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PART 1

Introduction

A **function** is a rule that relates an input value to an output value. Each input gives exactly one output. For example, $y = 3x + 4$ is a function. Each value of x yields exactly one value of y . The rule that relates the values is that each value of y is 4 more than 3 times the value of x .

The set of input values, or x -values, of a function is the **domain**. The set of output values, or y -values, of a function is the **range**. The rule explains how the range is related to the domain. One way to identify a function is from a set of ordered pairs.

Which of the following sets represents a function?

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

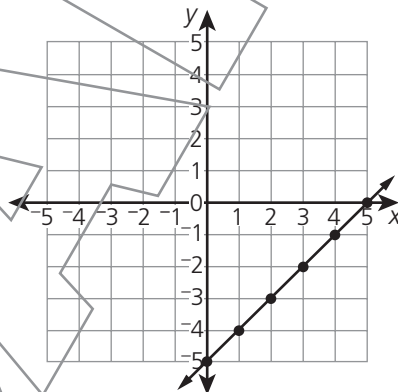
Set 2: $\{(2, 4), (3, 4), (5, 7), (1, 1)\}$

In set 1, the input value 2 is associated with 3, 4, 5, and 6. Because the same input value is associated with more than one output value, the relationship is not a function.

In set 2, each input value is associated with exactly one output. So, set 2 represents a function.

Another way to identify a function is from a graph.

Does this graph represent a function?



Each point on the graph is an ordered pair that relates an x -value to a y -value. You can see that each x -value is associated with only one y -value, so the graph represents a function.

In a function, no two inputs, or x -values, are the same.

To check if a graph represents a function, you can use the **vertical-line test**. If a vertical line drawn anywhere on the graph passes through at most one point, the graph represents a function. If a vertical line passes through two or more points, the graph does not represent a function.

Think About It

What is an example of a functional relationship that you may encounter in real life?



Focused Instruction

Some functions follow a specific rule to show how the input changes to the output. Find the rule by looking at the values in the function.

- The table shows the cost for a given number of granola bars in a snack machine.

Number of Granola Bars	1	2	3
Amount (\$)	0.75	1.50	2.25

What is the input? _____

List the given input values. _____

What is the output? _____

List the given output values. _____

What output value(s) is related to the input value of 1? _____

What output value(s) is related to the input value of 2? _____

What output value(s) is related to the input value of 3? _____

Are any input values related to more than one output value? _____

Is the relationship for the snack machine a function? _____

Look at how the input value changes to get the output value. Is the output greater than or less than the input? _____

The output depends on the input.

By how much does the output change when the input changes by 1?

Write an equation to show the rule that tells how the input is related to the output. _____

Use the tables to compare two relationships.

- The tables show the x - and y -values for two different relationships. Which one, if either, represents a function?

RELATIONSHIP A

x	y
5	15
10	30
20	60

RELATIONSHIP B

x	y
2	-3
4	1
4	5

Look at the input and output values for relationship A.

Write a set of ordered pairs based on the values in the table.

Are any values of x associated with more than one value of y ? Explain.

Does relationship A represent a function? _____

Look at the input and output values for relationship B.

Write a set of ordered pairs based on the values in the table.

Are any values of x associated with more than one value of y ? Explain.

Does relationship B represent a function? _____

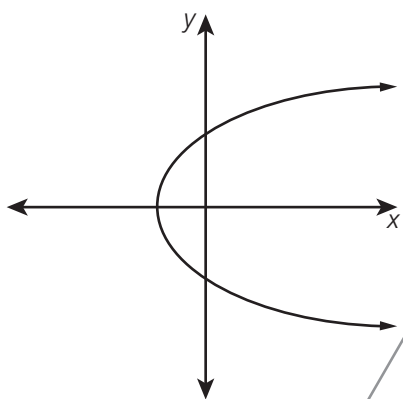
Use what you know about functions to decide whether or not each of the following sets of points shows a function. Write *yes* or *no*.

1 $\{(1, -3), (4, 4), (5, 8), (6, 4)\}$ _____

2

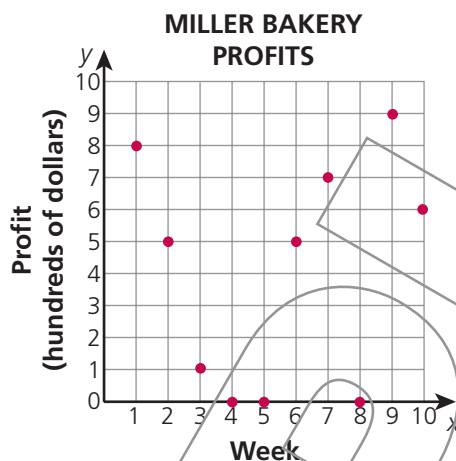
x	0	2	4	6	8
y	1	1	1	1	1

3



Solve the following problems.

- 1** The Miller family owns a bakery. They made a graph of their profits over 10 weeks. Does the graph represent a function? Explain your response.



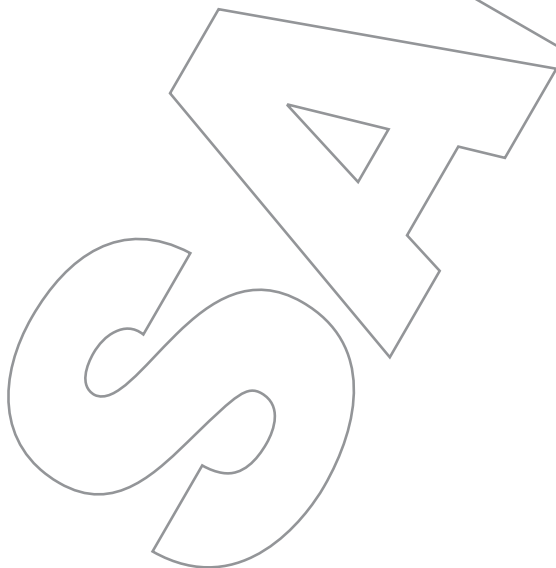
The weeks are the input values. Count the number of points shown for each week.

- 2** Write a function rule to describe the data in this function table.

x	-20	-10	0	10
y	-6	4	14	24

How does the value of x change to get the value of y?

Answer _____



Solve the following problems.

1 Which of the following sets are functions? Select **all** that apply.

- A $\{(0, 1), (0, 2), (0, 3), (0, 4)\}$
- B $\{(0, -1), (-1, 0), (-2, 5), (-3, -2)\}$
- C $\{(1, 1), (3, 2), (3, 3), (5, 4)\}$
- D $\{(2, 3), (3, 1), (1, 2), (2, 1)\}$
- E $\{(3, 3), (2, 2), (1, 1), (0, 0)\}$
- F $\{(3, -1), (4, -1), (5, -1), (6, -1)\}$

2 Which table does not represent a function?

A

x	y
1	4
2	4
3	4

B

x	y
2	3
2	4
2	5

C

x	y
1	1
3	3
5	5

D

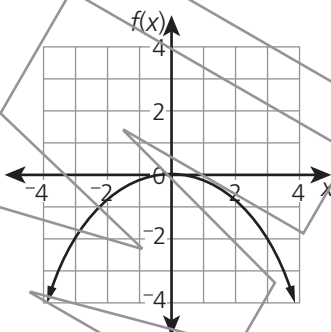
x	y
2	6
4	4
6	2

- 3 The ordered pairs (x, y) in this table of values do not form a function.

IN	OUT
2	1
5	k
7	6
h	9

What could be possible values of h and k ? Explain how you know.

- 4 Does the graph represent a function? Explain how you know.



- 5 Look at the set of points below.

$$\{(1, 1) (5, 8) (1, 5) (10, 20) (10, 6) (5, 3)\}$$

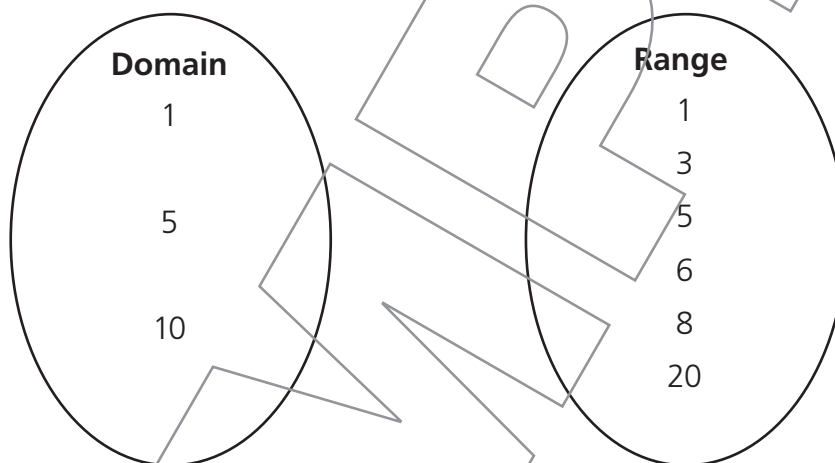
Part A What is the input?

Answer _____

What is the output?

Answer _____

Part B Use arrows to connect the elements of the domain to the range.



Part C Is this relationship a function? Explain how you know.

6 Jasper wrote this function table.

x	y
-4	-7
-3	-6
-2	-5
-1	-4

Part A Write a function rule that models this relationship.

Answer _____

Part B What is the value of x when $y = -9$? Explain how you know.

7 Reilly is buying DVDs that cost \$10.00 each. There is a shipping charge of \$3.95. The function that represents the total cost of x DVDs is represented by $y = 10x + 3.95$. Complete the table to represent this function.

x	1	3	5	7	10
y					