Algebra 1
3.2 Understanding Relations and Functions

Relation: a set of ordered pairs (x,y) where x in the input and y is the output.

domain - a set of numbers called inputs (x)
range - a set of numbers called outputs (y)

function - a pairing of elements such that each input is paired with exactly one output.

When you pump gas, the total cost depends on the number of gallons pumped. The total cost is *a function* of the number of gallons pumped.

Ex 1) Identify the domain and range. State the corresponding outputs for the given inputs in context and explain whether the relation is a function.

The given relation represents the number of hours worked and the amount of money earned for the corresponding number of hours worked.

Input	2	5	7	8
Output	14	35	49	56

Domain: {2, 5, 7, 8}

The domain represents hrs worked

Range: {14, 35, 49, 56}

The range represents $ earned.

For an input of 2 hrs, there is an output of $14.

For an input of 5 hrs, there is an output of $35.

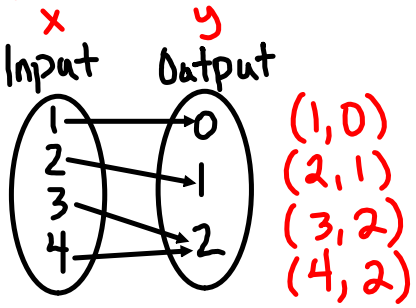
For an input of 7 hrs, there is an output of $49.

For an input of 8 hrs, there is an output of $56.

This relation is a function. Each domain value is paired with exactly one range value.

Mapping Diagrams

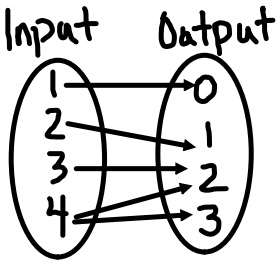
Note: an output can be paired with more than one input but no input is paired with more than one output



(1,0)
(2,1)
(3,2)
(4,2)

Function

b/c each input goes to exactly one output



(1,0)
(2,1)
(3,2)
(4,2)
(4,3)

Not a Function

b/c 4 goes to both 2 & 3

Tables

Note: an output can be paired with more than one input but no input is paired with more than one output

x	y
-4	6
0	-3
1	4
-4	1
2	0

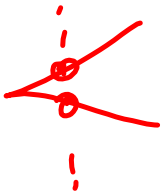
Not a Function
b/c -4 can't go to both 6 & 1

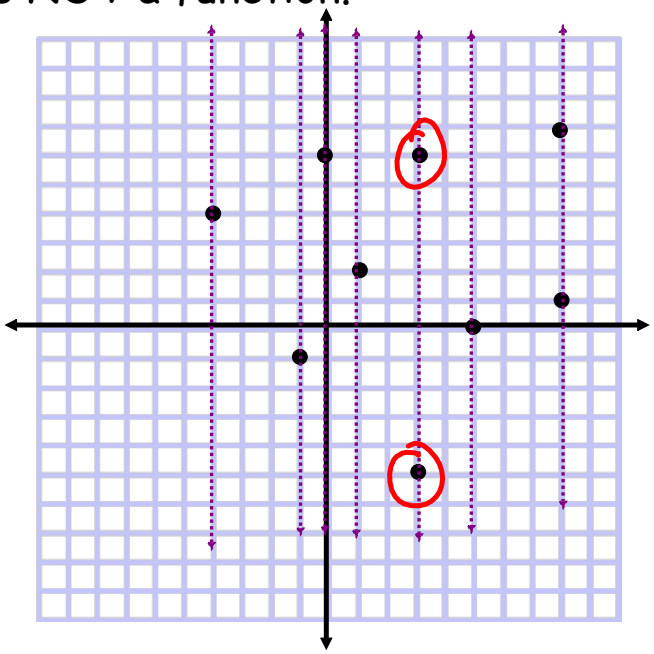
Input	-1	4	8	12
Output	0	2	0	22

Function
each input goes to exactly one output

Vertical Line Test

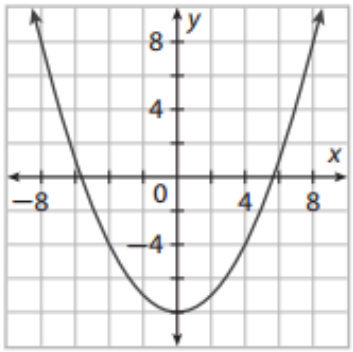
If a vertical line passes through more than one point. The relation is NOT a function.



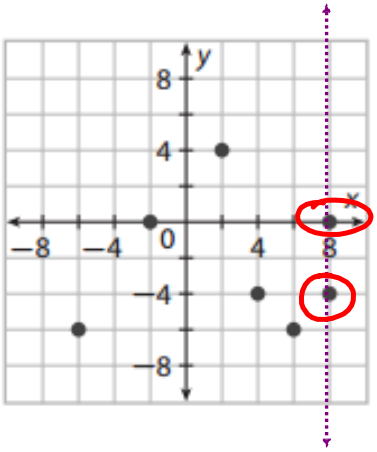


Not a function fails the vert. line test

Graphs



Function



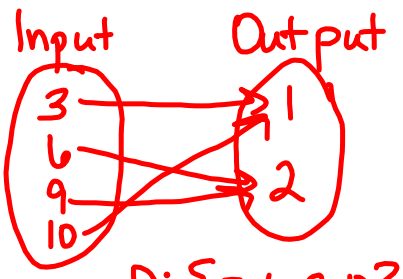
Not a Function

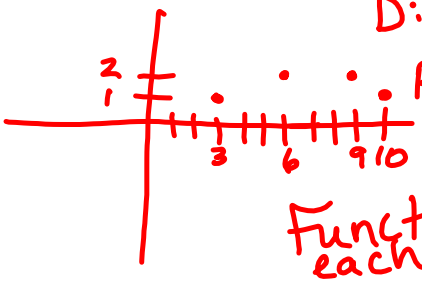
Try this:

Express each relation as a table, graph and mapping diagram. Determine whether it's a function or not. Then give Domain and Range.

1.) {(3,1), (6,2), (9,2), (10,1)}

x	y
3	1
6	2
9	2
10	1





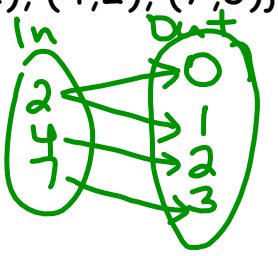
D: {3, 6, 9, 10}

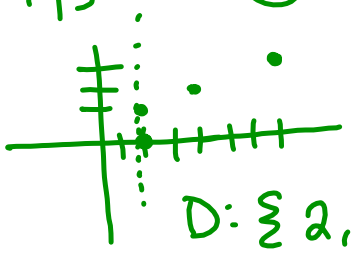
R: {1, 2}

Function input goes to exactly one output. each

2.) {(2,0), (2,1), (4,2), (7,3)}

x	y
2	0
2	1
4	2
7	3





D: {2, 4, 7}

R: {0, 1, 2, 3}

Not a function b/c 2 goes to 0 & 1

Homework

pg 102; 2,3-5,6-22e

EC: 24