

Transformations

$$y = a f [k(x-d)] + c$$

↑ Vertically Stretch $|a| > 1$
↑ Compression $|a| < 1$
↑ Reflection in x-axis $a < 0$

↑ Horizontal Stretch $|k| < 1$
↑ Compression $|k| > 1$
↑ Reflection in y-axis $k < 0$

↑ Horizontal shift
↑ Right $(x-d)$
↑ Left $(x+d)$

↑ Vertical translation
↑ Up $+c$
↑ Down $-c$

Recall

$$y = af(x-h) + k$$

gave us

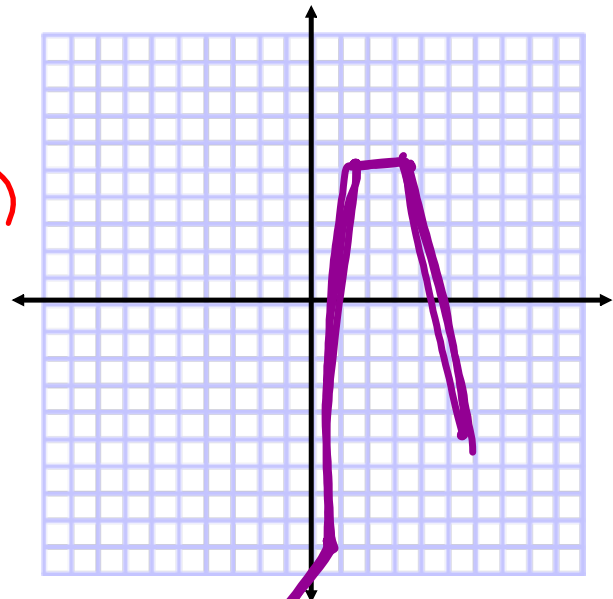
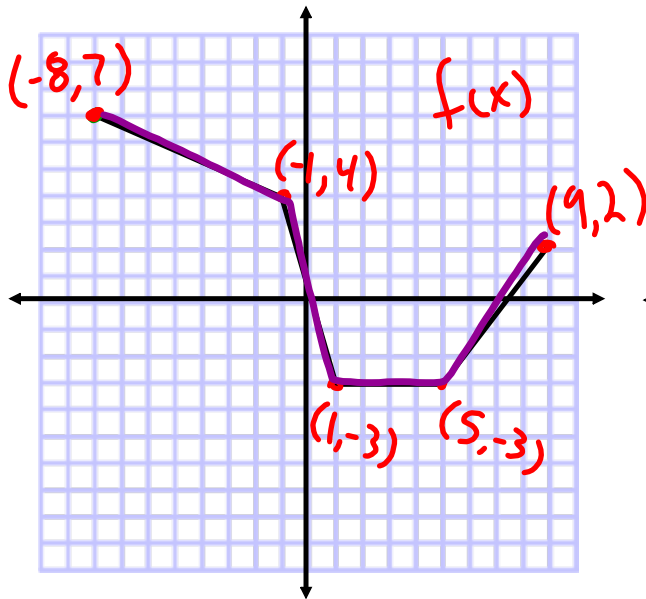
$$(x, y) \rightarrow (x-h, ay+k)$$

Now we have

$$y = a f [k(x-d)] + c$$

$$(x, y) \rightarrow \left(\frac{x}{k} - d, ay + c \right)$$

Given the graph of $f(x)$, graph $y = -2^a f(2^k(x-1)^d) - 1^c$



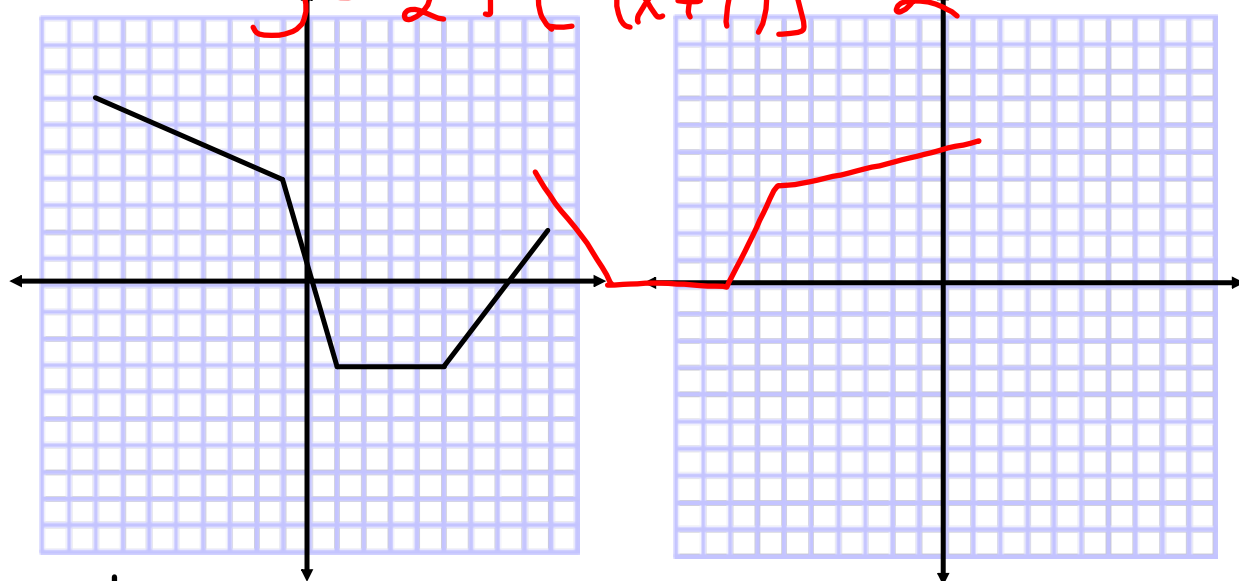
x	y
-8	7
-1	4
1	-3
5	-3
9	2

→

$\frac{x}{2} + 1$	$-2y - 1$
-3	-15
0.5	-9
1.5	5
3.5	5
5.5	-5

Given the graph of $f(x)$, graph

$$y = \frac{1}{2} f[-(x+7)] + 2$$



x	y
-8	7
-1	4
1	-3
5	-3
9	2

→

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

$$y = 0.25f(4(x+3)) + 2$$

c: