English Spanish

B.7 Graphing in the Coordinate Plane

Essential Question How can you use a graph to recognize a pattern and write a rule?

1 ACTIVITY: Graphing in a Coordinate Plane

Work with a partner.

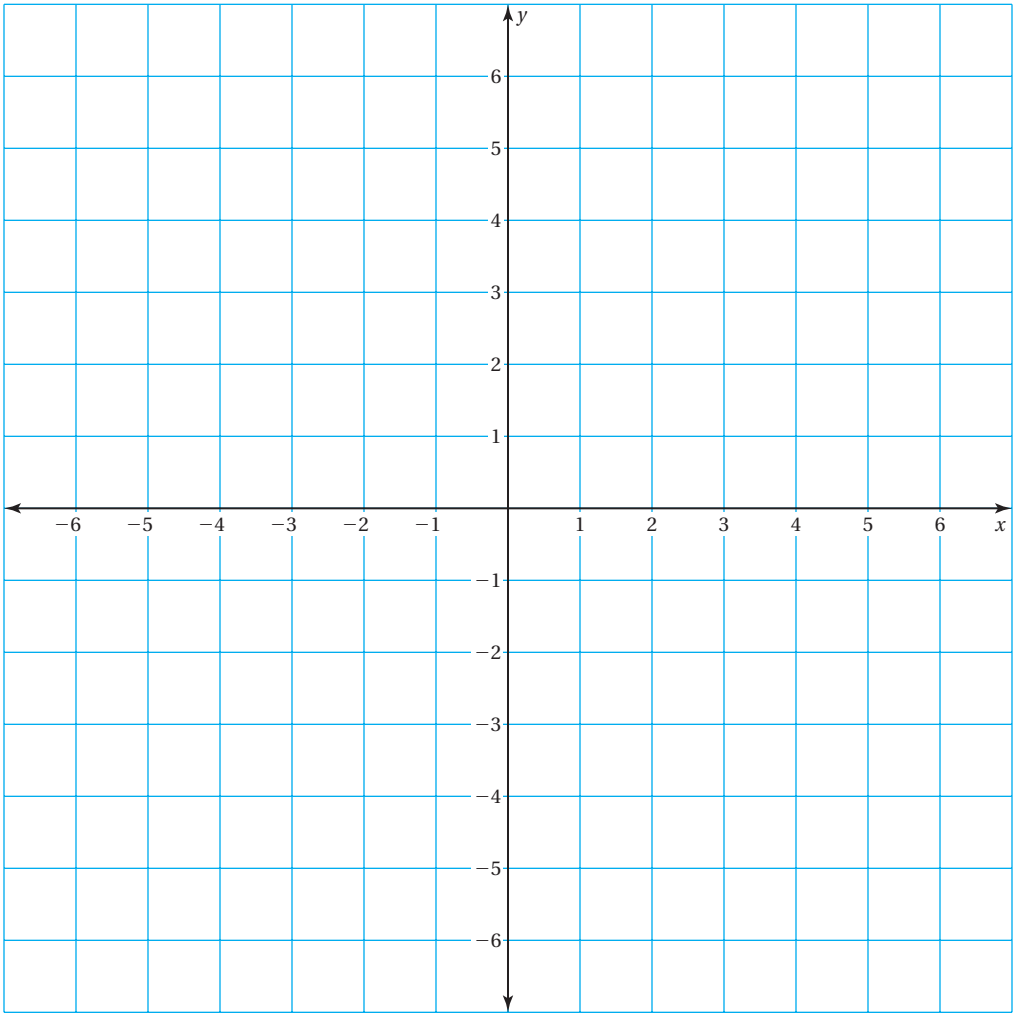
a. Copy and complete the table.

x	-4	-3	-2	-1	0	1	2	3	4
$y = x - 2$									

b. Make a list of the ordered pairs represented by the table.

c. Plot each ordered pair.

d. Connect the points. Describe the graph.



English Spanish

2 ACTIVITY: Finding a Pattern

Work with a partner. You have learned how to subtract positive numbers. Complete the following activity to discover how to subtract negative numbers.

a. Copy and complete the table.

x	0	1	2	3	4
$y = 1 - x$					

b. Plot the points from the table. Connect the points. Describe the graph.

c. Extend the graph to the left of the y-axis. Then use the graph to complete the pattern in the table.

x	−4	−3	−2	−1
$y = 1 - x$				

d. Use your completed table to answer the following.

$1 - (-4) =$ ____ $1 - (-3) =$ ____

$1 - (-2) =$ ____ $1 - (-1) =$ ____

3 ACTIVITY: Finding a Pattern

Work with a partner.

a. Copy and complete tables similar to those in Activity 2 for the equations, $y = 2 - x$, $y = 3 - x$, and $y = 4 - x$.

b. For each equation, plot the ordered pairs represented by the table in the same coordinate plane and connect the points.

c. Describe how the equations are the same. Describe how the graphs are the same. Describe how the equations are different. Describe how the graphs are different.

d. Without plotting points, predict how the equation $y = 5 - x$ would be the same as the other equations. Predict how it would be different.

What Is Your Answer?

4. IN YOUR OWN WORDS How can you use a graph to recognize a pattern and write a rule?

5. Write a rule for subtracting a negative number.

Practice Use what you learned about graphing in the coordinate plane to complete Exercises 9–12 on page A52.

English Spanish

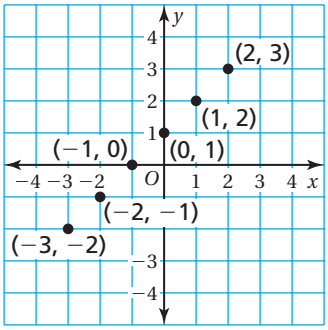
B.7 Lesson

Check It Out
Lesson Tutorials
BigIdeasMath.com

EXAMPLE 1 Using an Input-Output Table

Plot the data in the input-output table. Describe the pattern.

Input, x	Output, y
-3	-2
-2	-1
-1	0
0	1
1	2
2	3



∴ The points lie on a line.

On Your Own

Now You're Ready
Exercises 5–8

Plot the data in the input-output table. Describe the pattern.

1.

Input, x	-2	-1	0	1
Output, y	5	3	1	-1

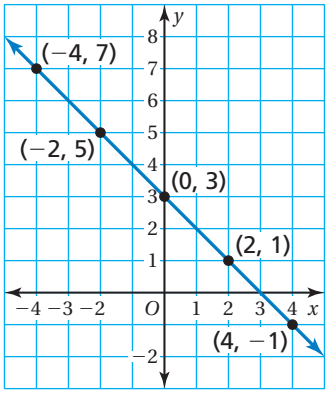
2.

Input, x	-5	-4	-3	-2
Output, y	-3	-2	-1	0

EXAMPLE 2 Graphing a Function

Make an input-output table for $y = 3 - x$. Use the inputs -4, -2, 0, 2, and 4. Then draw the graph of the function.

x	$3 - x$	y	(x, y)
-4	$3 - (-4)$	7	$(-4, 7)$
-2	$3 - (-2)$	5	$(-2, 5)$
0	$3 - 0$	3	$(0, 3)$
2	$3 - 2$	1	$(2, 1)$
4	$3 - 4$	-1	$(4, -1)$



On Your Own

Now You're Ready
Exercises 9–16

Make an input-output table for the function. Use the inputs -3, -1, 0, 1, and 3. Then draw the graph of the function.

3. $y = x - 1$

4. $y = 2 - x$

English Spanish

EXAMPLE 3 Standardized Test Practice

Which function is shown in the table?

Ⓐ $y = 3 - x$ Ⓑ $y = -x - 3$

Ⓒ $y = x + 3$ Ⓓ $y = x - 3$

Input, x	Output, y
-4	-7
-3	-6
-2	-5
-1	-4
0	-3

Remember

You can check your equation by substituting the input values for x in the equation.

Look at the relationship between the inputs and outputs. Each output y is 3 less than the input x. So, the function is $y = x - 3$.

∴ The correct answer is Ⓓ.

On Your Own

Now You're Ready
Exercises 23–26

Write an equation for the function shown in the table.

5.

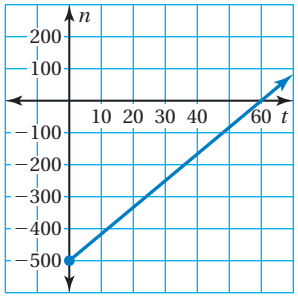
Input, x	-2	-1	0	1
Output, y	-8	-7	-6	-5

6.

Input, x	-2	-1	0	1
Output, y	2	1	0	-1

EXAMPLE 4 Real-Life Application

An underwater volcano erupts and forms an island. The graph shows the elevation n (in feet) of the volcano in relation to the ocean surface. Let t represent the number of years since its first eruption. What was the elevation of the volcano when it first erupted? Explain.



From the graph, the elevation is -500 feet when $t = 0$.

∴ So, the volcano first erupted 500 feet beneath the ocean surface.

On Your Own

7. In Example 4, how many years did it take for the volcano to reach the ocean surface? Explain.

8. In Example 4, estimate the elevation of the volcano 30 years after its first eruption. Explain how you found your answer.

English Spanish

B.7 Exercises

Check It Out
Help with Homework
BigIdeasMath.com

Vocabulary and Concept Check

1. **VOCABULARY** For the function $y = 3x + 4$, which variable is the input and which variable is the output?
2. **OPEN-ENDED** Name two points on the graph of $y = 2x - 1$.
3. **REASONING** Which function's graph passes through the origin?

$y = x - 2$ $y = x - 1$ $y = x$ $y = x + 1$

4. **REASONING** Is it possible for a line to pass through the points $(-2, 3)$, $(0, 4)$, and $(1, 5)$? Explain your reasoning.

Practice and Problem Solving

Plot the data in the input-output table. Describe the pattern.

1

5.

Input, x	-1	0	1	2	3
Output, y	-3	-2	-1	0	1

6.

Input, x	-4	-2	0	2	4
Output, y	-1	0	1	4	2

7.

Input, x	-2	-1	0	1	2
Output, y	-3	-1	1	3	5

8.

Input, x	-1	0	1	2	3
Output, y	7	4	1	-2	-5

Make an input-output table for the function. Use the inputs -2, -1, 0, 1, and 2. Then draw the graph of the function.

2

9. $y = 3 - x$
10. $y = 5 - x$
11. $y = -1 - x$
12. $y = -4 - x$
13. $y = x + 2$
14. $y = 3x$
15. $y = -10 + x$
16. $y = -2 + 2x$

17. **ERROR ANALYSIS** Describe and correct the error in making the input-output table for $y = 4 - x$.

x	$4 - x$	y	(x, y)
-3	$4 - 3$	1	$(-3, 1)$
-2	$4 - 2$	2	$(-2, 2)$
-1	$4 - 1$	3	$(-1, 3)$
0	$4 - 0$	4	$(0, 4)$

18. **SHRIMP PRODUCTION** Graph the function shown in the table. Write an equation for the function.

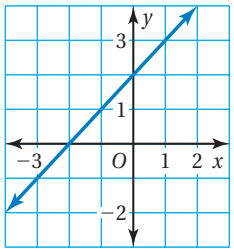
Amelia Island Shrimp Production	
Years, x	Pounds (millions), y
1	2
2	4
3	6
4	8

English Spanish

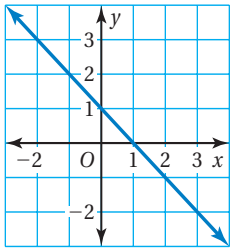
Match the function with its graph.

19. $y = x + 1$ **20.** $y = x + 2$ **21.** $y = -x + 1$ **22.** $y = 2x + 1$

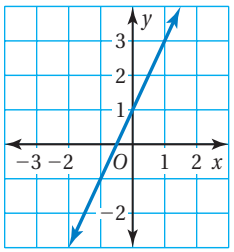
A.



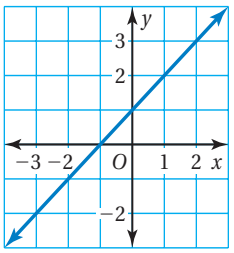
B.



C.



D.



Write an equation for the function shown in the table.

23.

Input, x	−2	−1	0	1	2
Output, y	−3	−2	−1	0	1

24.

Input, x	−4	−2	0	2	4
Output, y	4	2	0	−2	−4

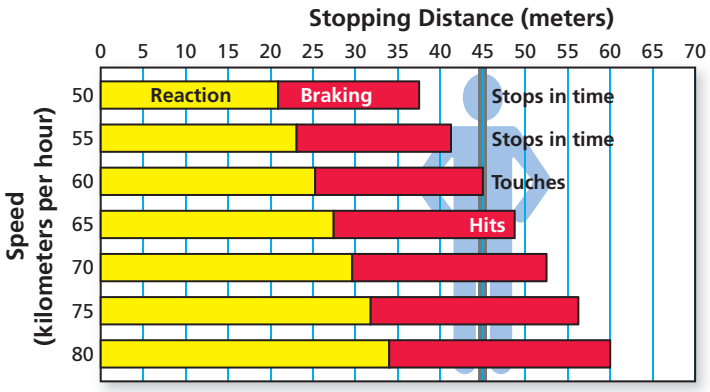
25.

Input, x	−1	0	1	2	3
Output, y	−2	0	2	4	6

26.

Input, x	−4	−2	0	2	4
Output, y	2	1	0	−1	−2

27. STOPPING DISTANCE The bar graph shows the stopping distances for a car traveling at different speeds. Let S be the speed, R be the distance traveled before reacting, and T be the total stopping distance.



a. Write a function that gives the distance traveled before the driver reacts.

b. Write a function that gives the total stopping distance in terms of the speed.

c. If a driver sees an object that is 45 meters away, will the car hit the object? Explain.

28. Critical Thinking Explain how you would graph the function $y = x^2 + 2$. Draw the graph of the function. How does it compare with the graphs of other functions in this lesson?

Fair Game Review What you learned in previous grades & lessons

Subtract. SKILLS REVIEW HANDBOOK

29. 69 − 38 **30.** 82 − 74 **31.** 177 − 63 **32.** 451 − 268

33. MULTIPLE CHOICE What is the range of the data set 12, 8, 17, 12, 15, 18, and 30? SECTION 5.5

(A) 12 (B) 15 (C) 18 (D) 22