

1. Function Notation
2. You should be familiar with functions and graphs of functions. In this lesson, we will describe function notation.
3. A function, such as the function depicted here, the function which squares a number, associated with the equation $y = x^2$ has three main parts. First, the function has a place to receive an input, for example, 2. Inside the box, a calculation is made. In this case, the function box squares the input of 2 to produce the answer 4. The function then also has a place to output the answer. Different inputs, such as 5, will produce different outputs. In this case, $5^2 = 25$. The input -5 also produces the output 25.
4. There is a strong connect between functions and graphs. We often identify a function with an equation, which is then graphed. The graph represents the function. The x -axis contains the inputs. For instance, if we wish to know the function value for the input of 2, we locate 2 on the x -axis, travel on a vertical line until we intersect with the graph, then read off the output, which is the y -value.
5.
 - (a) In addition to representing a function with an equation or with a graph, we can also represent a function with a name or abbreviation. For example, we can use the letter f to denote the function which squares the input. f is the name of the function box. The function notation displays the three key components as follows: Inside the parentheses is the input variable. x can be any number. There is a rule that describes how to calculate the output based on the input, in this case, squaring; x^2 is the output.
 - (b) Notice that the name of the input is not important. We can represent the same function using the letter n as the arbitrary input. We calculate the output in exactly the same way, the output is the square of the input. The left hand side of the equation, $f(x)$ is a notation for the output of the function.
 - (c) For example, we could write $f(3)$. $f(3)$ is a notation for the output of the function when the input is 3. The function squares the input,
 - (d) so $f(3) = 9$. To recap, some variable, like x represents the input. $f(x)$ is the output corresponding to the input. The equation is the rule that tells us what is happening inside the function box. The letter f is the name of the function. In essence f is the box.
6. You may be familiar functions on a calculator. Typical buttons on calculators list just the name of the function, though mathematicians often include the input x . If you have taken courses in geometry or trigonometry, you may be familiar with sine and cosine, and their inverses, which have two different notations. Another often used function is the logarithm function, for example the log base 10, and the natural log.
7. Those familiar with spreadsheets may be familiar with spreadsheet functions, which have the same format. ROUND is a function which takes a variable input from some cell name and rounds off the answer. ABS is the notation for the absolute value function. Students of statistics may compute a z -score using the normal distribution, otherwise known as the bell curve.

8. In later lessons, we will use function notation to perform a variety of manipulations of functions, for example, we may add two functions together, and we may take the output of one function as the input to another function.
9. To recap: There are three ways to think of a function. The first is as a machine that takes inputs and transforms them into outputs. This is symbolized used function notation, there is a place for an arbitrary input, a rule which describes how to calculate the output. $f(x)$ is a symbol for the output of the function f , when the input is x . The function is often associated with the equation $y = f(x)$, which leads to the graph of a function. The input variable is found on the horizontal axis, usually the x -axis, and the output values are found on the vertical axis, the y -axis.