

Pre-Chapter 4 Algebra 1 Notes "Functions"

Relation: A pairing between 2 groups (sets).
set of inputs and set of outputs.

VOCABULARY

Function

- a relation where each input has exactly 1 output.

Domain

- the set of allowable inputs

Range

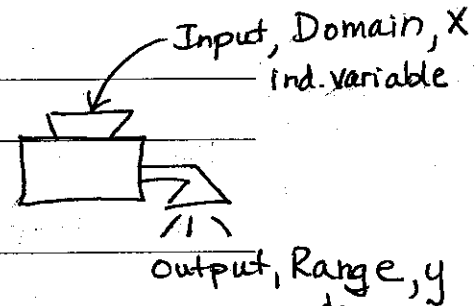
- the set of allowable outputs

Independent variable

- input variable

Dependent variable

- output variable



Birthday function
Person \rightarrow Birthdate

Example 1 Identify the domain and range of a function

The input-output table shows temperatures over various increments of time.
Identify the domain and range of the function.

Input (hours)	0	2	4	6
Output ($^{\circ}\text{C}$)	24	27	30	33

- 1 way to represent relation

Solution

Domain:

$\{0, 2, 4, 6\}$

Range:

$\{24, 27, 30, 33\}$

Checkpoint Identify the domain and range of the function.

1.

Input x	4	7	11	13
Output y	10	20	35	45

D: $\{4, 7, 11, 13\}$

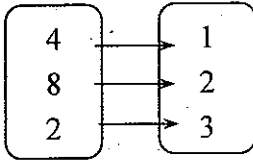
R: $\{10, 20, 35, 45\}$

Example 2 Identify a function

Tell whether the pairing is a function. Explain your reasoning.

Solution

a. Input Output



Yes because each input has 1 output.

b.

Input	Output
2	2
2	4
3	6
4	8

(2,2)
(2,4)
(3,6)
(4,8)

No because the input 2 has 2 outputs.

Mapping diagrams are often used to represent functions. Take note of the pairings to make your decision.

✔ **Checkpoint** Tell whether the pairing is a function. Justify your decision.

2.

Input	5	5	10	15
Output	3	4	6	8

No, because the input 5 has 2 outputs.

3.

Input	0	4	12	20
Output	3	5	9	13

Yes, because each input has exactly 1 output.

FUNCTIONS

Verbal Rule Equation Table

The output is 2 less than the input.

$y = x - 2$

Input	2	4	6	8	10
Output	0	2	4	6	8

A function may be represented using a rule that relates one variable to another.

Example 3 - Make a table for a function

The domain of the function $y = 3x$ is 0, 1, 2, and 3. Make a table for the function, then identify the range of the function.

Solution

x	0	1	2	3
$y = 3x$	0	3	6	9

$$y = 3x$$

$$y = 3(0) = 0$$

The range of the function is $\{0, 3, 6, 9\}$

GRAPHING A FUNCTION

- You can use a graph to represent a function/relation.
- If the graph is a function, it will pass the Vertical Line Test (VLT).
If any vertical line passes through more than one point on a graph, the graph does not represent a function.
- In a given table, each corresponding pair of input and output values forms an ordered pair: (x, y)
- An ordered pair of numbers can be plotted as a point.
- The x -coordinate is the input.
- The y -coordinate is the output.
- The horizontal axis of the graph is labeled with the input variable.
- The vertical axis is labeled with the output variable.

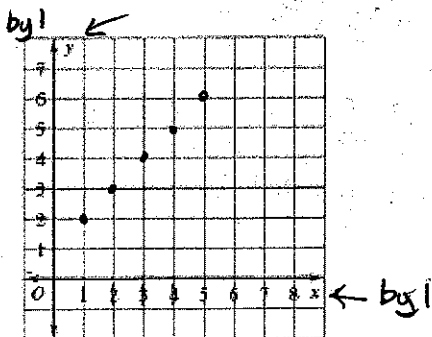
Example 1 Graph the function $y = x + 1$ with domain 1, 2, 3, 4, and 5.

Step 1 Make an input/output table.

x	1	2	3	4	5
y	2	3	4	5	6

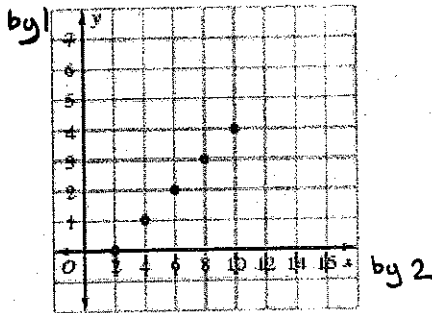
$$y = 1 + 1 = 2$$

Step 2 Plot a point for each ordered pair (x, y) .



Example 2 Write a function rule for a graph

Write a function rule for the function represented by the graph. Identify the domain and the range of the function.



Solution

Step 1 Make a table for the graph.

x	2	4	6	8	10
y	0	1	2	3	4

$$\frac{1}{2}(2) = 1$$

Step 2 Find a relationship between the input and output values.

Step 3 Write a function rule that describes the relationship.

$$\frac{x}{2} - 1$$

$$y = \frac{1}{2}x - 1$$

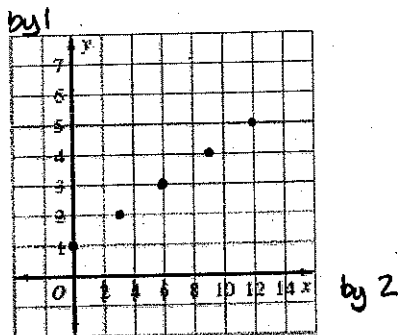
A rule for the function is $y = \frac{x}{2} - 1$. The domain of the function is $\{2, 4, 6, 8, 10\}$.

The range is $\{0, 1, 2, 3, 4\}$.

✓ **Checkpoint** Complete the following exercise.

1. Graph the function $y = \frac{1}{3}x + 1$ with domain 0, 3, 6, 9, and 12.

x	0	3	6	9	12
y	1	2	3	4	5



$$y = \frac{1}{3} \cdot 0 + 1$$

$$y = 0 + 1 = 1$$

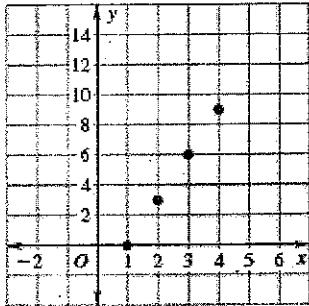
$$y = \frac{1}{3} \left(\frac{3}{1} \right) + 1$$

$$= \frac{3}{3} + 1 = 1 + 1 = 2$$

$$y = \frac{1}{3} \left(\frac{6}{1} \right) + 1$$

Checkpoint Write a rule for the function represented by the graph. Identify the domain and the range of the function.

2.



$$y = 3x - 3$$

x	y
1	0
2	3
3	6
4	9

$$D: \{1, 2, 3, 4\}$$
$$R: \{0, 3, 6, 9\}$$