



Algebra II Section 2.1

Functions and Their
Graphs

Relation

A Relation is a mapping, or pairing of input values with their output values

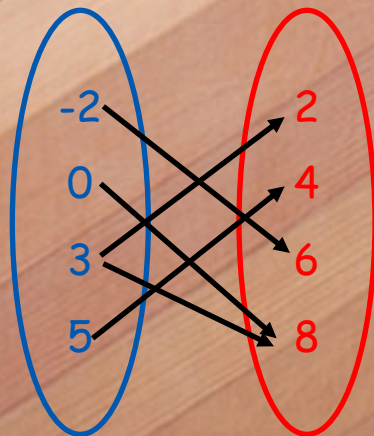
A connection between two variables.

$$y = 3x - 20$$

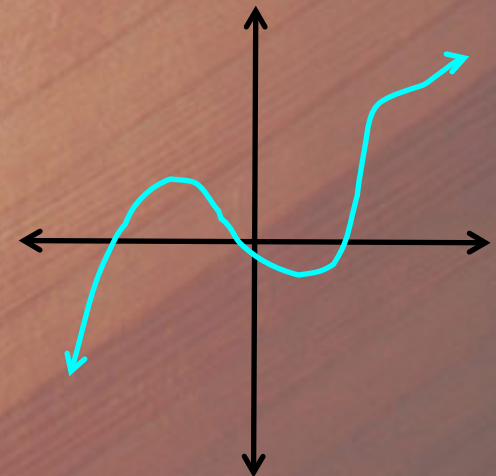
$$\{(1,2), (4,-2), (7,-4), (-3,2)\}$$

x	-2	2	3	5	2	0
y	3	3	3	5	5	5

Input Output



x	y
0	3
2	5
3	-2
4	3
8	-9



Domain and Range

Domain:

List of all the possible values for the input. The **input** is also referred to as the **independent variable**, and is graphed on the x-axis

Range:

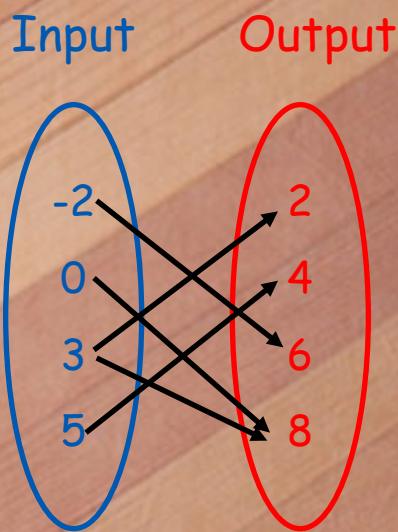
List of all the possible values for the output. The **output** is also referred to as the **dependent variable**, and is graphed on the y-axis

Domain and Range

Domain:

Range:

$\{-2, 0, 3, 5\}$



$\{2, 4, 6, 8\}$

$\{-3, 1, 4, 7\}$ $\{(1, 2), (4, -2), (7, -4), (-3, 2)\}$ $\{-4, -2, 2\}$

$\{-2, 0, 2, 3, 5\}$

x	-2	2	3	5	2	0
y	3	3	3	5	5	5

$\{3, 5\}$

Domain and Range

Domain:

$\{0, 2, 3, 4, 8\}$

x	y
0	3
2	5
3	-2
4	3
8	-9

Range:

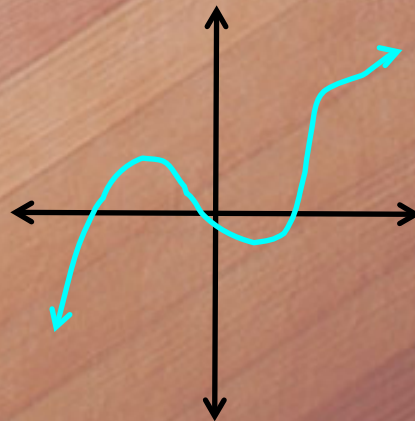
$\{-9, -2, 3, 5\}$

$\{R\}$

$$y = 3x - 20$$

$\{R\}$

$\{R\}$



$\{R\}$

Function

A function is a relation in which, for each value of the input there is one and only one value for the output.

To determine whether a relation is a function or not, look at the Domain, or inputs. If there is any value in the Domain that has more than one possible values in the Range, it is not a function.

This is easy when given a table or graph, but harder when given an equation.

Functions

For the following relations, determine whether they are a function 😊 or not. 😞

😊 $y = 3x - 20$

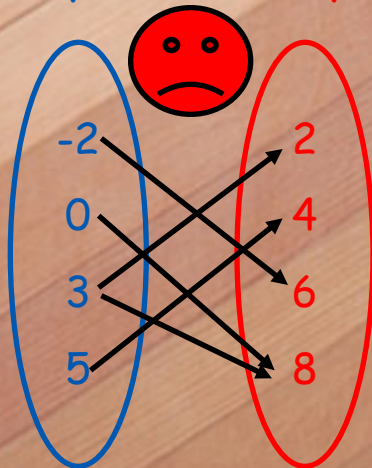
😊 $\{(1,2), (4,-2), (7,-4), (-3,2)\}$



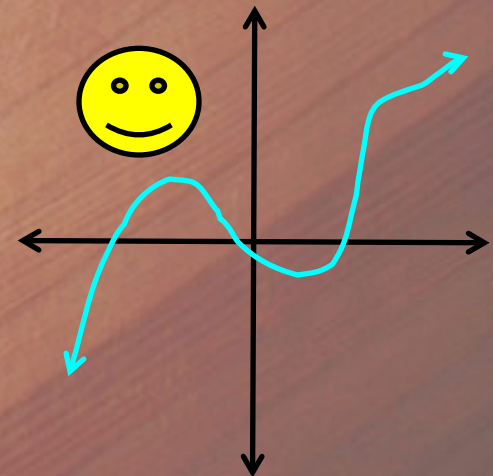
x	-2	2	3	5	2	0
y	3	3	3	5	5	5

Input

Output

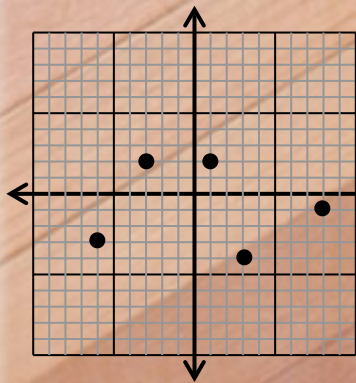


x	y
0	3
2	5
3	-2
4	3
8	-9

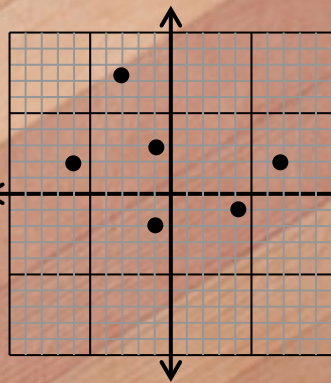


Vertical Line Test

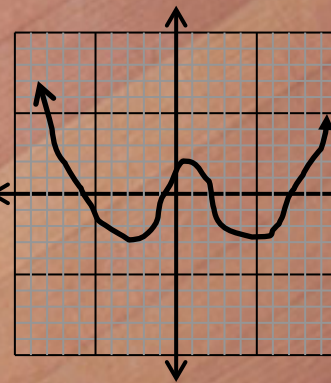
A relation is a function if and only if no vertical line intersects the graph of the relation at more than one point



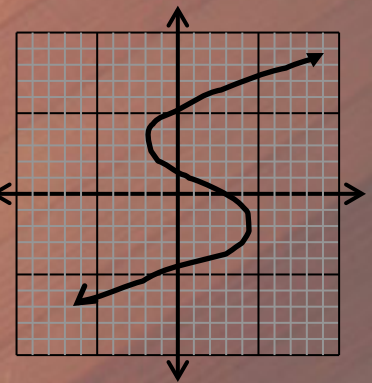
Function



Not



Function

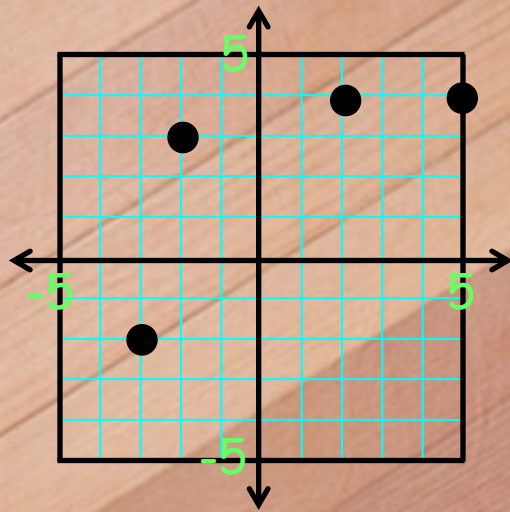


Not



Graphing Functions

$\{(2,4),(-2,3),(5,4),(-3,-2)\}$

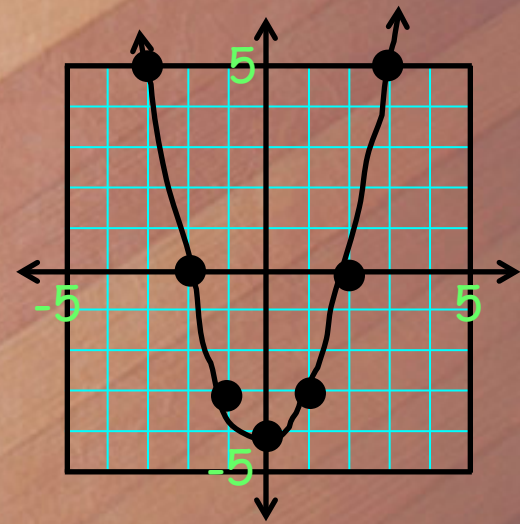


Domain: $\{-3, -2, 2, 5\}$

Range: $\{-2, 3, 4\}$

Function

$$y = x^2 - 4$$



Domain: $\{\mathbf{R}\}$

Range: $\{y \mid y \geq -4\}$

Function

x	y
-3	5
-2	0
-1	-3
0	-4
1	-3
2	0
3	5