Function Notation

New name for functions!

- Old: \( y = \ldots \)
- New: \( f(x) = \ldots \)
- Everything works the same as with "\( y = \)" notation!
  - Domain is the values of \( x \) for which the function is defined.
  - Range is the values of \( f(x) \) where \( x \) is in the domain of \( f \).
  - Graph the same way (table of values, intercepts, or slope-intercept "up and over").

Function Notation \( f(x) \):

- Pronounced: "\( f of \ x \)"
- Means: "the value of \( f \) at \( x \)"
- Indicates: \( x \) is the variable in the function
- We can use letters other than \( f \) (such as \( g \) or \( h \))

**Example:** \( f(x) = 3x - 15 \)

- Same as \( y = 3x - 15 \)
- \( x \) is the variable

**Example:** Given an \( x \)-value, find the value of \( f(x) \)

- \( f(3) \) means evaluate \( f(x) \) when \( x = 3 \)
- If \( f(x) = 3x - 15 \), then \( f(3) = 3(3) - 15 = -6 \)

**You try:** Evaluate the functions below...

- a) \( f(x) = -7x \)
  - Find \( f(7) \)
- b) \( g(x) = 12x + 1 \)
  - Find \( g(-2) \)
- c) \( h(x) = -8x - 2 \)
  - Find \( h(0) \)
- d) \( p(x) = -\frac{3}{2}x + 5 \)
  - Find \( p(2) \)

**Example:** Given a function, find an \( x \)-value

For \( f(x) = 2x - 10 \), find the value of \( x \) so that \( f(x) = 6 \).

- \( f(x) = 2x - 10 \)
- \( 6 = 2x - 10 \)
- \( x = 8 \) (solving the equation gives us this)
Function Families
- Describe a group of functions with similar characteristics
- Similar to the concept of literal equations
- Example: \( f(x) = mx + b \) describes the family of linear functions

**Parent Functions** represent the simplest form of a function family
- For the family of linear equations, the parent function is \( f(x) = x \)
- We can compare other functions in the family to the parent function
- **Transformations**: vertical translation vs. dilation (stretch)/compression (shrink)

Parent Function: \( f(x) = x \)  
Changing the y-intercept: \( g(x) = x + b \)  
Changing slope: \( g(x) = mx \) where \( m > 0 \) or \( m < 0 \)

Example: Compare the functions below to the graph of \( f(x) = x \)

a) \( g(x) = x + 3 \)
   - The graphs have the same ________________.
   - Therefore the lines are _______________.
   - The y-intercept of \( g \) is ________________ than the y-intercept of \( f \) so is a ________________.

b) \( h(x) = 2x \)
   - The slope of \( h \) is ________________ than the slope of \( f \).
   - The y-intercept for both is the ________________ and passes through the ________________.
   - Function \( h \) is a ________________ of function \( f \).

**Word bank:** vertical stretch (dilation) slope greater than parallel origin vertical translation