

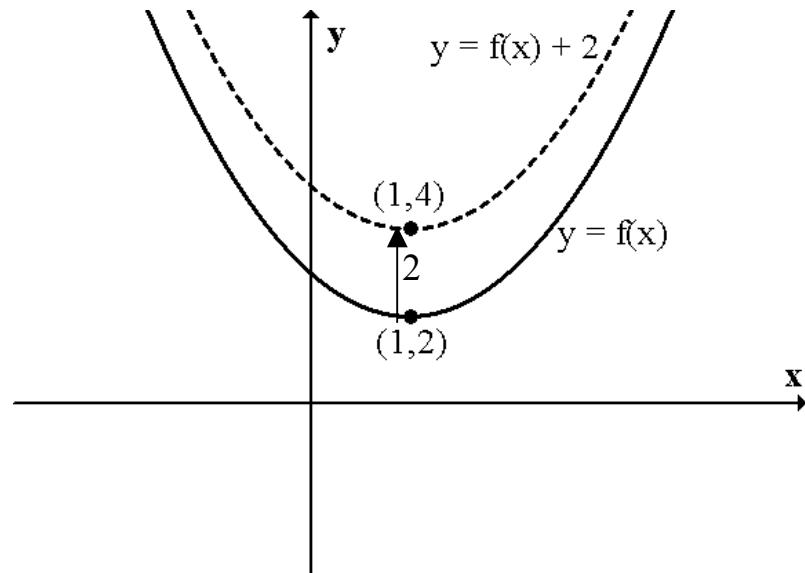
Graphs of Functions

The following rules apply to all graphs, $y = f(x)$, you may be asked to draw, whether polynomial, trigonometric or logarithmic.

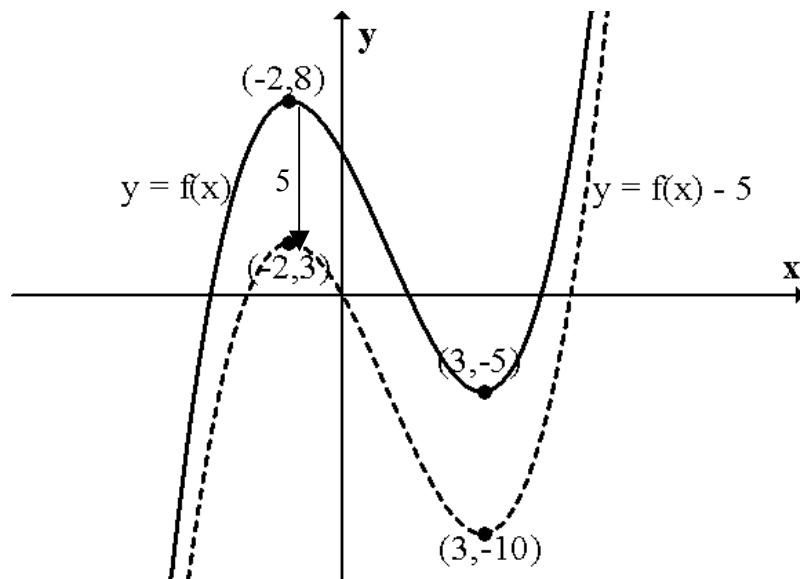
$$y = f(x) + a$$

Moves a graph vertically: **up** if $a > 0$ **down** if $a < 0$

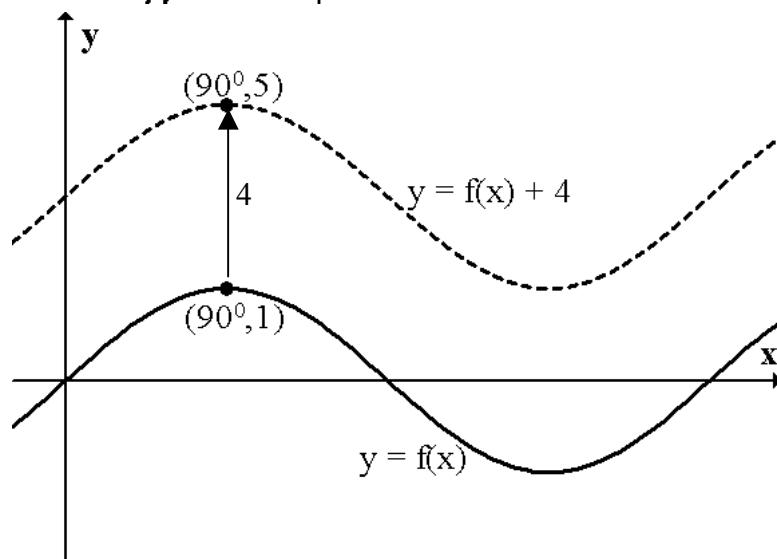
Example 1



Example 2



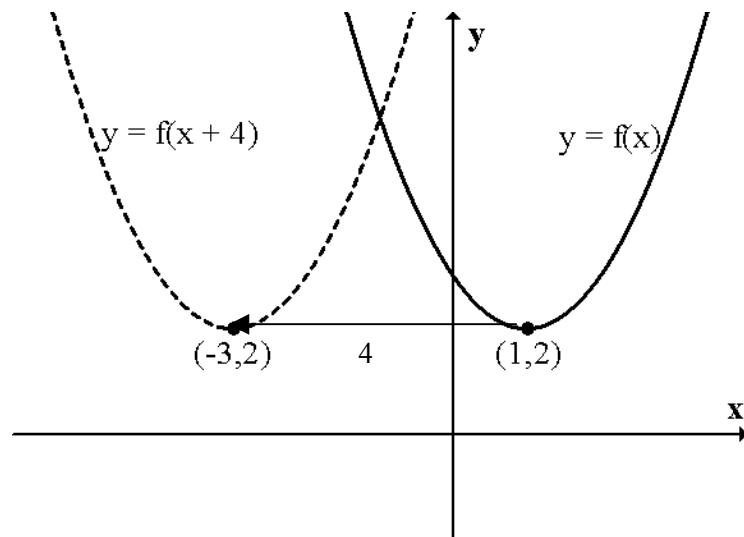
Example 3



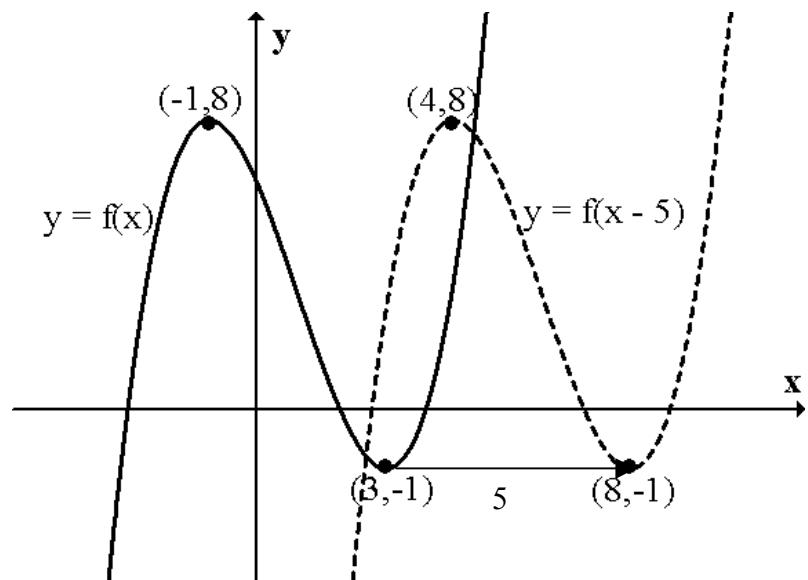
$$y = f(x + a)$$

Moves a graph horizontally: **left** if $a > 0$ **right** if $a < 0$

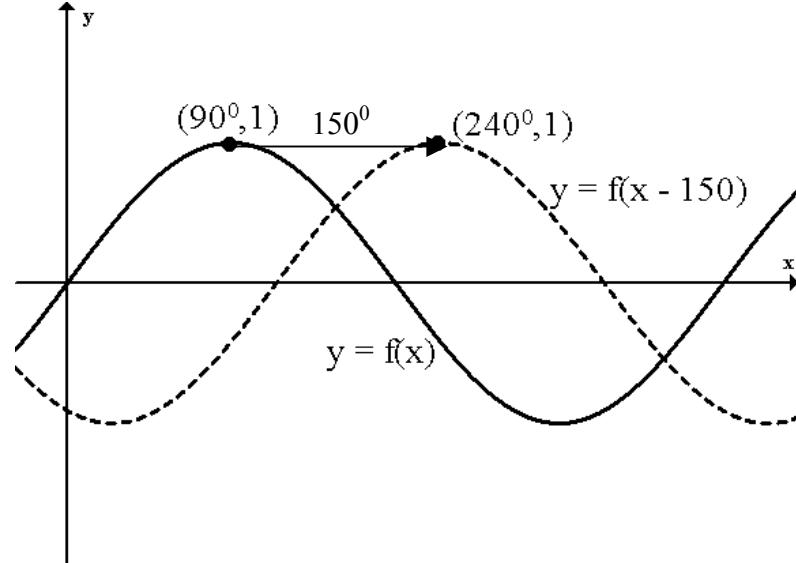
Example 1



Example 2



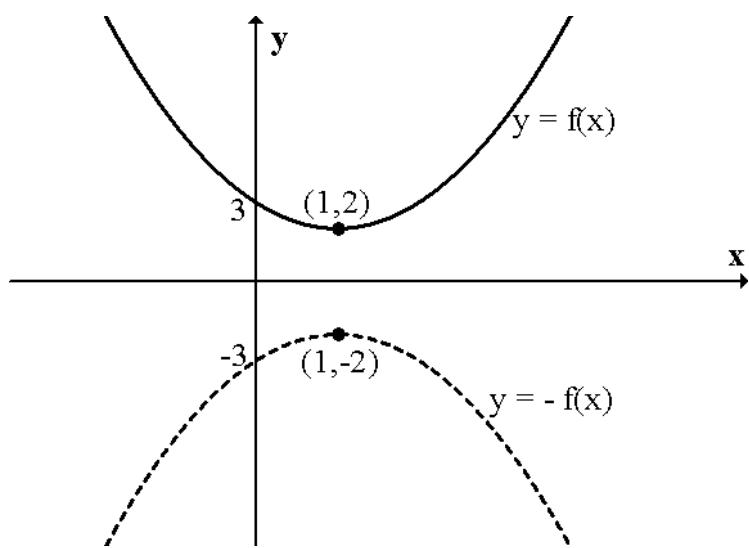
Example 3



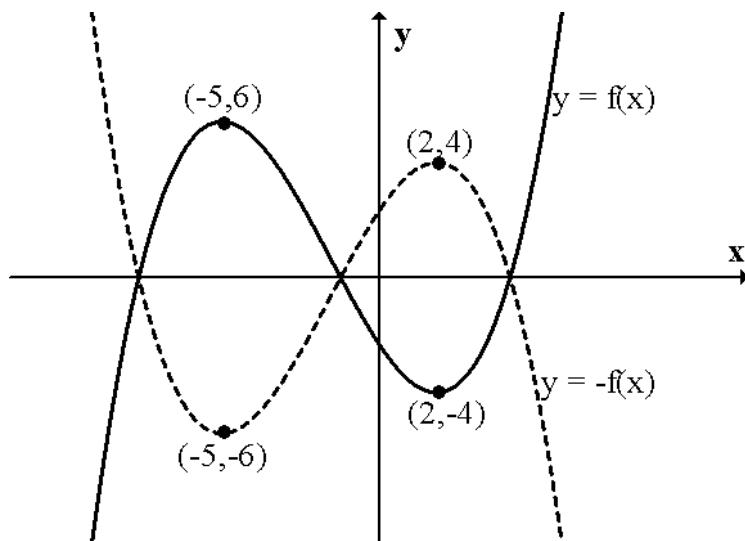
$$y = -f(x)$$

Reflects a graph in the $x - \text{axis}$.

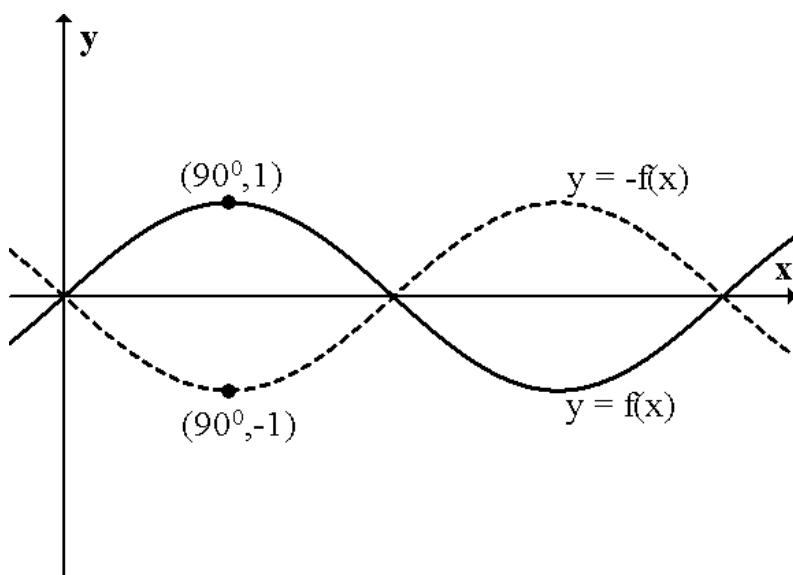
Example 1:



Example 2:



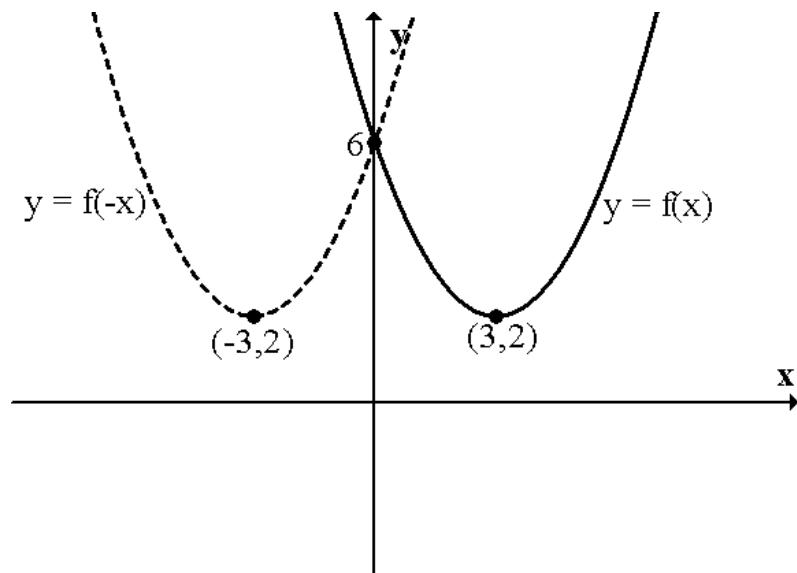
Example 3:



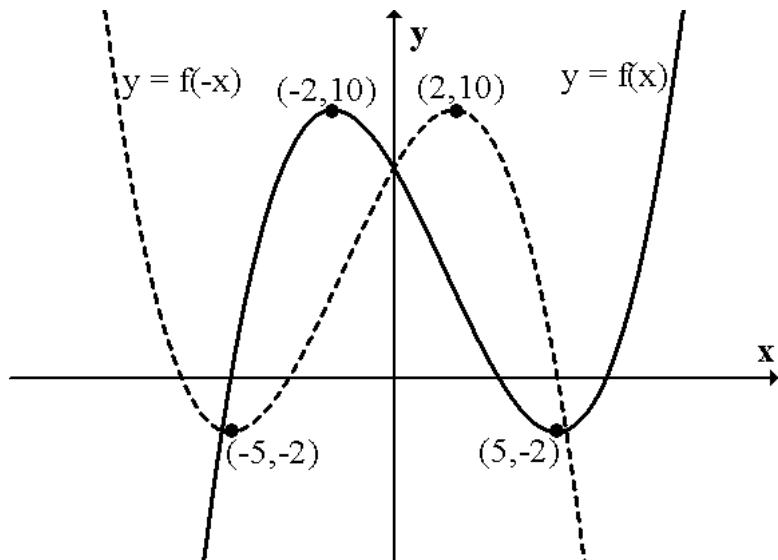
$$y = f(-x)$$

Reflects a graph in the y – axis.

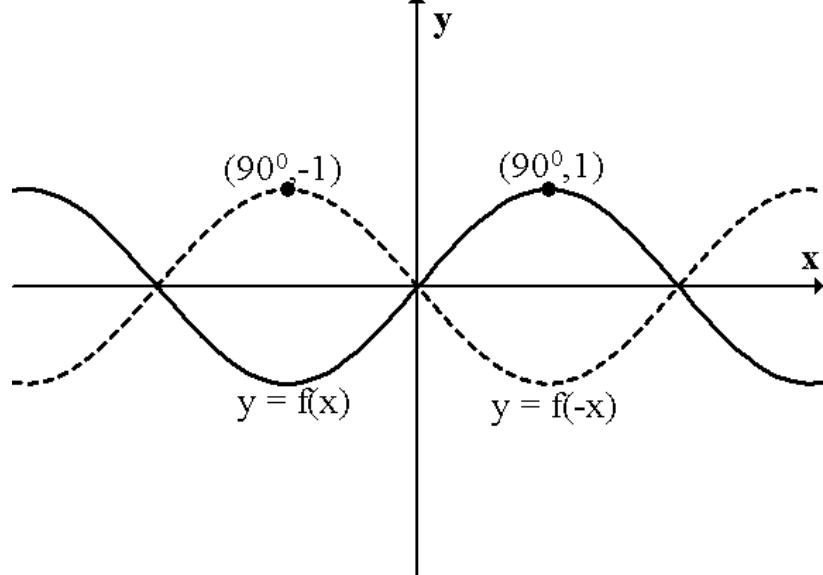
Example 1:



Example 2:



Example 3:

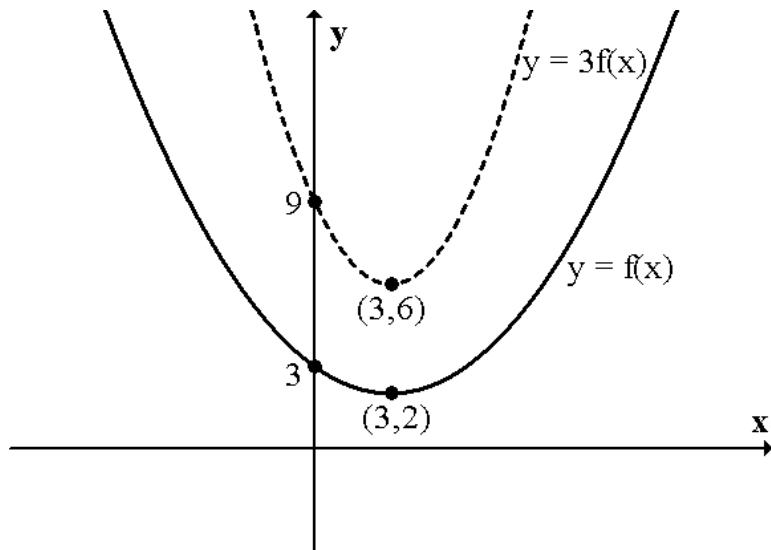


$$y = kf(x)$$

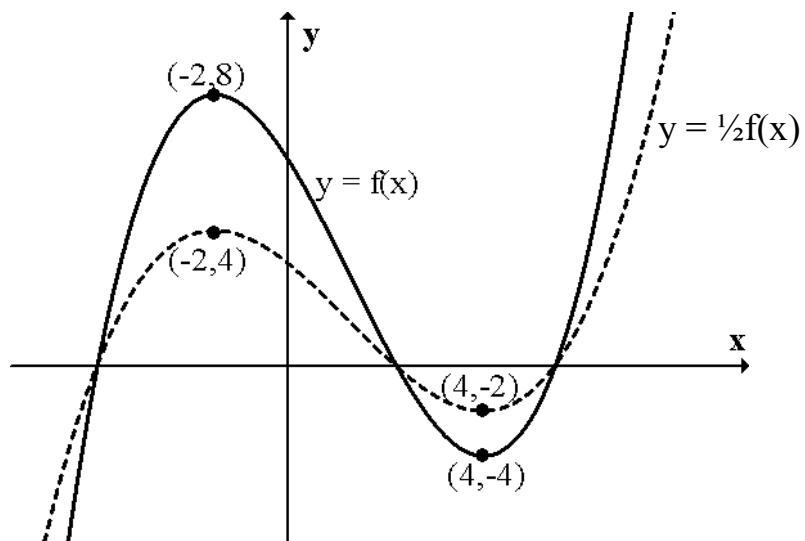
Stretches or compresses a graph vertically.

Stretches if $k > 1$ Compresses if $k < 1$

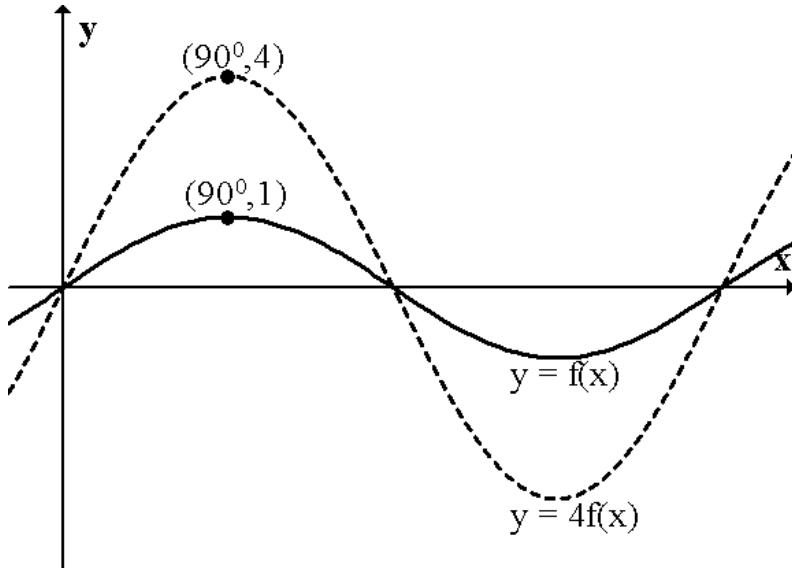
Example 1:



Example 2:



Example 3:



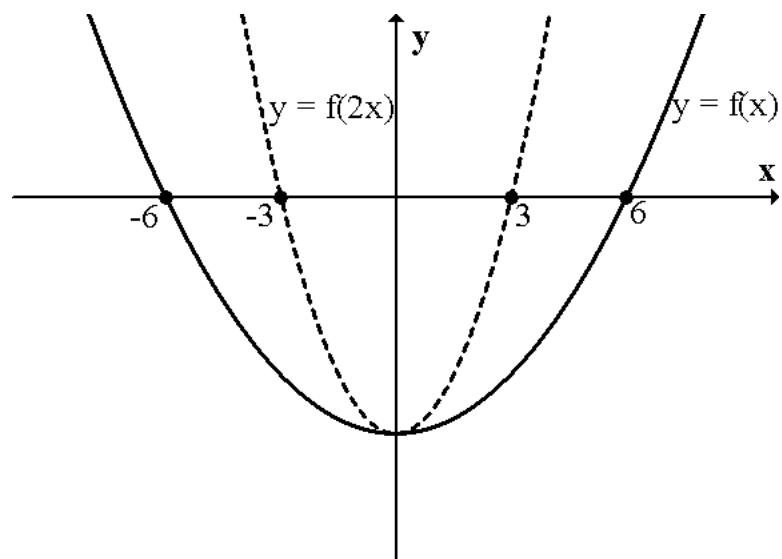
$$y = f(kx)$$

Stretches or compresses a graph horizontally.

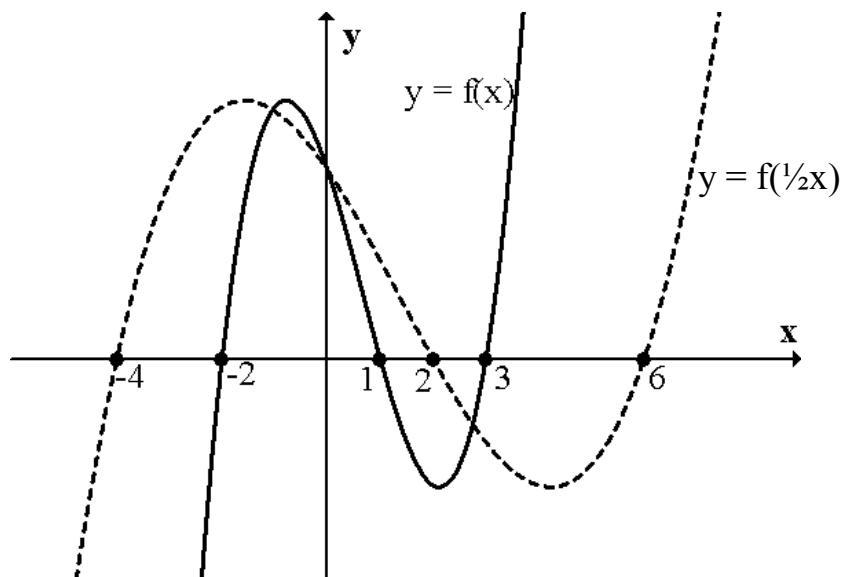
Compresses if $k > 1$

Stretches if $k < 1$

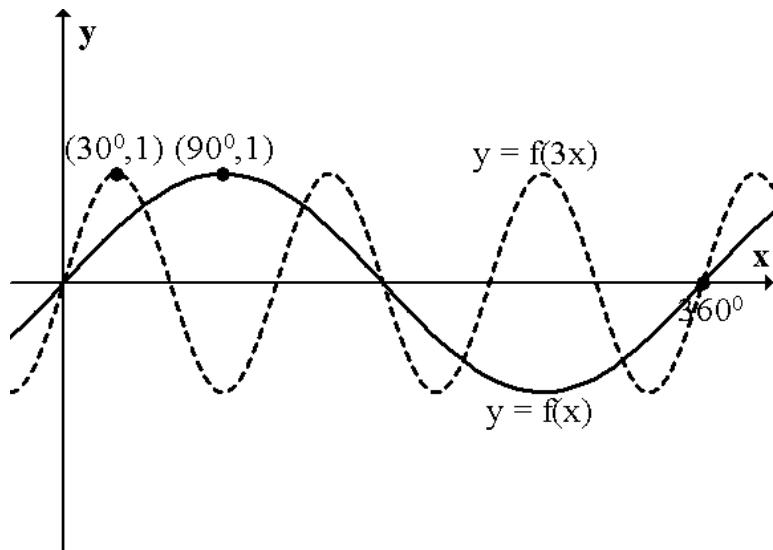
Example 1:



Example 2:



Example 3:



Summary:

$y = f(x) + a$ move vertically: up if $a > 0$, down if $a < 0$

$y = f(x + a)$ move horizontally: left if $a > 0$, right if $a < 0$

$y = -f(x)$ reflect in x - axis

$y = f(-x)$ reflect in y - axis

$y = kf(x)$ stretch vertically if $k > 1$, compress vertically if $k < 1$

$y = f(kx)$ stretch horizontally if $k < 1$, compress horizontally if $k > 1$

NOTE: To draw something of the form $y = 6 - f(x)$ it must be done as $y = -f(x) + 6$ i.e. reflect in x – axis first **then** move up by 6.

Example:

