

Suppose $y = f(x)$ is a function (or a relation).

The following transformations of $f(x)$ can be done algebraically :

Transformation	formula	comment
Shift $f(x)$ right by h units	$y = f(x-h)$	
Shift $f(x)$ up by k units	$(y-k) = f(x)$	
Shift $f(x)$ right h units, up k units.	$(y-k) = f(x-h)$	$(y - y_shift) = f(x - x_shift)$
Mirror $f(x)$ about the x -axis	$y = -f(x)$	Interchange y and $-y$
Mirror $f(x)$ about the y -axis	$y = f(-x)$	Interchange x and $-x$

Problems:

Suppose $y = f(x) = 2x^2 - 3x + 1$. Write formulae for each of the following operations on $f(x)$:

	New function description	Work	Answer: Simplified new function
1	$g(x) = f(x)$ shifted to the left 3 and up 1.5 [example !]	$y - (1.3) = f(x - (-3))$ $y - 1.3 = f(x+3)$ $= 2(x+3)^2 - 3(x+3) + 1$ $= 2(x^2+6x+9) - 3x - 3 + 1$ $= 2x^2 + 12x + 18 - 3x - 3 - 1$ $y - 1.3 = 2x^2 + 9x + 14$ $y = 2x^2 + 9x + 14 + 1.5$	$g(x) = 2x^2 + 9x + 15.5$
2	$k(x) = f(x)$ mirrored about the y -axis		
3	$z(x) = f(x)$ mirrored about the x -axis		
4	$w(x) = f(x)$ first shifted down 2 and to the right 1, and after that mirrored about the y -axis		
5	$s(x) = f(x)$ first mirrored about the y -axis, and then mirrored about the x -axis.		
6	$t(x) = f(x)$ first mirrored about the x -axis, and then shifted up 4 and to the left 5.		