Relations & Functions

Relation: A mapping, or pairing, of input values with output values.

Domain: The set of input values.

Range: The set of output values.

Representing Relations:

A relation can be represented in the following ways.

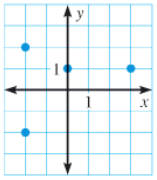
Ordered Pairs

(−2, 2)
(−2, −2)
(0, 1)
(3, 1)

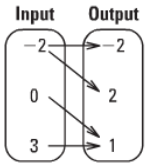
Table

x	y
−2	2
−2	−2
0	1
3	1

Graph



Mapping Diagram

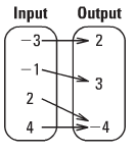


In each case the domain is {-2,0,3} and the range is {-2,2,1}

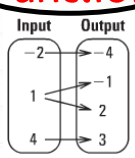
Some relations are functions.

A **function** is a relation for which each input has exactly one output.
If any input of a relation has more than one output, the relation is *not* a function.

Function



~~Function~~

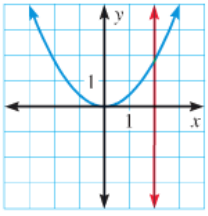


Each input must have a single output.

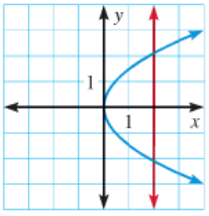
The vertical line test:

A relation is a function if and only if no vertical line intersects the graph of the relation at more than one point.

Function



Not a function



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Equations in Two Variables

EQUATIONS IN TWO VARIABLES Many functions can be described by an **equation in two variables**, such as $y = 3x - 5$. The input variable (in this case, x) is called the **independent variable**. The output variable (in this case, y) is called the **dependent variable** because its value *depends* on the value of the input variable.

In this case....

x = input = independent variable = domain

y = output = dependent variable = range

f(x) does not mean multiply f by x !!!!!!!!!!

Linear Equations: y = mx + b

Linear Functions: f(x) = mx + b

Function Notation

f(x) means the output value of the function when the input value is the number x.

For example f(8) means the value of the function evaluated for an input value of 8.

For f(x) we say, "f of x." For f(8), we say, "f of 8."

$y = 3x - 5$

$f(x) = 3x - 5$

$f(8) = 3(8) - 5$

$f(8) = 19$