A relation is a connection between two quantities called variables.

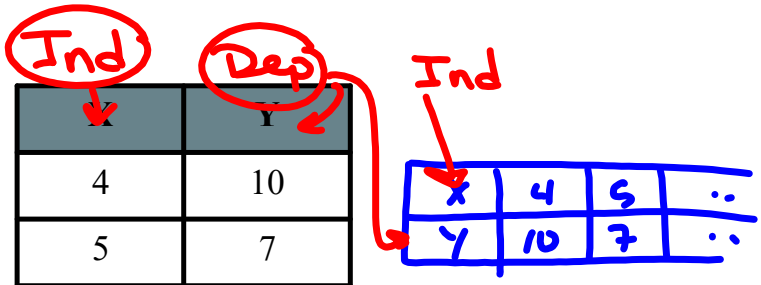
Many relations involve a dependency between the variables. This is when the values of one variable (dependent variable) are determined by the values of the other variable (independent variable).

Recall: there are four ways to describe a relation.

Table of Values

(4,10)
(5,7)
(6,4)

X	Y
4	10
5	7
6	4
7	1
10	-8

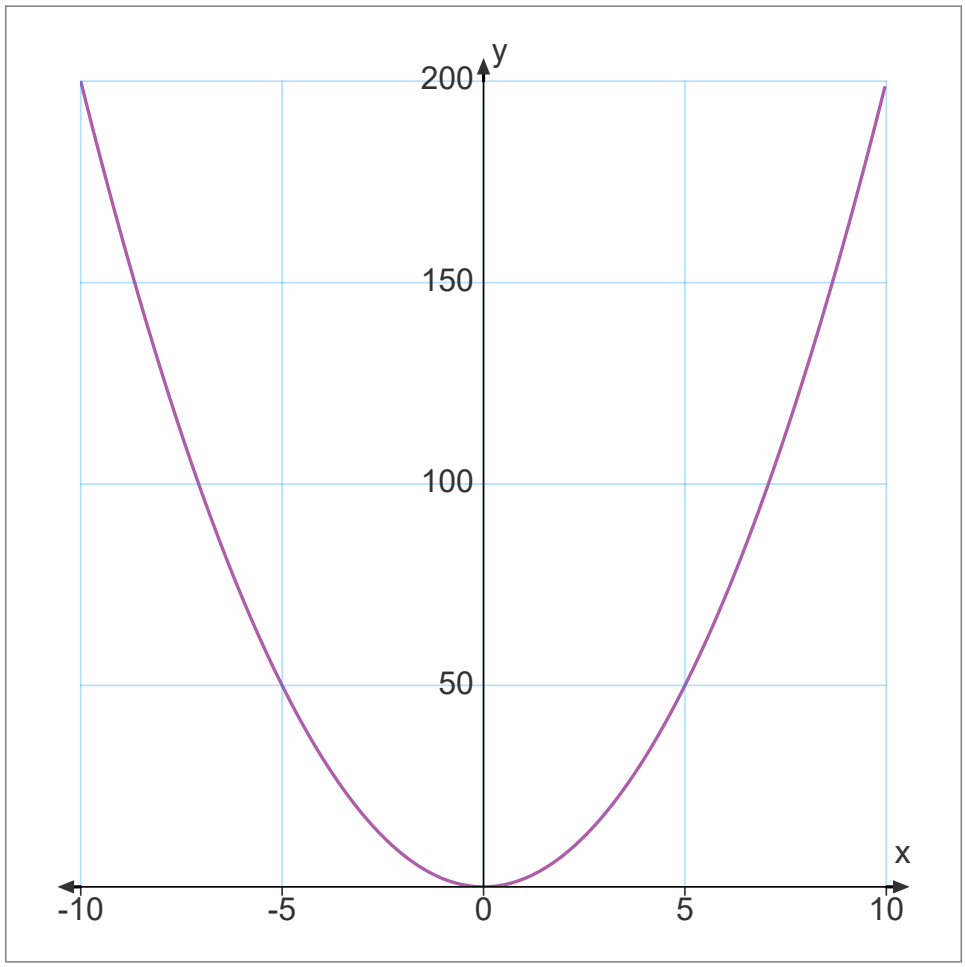


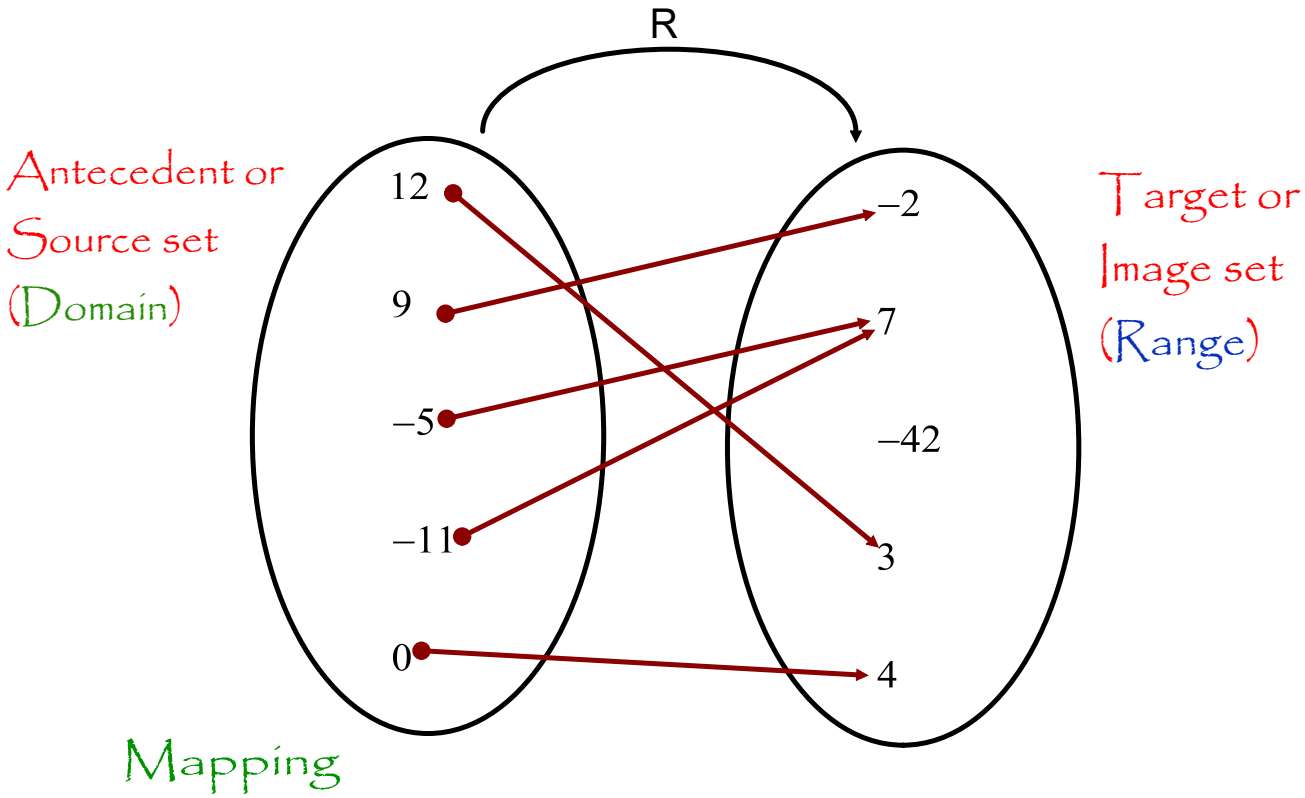
Rule or Equation

$$y = -3x + 22$$

Graph

Cartesian Plane




R
Antecedent or
Source set
(Domain)
12
9
−5
−11
0
−2
7
−42
3
4
Target or
Image set
(Range)
Mapping

Verbal Description

The cost of parking is $2 for the first hour, or part thereof, and $1 for each consecutive hour, or part thereof.

Function A relation in which each value of the independent variable is associated with one and only one value of the dependent variable.

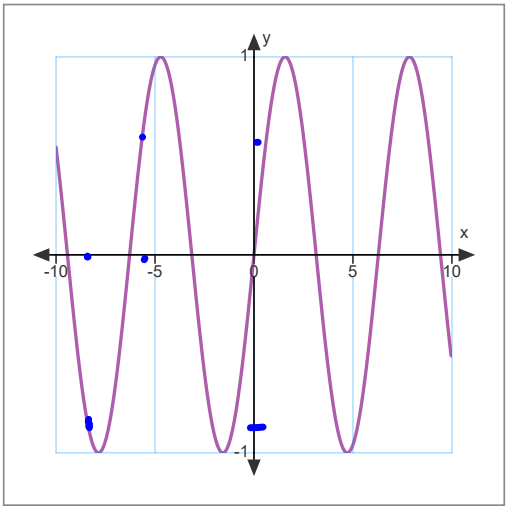
Not a Function

x	y
3	6
4	9
7	12
4	14
9	15

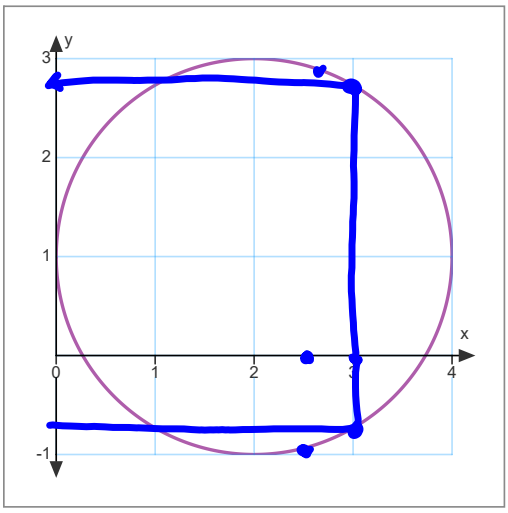
Function

x	y
3	12
4	15
5	9
6	12

Function



Not a Function

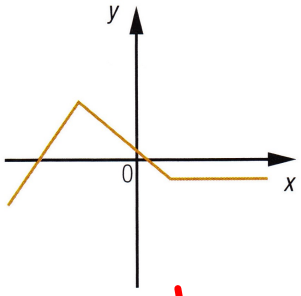


Vertical Line Test for a Graph

If you draw a vertical line through the graph of a relation, and that line can only pass through the curve once (no matter where the line is drawn), then the relation is a function.

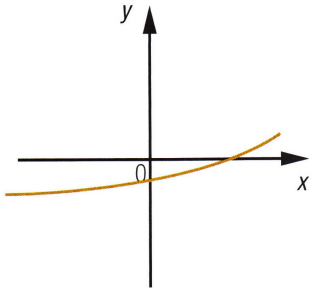
Identify which of the following graphs represents a function.

A



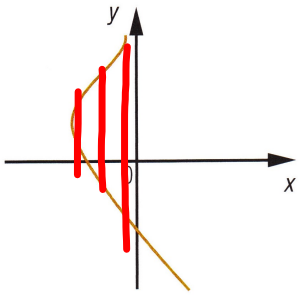
Function

B



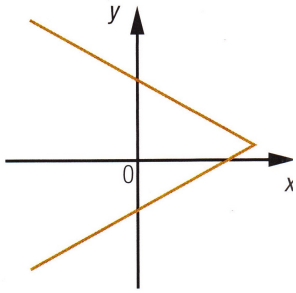
Function

C



Not

D



Not

Function Notation - is a way of writing the rule of a function. Instead of using y, we use $f(x)$ (or $g(x)$, or $h(x)$, etc.)

f of x

e.g. $y = 2x + 2$ becomes $f(x) = 2x + 2$

Why? 1: It lets us know that a relation is a function.

2: It can be used to show a point that is on the curve (graph).

e.g. $f(4) = 40$ means that when $x = 4,\ y = 40$, or $(4, 40)$.

Example: If $f(x) = 2x^3 - 6$ determine $f(4)$.

let $x = 4$

$$f(4) = 2(4^3) - 6$$
$$f(4) = 2 \cdot 64 - 6$$
$$f(4) = 128 - 6$$
$$f(4) = 122$$

$\rightarrow y = 122$

let $y = 48$

If $f(x) = 48$, determine x.

Isolate x

$$48 = 2x^3 - 6$$
$$+6 \qquad +6$$
$$54 = 2x^3$$
$$\div 2 \qquad \div 2$$
$$27 = x^3$$
$$\sqrt[3]{27} = x$$
$$3 = x$$

Interval Notation : Used for Real Numbers $(\mathbb{R})$; to show where something starts and something ends (an interval).

We use square brackets and/or parentheses.

Examples : $[4,22)$ or $[4,22[$: 4 is included, but 22 is not.

$(-3,10]$ or $]-3,10]$: 10 is included but -3 is not.

$[2,7]$: both values are included.

$]0,5[$: both values are excluded.

Properties of Functions

1) Domain and Range

2) Variation

3) Extrema

4) Sign

5) Intercepts

1) Domain and Range

Domain and range refer to the values that the variables are allowed to be.

Domain: these are the values of the independent variable (x-values)

Range: these are the values of the dependent variable (y-values)

Determine the domain and range of the function below.