for each of the following: Describe transformation
Sketch the graph

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

$y - 2 = -f(x-3)$

2) $y = 2f(x+4)$

$\frac{y}{2} = \frac{2f(x+4)}{2}$ $\quad \frac{y}{2} = f(x+4)$

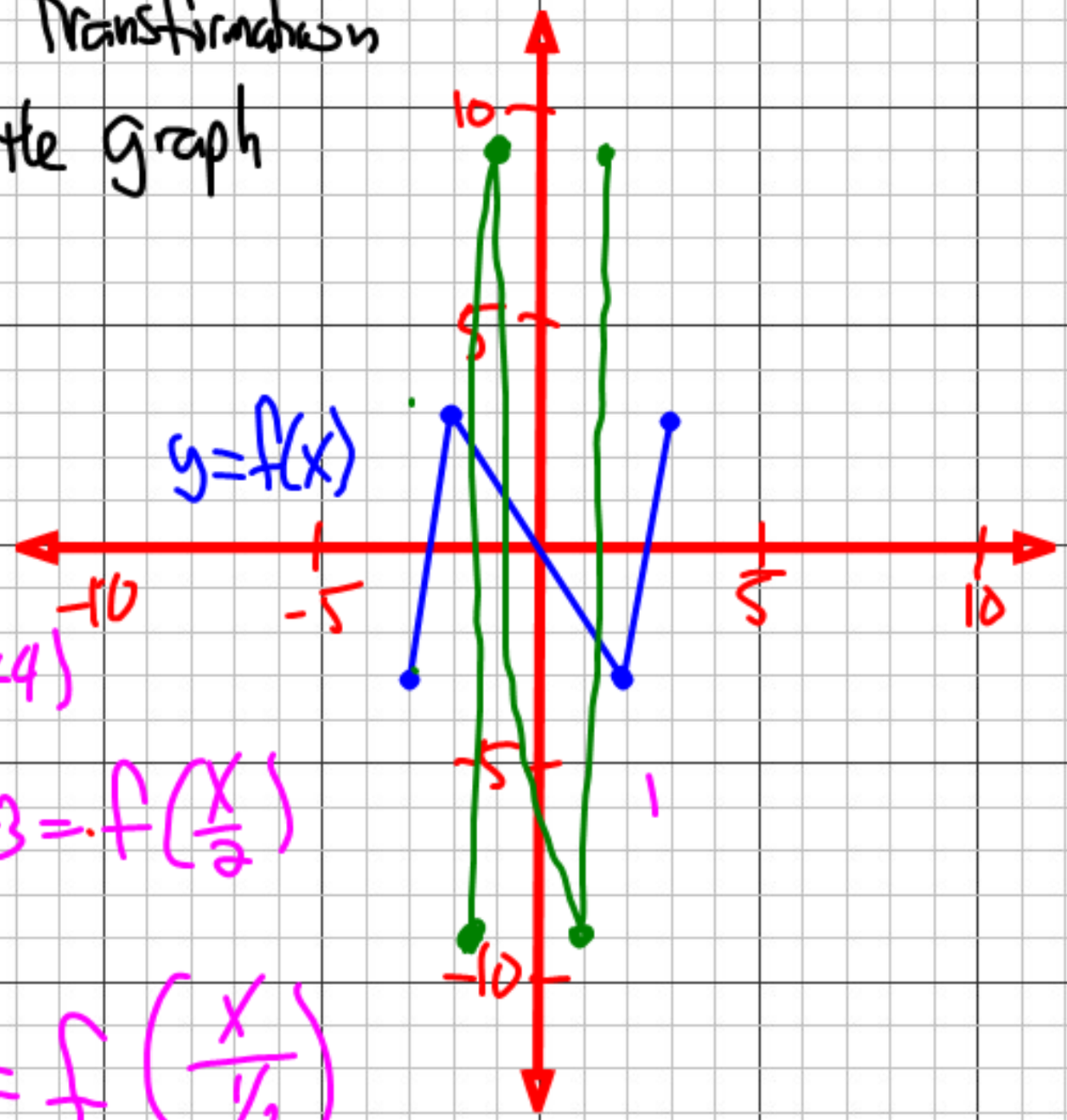
3) $y = f\left(\frac{x}{2}\right) - 3$

$+3 \quad +3$

$y + 3 = f\left(\frac{x}{2}\right)$

4) $y = 3f(2x)$

$\frac{y}{3} = f\left(\frac{x}{1/2}\right)$



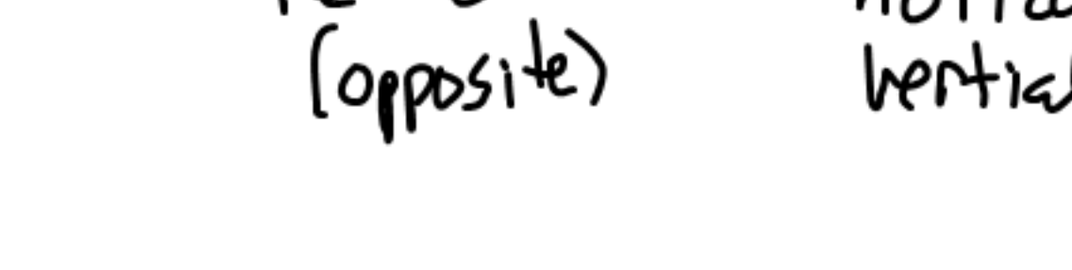
Summary of Transformations

$$y = f(x) \Rightarrow \frac{y-k}{b} = f\left(\frac{x-h}{a}\right)$$

or

$$y = bf\left(\frac{x-h}{a}\right) + k$$

$y = x^2$ $y = \sqrt{x}$ $y = |x|$



Translation	horizontal $= h$	$x \to x - h$	
	vertical $= k$	$y \to y - k$	
Dilation	horizontal $= a$	$x \to \frac{x}{a}$	
	vertical $= b$	$y \to \frac{y}{b}$	
Reflections (opposite)	horizontal	$x \to -x$	$a < 0$
	vertical	$y \to -y$	or $b < 0$

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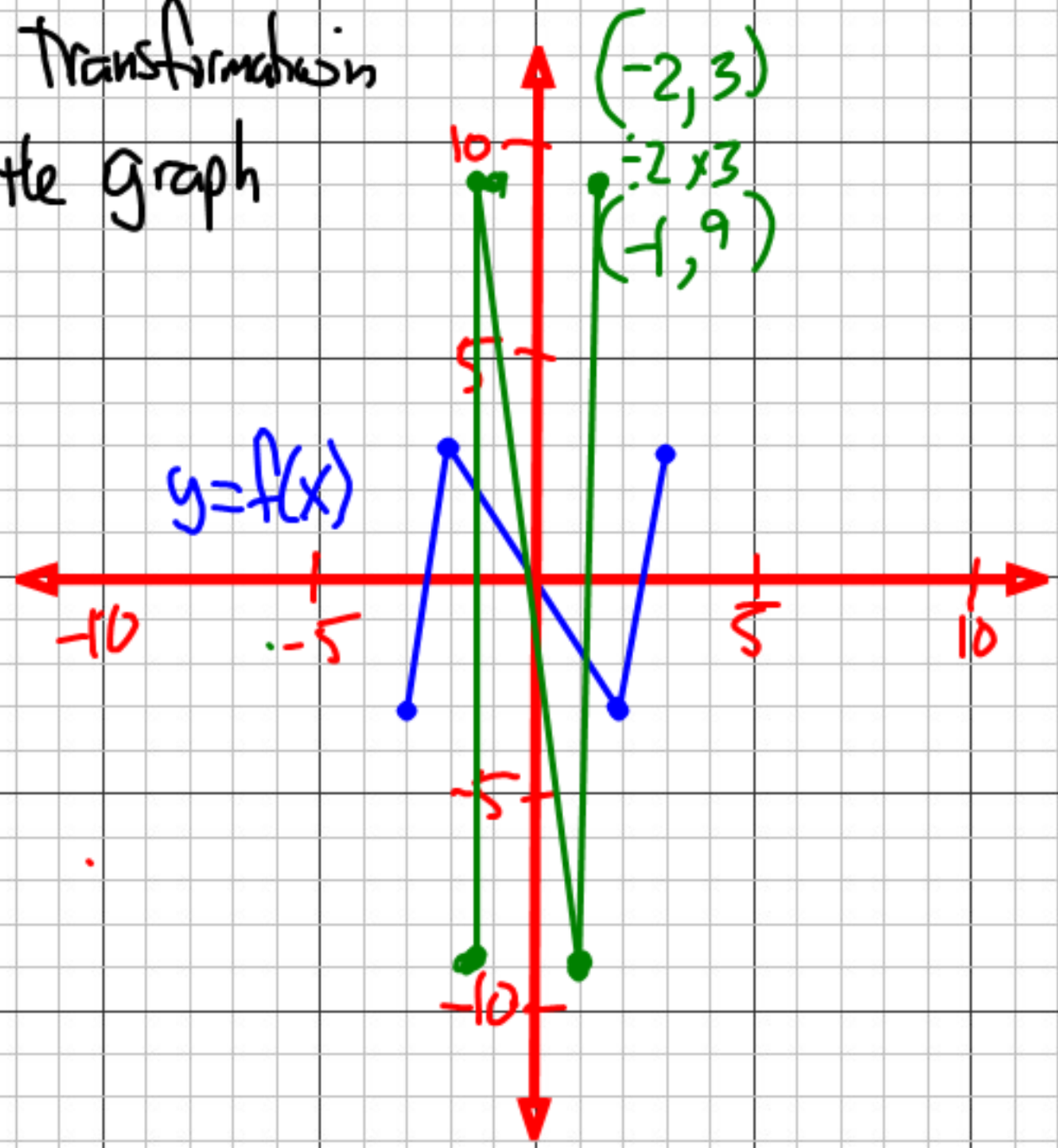

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