Algebra II

Lesson 4: Function Notation

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You have already been using function notation and it has shown up in previous lessons. Function notation is the most accurate way to represent a function. The basic form is $f(x)$, the stuff inside parentheses is called the argument of the function. Recognize that **x** is the **input.** Whatever **x** is completely determines the output; hence, a functional relationship in terms of x (for this example). When we see an equation written in function form we know that the relationship is a function.

What makes a function?

Example 1… Are the following relations functions? Why or why not?

a. $\{(0,4),(-2,3),(-1,3),(-2,2),(1,-3)\}$ **b.** $y = x^2 + 5$ **c.** $3xy + x^2 = 6$

Instead of just using "$y =$ " function notation uses any letter of the alphabet, and specifies what's going to be the variable in the equation. Write some examples below.

When you see function notation with a number in the parentheses, the number is the value of the independent variable or your input. When you evaluate $f(x)$ for some *x*, the answer is the dependent variable or output. In other words, substitute the number for every independent variable.

Example 2… Given the functions $f(x) = |x + 1|$ and $h(t) = t^2 + 2t - 1$, evaluate the following.

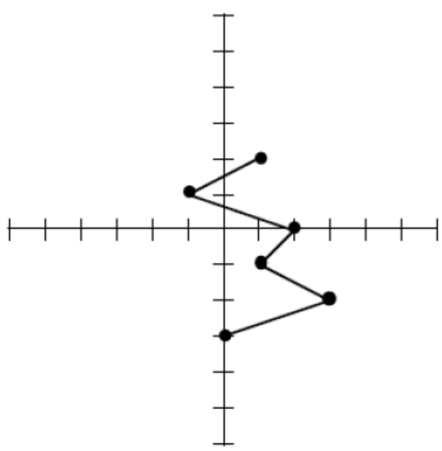
a. $f(2)$	**b.** $h(3)$	**c.** $h(-1) + f(8)$
d. $2f(-5) - 3h(1)$	**e.** $f(c + 1)$	

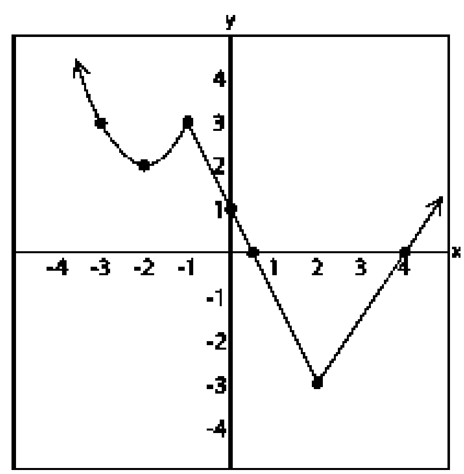
Now, let's try evaluation from a table or a graph.

Example 2… Given each table or graph, state the domain and range, determine if the relation is a function and whether it is continuous or discrete. Then evaluate it for $f(-2), f(0)$, and $f(3)$.

x	*f(x)*
-2	13
-1	12
0	11
1	10
2	9

x	*f(x)*
-3	4
-2	7
1	4
2	-1
3	-8





Composition of Functions

In some cases we will work with more than one function. The first function will be evaluated at a given independent value (the input). Now, the output of the first function is used as the input of the second function! When you combine two or more functions in this fashion you form a **composite function**.

Definition | **Composition of Functions**

The composition of function g with function f is written as $g \circ f$ and is defined as $(g \circ f)(x) = g(f(x))$. The domain of $g \circ f$ consists of the values a in the domain of f for which $f(a)$ is in the domain of g.

$$(g \circ f)(x) = \underbrace{g(\underbrace{f(x)}_{①})}_{②}$$

① **Evaluate the inner function $f(x)$ first.**

② **Then use your result as the input of the outer function $g(x)$.**

The first function to evaluate is "nested" inside of the second function..

Given the functions: $f(x) = x - 1$ *and* $g(x) = x^2 + 3$ evaluate the following	
$f(g(+2))$	$g(f(3))$
$g\ o\ f(-4)$	$f\ o\ g(1)$