Evaluating a Function

by Sophia

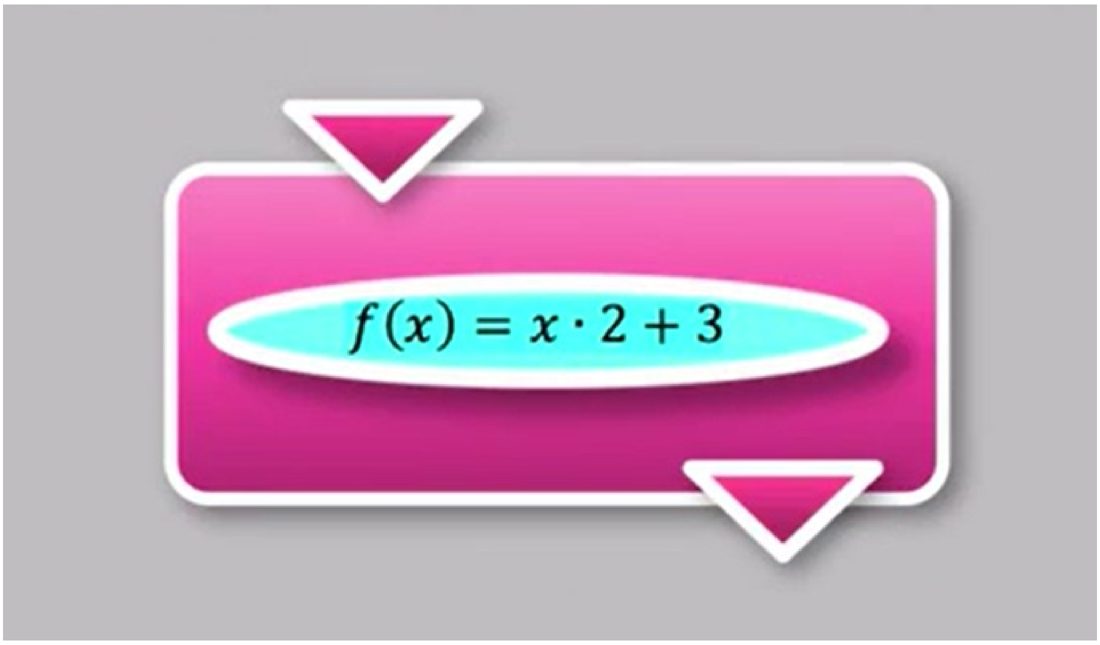
WHAT'S COVERED

This tutorial covers defining a function, through the definition and discussion of:

1. Functions

A **function** is a relation between two variables in which an input variable corresponds to exactly one output variable. These variables can be referred to as inputs and outputs because the value for one variable is "put in" to a function, and then the function provides a specific set of operations to "output" a specific value for another variable.

EXAMPLE Suppose you have the following rule, which would read as: "Take the input, multiply by 2, and add 3."



Evaluate the function for the following values.

Input	Output	Explanation

$x=5$	$f(5)=5\cdot2+3$ $f(5)=10+3$ $f(5)=13$	If you use the input 5 with this rule, the output would be 13 because 5 times 2 is 10 and 10 plus 3 is 13.
$x=8$	$f(8)=8\cdot2+3$ $f(8)=16+3$ $f(8)=19$	Similarly, if you use the input 8 with this rule, the output would be 19 because 8 times 2 is 16 and 16 plus 3 is 19.
$x=5$	$f(-10)=(-10)\cdot2+3$ $f(-10)=-20+3$ $f(-10)=-17$	Finally, if you use the input -10, the output would be -17 because -10 times 2 is -20 and -20 plus 3 is -17.

TERM TO KNOW

Function

A relation in which every element in the domain corresponds to exactly one element in the range

2. Interpreting Function Notation

The expression “f(x)” is commonly used for function notation. It is read "f of x" and does not mean f multiplied by x. Function notation is used to name a function where x is the independent variable or the input. The expression f(x) is used to represent the dependent variable or output of the function; therefore, it is the same as the variable y.

→ EXAMPLE Another example of function notation would be g(t), where t is the independent variable or the input of the function g(t).

3. Evaluating Functions

To evaluate a function means to find the value of the output f(x) for a given input x. To evaluate a function, you replace each x in the function with the input value and use order of operations to simplify the expression to determine the output value.

→ EXAMPLE Evaluate the function $f(x)=4x^2-6$ for x equals 10.

First, replace each x with 10.

$$f(10)=4(10)^2-6$$

Simplify starting with your exponent, then move on to multiplication and subtraction, which provides f(10) = 394.

$$f(10)=4(100)-6$$
$$f(10)=400-6$$
$$f(10)=394$$

Remember, you read this as f of 10, and it does not mean to multiply f and 10 together.

DID YOU KNOW

You can also represent your solution as an ordered pair — (10, 394) — which would be on the graph of this function.

TRY IT

Consider the same function as above: $f(x) = 4x^2 - 6$.

Evaluate f(x) for x equals -4.

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Start by replacing each x with -4.

$$f(x) = 4x^2 - 6$$
$$f(-4) = 4(-4)^2 - 6$$

Again, start with your exponent, then multiply and subtract.

$$f(-4) = 4(16) - 6$$
$$f(-4) = 64 - 6$$
$$f(-4) = 58$$

Again, you can write this as an ordered pair — (-4, 58) — which is a point that would be on the graph of the function f(x).

SUMMARY

Today you learned that a **function** is a relation between two variables—referred to as inputs and outputs—in which an input variable corresponds to exactly one output variable. You also learned that **function notation** is used to name a function where x is the independent variable or the input of the function. Lastly, you learned that f(x) is used to represent the dependent variable or output of the function, so it is the same as the variable y.

Source: This work is adapted from Sophia author Colleen Atakpu.

TERMS TO KNOW

Function
A relation in which every element in the domain corresponds to exactly one element in the range.

