

Functional Notation and Evaluating

Functional Notation:

Traditionally, functions are referred to by the letter name f , but f need not be the only letter used in function names. The following are but a few of the notations that may be used to name a function: $f(x)$, $g(x)$, $h(a)$, $A(t)$, ...

$$f(x) = x^2 \quad g(x) = 2x + 4 \quad h(a) = a^2 + 5a + 4 \quad A(t) = 16t^2 - 4t - 1$$

Note: The $f(x)$ notation can be thought of as another way of representing the y -value in a function, especially when graphing. The y -axis is even labeled as the $f(x)$ axis, when graphing.

Often times, mathematics has a variety of ways to say the same thing. Examine these notations that are all equivalent:



$$y = x^2 + 7$$

$$f(x) = x^2 + 7$$

$$x \xrightarrow{f} x^2 + 7$$

(the arrow is read "is mapped to")

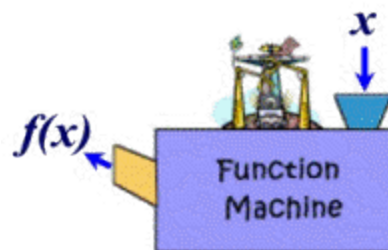
$$f : x \rightarrow x^2 + 7$$

$$f = \{(x, y) \mid y = x^2 + 7\}$$

(the vertical bar is read "such that")

It should be noted here that since $y = x^2 + 7$ is a function, it can be renamed as $f(x) = x^2 + 7$.

Evaluating Functions:



To evaluate a function, simply replace (**substitute**) the function's variable with the indicated number or expression.

1.	<p>A function is represented by $f(x) = 2x + 5$. Find $f(3)$.</p> <p>To find $f(3)$, replace the x-value with 3. $f(3) = 2(3) + 5 = 11$. The answer, 11, is called the image of 3 under $f(x)$.</p>
2.	<p>Find the value of $R(v) = v^3 + 3v^2 - 5v - 6$ when $v = -2$. Replace the v-values with -2.</p> $R(-2) = (-2)^3 + 3(-2)^2 - 5(-2) - 6 = 8$
3.	<p>Find the value of $h(x) = 2x^2 + 6x - 3$ when $x = 4a$.</p> <p>Replace the x-values with $4a$.</p> $\begin{aligned} h(4a) &= 2(4a)^2 + 6(4a) - 3 \\ &= 2 \cdot 16a^2 + 24a - 3 = 32a^2 + 24a - 3 \end{aligned}$ <p>Notice that the final answer is in terms of a.</p>
4.	<p>Find $f(3h+2)$ when $f(x) = x^2 + 2x - 1$.</p> <p>To find $f(3h+2)$, replace the x-values with $3h+2$. Using parentheses for this substitution will help prevent algebraic errors. Use $(3h+2)$ when substituting.</p> $\begin{aligned} f(3h+2) &= (3h+2)^2 + 2(3h+2) - 1 \\ &= 9h^2 + 12h + 4 + 6h + 4 - 1 \\ &= 9h^2 + 18h + 7 \end{aligned}$