Shifting Functions

We are looking at how A, B, C, and D affect $Af(B(x-C))+D$

Vertical Stretch/Squish: A affects the y values of your function.

- $|A| > 1$ stretches your function vertically by a factor of A
- $|A| < 1$ "squishes" your function vertically by a factor of A
- **Note:** Your zeros, points on the x-axis, serve as your "anchors." In other words, they don't move since $A \cdot 0 = 0$

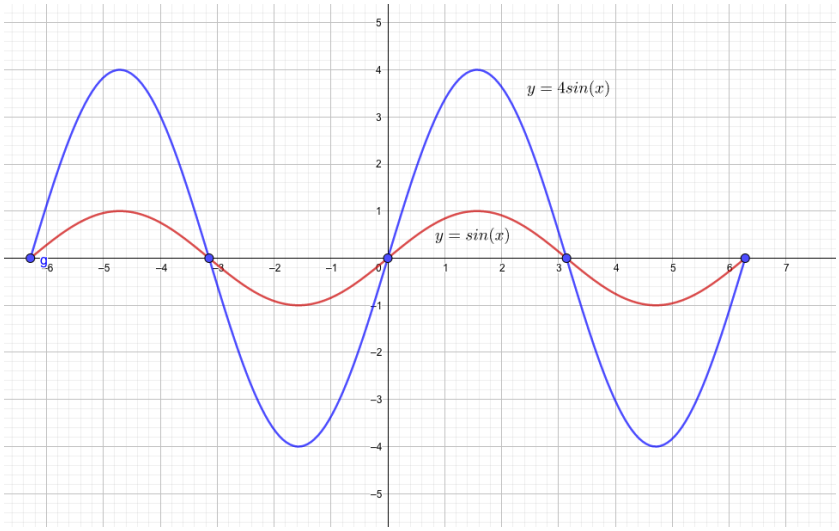

Figure 1: Vertical stretch by a factor of 4

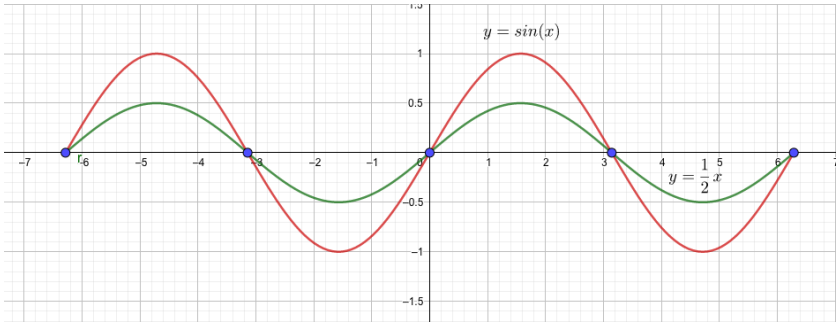

Figure 2: Vertical squish by a factor of 2

Vertical Shift: D affects the y-values of your function

- + D shifts your function vertically D units up
- - D shifts your function vertically D units down

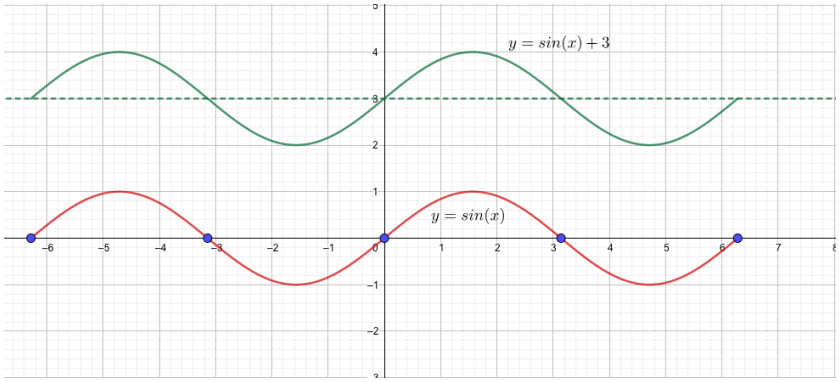

Figure 3: Shift up 3 units

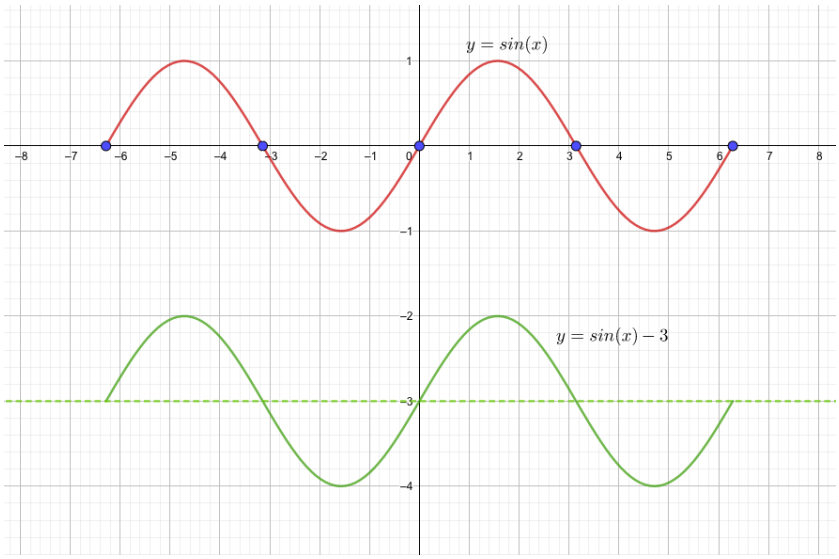

Figure 4: Shift down 3 units

Horizontal Stretch/Squish: B affects the x-values of your function.

- $|B| > 1$ squishes your function horizontally by a factor of B. [the effect is that your original (x, y) points move to $(\frac{x}{B}, y)$]
- $|B| < 1$ stretches your function horizontally by a factor of B. [the effect is that your original (x, y) points move to $(\frac{x}{B}, y)$]
- **Note:** Points on the y-axis, i.e. where $x = 0$ serve as "anchors." In other words, they don't move since $\frac{0}{B} = 0$

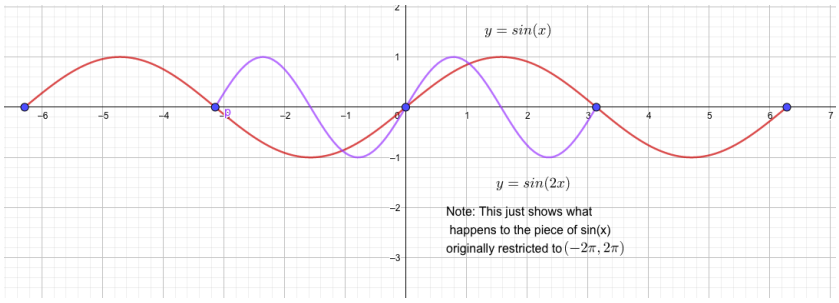

Figure 5: Horizontal "Squish" by a factor of 2

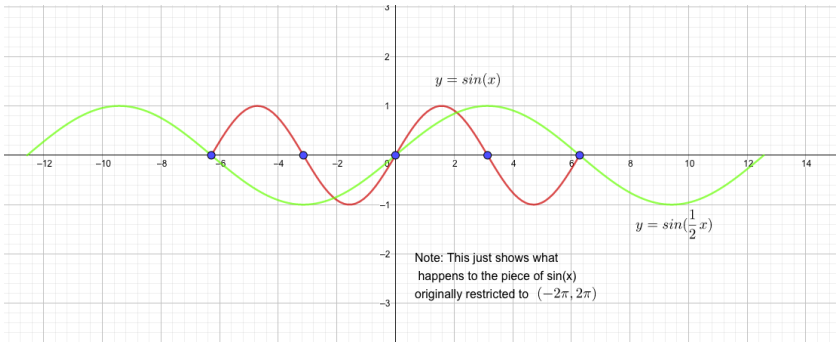

Figure 6: Horizontal Stretch by a factor of 2

Horizontal Shifts: C affects the x-values of your function.

- $C > 1$ shifts your function C units to the right
- $C < 1$ shifts your function C units to the left
- **Note:** Your function is in the form $f(x - C)$ so you are moving the opposite direction of the sign

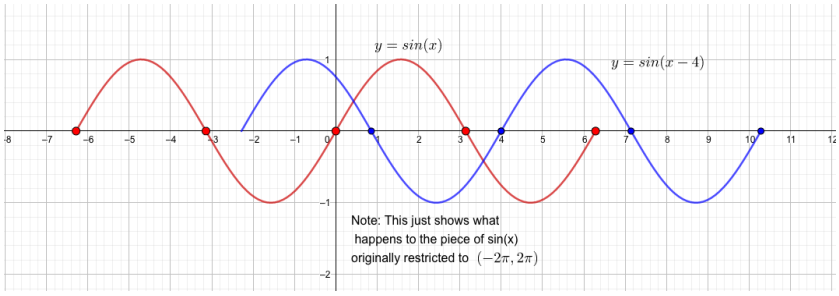

Figure 7: Horizontal shift right 4 units

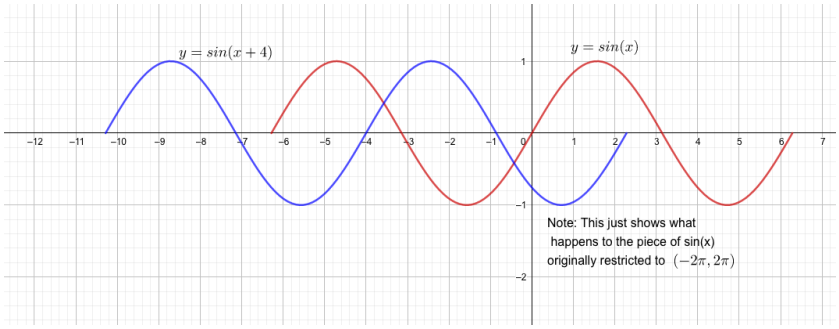

Figure 8: Horizontal shift left 4 units