

3.2.1 LESSON NOTES

Functions

Key Objectives

- Find the domain and range of a relation.
- Represent functions with tables, graphs, or equations.
- Identify functions.

Key Terms

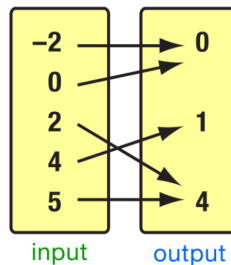
- A set of ordered pairs is called a **relation**.
- A **function** is a rule that relates two quantities so that each input value corresponds exactly to one output value.
- The value substituted into a function for x is called the **input**.
- The y -value that results from substituting an input value into a function is called the **output**.
- A **domain** of a function is the set of all possible input values for the function.
- A **range** of a function is the set of all possible output values for the function.
- The **vertical line test** is used to determine if a relation is a function. If a vertical line intersects the graph of a relation at only one point, then the relation is a function. If the line intersects the graph of a relation at more than one point, then the relation is not a function.
- A **graph of an equation** is a graph of the set of ordered pairs that are solutions of the equation.

Example 1

Finding the Domain and Range of a Relation

In this example, the domain and range are found for two relations. The first relation is a mapping diagram and the second relation is a table.

Give the domain and range of each relation.

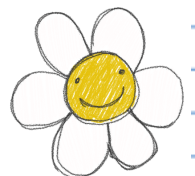


Domain: -2, 0, 2, 4, 5 *The domain is the set of all input or x -values.*

Range: 0, 1, 4 *The range is the set of all output or y -values.*

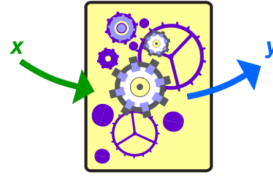


See Prof. Burger's video lessons online for this topic!



3.2.1 CONTINUED

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



Domain: -2, -1, 0, 1, 2

Range: 0, 1, 4

List 1 and 4 only once in the range even though each appears twice in the outputs.

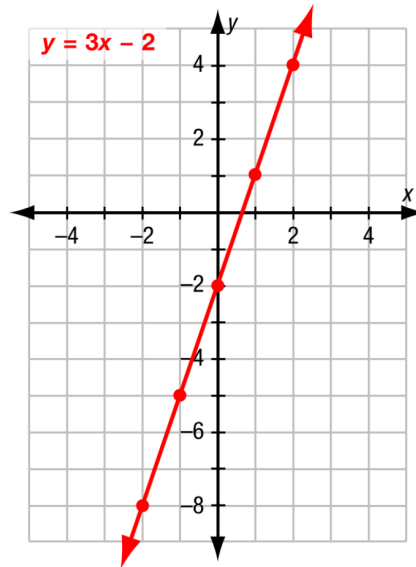
Example 2 Finding Different Representations of a Function

Functions can be represented in many ways, including tables, graphs, and equations.

Make a table and a graph of $y = 3x - 2$.

x	$3x - 2$	y
-2	$3(-2) - 2$	-8
-1	$3(-1) - 2$	-5
0	$3(0) - 2$	-2
1	$3(1) - 2$	1
2	$3(2) - 2$	4

Choose x-values to input into the function.



3.2.1 CONTINUED

Example 3 Identifying Functions

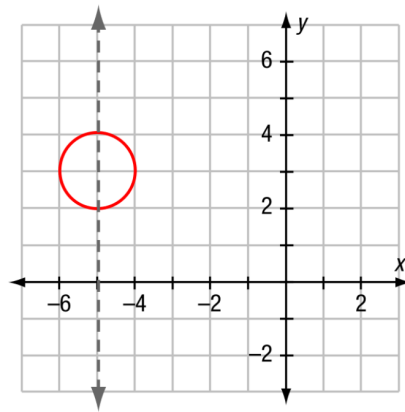
If a relationship is a function, each input has exactly one output. When the relationship is graphed, use the vertical line test to determine whether the relationship is a function. If a vertical line intersects the graph at only one point, then the relationship is a function. If the vertical line intersects the graph at more than one point, then the relationship is not a function.



Describe if each relationship represents a function.

x	y
0	11
2	10
4	9
6	8

Each input x has only one output y .
The relationship is a function.



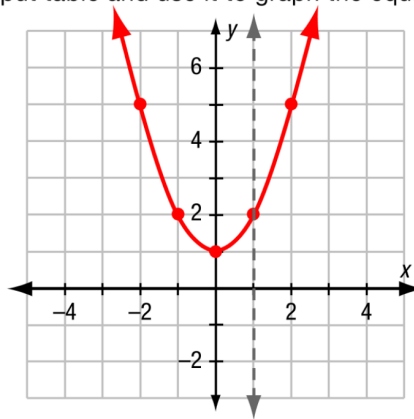
Notice that a vertical line can be drawn that intersects the graph at two points.

The relationship is not a function.

$y = x^2 + 1$

Make an input-output table and use it to graph the equation.

x	y
-2	5
-1	2
0	1
1	2
2	5



The vertical line intersects the graph at one point.
The relationship is a function.

