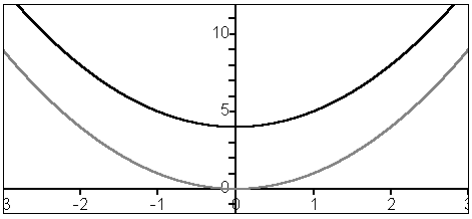
Function Notation

f(x) can represent any expression containing x. For example f(x) could be x^2
The expression in brackets can be changed - for example:
(a) $f(x + 2) = (x + 2)^2$ (b) $f(2x) = (2x)^2$ (c) $f(-x) = (-x)^2$ etc.
Compare these with changes outside the brackets - for example
(a) $f(x) + 2 = x^2 + 2$ (b) $2f(x) = 2x^2$ (c) $-f(x) = -x^2$

Transformations of Graphs

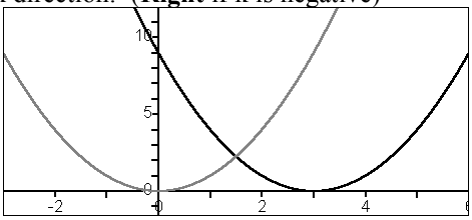
1)
(a) The graph of $y = f(x) + k$ is the same as the graph of $y = f(x)$, but shifted **up** by k units in the y direction. (**Down** if k is negative)

Example: The graph on the right shows $y = x^2$ (in grey) and $y = x^2 + 4$ (in black)



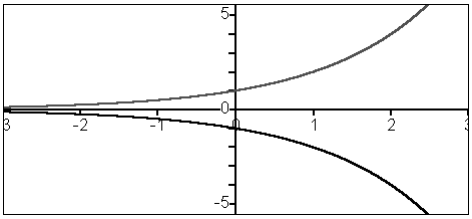
(b) The graph of f(x+k) is the same as the graph of f(x), but shifted **left** by k units in the x direction. (**Right** if k is negative)

Example: The graph on the right shows $y = x^2$ (in grey) and $y = (x-3)^2$ (in black)



2)
(a) The graph of $y = -f(x)$ is the same as the graph of $y = f(x)$, but reflected in the x-axis.

Example: The graph on the right shows $y = 2^x$ (in grey) and $y = -2^x$ (in black)



(b) The graph of $y = f(-x)$ is the same as the graph of $y = f(x)$, but reflected in the y-axis.

Example: The graph on the right shows $y = 2^x$ (in grey) and $y = 2^{-x}$ (in black)