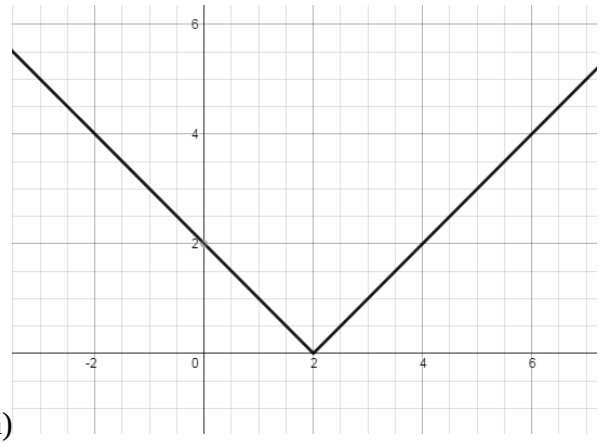
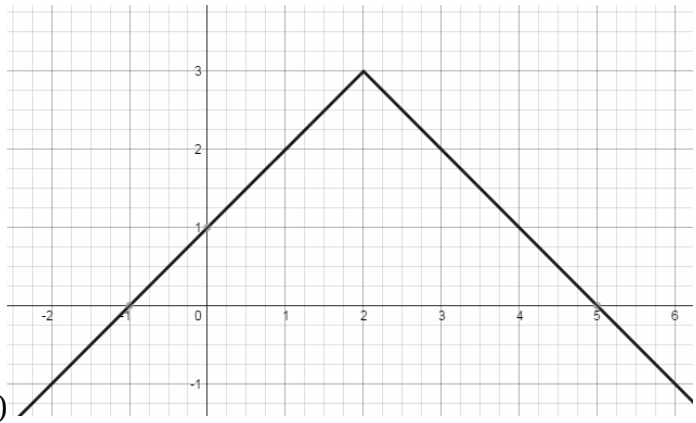
www.m4ths.com - Graph Transformations

Translations (Move)	Reflections (Flip)	Stretches (Stretch!)
$f(x-a)$ moves in x direction by the vector $\begin{pmatrix} a \\ 0 \end{pmatrix}$.	$f(-x)$ reflects the graph in the y axis.	$f(ax)$ is a scale factor stretch of $\frac{1}{a}$ in x direction. (divide the x coordinate by a)
$f(x)+a$ moves in y direction by the vector $\begin{pmatrix} 0 \\ a \end{pmatrix}$.	$-f(x)$ reflects the graph in the x axis.	$a\,f(x)$ is a scale factor stretch of a in y direction. (multiply the y coordinates by a)

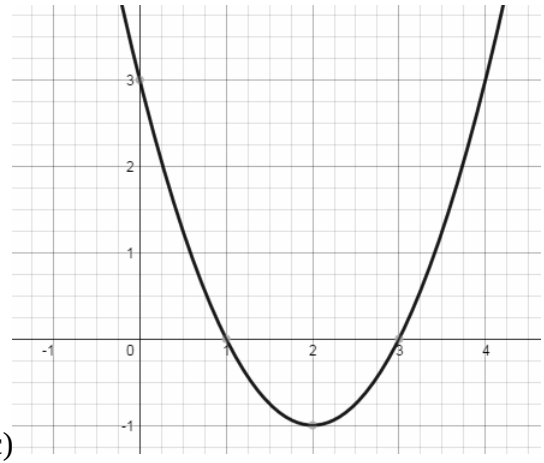
(a)



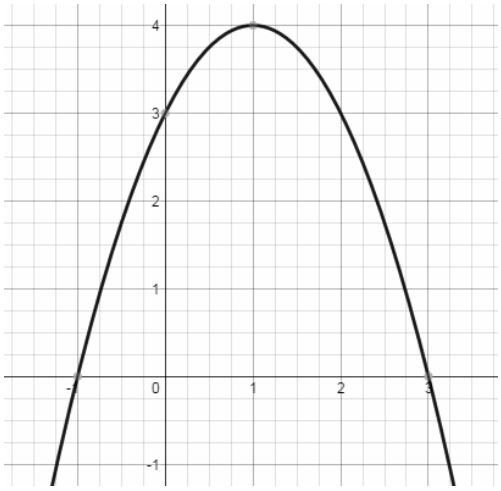
(b)



(c)



(d)



Apply each of the transformations below to **each** graph above (a, b, c and d).
Write down the maximum or minimum point **after** each transformation has been applied.

Translations

$f(x-1)$	$f(x+1)$	$f(x)+1$	$f(x)-1$	$f(x)+3$
$f(x+2)$	$f(x+2)+3$	$f(x-1)+2$	$5+f(x)$	$5+f(x-1)$

Reflections

$f(-x)$	$-f(x)$	$-f(-x)$

Stretches

$2f(x)$	$f(2x)$	$f(4x)$	$3f(x)$	$\frac{1}{2}f(x)$

Combined Transformations (extension)

$-f(x)+1$	$2f(x-1)$	$f(-x)-1$	$f(2x)+1$	$-3f(x)$