

Basic: What is a function? How does it relate to a table and graph?

A **function** is an object which assigns exactly one output to every input.

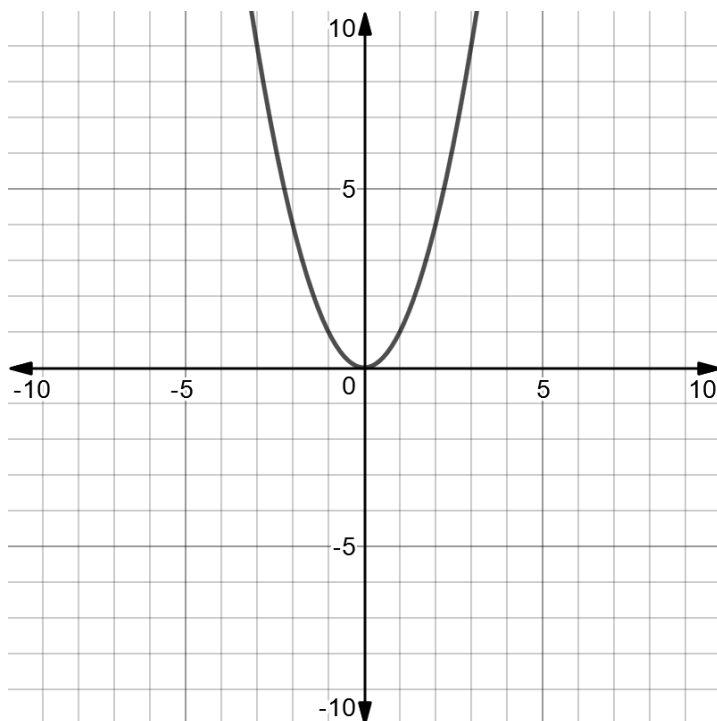
- The **domain** of a function is the set of all values which can serve as its input.
- The **range** of a function is the set of all values which can serve as its output.
- Usually we will use letters such as f , g , and h to denote functions. An expression like $f(x)$ represents the output of the function when the input is x .
- Since that $f(x) = x^2$ and $g(t) = t^2$ both square the input to get the output, the functions are identical. In other words, $f = g$.
- We may also use informal function notation $y = x^2$ instead of $f(x) = x^2$

An example of a function is $y = x^2$ ($f(x) = x^2$ if you prefer the formal notation). This is a function because for any input x , there is exactly one output x^2 .

We could make a **table** of x and y values for our function as such:

x	-3	-2	-1	0	1	2	3
y	9	4	1	0	1	4	9

Tables are useful because they allow us to **graph** a function by plotting the points from our table and connecting them in the smoothest way possible. The more entries in your table, the more points you have to graph, the more accurate a graph you can make. Below is what the graph of $y = x^2$ looks like. Observe that any vertical line you draw on this grid will only intersect the graph once. This should be the case with any function and is known as the **Vertical Line Test**.



Algebra II – Lesson 2: Functions, Tables, and Graphs (page 2)
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Name: _____

Work with your group to come up with 3 more examples of functions and 2 examples of relations that are *not* functions. Everyone in your group should agree on the same 3 functions and same 2 non-functions. Try to make the functions different. In other words, don't pick your 3 functions to all be linear or all be any other single type of function.

Write a formula or equation for each of them, make a table using 7 points, and answer the questions below.

Function 1: _____

x							
y							

What is the domain?

What is the range?

Function 2: _____

x							
y							

What is the domain?

What is the range?

Function 3: _____

x							
y							

What is the domain?

What is the range?

Non-Function 1: _____

x							
y							

Explain why this is not a function:

Non-Function 2: _____

x							
y							

Explain why this is not a function:

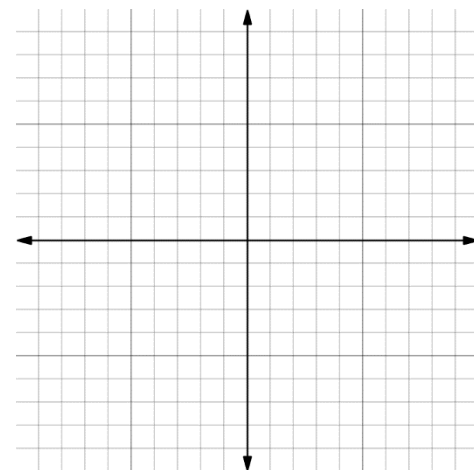
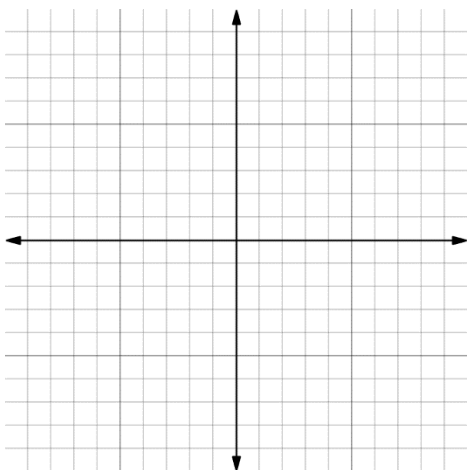
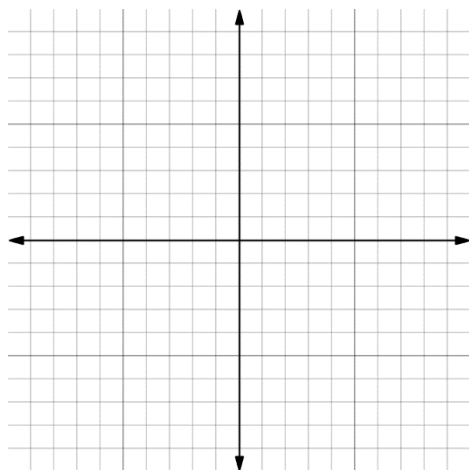
Intermediate: Practice Graphing Functions

Consider again each of your functions from the previous part. Plot the 7 points from your table for each function; then draw the graph by connecting the points. Remember to number your axis so that someone reading your graph can be sure they understand it.

Function 1:

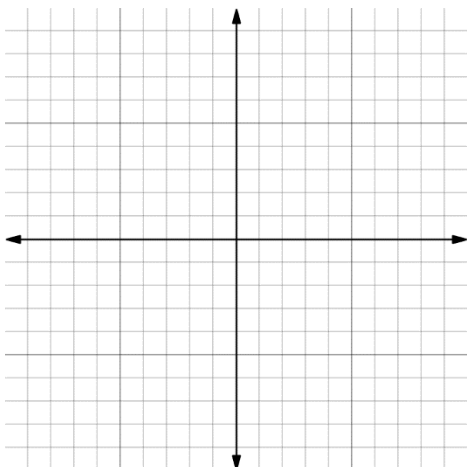
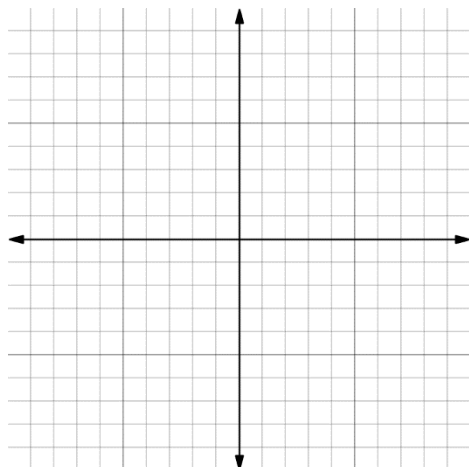
Function 2:

Function 3:



Non-Function 1:

Non-Function 2:



Advanced: Can every function be graphed?

Consider the formula $f(x) = \begin{cases} 1, & \text{if } x \text{ is rational} \\ 0, & \text{if } x \text{ is irrational} \end{cases}$

This means that when the input is a rational number the output will be 1 and when the input is an irrational number the output will be 0. What is $f(3.2)$? What is $f(\pi)$?

Is f a function? Why or why not?

What difficulties arise from attempting to graph f ?