

LESSON

2

To Be or Not to Be a Function

LEARNING OBJECTIVES

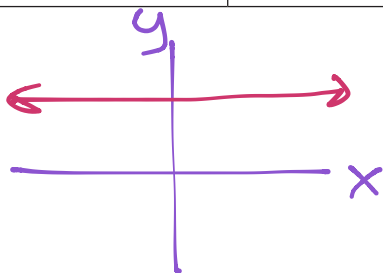
- Today I am: looking at examples of functions.
- So that I can: determine the requirements for a relation to be a function.
- I'll know I have it when I can: sort a variety of relations into those that are functions and those that are not.

Opening Activity

1. Kaylee came up with two input/output tables that she believed do **not** have a rule. Do you think Kaylee is correct? Explain your thinking.

Table 1: The Output Never Changes

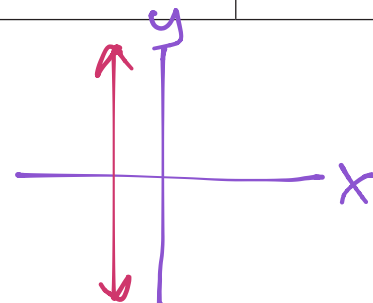
Input: x	Output: $f(x)$
-9	3
10	3
0	3
3	3



$$y = 3$$
$$f(x) = 3$$

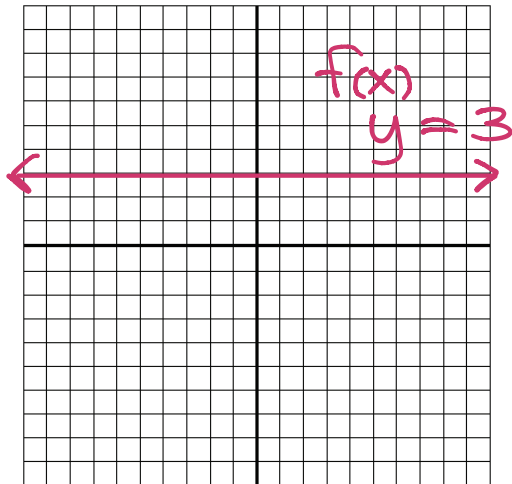
Table 2: The Input Never Changes

Input: x	Output: $f(x)$
-1	3
-1	-5
-1	0
-1	9

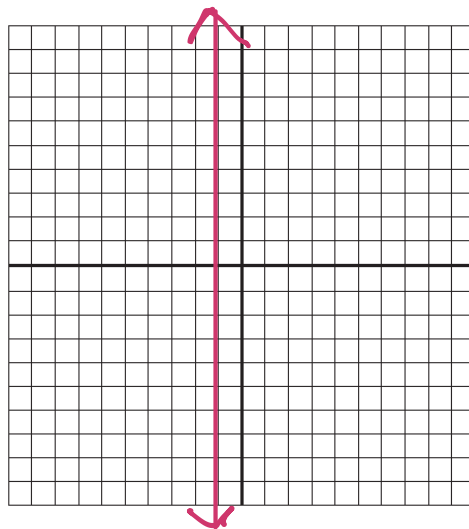


$$x = -1$$

2. Graph Kaylee’s data on the two grids below. Did the graphs change your thoughts on a rule for each set of data? Explain.



$$y = 1$$



$$x = -1$$

Although each set of data can be written as an equation, only one of them is a function.

What Is a Function?

Let’s look at the definition of a function and several examples and non-examples. Then you’ll write your own requirements of a function.

Definition:

A **function** is a correspondence from a first set, called the **domain**, to a second set, called the **range**, such that each element of the domain corresponds to **exactly** one element in the range.


one-to-one

one x → one y
 domain range

Examples

$\{(1, 6), (2, 6), (3, 8), (4, 9)\}$

The assignment of the members of a football team to jersey numbers.

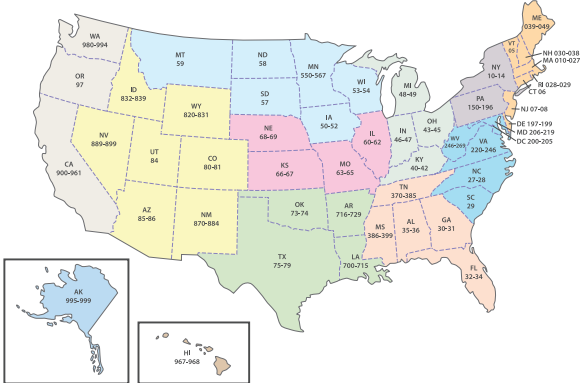


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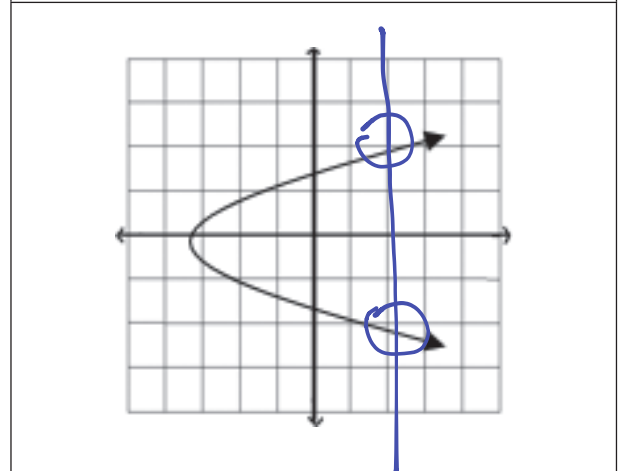
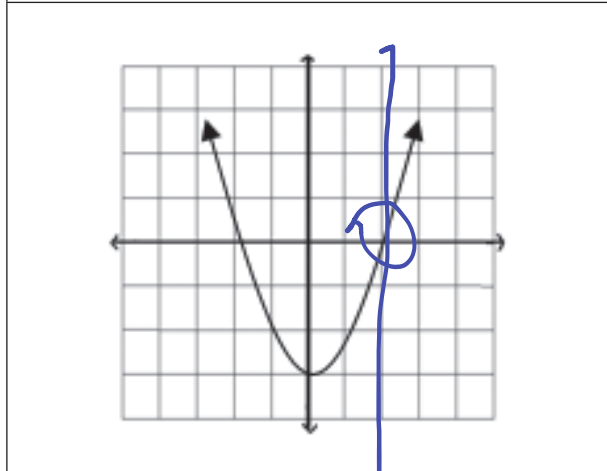
Non-Examples

$\{(6, 1), (6, 2), (8, 3), (9, 4)\}$

The assignment of zip codes to residences.



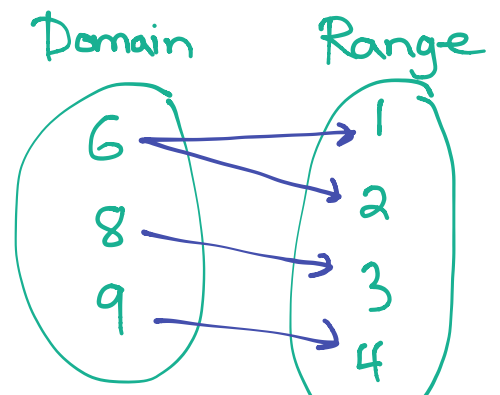
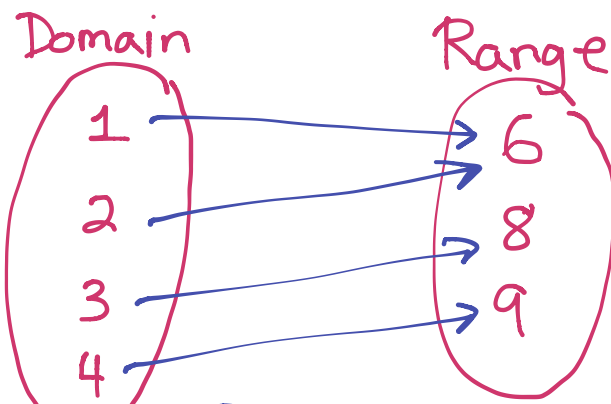
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3. Which set of data in Exercise 1 is a function? How do you know?

$\{(1, 6), (2, 6), (3, 8), (4, 9)\}$

$\{(6, 1), (6, 2), (8, 3), (9, 4)\}$



Function

Not a function

4. Write your own definition or requirements for a graph, data set or situation to represent a function.

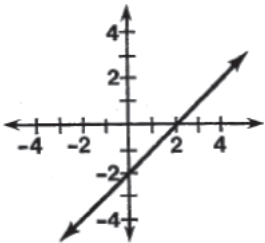
- X values can not repeat

Vertical Line Test for Functions

If any vertical line intersects a graph in more than one point, the graph does not define y as a function of x .

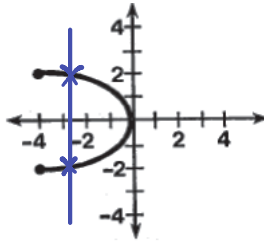
For each graph below, determine if it is a function.

5.



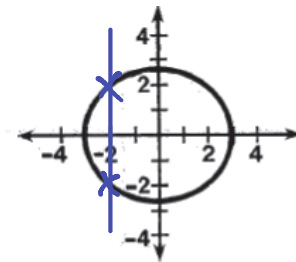
Function

6.



Not a function

7.



Not a function

Function Sorting Game

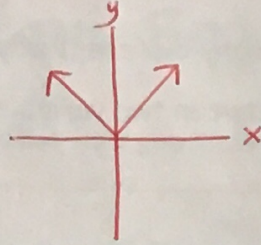
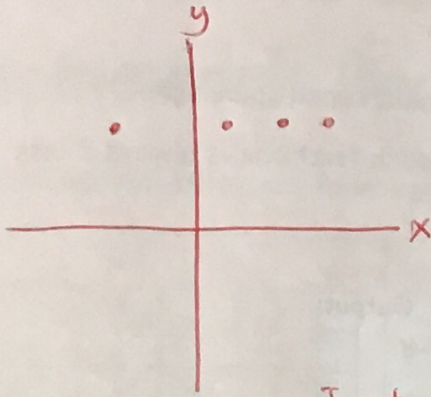
Source: adapted from <http://mathtalesfromthespring.blogspot.com/2012/06/determining-whether-relation-is.html>

You will need: Relation card handout, glue stick or tape, scissors

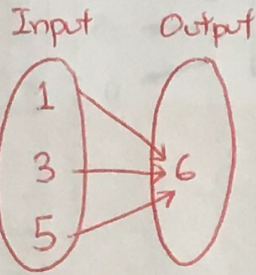
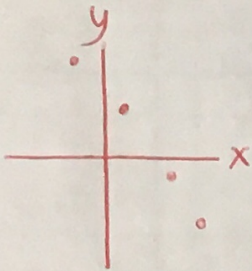
8. Directions:

- Cut out the cards on the Relation card handout.
- Determine which cards are showing functions and which are not.
- Glue or tape the cards into the correct space on the next page.

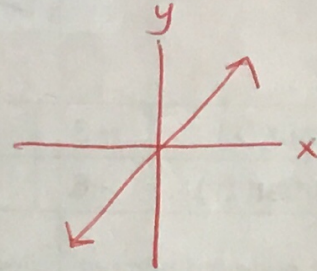
Functions



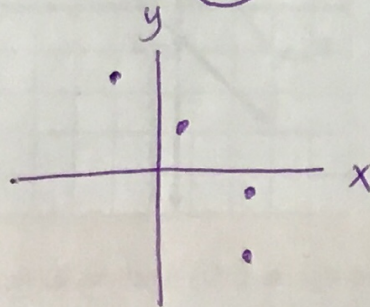
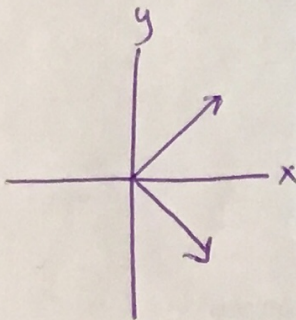
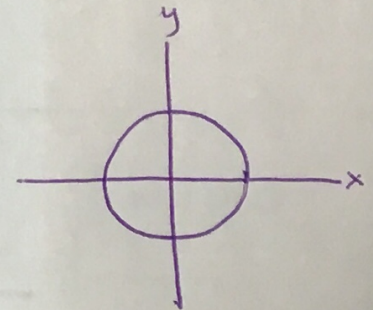
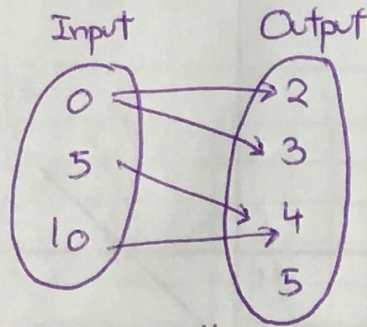
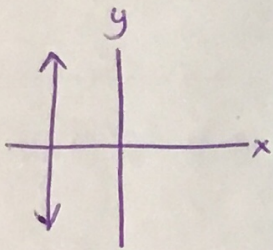
x	-1	2	5
y	-4	8	20



$\{(-1, 5), (2, 5), (3, 5), (8, 5)\}$



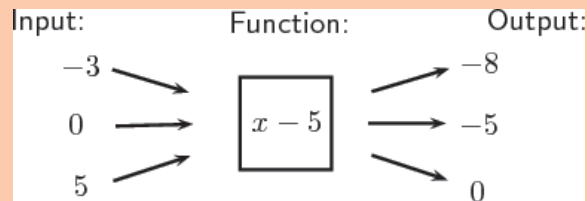
Not Functions



Lesson Summary

Functions can be expressed in many different ways for different purposes.

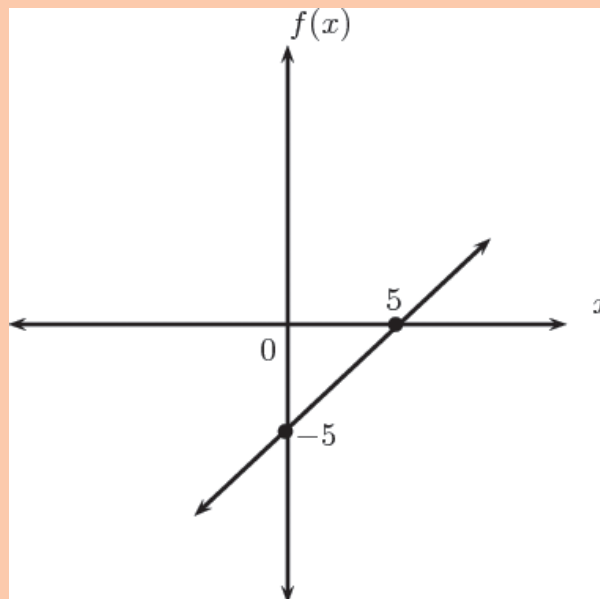
1. Words: "The relationship between two variables is such that one is always 5 less than the other."
2. Mapping diagram:



3. Table:

Input (x)	-3	0	5
Output (y)	-8	-5	0

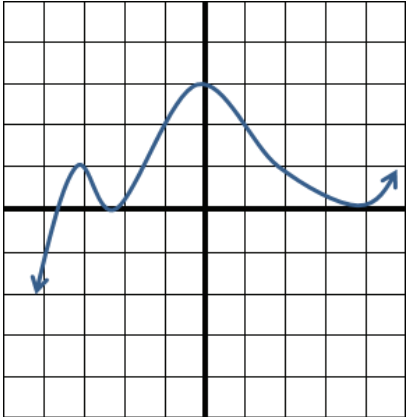
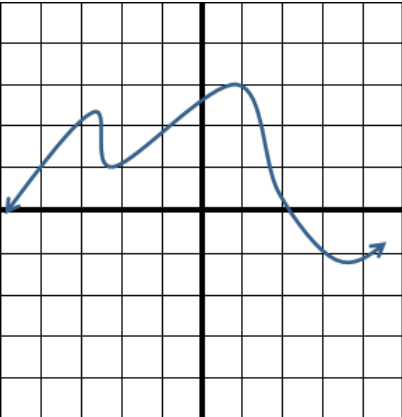
4. Set of ordered number pairs: $(-3; -8)$, $(0; -5)$, $(5; 0)$
5. Algebraic formula: $f(x) = x - 5$
6. Graph:



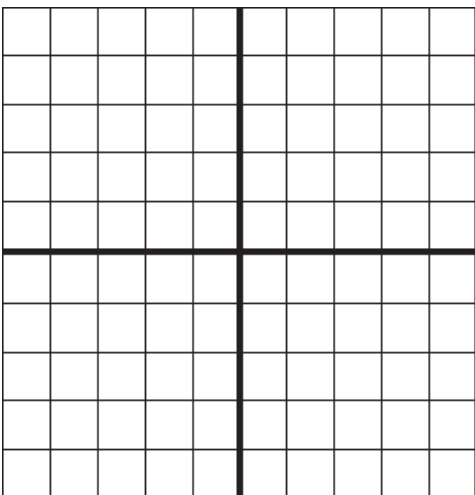
NAME: _____ PERIOD: _____ DATE: _____

Homework Problem Set

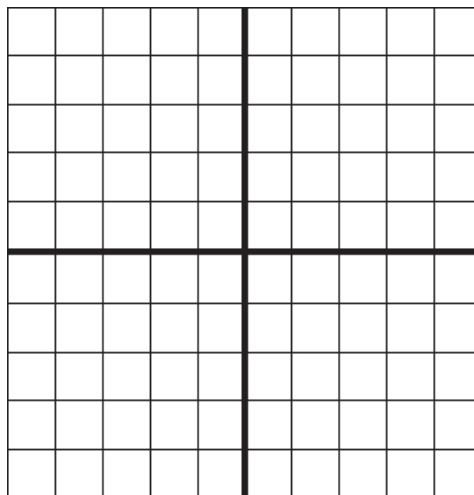
Which relations below are functions? Explain how you know.

<p>1.</p> 	<p>2.</p> <p>$\{(1, 2), (1, 3), (2, 3)\}$</p>	<p>3.</p> <p>$y = -2x + 7$</p>												
<p>4.</p> <p>$\{(1, 2), (3, 3), (2, 3)\}$</p>	<p>5.</p> 	<p>6.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">input</th> <th style="padding: 5px;">output</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">3</td> <td style="padding: 5px;">3</td> </tr> <tr> <td style="padding: 5px;">2</td> <td style="padding: 5px;">2</td> </tr> <tr> <td style="padding: 5px;">1</td> <td style="padding: 5px;">1</td> </tr> <tr> <td style="padding: 5px;">0</td> <td style="padding: 5px;">0</td> </tr> <tr> <td style="padding: 5px;">-1</td> <td style="padding: 5px;">0</td> </tr> </tbody> </table>	input	output	3	3	2	2	1	1	0	0	-1	0
input	output													
3	3													
2	2													
1	1													
0	0													
-1	0													

7. Draw two different graphs – one of which is a function while the other is not a function.



Function

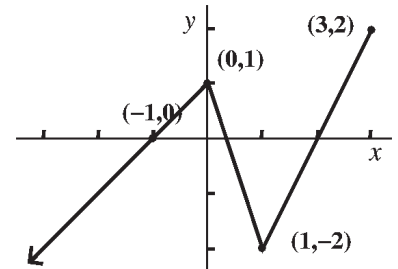


Not a Function

Spiral REVIEW—Reading Graphs

Use the graph of $f(x)$ to determine each of the following. Where applicable, use interval notation.

8. x -intercepts



9. y -intercepts

10. $f(-2) = \underline{\hspace{2cm}}$

11. The values of x for which $f(x) = 0$

Spiral REVIEW—Tables, Graphs, and Equations

Source: adapted from The CUNY HSE Curriculum Framework—Math

Four friends used the same taxi service to meet at a restaurant for dinner. When they arrived at the restaurant, they compared their cab fare and thought that something must be wrong. They tried to figure out a rule that the taxi company used to calculate cost to see who was mischarged.



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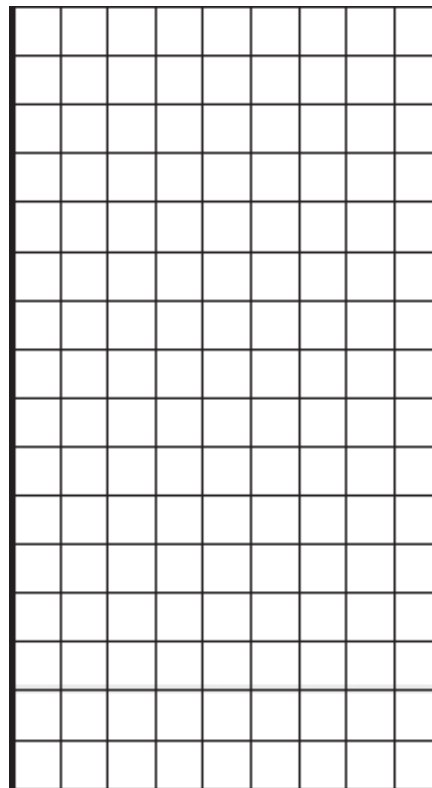
- Denise’s trip was only 1 mile and her total cost was \$4.50.
- Mark said that his trip was 6 miles and his total cost was \$12.00.
- Solange’s trip was 3 miles and her total cost was \$6.00.
- Jamel’s trip was 8 miles and his total cost was \$15.00.

12. Complete the table below for the four passengers.

Passenger	Distance	Cost	Coordinate Point
Denise			
Mark			
Solange			
Jamel			

13. Which fare do you believe is incorrect? Why?

14. Use the coordinate points to plot the costs in the graph at the right. Is there one coordinate that doesn't seem to match the others?



15. Use the three coordinates that form a line to determine the base charge and the fee for each mile traveled.

16. Who was mischarged? What should their charge have been?

17. What would it cost for someone to travel 10 miles with this taxi service?

18. If it costs someone \$9 for their trip, how many miles did they travel? Explain how you got your answer.