

2.1 Introduction to Functions

A RELATION is a set of ordered pairs.

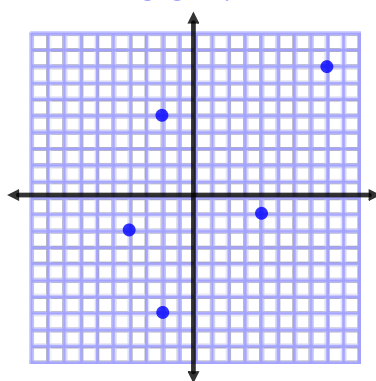
Relations can be shown...

- Using braces. $\{(-4,-1),(-2,3),(1,0),(2,2),(-2,0)\}$

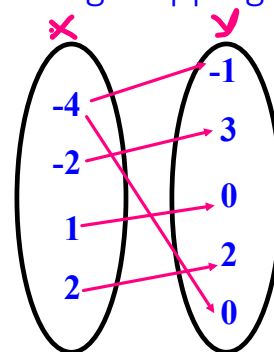
- Using tables.

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

- Using graphs.



- Using mappings.



The DOMAIN is the set of all possible values of the first variable (independent variable). *left to right*
x-values input

The RANGE is the set of all possible values of the second variable (dependent variable). *low to high*
y-values output

A FUNCTION is a relation such that each value of the domain is paired with *exactly one value* of the range.

In other words...the domain CANNOT repeat!

A LINEAR FUNCTION is the graph of a line.

It is in the form of $y = mx + b$.

ARE THE FOLLOWING FUNCTIONS?

1. $\{(1,3), (2,5), (3,4), (5,6)\}$
function (x's don't repeat)

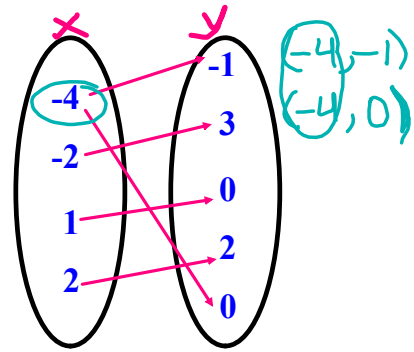
3. $\{(-1,1), (0,3), (2,3), (-1,4)\}$
not a function (-1 repeats)

4.

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

not a function
(-2 repeats)

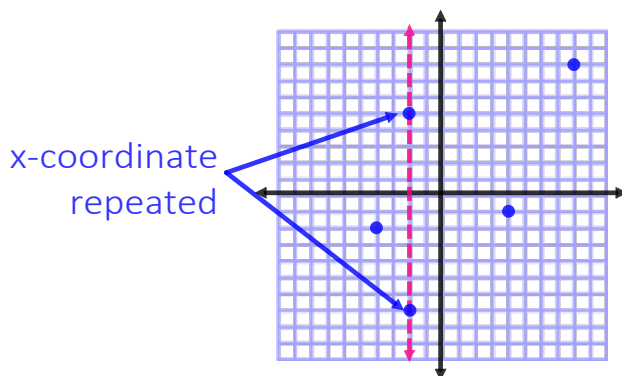
2.



not a function
(x-value repeats)

To determine if a graph is a function,
use the vertical line test (VLT).

If a vertical line passes through more than one point on the graph of a relation, then the relation is **NOT** a function.

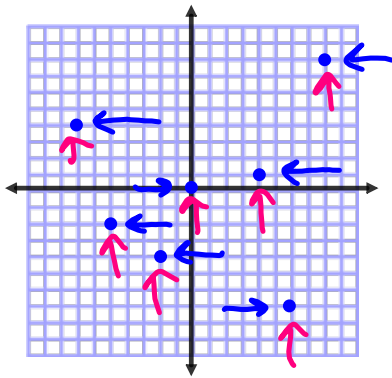


More VLT
Examples

Using VLT
Worksheet

Determine if each graph is a function.
Then state the domain and range of each.

5.

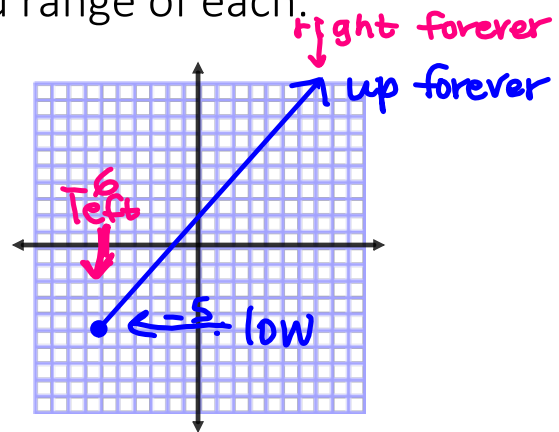


function

$$D: \{-7, -5, -2, 0, 4, 6, 8\}$$

$$R: \{-7, -4, -2, 0, 1, 4, 8\}$$

6.



function

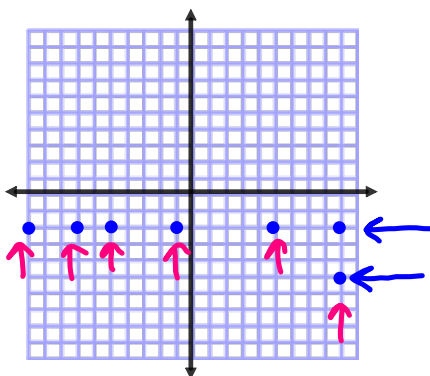
$$D: x \geq -6$$

$$R: y \geq -5$$

Determine if each graph is a function.

Then state the domain and range of each.

7.

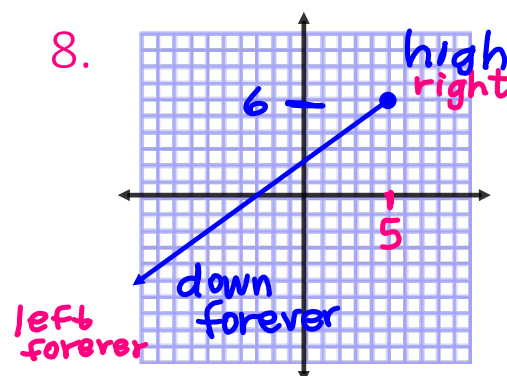


not a function

$$D: \{-10, -7, -5, -1, 5, 9\}$$

$$R: \{-5, -2\}$$

8.



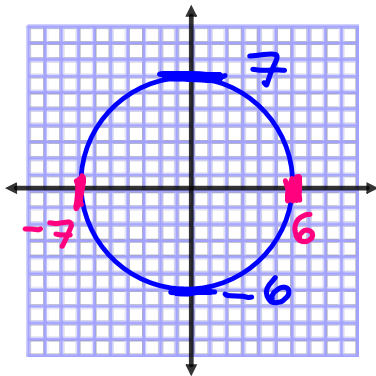
function

$$D: x \leq 5$$

$$R: y \leq 6$$

Determine if each graph is a function.
Then state the domain and range of each.

9.

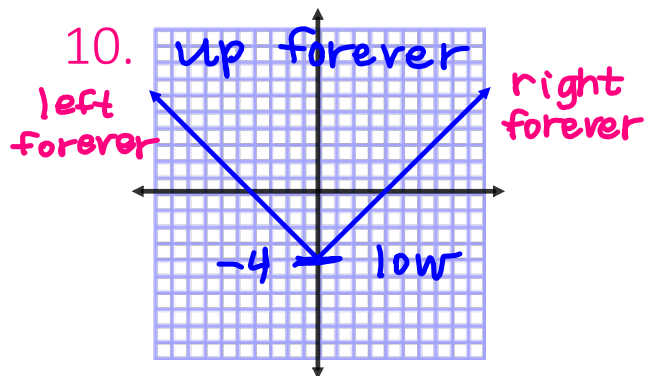


not a function

$$D: -7 \leq x \leq 6$$

$$R: -6 \leq y \leq 7$$

10.



function

$$D: \mathbb{R}$$

$$R: y \geq -4$$

An equation can represent a function.

This can be written in function notation.

$$\textcircled{y} = 2x - 5 \quad \text{---} \quad \textcircled{f(x)} = 2x - 5$$

"f of x"

x is the independent variable

y, or f(x), is the dependent variable

Evaluate each function for the given value of x .

11. $f(x) = \frac{1}{3}x - 7$ for $x = -11$
 $f(-11) = \frac{1}{3}(-11) - 7$
 $f(-11) = -\frac{32}{3}$ means $\rightarrow (-11, -\frac{32}{3})$

12. $g(x) = -x^2 + 4x - 5$ for $x = 9$
 $g(9) = -(9)^2 + 4(9) - 5$
 $g(9) = -50$

13. $h(x) = \frac{4x - 9}{2x + 1}$ for $x = \frac{5}{2}$
 $h(\frac{5}{2}) = \frac{4(\frac{5}{2}) - 9}{2(\frac{5}{2}) + 1} = \frac{1}{6}$

14. The volume of a cube with side length s is given by the function $V(s) = s^3$.

a) Find $V(5)$.

$$V(5) = (5)^3$$

$$V(5) = 125$$

b) Explain what $V(5)$ represents.

↑
side length = 5

↘
Volume is
125

Attachments

VLТ Examples.pdf

Using VLT Wksht.pdf