

## 2.3 Introduction to Functions

A RELATION is a set of ordered pairs.

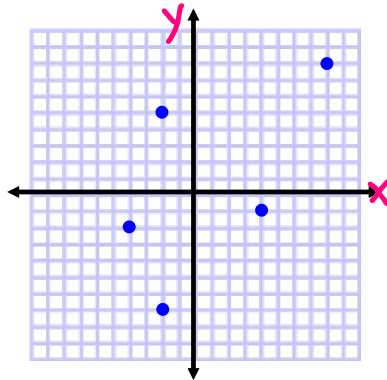
Relations can be shown...

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

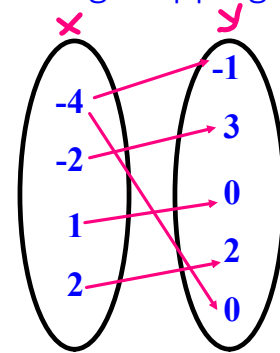
- Using tables.

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) . **input x-values**

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

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!

## ARE THE FOLLOWING FUNCTIONS?

1.  $\{(1,3), (2,5), (3,4), (5,6)\}$

function b/c domain  
did not repeat

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

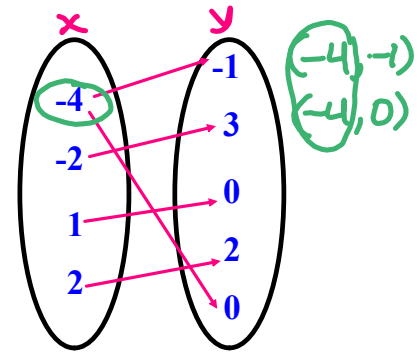
not a function b/c  
domain repeats

4.

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

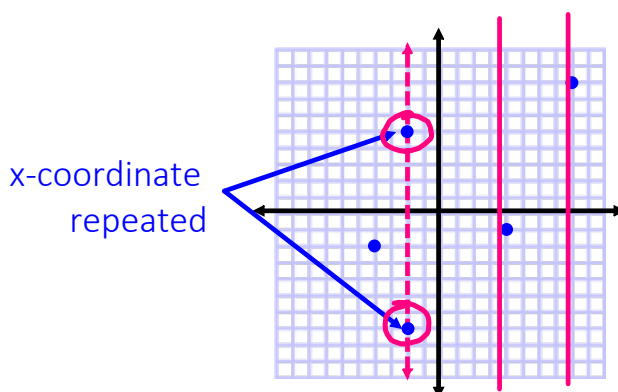
not a function  
b/c domain  
repeats

2.

not a function  
b/c domain repeats

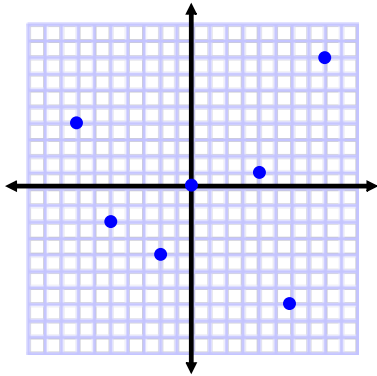
To determine if a graph is a function,  
use the vertical line test (VLT).

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



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

5.

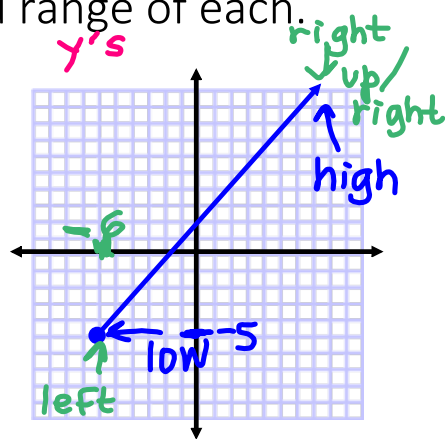


function

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

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

6.



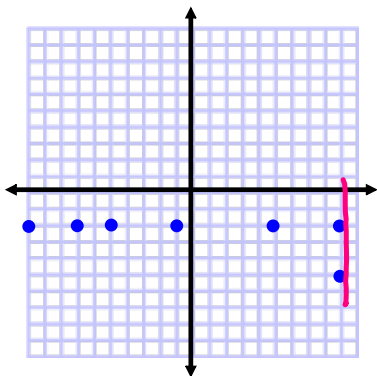
function

$$D: x \geq -6$$

$$R: y \geq -5$$

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

7.

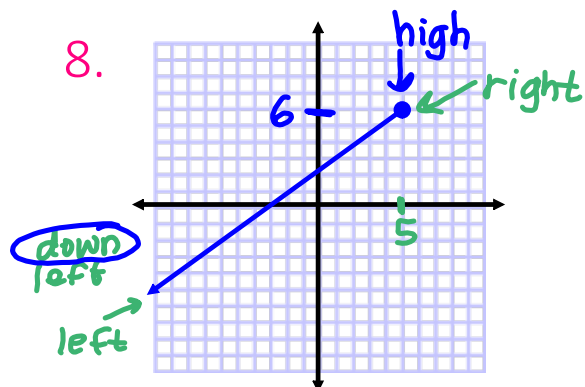


not a function

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

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

8.



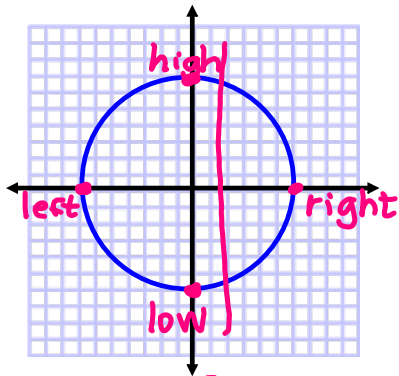
function

$$D: x \leq 5$$

$$R: y \leq 6$$

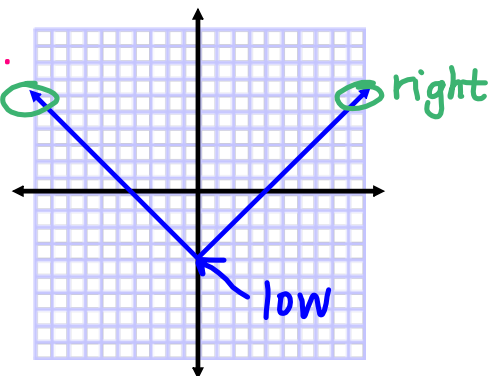
Determine if each graph is a function.  
Then state the domain and range of each.

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.

$$\underline{y} = 2x - 5 \longrightarrow \underline{f(x)} = 2x - 5$$

$x$  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  $x = -11$

$$f(-11) = \frac{1}{3}(-11) - 7$$

$$f(-11) = -\frac{11}{3} - 7$$

$$f(-11) = -\frac{11}{3} - \frac{21}{3}$$

$$f(-11) = -\frac{32}{3}$$

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

$$g(9) = -(9)^2 + 4(9) - 5$$

$$g(9) = -81 + 36 - 5$$

$$g(9) = -50$$

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

$$h\left(\frac{5}{2}\right) = \frac{4\left(\frac{5}{2}\right) - 9}{2\left(\frac{5}{2}\right) + 1}$$

$$h\left(\frac{5}{2}\right) = \frac{10 - 9}{5 + 1} = \frac{1}{6} = h\left(\frac{5}{2}\right)$$

14. The table at the right gives the median price of homes in a small town over a period of time. Write a linear function with  $t = 0$  as 1980. Predict the cost of a house in the year 2025.  $\leftarrow t = 45$

Year	Median House Value
<del>1980</del> 0	\$72,500
<del>1985</del> 5	\$81,000
<del>1990</del> 10	\$89,500
<del>1995</del> 15	\$98,000

$$(x_1, y_1) = (0, 72500) \quad (x_2, y_2) = (5, 81000)$$

$$m = \frac{81000 - 72500}{5 - 0} = \frac{8500}{5} = 1700$$

$$y - y_1 = m(x - x_1)$$

$$y - 81000 = 1700(x - 5)$$

$$y - 81000 = 1700x - 8500$$

$$y = 1700x + 72500$$

$$C(t) = 1700t + 72,500$$

$$C(45) = 1700(45) + 72,500$$

$$C(45) = \$149,000$$

## Attachments

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VLТ Examples.pdf

Using VLT Wksht.pdf