Base Curve : $y = f(x)$

Transformed Curve : $y = \mathbf{a}\, f(\mathbf{b}[x + \mathbf{c}]) + \mathbf{d}$

*** Note: If there is a b and c , b must be factored !!**

a $y = f(x)$ and $y = \mathbf{a}\, f(x)$

Case #1 - $\mathbf{a} > 1$ and **a** is positive -Vertical Stretch , no reflection
Case #2 - $0 < \mathbf{a} < 1$ and **a** is positive -Vertical Compression , no reflection

Case #3 - $\mathbf{a} > 1$ and **a** is negative -Vertical Stretch , Reflect in x axis
Case #4 - $0 < \mathbf{a} < 1$ and **a** is negative -Vertical Compression , Reflect in x axis

b $y = f(x)$ and $y = f(\mathbf{b}\, x)$

Case #1 - $\mathbf{b} > 1$ and **b** is positive -Horizontal Compression , no reflection
Case #2 - $0 < \mathbf{b} < 1$ and **b** is positive -Horizontal Stretch , no reflection

Case #3 - $\mathbf{b} > 1$ and **b** is negative -Horizontal Compression , Reflect in y axis
Case #4 - $0 < \mathbf{b} < 1$ and **b** is negative -Horizontal Stretch , Reflect in y axis

c $y = f(x)$ and $y = f(x + c)$

Case #1 - c is positive -Move c units Left
Case #2 - c is negative -Move c units Right

d $y = f(x)$ and $y = f(x) + \mathbf{d}$

Case #1 - **d** is positive -Move **d** units Up
Case #2 - **d** is negative -Move **d** units Down

Examples:

$y = x^2$	$y = \mathbf{3}(x - 4)^2 + \mathbf{5}$	**a** = 3, c = -4, **d** = 5	-V. S. factor 3 , No reflection , 4 right , 5 up
$y = \sqrt{x}$	$y = \sqrt{-4(x+2)} - \mathbf{7}$	**b** = -4, c = 2, **d** = -7	-H. C. factor ¼ , Reflect in y axis , 2 left , 7 down
$y = \frac{1}{x}$	$y = \frac{-6}{x - 5} + \mathbf{3}$	**a** = -6, c = -5, **d** = 3	-V. S. factor 6 , Reflect in x axis , 5 right , 3 up