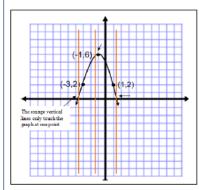# Functions — Quick Reference

Function Notation can be written as:

$f(x) = 3x+2$ this translates to: "f of x" equals 3x+2"
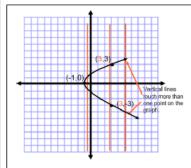$g(x) = 3x-1$ this translates to: "g of x equals 3x − 1"

Identifying Functions using the Vertical Line Test

If a graph represents a function, that graph will only intersect with a vertical line one time.

The orange vertical lines only touch the graph at one point

When vertical lines are drawn through this graph, each vertical line touches the graph only one time.

This graph represents a function.

Vertical lines touch more than one point on the graph.

When vertical lines are drawn through this graph, each vertical line touches the graph more than once.

This graph does not represent a function.

Evaluating Functions

$f(x) = 6x - 1$ Find f(5)   **Original Problem**

$f(x) = 6x - 1$ Find f(5)   ← Notice how 5 replaces the x in the function notation.

$f(5) = 6(5) - 1$ Substitute 5 for x in the original function.

$f(5) = 29$ Evaluate! This is your answer!

This answer means that if you substitute 5 for x, into this function, you will get an answer of 29! You "used" to write: y = 29. Now, in place of y, you will use f(5).

**(The 5 can be replaced with whatever number you substitute into the equation.)

Linear Functions

Function notation can be confusing, but once you can identify the x and y coordinate, you can think of your typical ordered pair.

A typical ordered pair: (2, 5) where (2, 5)
                                x   y

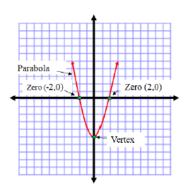An ordered pair using **function notation: f(2) = 5**

f(x) = y coordinate   x   y

Quadratic Functions

Quadratic Functions will have a "squared term"

$f(x) = ax^2 + bx + c$ $f(x) = 2x^2 + 3x + 4$
coefficients   constant   coefficients   constant

A quadratic function will result in a "parabola" when graphed.

Parabola
Zero (-2,0)   Zero (2,0)
Vertex

**If the lead coefficient is positive, then the parabola will open up. Example: $3x^2 + 2x - 5$ (3 is positive)
**If the lead coefficient is negative, then the parabola will open down. Example: $-2x^2 + 2x - 5$ (2 is negative)

Vertex Formula

Given the function: $f(x) = ax^2 + bx + c$

Vertex Formula: $\dfrac{-b}{2a}$ (The opposite of b divided by 2 times a)