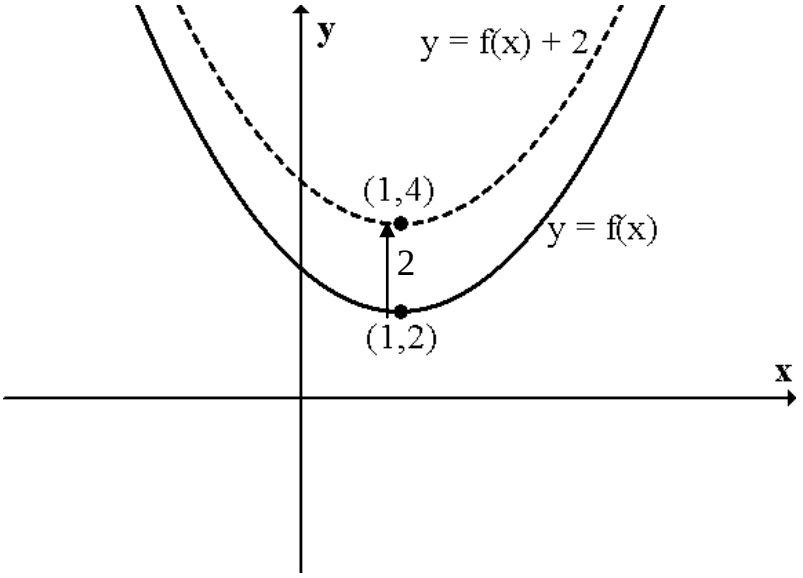
Graphs of Functions

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

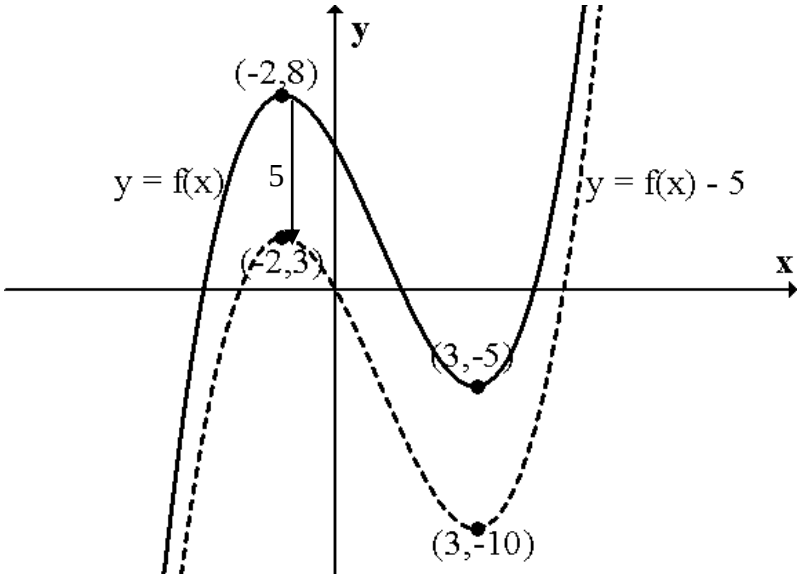
y = f(x) + a

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

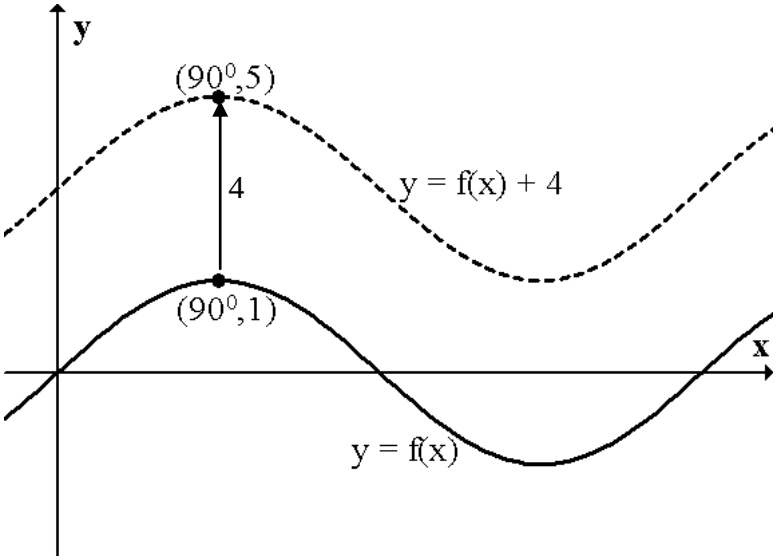
Example 1



Example 2



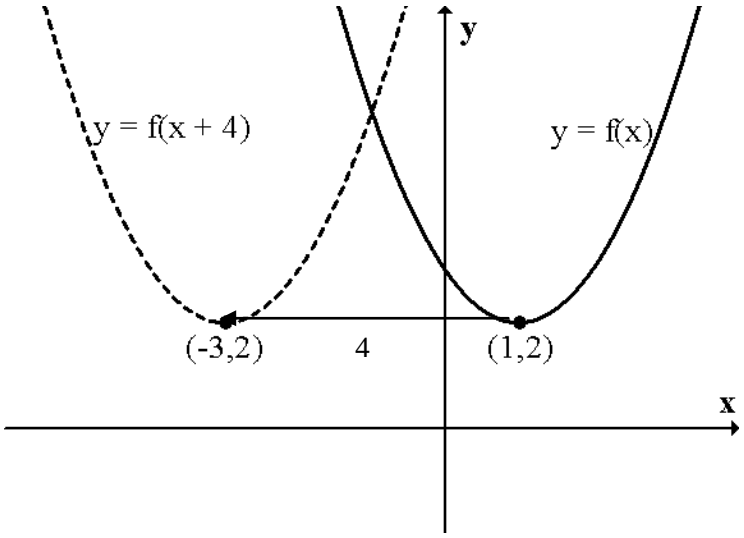
Example 3



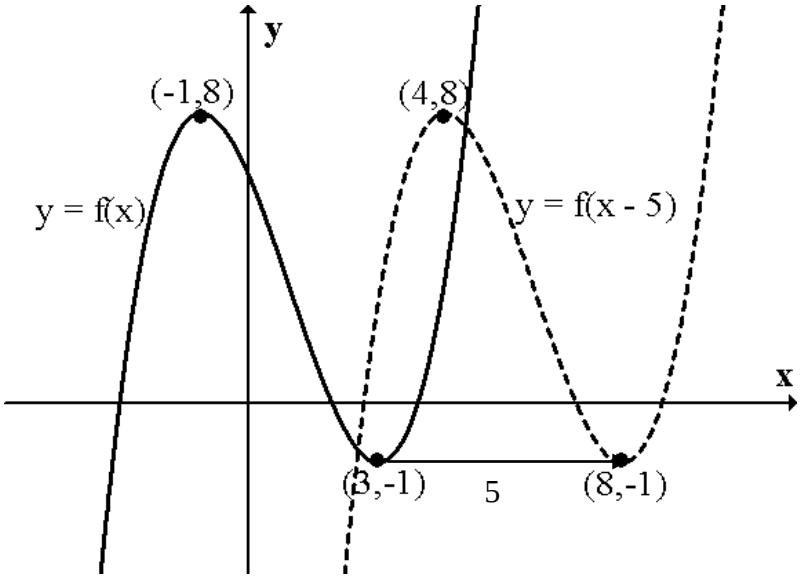
$y = f(x + a)$

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

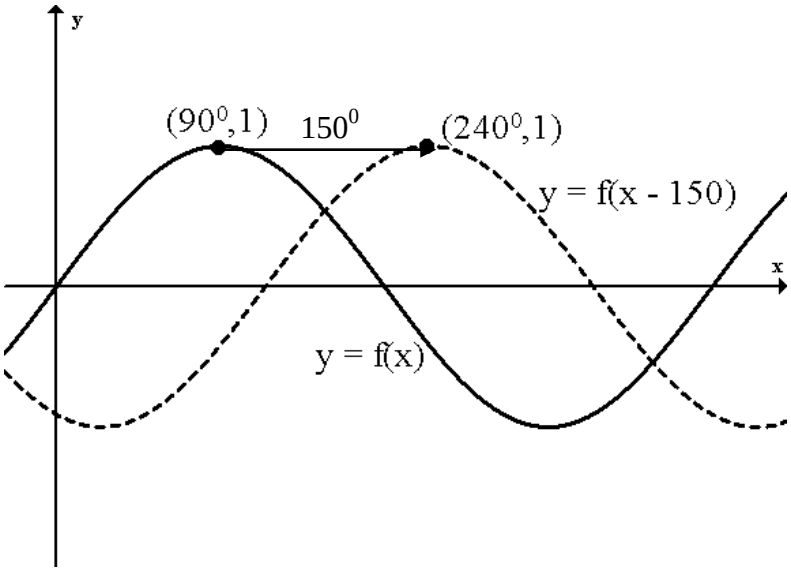
Example 1



Example 2



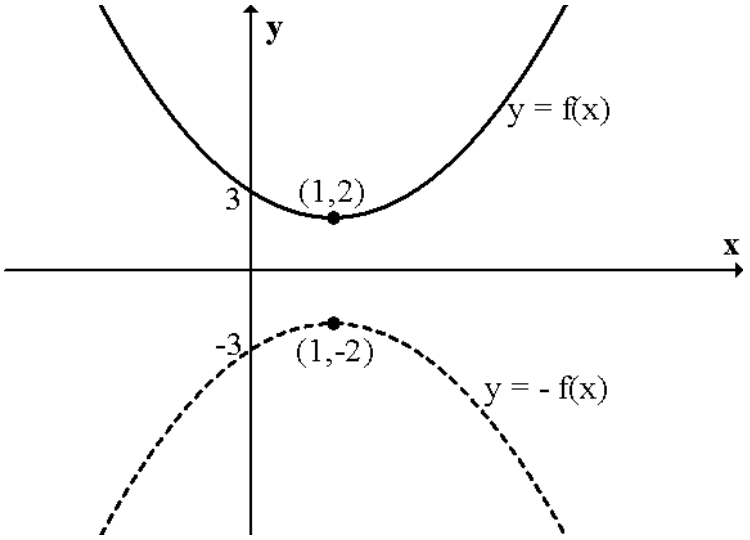
Example 3



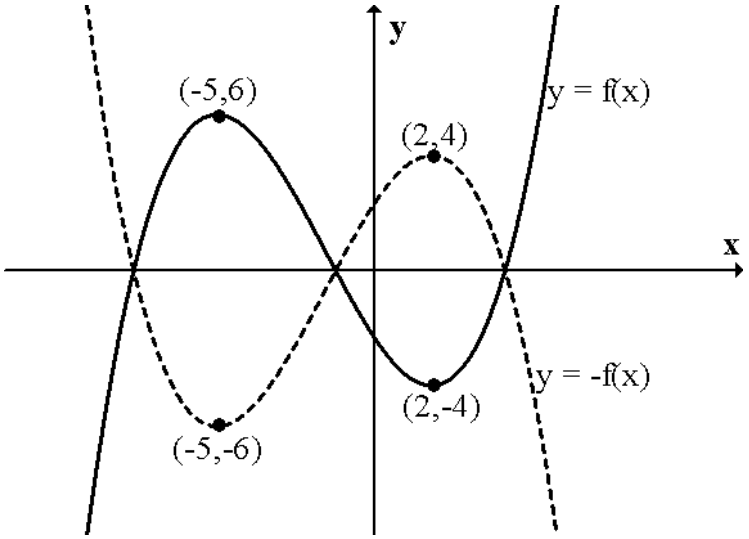
$y = -f(x)$

Reflects a graph in the **x – axis.**

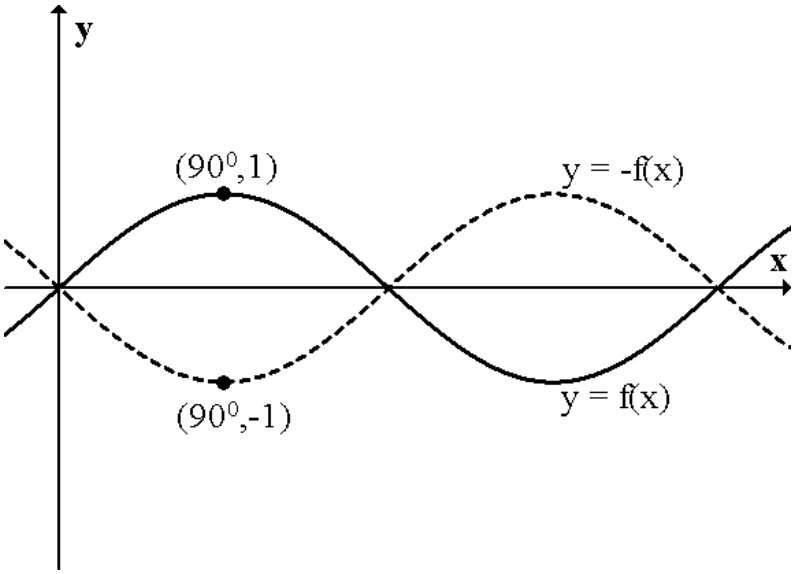
Example 1:



Example 2:



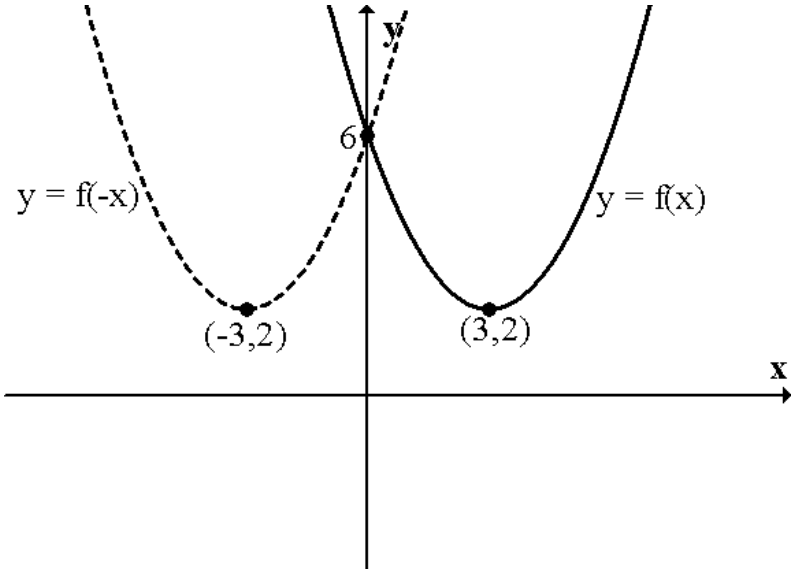
Example 3:



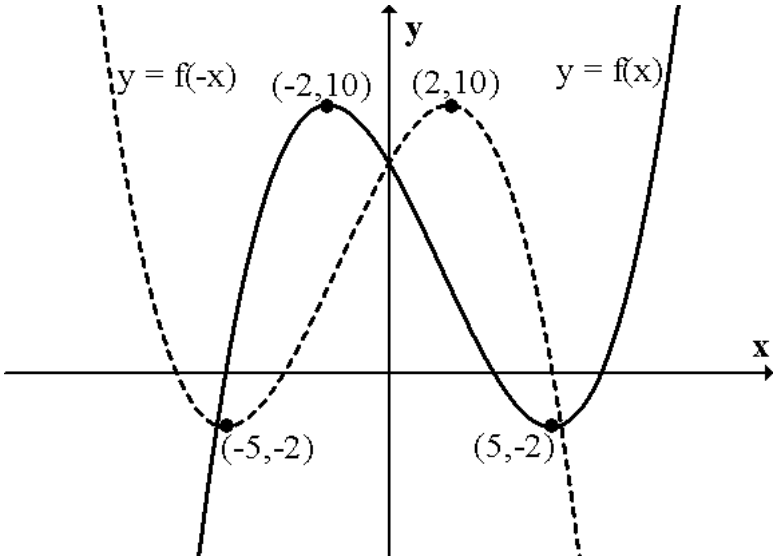
$y = f(-x)$

Reflects a graph in the **y – axis**.

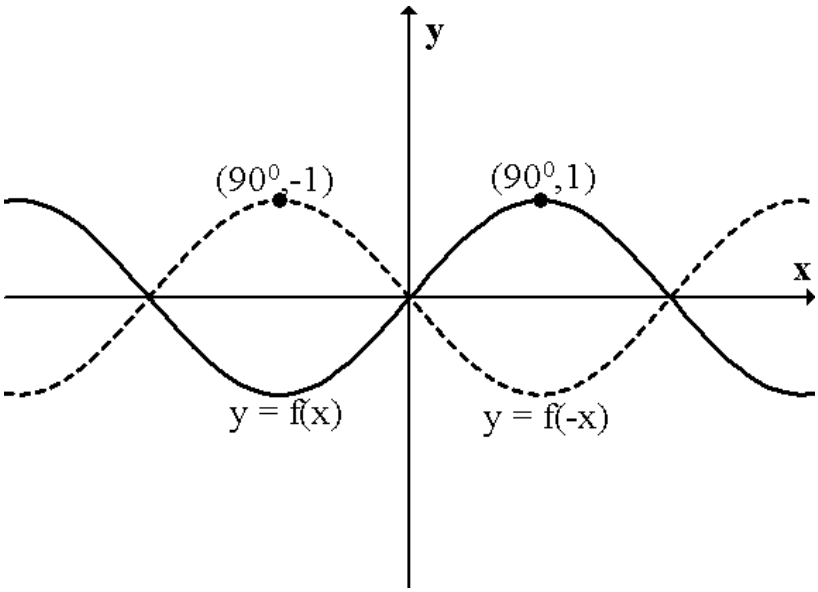
Example 1:



Example 2:



Example 3:

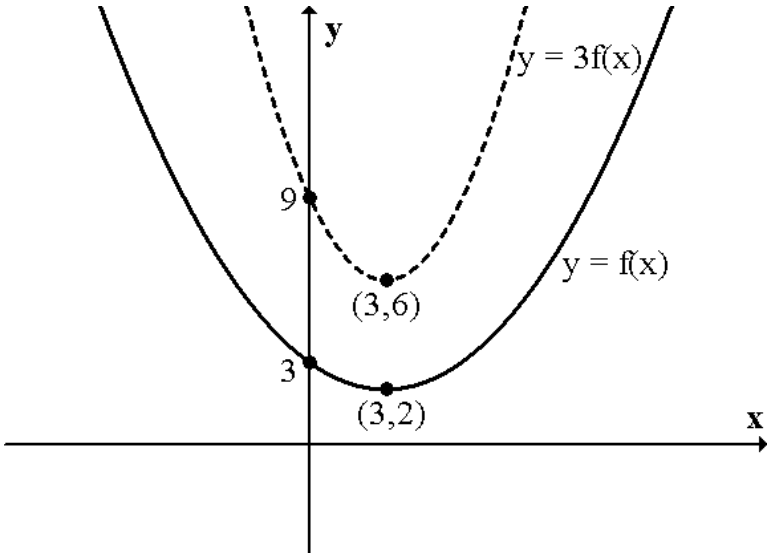


$y = kf(x)$

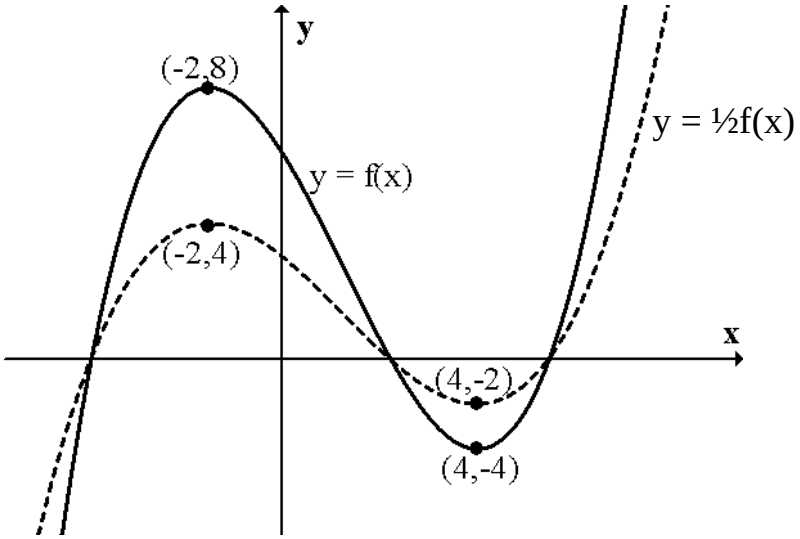
Stretches or **compresses** a graph **vertically.**

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

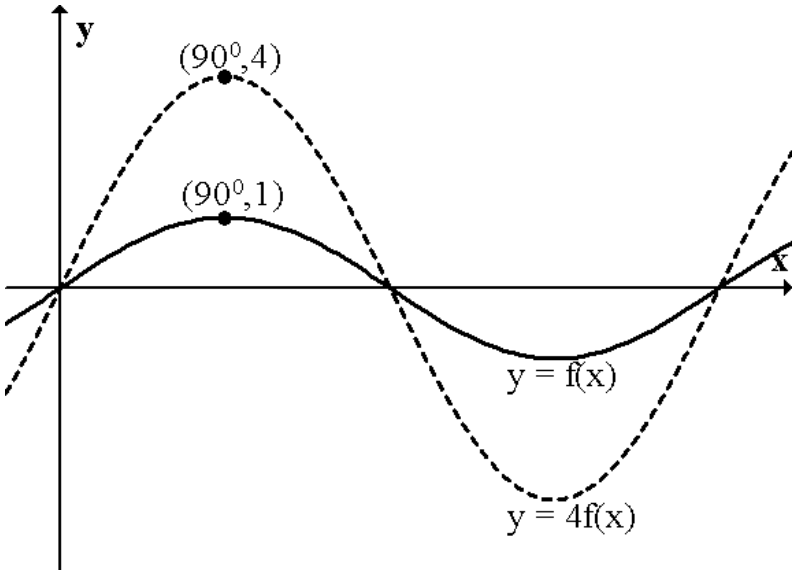
Example 1:



Example 2:



Example 3:

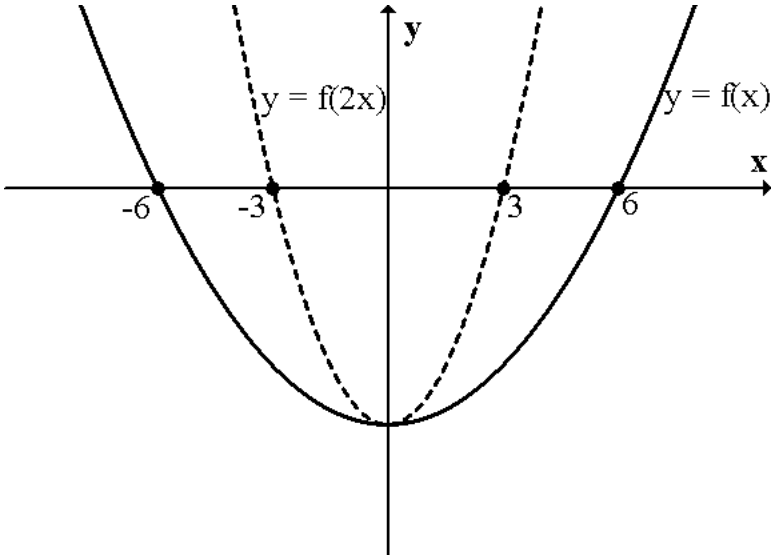


y = f(kx)

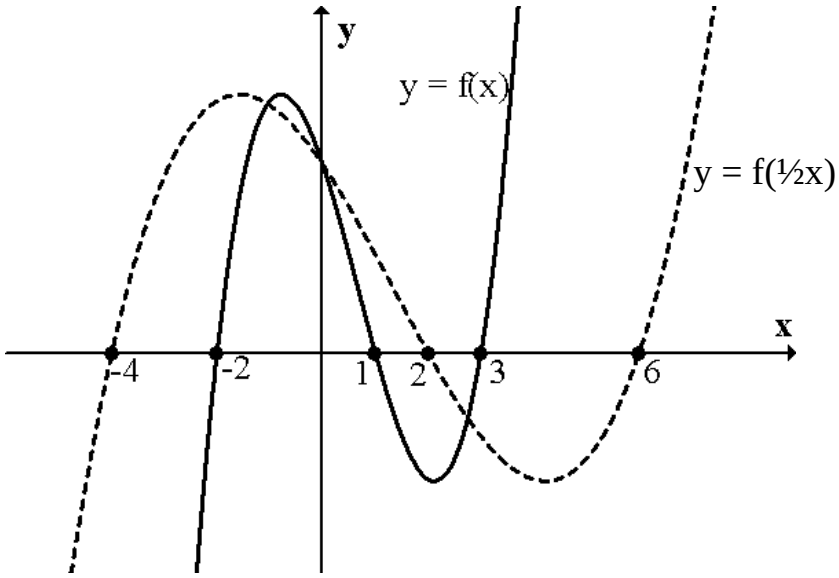
Stretches or **compresses** a graph **horizontally.**

Compresses if k > 1 Stretches if k < 1

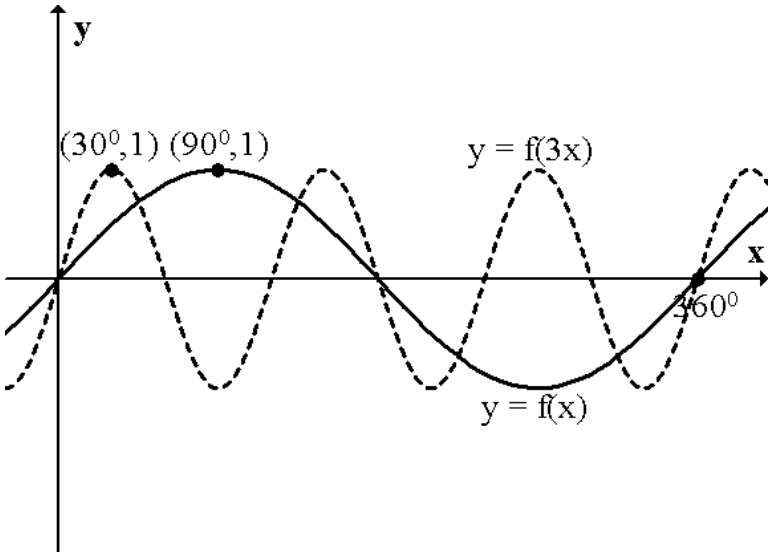
Example 1:



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: