

Functions

A relation is simply two items that are together. Think of these as people dating: women and men. In math, these two items are usually called x and y . As long as there is one of each in each pair, you have a relation.



A function is a special type of relation, one in which each x has a relationship with only one y . In other words, each x is only represented once, although y can be represented more than once.

How to identify a function:

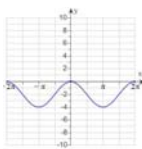
From ordered pairs: Simple, it's a function if x appears only once in the set of ordered pairs (or only with the same y , if it does show up twice)

$\{(1,4)(2,3)(5,1)(3,2)\}$ Function: each x represented *once*

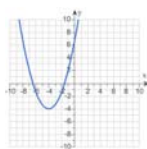
$\{(1,4)(2,3)(5,1)(2,5)\}$ Not a function: x is repeated

$\{(1,4)(2,2)(5,1)(3,2)\}$ Function: each x represented *once*
(y can be repeated).

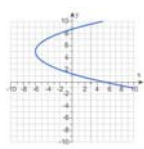
From a graph: To identify a function from a graph, use the vertical line test. Run your finger along the x axis. If there is only one y value at each point, then each x is belonging to only one y , and it's a function.



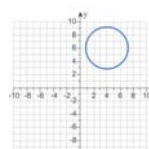
function



function



Not a function



Not a function

From an equation: If you can set the equation to $y =$ (and you don't get a $\pm\sqrt{x}$) then you have a function.

Functions:

$$x + y = 5 \rightarrow y = -x + 5$$

$$y = x^2 + 2x - 3$$

$$4x^2 = 2y - 6 \rightarrow y = 2x^2 + 3$$

Not Functions:

$$x^2 + y^2 = 1 \rightarrow y^2 = -x^2 + 1 \rightarrow y = \pm\sqrt{-x^2 + 1}$$

$$x = 3 \rightarrow \text{no } y!$$

How to write an equation as a function:

Set the equation to $y =$ and then replace the y with the function label $f(x)$

e.g. $y = x^2 + 6x - 2 \rightarrow f(x) = x^2 + 6x - 2$

****Important!** $f(x)$ is like a label, you cannot move it and it is not multiplication.