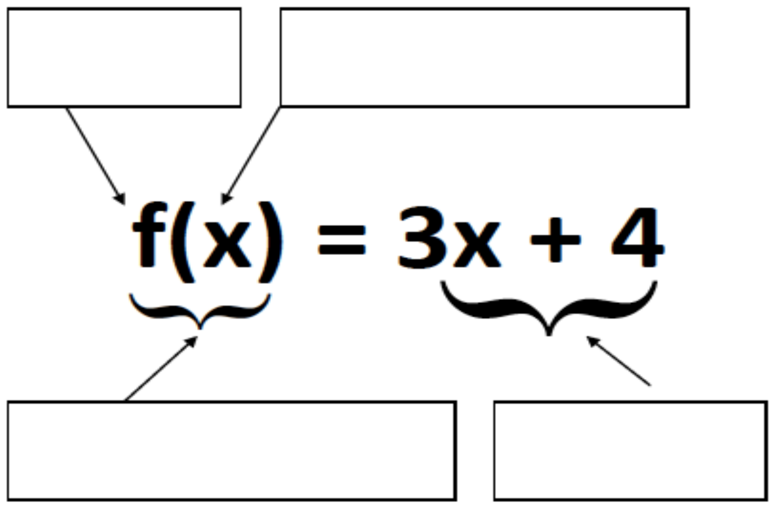
Functions

Function Notation:

A function can be thought of as a __________ that assigns ____ __________ to ______ ______.



Examples:

1. If $f(x) = 3x^2 - 4x$, find the function value for:

a. $f(6)$

b. $f(x+2)$

2. If $f(x) = 6$, find the function value for:

a. $f(-3)$

b. $f(x^2)$

3. If $f(x) = \begin{cases} |x+2|, x \leq 2 \\ \frac{2}{3}x - 1, 2 < x \leq 6 \\ 3, x > 6 \end{cases}$

find the function value for:

a. $f(6)$

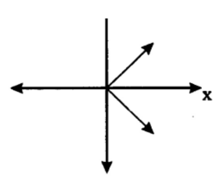
b. $f(0)$

4. Determine with the relation is a function:

a.

x	–1	2	5
y	–4	8	20

b.



c. {-1, 5), (2, 5), (3, 5) (8, 5)}

Function Operations:

Operations with Functions	
$(f+g)(x)$ means $f(x)+g(x)$ *Example:* $f(x)=3x+5, g(x)=2x-7$	$(f-g)(x)$ means $f(x)-g(x)$ *Example: :* $f(x)=2x-4, g(x)=x+3$
$(f \cdot g)(x)$ means $f(x) \cdot g(x)$ *Example: :* $f(x)=x+2, g(x)=x-3$	$\frac{f}{g}(x)$ means $\frac{f(x)}{g(x)}$ *Example: :* $f(x)=x^2-16, g(x)=x+4$

Composition of functions:

Example: **f(x) = 2x+3** and **g(x) = x²**

"x" is just a placeholder, and to avoid confusion let's just call it "input":

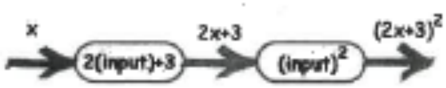
f(input) = 2(input)+3

g(input) = (input)²

So, let's start:

(g ∘ f)(x) = g(f(x))

First we apply f, then apply g to that result:



(g ∘ f)(x) = (2x+3)²

Examples: Let $f(x)=x^2, g(x)=\sqrt{x}$+1, h(x)=2x+3

1. $fog(4)=f(g(4))=$
2. $g(h(x))=$
3. $f(h(x))=$

Inverse Relations: "switch the x and y", if the inverse is a function then it is called an inverse function

Examples:

1. Find the inverse realation from the table:

x	0	1	2	3	4
y	3	5	7	9	11

Is the inverse a function?

2. Find the equation of the inverse relation

$y = \frac{1}{2}x + 4$

Is the inverse a function?

3. Verify the *f* and *g* are inverses:

$f(x) = x + 2; g(x) = x - 2$

Rates of change: Simply means slope

Slope of any line by using the slope formula between 2 points.

"Average Rate of Change" Simply means draw a line through 2 points and find the slope.

Examples:

1. Find the average rate of change of $f(x) = x^2 + 3$ on the interval [0, 2]

Find the average rate of change of $f(x) = 3x^3$on the interval [-2, 3]