Evaluating Functions

by Sophia

WHAT'S COVERED

In this lesson, you will learn how to evaluate a function for a given value. Specifically, this lesson will cover:

1. Review of Function Notation

Before we go into evaluating a function for a given value, let's first review the basics of function notation. Recall that the notation $f(x)$ is read, "*f* of *x*". The meaning behind this notation is that we are evaluating the function for some *x* value. We often times refer to *x* as the **argument** for the function *f*.

HINT

Keep in mind that $f(x)$ does not mean *f* multiplied by *x*. This is an easy mistake to make.

TERM TO KNOW

Argument

The input value of a function, on which the value of a function depends.

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2. Evaluating *f*(*a*)

Now that we have reviewed function notation, let's take a look at what it means to evaluate a function for some value of *x*.

↱ EXAMPLE Suppose we have the equation $f(x) = 2x + 4$ and are asked to evaluate this function when $x = 5$. What steps should we take?

First, we need to realize that when we are being asked to evaluate a function, what we are really being asked to do is determine the function's value when the variable that it is dependent upon is equal to a certain value. In this case, the function $f(x)$ is dependent upon *x*, and we want to know the value of $f(5)$ or $f(x = 5)$. To evaluate the function for when $x = 5$, we simply replace each *x* variable with 5, as shown below:

Substitute 5 in for *x*

$f(x) = 2x + 4$
$f(5) = 2(5) + 4$ Multiply 2 and 5

$f(5) = 10 + 4$ Add 10 and 4

$f(5) = 14$ Our solution

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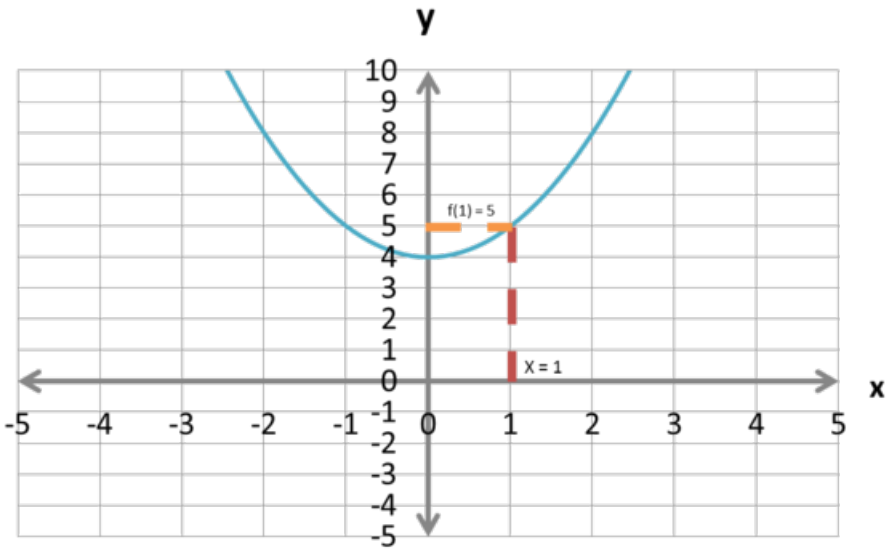
3. Finding *f*(*a*) on a Graph

Sometimes you may be given the graph of a function and asked to determine some value of the function $f(a)$. When you are asked to do this, the process is very similar to if you were given the graph of the equation and asked to find the value of *y* for a specific value of *x*.

↱ EXAMPLE In the equation $y = x^2 + 4$, find the value of *y* when $x = 1$. In this case, you would simply locate the point on the coordinate plane where $x = 1$ and then move vertically up or down until you touch a point on the graph for the line $y = x^2 + 4$. Next, you move horizontally towards the y-axis and identify the point where you touch the y-axis. The y-value of the coordinate system at this point represents the *y* in this equation.



We can rewrite the previous equation with $f(x)$ instead of *y* to get $f(x) = x^2 + 4$. If we are asked to find the value of the function when $x = 1$, we follow the same process we did before when $x = 1$. The only difference is that this time we are saying that $f(1)$ is equal to some value instead of *y*. We would write this as $f(1) = 5$.

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4. Evaluating *f*(*x* + *a*)

Sometimes we may be asked to evaluate a function for some value given in the form $f(x + a)$. The process we follow is the same as we did for a single argument, only now instead of replacing the x's with a's we replace them with $x + a$.

↱ EXAMPLE Suppose we are given the function $f(x)=5x-2$ and asked to evaluate the function for $f(x+2)$. How would we evaluate this function?

$f(x)=5x-2$	Substitute $(x+2)$ in for x
$f(x+2)=5(x+2)-2$	Distribute 5 into $(x+2)$
$f(x+2)=5x+10-2$	Combine like terms
$f(x+2)=5x+8$	Our solution

HINT

Whenever evaluating a function for some value, simply replace the variable of the function with the quantity you want to evaluate it for and then simplify.

SUMMARY

Reviewing function notation, recall that $f(x)$ is read "*f* of *x*". The function $f(x)$ is a function of *x*, where *x* is referred to as the argument. The argument of the function is the input value on which the value of the function depends. You can evaluate a function algebraically by substituting a given value in the domain for *x*, or **evaluate *f*(*a*)** where a is a given value. You can evaluate a function graphically by **finding $f(a)$ on a graph**. To do this, find a given value in the domain on the x-axis and determine the corresponding y-value of the function. Sometimes you are asked to **evaluate *f*(*x* + *a*)**. The process you follow is the same as you did for a single argument, only now instead of replacing the x's with a's, you replace them with $(x+a)$.

TERMS TO KNOW

Argument

The input value of a function, on which the value of a function depends.