

Summary

S/n	Type of Transformation	General Equation	Description	Results
1	Translation (along y-axis)	$y = f(x) + a$	Translate up along y-axis by a units.	y co-ordinates change.
		$y = f(x) - a$	Translate down along y-axis by a units.	y co-ordinates change.
2	Translation (along x-axis)	$y = f(x + b)$	Translate left along x-axis by b units.	x co-ordinates change.
		$y = f(x - b)$	Translate right along x-axis by b units.	x co-ordinates change.
3	Stretching (along y-axis)	$y = pf(x), p > 1$	Stretch $y = f(x)$, parallel to the y-axis . Factor p .	y co-ordinates change. Multiply the y co-ordinates by p .
		$y = pf(x), p < 1$		
		$y = -pf(x), p > 1$	Stretch $y = f(x)$ parallel to the y-axis to obtain $y = pf(x)$. Factor p . Reflect $y = pf(x)$ on the x-axis .	y co-ordinates change. Multiply the y co-ordinates by $-p$.
		$y = -pf(x), p < 1$		
4	Stretching (along x-axis)	$y = f(kx), k > 1$	Stretch $y = f(x)$, parallel to the x-axis . Factor $\frac{1}{k}$.	x co-ordinates change. Multiply the x co-ordinates by $\frac{1}{k}$.
		$y = f(kx), k < 1$		
		$y = f(-kx), k > 1$	Stretch $y = f(x)$, parallel to the x-axis to obtain $y = f(kx)$. Factor $\frac{1}{k}$. Reflect $y = f(kx)$ on the y-axis .	x co-ordinates change. Multiply the x co-ordinates by $\frac{1}{-k}$.
		$y = f(-kx), k < 1$		

1. Translations change the location of a graph.
2. Stretchings change the appearance of a graph.

S/n	Graph	Transformation
1	$y = f(x - 2)$	Translate $y = f(x)$ right along x-axis by 2 units to obtain $y = f(x - 2)$.
2	$y = f(x) - 2$	Translate $y = f(x)$ down along y-axis by 2 units to obtain $y = f(x) - 2$.
3	$y = 3f(x)$	Stretch $y = f(x)$ parallel to the y-axis by a factor of 3 to obtain $y = 3f(x)$.
4	$y = f(3x)$	Stretch $y = f(x)$ parallel to the x-axis by a factor of $\frac{1}{3}$ to obtain $y = f(3x)$.
5	$y = 2f(x + 3) - 5$	First, translate $y = f(x)$ left along x-axis by 3 units to obtain $y = f(x + 3)$. Next, stretch $y = f(x + 3)$ parallel to the y-axis by a factor of 2 to obtain $y = 2f(x + 3)$. Lastly, translate $y = f(x)$ down along y-axis by 5 units to obtain $y = 2f(x + 3) - 5$.
6	$y = -f(x)$	Reflect $y = f(x)$ on the x-axis .
7	$y = f(-x)$	Reflect $y = f(x)$ on the y-axis .

