal stretch/compression:  $\text{period} = \frac{360^\circ}{k}$

Ex. Sketch each function and state the period and the horizontal stretch/compression for each.

a)  $y = 5 \cos 2x$

b)  $y = 4 \sin \frac{1}{3}x$

Write an equation for the following sinusoidal function and label the amplitude, period, and phase shift.



Ex. Determine the amplitude, period, phase shift, and vertical shift for the following functions.

a)  $y = 3\sin 5x - 4$

b)  $y = \cos(2x + 80^\circ) + 5$

A horizontal reference line is very helpful when sketching a function that has a vertical shift.

Ex. Sketch the function  $y = 2\cos(x - 45^\circ) + 5$  and label any properties of the graph.