Transformations of Graphs of Functions

Given the graph of a function, $y = f(x)$, the graphs of the following functions are given by the following transformations of the graph of the original function.

Function	Transformation
$y = f(x + a)$	Translation by the vector $\begin{pmatrix} -a \\ 0 \end{pmatrix}$
$y = f(ax)$	Stretch, scale factor $\frac{1}{a}$, parallel to the x axis
$y = f(-x)$	Reflection in the y axis

The change is inside the bracket.

These all affect the x coordinate.

They do the opposite of what you might think.

Function	Transformation
$y = f(x) + a$	Translation by the vector $\begin{pmatrix} 0 \\ a \end{pmatrix}$
$y = af(x)$	Stretch, scale factor a, parallel to the y axis
$y = -f(x)$	Reflection in the x axis

The change is outside the bracket.

These all affect the y coordinate.

They do exactly what you would expect.