

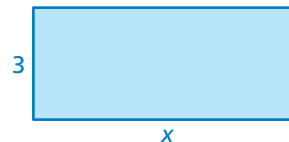
## 9.3 Input-Output Tables

**Essential Question** How can you use a table to describe a function?

### 1 ACTIVITY: Using a Function Table

Work with a partner.

- a. Copy and complete the table for the perimeter of the rectangle.



Input, $x$	1	2	3	4	5
Output, $P$					

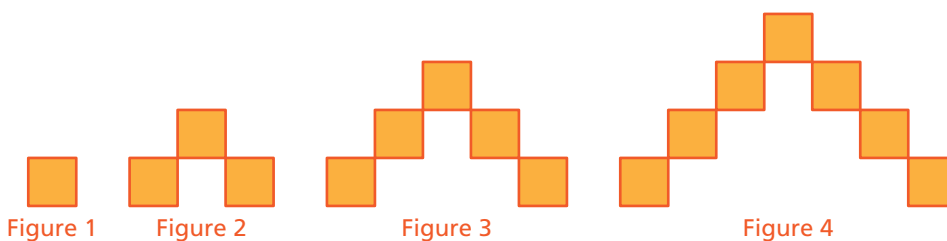
- b. Write an equation that describes the function.  
 c. Use your equation to find the value of  $x$  for which the perimeter is 50.

### 2 ACTIVITY: Using a Function Table

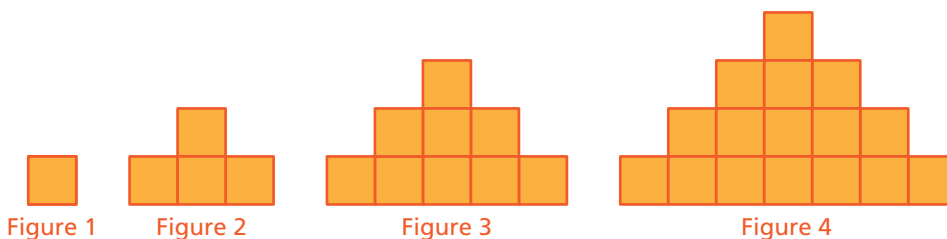
Work with a partner. Use the strategy shown in Activity 1 to make a table that shows the pattern for the area. Write an equation that describes the function. Then use your equation to find which figure has an area of 81.



a.



b.



### 3 ACTIVITY: Making a Function Table

Work with a partner. Copy and complete a sales tax table for each of the four cities.

Madison, WI, 5.50%

Sale, $x$	\$20	\$30	\$40	\$50	\$60
Sales Tax, $T$					

Ann Arbor, MI, 6.00%

Sale, $x$	\$20	\$30	\$40	\$50	\$60
Sales Tax, $T$					

Edison, NJ, 7.00%

Sale, $x$	\$20	\$30	\$40	\$50	\$60
Sales Tax, $T$					

Norman, OK, 7.50%

Sale, $x$	\$20	\$30	\$40	\$50	\$60
Sales Tax, $T$					

## What Is Your Answer?

4. **IN YOUR OWN WORDS** How can you use a table to describe a function? Describe an example of a function table in real life.

Amount of Sale	Tax
.10 - .16	.01
.17 - .33	.02
.34 - .50	.03
.51 - .66	.04
.67 - .83	.05
.84 - 1.09	.06



"Dear Sir: Yesterday, I bought a piece of 9-cent candy six times and paid NO tax. Today, I bought six pieces at once and you charged me \$0.04 tax. What's going on?"

### Practice

Use what you learned about input-output tables to complete Exercises 3 and 4 on page 382.

### Key Vocabulary

input-output table,  
p. 380

## Key Idea

### Input-Output Tables

A function can be represented by an **input-output table**. The table below is for the function  $y = x + 2$ .

Input, $x$	Output, $y$
1	3
2	4
3	5
4	6

$\leftarrow y = x + 2$   
 $\leftarrow 3 = 1 + 2$   
 $\leftarrow 4 = 2 + 2$   
 $\leftarrow 5 = 3 + 2$   
 $\leftarrow 6 = 4 + 2$

## EXAMPLE 1 Completing Input-Output Tables

Write an equation for the function. Then copy and complete the table.

- a. The output is 1 less than the input.

Input, $x$	2	3	4	5
Output, $y$				

- b. The output is twice the input.

Input, $x$	0	3	6	9
Output, $y$				

- a. An equation is  $y = x - 1$ .

Input, $x$	2	3	4	5
Output, $y$	1	2	3	4

$y = x - 1$

- b. An equation is  $y = 2x$ .

Input, $x$	0	3	6	9
Output, $y$	0	6	12	18

$y = 2x$

## On Your Own

Write an equation for the function. Then copy and complete the table.

- The output is 5 more than the input.
- The output is the product of 7 and the input.

Input, $x$	1	3	5	7
Output, $y$				

Input, $x$	0	2	4	6
Output, $y$				

Now You're Ready  
Exercises 5 and 6

## EXAMPLE 2 Standardized Test Practice

Which function rule is shown by the table?

- (A)  $y = 5x$       (B)  $y = \frac{x}{5}$   
 (C)  $y = x + 4$       (D)  $y = 10x$

Input, $x$	Output, $y$
1	5
2	10
4	20
8	40

Look at the relationship between the inputs and outputs. Each output  $y$  is 5 times the input  $x$ . So, the function rule is  $y = 5x$ .

∴ The correct answer is (A).

## EXAMPLE 3 Finding a Missing Input

Input, $x$	Output, $y$
1	7
5	15
10	25
20	45
?	53

Each output in the table is 5 more than twice the input. Find the missing input.

**Step 1:** Write an equation for the function shown by the table.

**Words** Output is five more than twice the input.

**Variables** Let  $y$  be the output value and  $x$  be the input value.

**Equation**  $y = 5 + 2 \cdot x$

An equation is  $y = 5 + 2x$ .

**Step 2:** Substitute 53 for  $y$ . Then solve for  $x$ .

$$y = 5 + 2x \quad \text{Write the equation.}$$

$$53 = 5 + 2x \quad \text{Substitute 53 for } y.$$

$$48 = 2x \quad \text{Subtract 5 from each side.}$$

$$24 = x \quad \text{Divide each side by 2.}$$

**Check**

$$2x + 5 = 53$$

$$2(24) + 5 \stackrel{?}{=} 53$$

$$48 + 5 \stackrel{?}{=} 53$$

$$53 = 53 \quad \checkmark$$

∴ The missing input is 24.

### On Your Own

Use the first three input values to write an equation for the function shown by the table. Then find the missing input.

3.

Input, $x$	Output, $y$
1	5
3	7
7	11
?	25

4.

Input, $x$	Output, $y$
2	1
4	2
6	3
?	4

*Now You're Ready*  
Exercises 7–13



## Vocabulary and Concept Check

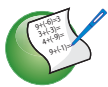
- VOCABULARY** Explain how you can use an input-output table to represent a function.
- DIFFERENT WORDS, SAME QUESTION** Which is different? Find “both” answers.

What output is 4 more than twice the input 3?

What output is twice the sum of the input 3 and 4?

What output is the sum of 2 times the input 3 and 4?

What output is 4 increased by twice the input 3?



## Practice and Problem Solving

Copy and complete the input-output table for the function.

3.  $y = x + 5$

Input, $x$	1	2	3	4
Output, $y$				

4.  $y = 4x$

Input, $x$	0	2	4	6
Output, $y$				

Write an equation for the function. Then copy and complete the table.

- 1 5. The output is 3 more than the input.

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

6. The output is 5 times the input.

Input, $x$	1	3	5	7
Output, $y$				

Write an equation for the function shown by the table.

- 2 7.

Input, $x$	1	2	3	4
Output, $y$	9	10	11	12

- 8.

Input, $x$	2	4	6	8
Output, $y$	4	8	12	16

- 9.

Input, $x$	0	3	6	9
Output, $y$	0	1	2	3

- 10.

Input, $x$	3	5	7	9
Output, $y$	1	3	5	7

11. **ERROR ANALYSIS** Describe and correct the error in writing an equation for the function shown by the table.



Input, $x$	0	4	8	12
Output, $y$	0	1	2	3

$y = 4x$

In Exercises 12 and 13, copy and complete the table.

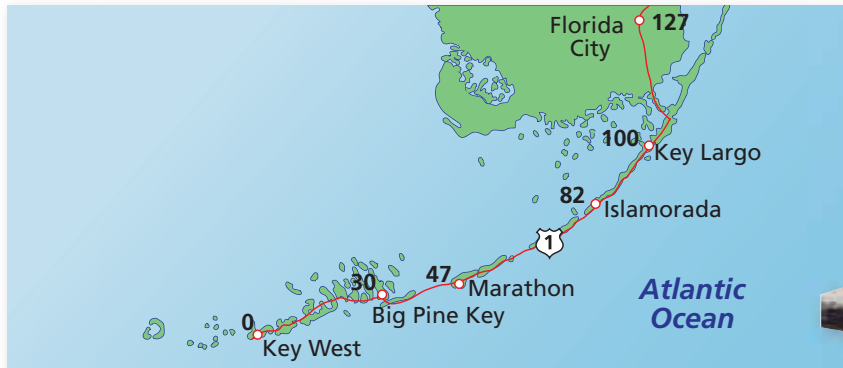
- 3 12. For each output, multiply the input by 4, then subtract 5.

<b>Input, <math>x</math></b>	2	3	4	7		
<b>Output, <math>y</math></b>	3	7	11	23	35	55

13. For each output, divide the input by 2, then add 4.

<b>Input, <math>x</math></b>		2	4	10		
<b>Output, <math>y</math></b>	4	5	6	9	12	17

14. **GEOGRAPHY** You travel along US Highway 1 from mile marker 0 in Key West to mile marker 100 in Key Largo.



- a. Copy and complete the input-output table.

<b>Distance from Key West, <math>x</math></b>	0	30	47	82	100
<b>Distance to Key Largo, <math>y</math></b>					

- b. Write a function rule in which  $x$  is the input and  $y$  is the output.  
 c. Can you use your function rule to find the distance to Florida City? If not, write a function rule that you can use.
15. **TIME** Make an input-output table with the Greenwich Mean Time (GMT) hourly times as inputs, and times where you live as outputs. Write a function rule for the data.
16. **Critical Thinking** Write an equation with the same outputs as  $y = 2x + 3$  for  $x = 0, 1, 2, 3,$  and  $4$ .



## Fair Game Review what you learned in previous grades & lessons

Plot the ordered pairs in the same coordinate plane. (*Skills Review Handbook*)

17. (1, 2)                      18. (0, 7)                      19. (2, 3)                      20. (6, 5)

21. **MULTIPLE CHOICE** Which is the solution of the inequality  $6x \leq 24$ ? (*Section 8.3*)

- (A)  $x < 4$                       (B)  $x \leq 4$                       (C)  $x < 144$                       (D)  $x \leq 144$