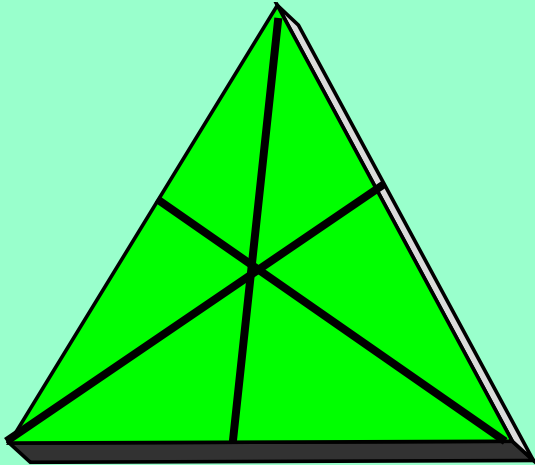


14.

Summary of graph transformations



Graph	X-coord	Y-coord	Comment
$y = f(x) \pm a$	No change	$\pm a$	Graph moves vertically up or down by a.
$y = f(x \pm a)$	$\pm a$	No change	Graph moves left (+) or right (-) by a.
$y = -f(x)$	No change	Change sign	Graph reflected in x-axis
$y = f(-x)$	Change sign	No change	Graph reflected in y-axis.
$y = kf(x)$	No change	Multiply by k	Graph stretched vertically
$y = f(kx)$	Divide by k.	No change	Graph compressed horizontally

Points to note:

1. If transforming action is **inside** the bracket it is the x coordinates which are affected. Eg. $f(\mathbf{3x})$
2. If transforming action is **outside** bracket it is the y coordinates which are affected. Eg. $\mathbf{3f(x)}$
3. For $f(x+a)$ think “what will make bracket zero” eg. For $f(x+3)$ **subtract 3** from all x-coordinates of key points.