



# Transformations of Functions V - Pulling it All Together

$$y = af(k(x - d) + c$$

Video Notes

[Video Link](#)

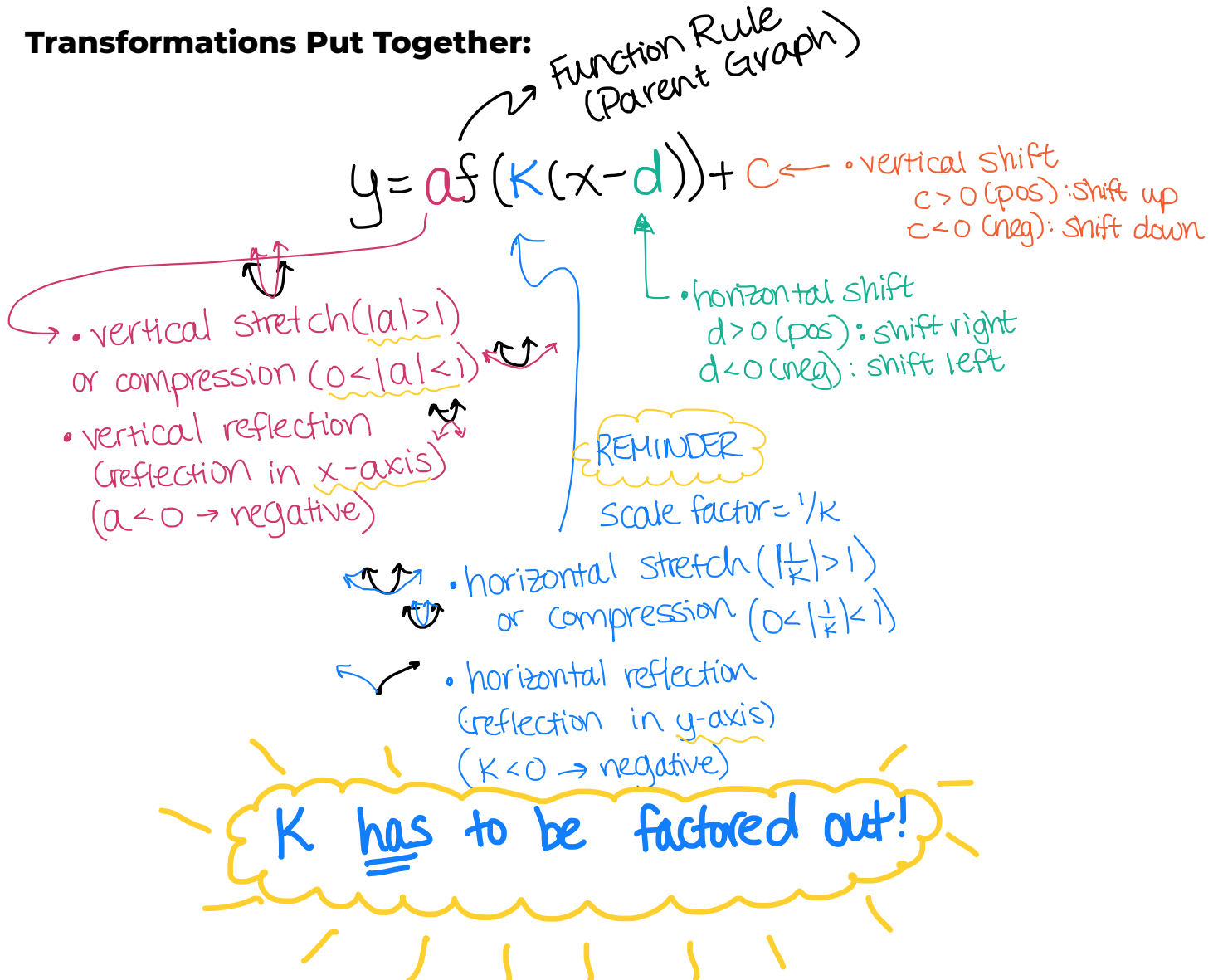
# Transformations of Functions V - Pulling it All Together

$$y = af(k(x - d)) + c$$

Background Knowledge:

- Transformations of Functions Parts I - IV

**Transformations Put Together:**



$$g(x) = a f(K(x-d)) + c$$

Consider the function,  $g(x) = \frac{1}{4}(2x-2)^2 - 5$ . Determine the **parent function** and **describe the transformations** done to the parent function to result in  $g(x)$ . Graph the function.

$$g(x) = \frac{1}{4}(2x-2)^2 - 5$$

\*  $K$  must be factored out

$$g(x) = \frac{1}{4}(2(x-1))^2 - 5$$

**Transformations:**

•  $a = \frac{1}{4} \rightarrow$  vertical compression (s.f. =  $\frac{1}{4}$ )

•  $K = 2 \rightarrow \frac{1}{K} = \frac{1}{2} \rightarrow$  horizontal compression (s.f. =  $\frac{1}{2}$ )

•  $d = 1 \rightarrow$  horizontal translation 1 unit right

•  $c = -5 \rightarrow$  vertical translation 5 units down

$$(x, y) \rightarrow (\frac{1}{2}x + 1, \frac{1}{4}y - 5)$$

**General rule:**

$$(x, y) \rightarrow (\frac{1}{K}x + d, ay + c)$$

**Domain:**

$$\{x \in \mathbb{R}\}$$

OR

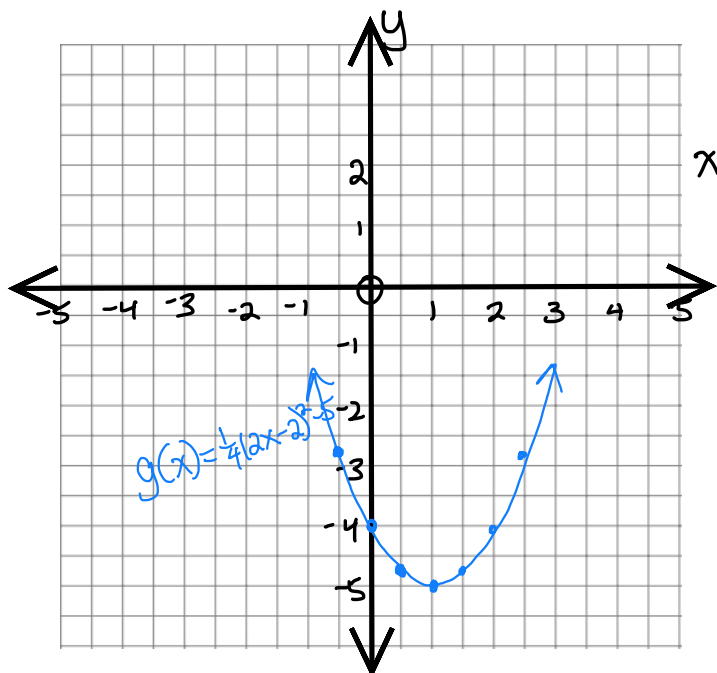
$$(-\infty, \infty)$$

**Range:**

$$\{y \in \mathbb{R} \mid y \geq -5\}$$

OR

$$[-5, \infty)$$



**Parent Function:**

$$f(x) = x^2$$

$x$	$f(x)$
-3	9
-2	4
-1	1
0	0
1	1
2	4
3	9

Multiply  $x$  by  $\frac{1}{2}$   
Multiply  $y$  by  $\frac{1}{4}$

$\frac{1}{2}x$	$\frac{1}{4}y$
-1.5	2.25
-1	1
-0.5	0.25
0	0
0.5	0.25
1	1
1.5	2.25

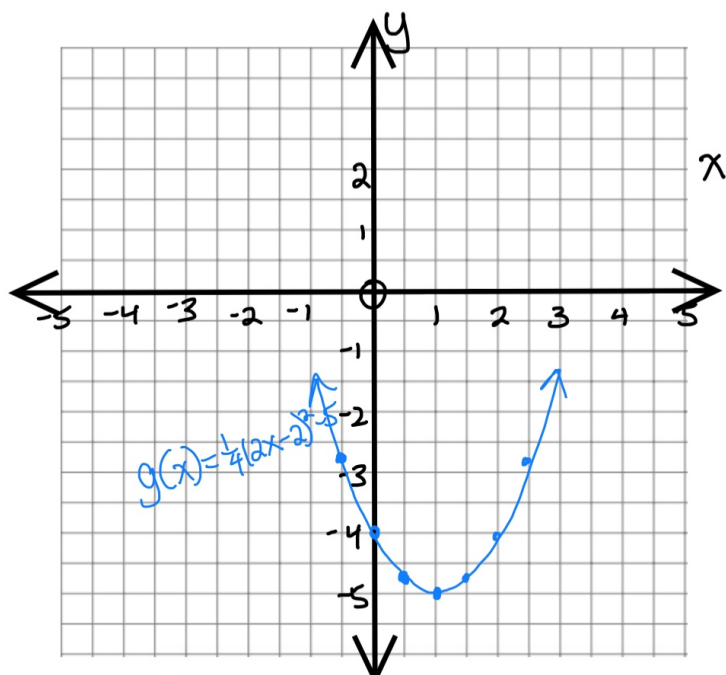
Add 1 to  $x$   
Subtract 5 from  $y$

$\frac{1}{2}x + 1$	$\frac{1}{4}y - 5$
-0.5	-2.75
0	-4
0.5	-4.75
1	-5
1.5	-4.75
2	-4
2.5	-2.75

compressions

Translations

This is  $g(x)$ .



Domain:

$$\{x \in \mathbb{R}\}$$

OR

$$(-\infty, \infty)$$

Range:

$$\{y \in \mathbb{R} \mid y \geq -5\}$$

OR

$$[-5, \infty)$$