

# Parent Functions and their Transformations

All graphs we encounter are just transformations of their parent function. A parent function is the simplest function that still satisfies the definition of a certain type of function.

## Example:

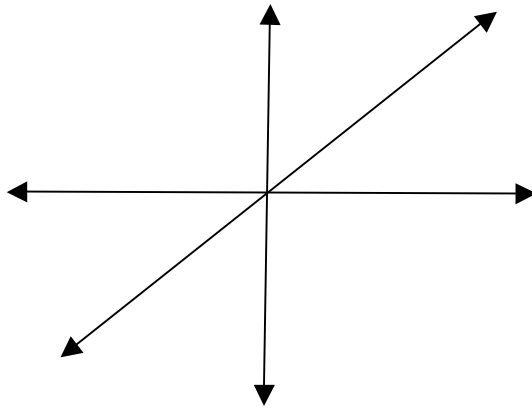
$$F(x) = 2(x-1) + 3$$

This is a linear function.

$$F(x) = x$$

This is the parent function for a linear function.

## Graph of parent function:



If we replace the numerical values with variables “h”, “k”, and “m”, we would get:

$$F(x) = m(x-h) + k$$

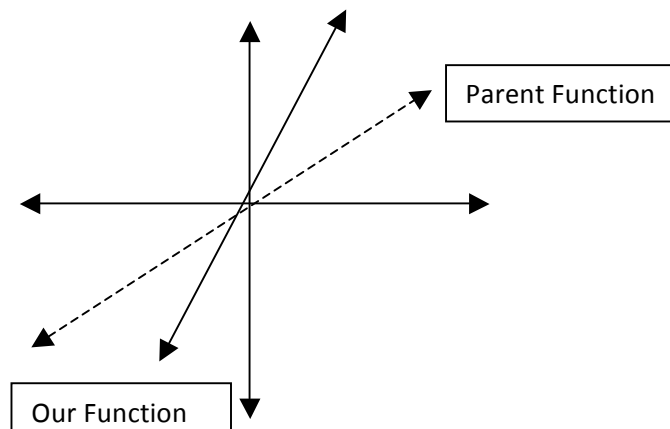
“m” = Slope

“h” = Horizontal Shift

“k” = Vertical Shift

Looking back at our original function, we can see that our  $m = 2$ ,  $h = 1$ , and  $k = 3$ . This means that our graph has a slope of 2, a vertical shift of 3, and a horizontal shift of 1.

## Graph of our function:



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## Parent Functions of other graphs:

$$F(x) = c \quad \text{"c" = Constant}$$

$$F(x) = x \quad F(x) = m(x-h)+k$$

$$F(x) = x^2 \quad F(x) = (x-h)^2+k$$

$$F(x) = x^3 \quad F(x) = (x-h)^3+k$$

$$F(x) = |x| \quad F(x) = |x-h| + k$$

$$F(x) = \sqrt{x} \quad F(x) = \sqrt{x-h} + k$$

