Parent Functions & Transformations

Anatomy of a Transformation, applied to $f(x) = x^2$

vertical stretch (if >1) or
vertical Shrink (if < 1)
Multiply y by this number.

Horizontal Shrink (if >1)
or stretch (if < 1)
Divide x by this number.

y shift. Positive value
Shifts up; negative down.
Add this number to y.

Negative sign in front
reflects around x-axis.
Reverse the sign of y.

$$f(x) = -2(-3(x - 4))^2 + 6$$

Negative inside the parent
reflects around y-axis.
Reverse the sign of x.

x shift. Negative values shift
right; positive left. (Go figure.)
Subtract this number from x.

Notes

▶ You should apply these transformations left-to-right:

▶ Note that the transformations that apply to *x* are generally the reverse of what intuition would tell you:

  ▷ The number inside the parent function is an *x divisor,* instead of multiplier; the "3" in the above example will make the graph ⅓ as wide as normal.

  ▷ The *x* offset is to the left when positive, to the right when negative.