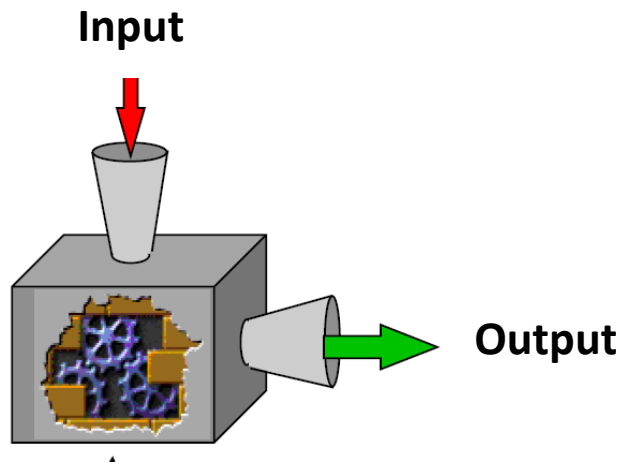
Functions and Their Representations

Function Basics

What is a Function?

A **function** is a correspondence between two sets such that each member of the first set (input) corresponds to exactly one member of the second set (output).



Example: Each person corresponds to his or her birthday. Even though some people share the same birthday, each person has only one birthday.

Function Notation
y = *f(x)*

We write $y = f(x)$ and say "y is a function of x." For the function defined by $y = f(x)$,

- x is the independent variable (also known as the input)
- y is the dependent variable (also known as the output)
- f is the function name

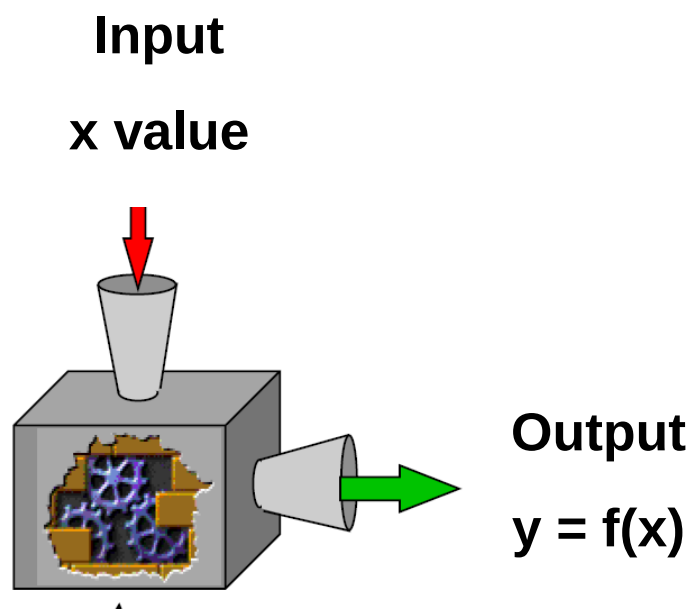
Caution: *f(x)* does not mean *f* times *x*

Example:

y = 3x +2 is the same as *f(x)* = 3x + 2

Evaluate f(-2)

A point on the graph of *f(x)* = 3x+2 is _____



Representations of functions

Functions can be represented verbally, symbolically, numerically, or graphically. Write the following verbal description in the other forms.

Verbally – *Multiply the input x in feet by 12 to obtain the output y in inches.*

Symbolically –

Numerically –

x					
$f(x)$					

Graphically –

Example: Let $f(x) = -7x + 3$ and let $g(x) = x^2 + 12x + 20$. Find the following:

a) Evaluate $f(5)$.

b) Evaluate $g(-3)$.

c) Solve $f(x) = 17$.

d) Solve $g(x) = 0$.

The solution set is _____

The solution set is _____

Example: Temperature readings for Portland, OR, on October 10, 2012, are given in Table 1. Let $f(t)$ be the temperature in degrees Fahrenheit and let t be hours after midnight.

Table 1

t (hours after midnight)	1	2	3	4	5	6	7	8	9	10	11	12
$f(t)$ (temperature in °F)	51	49	47	47	45	46	48	46	47	48	49	51

a) Find $f(10)$. Explain what this function value represents in the context of the problem.

b) Find the value of the function f when $t = 3$. Explain what this function value represents in the context of the problem.

c) Solve $f(t) = 45$. Explain what this solution set represents in the context of the problem.

Example: A population of bees was happily residing in someone's backyard. Let $B(t)$ be the size of the bee population (in thousands) t months after April 1, 2012, which is shown in Figure 1 below.

a) Evaluate the function B at $t = 3$. Explain what this function value represents in the context of the problem.

b) Evaluate $B(0)$. Explain what this function value represents in the context of the problem.

c) Solve $B(t) = 13$. Explain what this solution set represents in the context of the problem.

d) Solve $B(t) = 0$. Explain what this solution set represents in the context of the problem.

Figure 1. Graph of $y = B(t)$