Activate Prior Learning:

Solving Linear Equations

To solve a linear equation, we isolate the variable on one side of the equation.

To do this, we use inverse operations. Whatever we do to one side of an equation, we must also do to the other side.

Always verify the solution.

Solve: $3a + 17 = 26$

$-17 \quad -17$

$$\frac{3a}{3} = \frac{9}{3}$$

$$a = 3$$

Verify:

LS	RS
$3(3) + 17$	26
26	

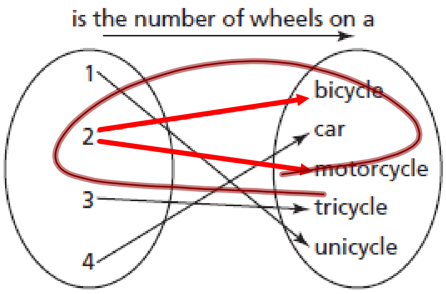
$LS = RS$

Properties of Functions

The set of first elements of a relation is called the domain.
The set of related second elements of a relation is called the range.
A function is a special type of relation where each element in the domain is associated with exactly one element in the range.

A function is a "well-behaved" relation !!

This relation associates a number with a vehicle with that number of wheels.



What is the domain?

$\{1, 2, 3, 4\}$

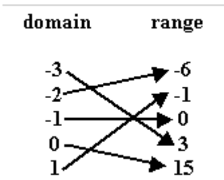
What is the range?

{bicycle, car, motorcycle, tricycle, unicycle}

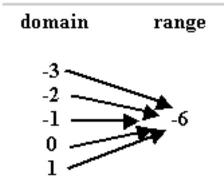
Is this relation a function?

Not a function

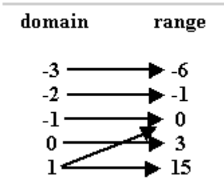
Would any of these be functions???



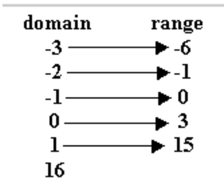
yes



yes



No

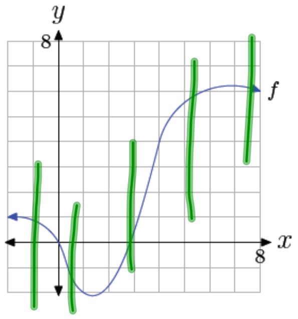


No

- State the domain and range of the following relation. Is the relation a function?
  $\{(2, -3), (4, 6), (3, -1), (6, 6), (2, 3)\}$

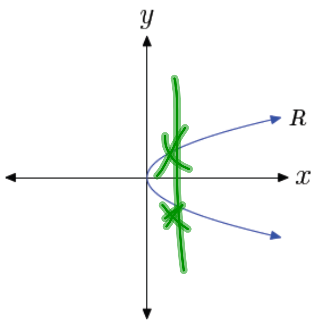
What if we are provided a graph?

Would this be a function?



yes

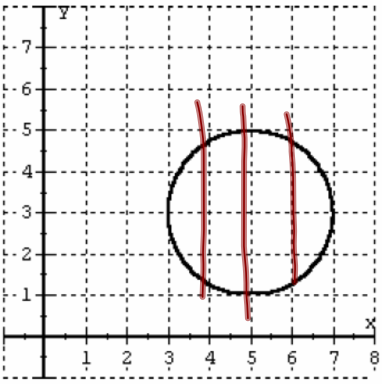
How about this one?



No

See any quick way to determine if a graph is a function?

The Vertical Line Test. If any vertical line cuts the graph of a relation more than once, then the relation is **NOT** a function.

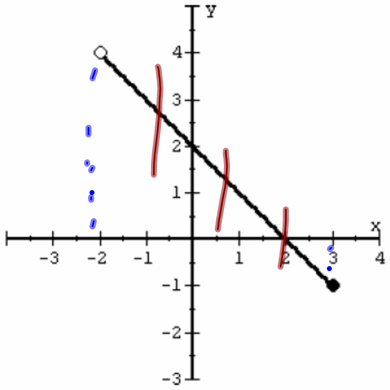


$(x-5)^2 + (y-3)^2 = 4$

Function? No $\leq$

Domain: $\{x \mid 3 \leq x \leq 7, x \in R\}$

Range: $\{y \mid 1 \leq y \leq 5, y \in R\}$

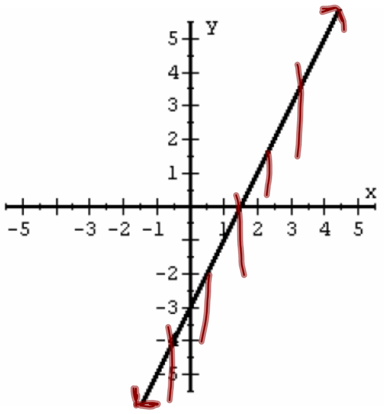


Line Segment

Function? yes

Domain: $\{x \mid -2 < x \leq 3, x \in R\}$

Range: $\{y \mid -1 \leq y < 4, y \in R\}$

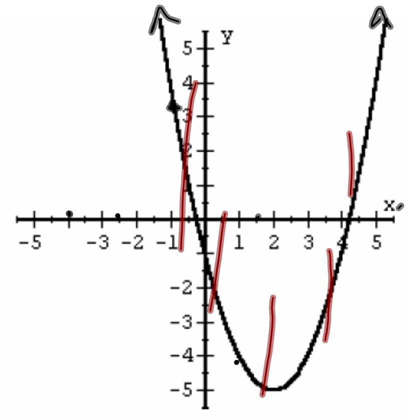


$y = 2x - 3$

Function? Yes

Domain: $\{x \mid x \in R\}$

Range: $\{y \mid y \in R\}$

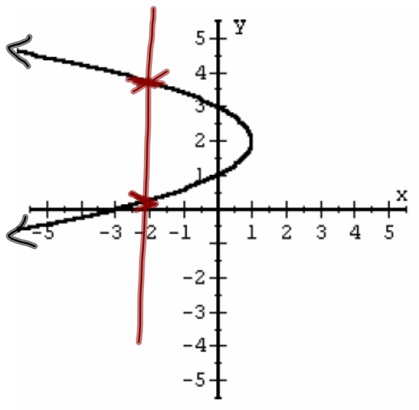


$y = (x-2)^2 - 5$

Function? yes

Domain: $\{x \mid x \in R\}$

Range: $\{y \mid y \geq -5, y \in R\}$

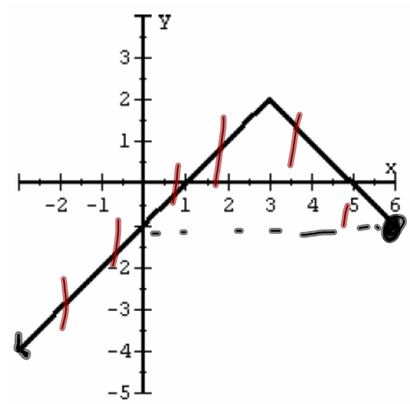


$x = -(y-2)^2 + 1$

Function? No

Domain: $\{x \mid x \leq 1, x \in R\}$

Range: $\{y \mid y \in R\}$



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

Function? yes

Domain: $\{x \mid x \leq 6, x \in R\}$

Range: $\{y \mid y \leq 2, y \in R\}$

In the workplace, a person's gross pay, P dollars, often depends on the number of hours worked, h.

So, we say P is the *dependent variable*. Since the number of hours worked, h, does not depend on the gross pay, P, we say that h is the *independent variable*.

independent variable

Hours Worked, h	Gross Pay, P ($)
1	12
2	24
3	36
4	48
5	60

dependent variable

domain

range

The values of the independent variable are listed in the first column of a table of values. These elements belong to the domain.

The values of the dependent variable are listed in the second column of a table of values. These elements belong to the range.

Using Function Notation:

When a function is represented algebraically, we are given the rule as it applies to some variable. This is called functional notation. To compute the rule applied to any input we simply replace the variable with the input.

$$f(x) = 3x^3 - 7x + 2$$

$$f(7) = 3(7)^3 - 7(7) + 2$$

$$\begin{aligned} \text{Given:}\quad f(x) &= x^2 \ \text{ then} \\ f(5) &= (5)^2 = 25 \\ f(-1) &= (-1)^2 = 1 \\ f(a+b) &= (a+b)^2 = a^2 + 2ab + b^2 \\ f(2y) &= (2y)^2 = 4y^2 \end{aligned}$$

f(☺) = ☺²

IMPORTANT!! $\boxed{f(x) = x^2}$

This does NOT mean f multiplied by x