

Graphing with Shifts, Stretches, Compressions, and Reflections

$$k + af\left(bx + h\right) \text{ or } k + af\left(b\left(x + \frac{h}{b}\right)\right)$$

- $|b|$: If $|b| > 1$ then this is a horizontal compression by a factor of $\frac{1}{|b|}$.
- $|b|$: If $0 < |b| < 1$ then this is a horizontal stretch by a factor of $\frac{1}{|b|}$.
- b : If $b < 0$ then this is a reflection in the y-axis and a horizontal stretch or compression.
- $|a|$: If $|a| > 1$ then this is a vertical stretch by a factor of $|a|$.
- $|a|$: If $0 < |a| < 1$ then this is a vertical compression by a factor of $|a|$.
- a : If $a < 0$ then this is a reflection in the x-axis and a vertical stretch or compression.
- h : If $\frac{h}{b} > 0$ then it is a horizontal shift left by $\frac{h}{b}$.
- h : If $\frac{h}{b} < 0$, then it is a horizontal shift right by $\frac{h}{b}$.
- k : If $k > 0$ then it is a vertical shift up by k .
- k : If $k < 0$ then it is a vertical shift down by k .

