Transforming Sinusoidal Functions

*Vertical Translation

$y = f(x) + c$ Graph shifts upward c units.

$y = f(x) - c$ Graph shifts downward c units.

*Horizontal Translation

$y = f(x - c)$ Graph shifts to the right c units

$y = f(x + c)$ Graph shifts to the left c units.

*Reflections

$y = f(-x)$ Reflect graph about y-axis.

$y = -f(x)$ Reflect graph about x -axis.

*Horizontal Stretching/ Shrinking

$y = f(cx)$ If $c > 1$, horizontal shrink (Divide each x coordinate by c)

If $0 < c < 1$, horizontal stretch (Divide each x coordinate by c)

*Vertical Stretching/Shrinking

$y = cf(x)$ If $c > 1$, graph is vertically stretched (Multiply each y coordinate by c)

If $0 < c < 1$, graph is vertically shrunk (Multiply each y coordinate by c)