English Spanish

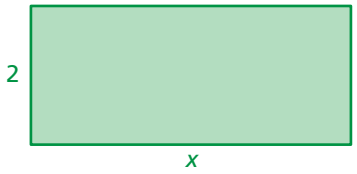
9.1 Mapping Diagrams

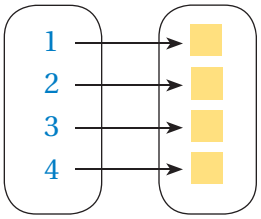
Essential Question What is a mapping diagram? How can it be used to represent a function?

1 ACTIVITY: Constructing Mapping Diagrams

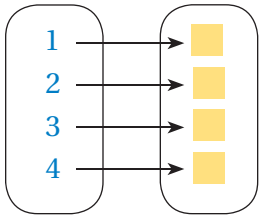
Work with a partner. Copy and complete the mapping diagram.

a. Area A

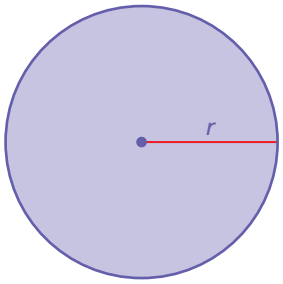


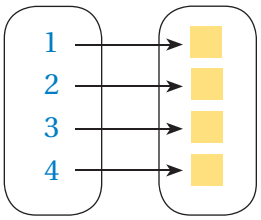


b. Perimeter P

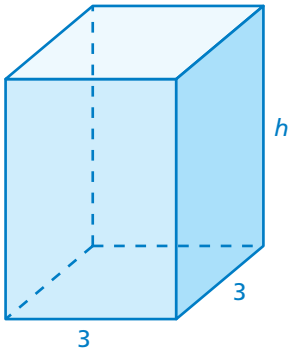


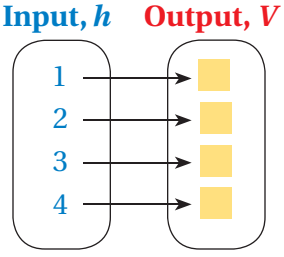
c. Circumference C





d. Volume V

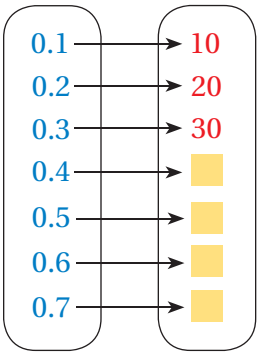




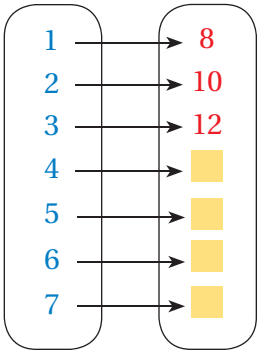
2 ACTIVITY: Interpreting Mapping Diagrams

Work with a partner. Describe the pattern in the mapping diagram. Copy and complete the diagram. Find two earlier lessons where you used a similar function.

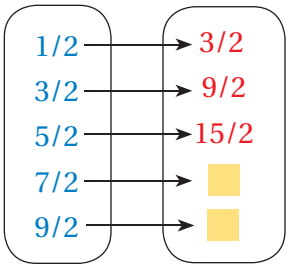
a. Input, d Output, P



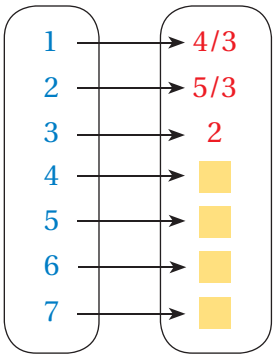
b. Input, t Output, M



c. Input, n Output, S



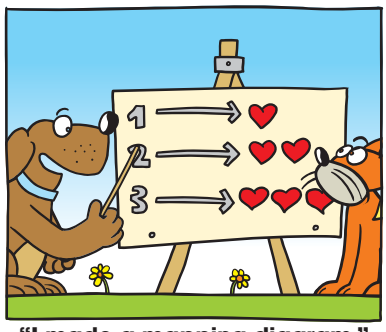
d. Input, x Output, A



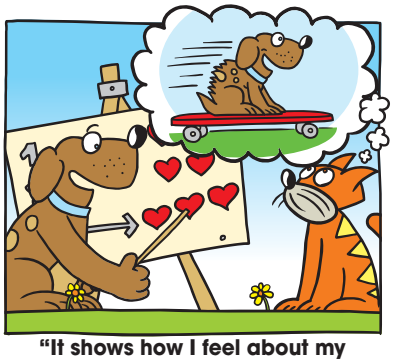
What Is Your Answer?

3. IN YOUR OWN WORDS What is a mapping diagram? How can it be used to represent a function?

4. Construct a mapping diagram that represents a function you have studied.



"I made a mapping diagram."



"It shows how I feel about my skateboard with each passing day."

Practice Use what you learned about mapping diagrams to complete Exercises 3–5 on page 370.

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9.1 Lesson

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Lesson Tutorials
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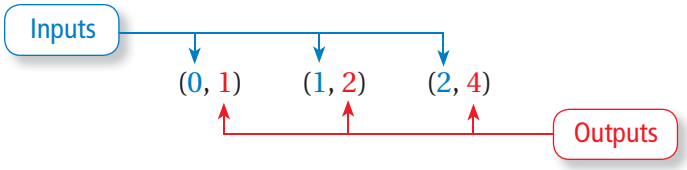
Key Vocabulary
input, *p. 368*
output, *p. 368*
function, *p. 368*
mapping diagram, *p. 368*

Ordered pairs can be used to show **inputs** and **outputs**.



Key Idea

Functions and Mapping Diagrams

A **function** is a relationship that pairs each input with exactly one output. A function can be represented by ordered pairs or a **mapping diagram**.

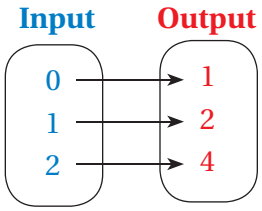
Ordered Pairs

(0, 1)

(1, 2)

(2, 4)

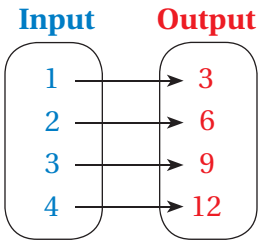
Mapping Diagram



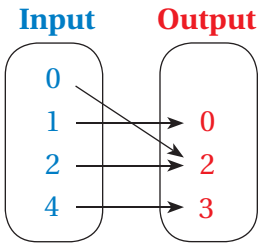
EXAMPLE 1 Listing Ordered Pairs

List the ordered pairs shown in the mapping diagram.

a.



b.



a. The ordered pairs are (1, 3), (2, 6), (3, 9), and (4, 12).

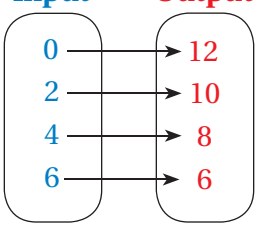
b. The ordered pairs are (0, 2), (1, 0), (2, 2), and (4, 3).

On Your Own

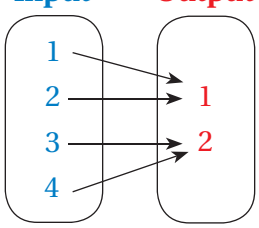
Now You're Ready
Exercises 6–8

List the ordered pairs shown in the mapping diagram.

1.



2.



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EXAMPLE 2 Drawing a Mapping Diagram

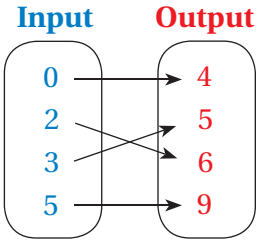
Draw a mapping diagram of (0, 4), (2, 6), (3, 5), and (5, 9).

List the inputs and outputs in order from least to greatest.

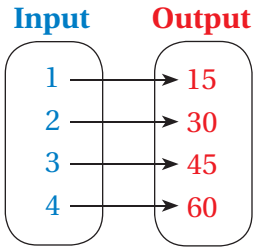
Inputs: 0, 2, 3, 5

Outputs: 4, 5, 6, 9

Draw arrows from the inputs to their outputs.



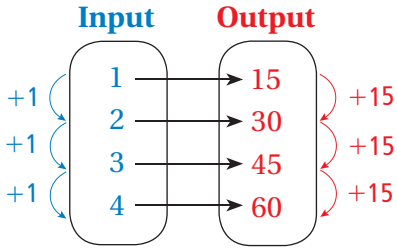
EXAMPLE 3 Describing a Mapping Diagram



Describe the pattern of inputs and outputs in the mapping diagram.

Look at the relationship between the inputs and outputs.

As each input increases by 1, the output increases by 15.

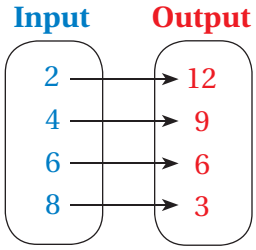


On Your Own

Now You're Ready
Exercises 9–17

3. Draw a mapping diagram of (1, 2), (2, 4), (5, 3), and (8, 1).

4. Describe the pattern of inputs and outputs in the mapping diagram shown.



EXAMPLE 4 Real-Life Application

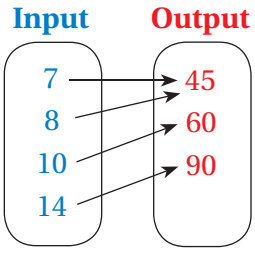
Number of Songs Played	Time Onstage (minutes)
8	45
10	60
7	45
14	90

The table shows the number of songs played by four bands at a festival and the amount of time each band played. Use the table to draw a mapping diagram.

Let the number of songs played be the inputs and the times onstage be the outputs.

Inputs: 7, 8, 10, 14

Outputs: 45, 60, 90



On Your Own

5. WHAT IF? In Example 4, a fifth band plays 12 songs and is onstage for 70 minutes. Draw a mapping diagram for the five bands.

English Spanish

9.1 Exercises

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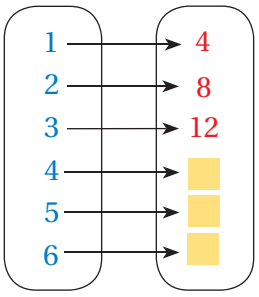
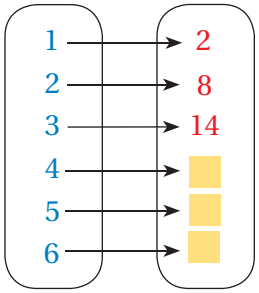
Vocabulary and Concept Check

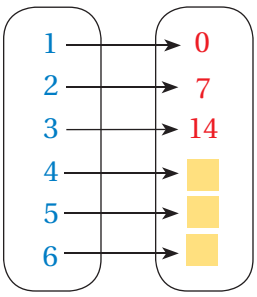
1. **VOCABULARY** In an ordered pair, which number represents the input? the output?
2. **OPEN-ENDED** Draw a mapping diagram where the number of inputs is greater than the number of outputs.

Practice and Problem Solving

Describe the pattern in the mapping diagram. Copy and complete the diagram.

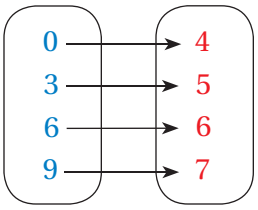
3.


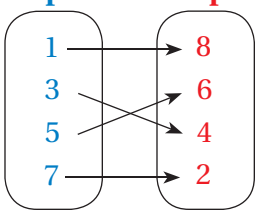
4.


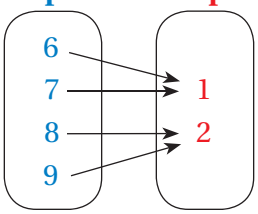
5.


List the ordered pairs shown in the mapping diagram.

1

6.


7.


8.


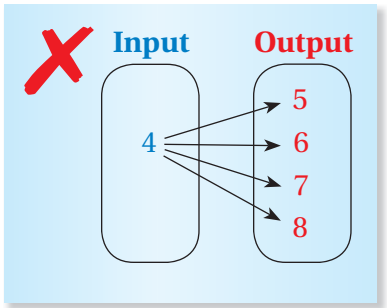
Draw a mapping diagram of the set of ordered pairs.

2

9. (1, 3), (5, 7), (8, 10), (14, 16)
10. (0, 10), (4, 6), (6, 4), (7, 3)
11. (0, 11), (1, 8), (4, 15), (6, 19)
12. (1, 0), (2, 0), (3, 0), (4, 2), (5, 2)

13. **ERROR ANALYSIS** Describe and correct the error in drawing a mapping diagram of the set of ordered pairs.

(5, 4), (6, 4), (7, 4), (8, 4)



Radius (ft)	Area (ft^2)
2	12.56
3	28.26
7	153.86
9	254.34

14. **AREA** The table shows the radius and approximate area for four circles. Use the table to draw a mapping diagram.

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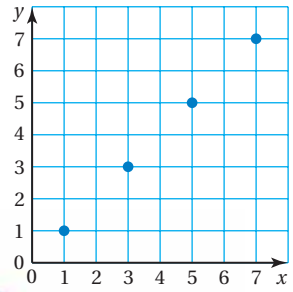
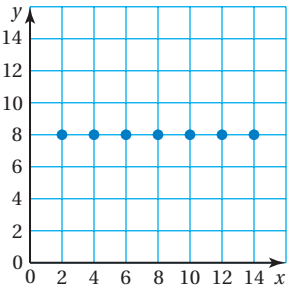
Draw a mapping diagram for the graph. Then describe the pattern of inputs and outputs.

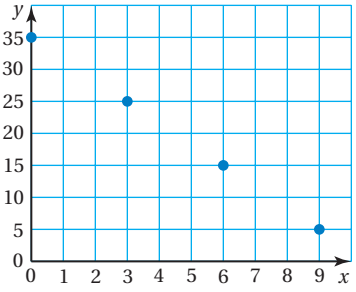
15.



16.



17.



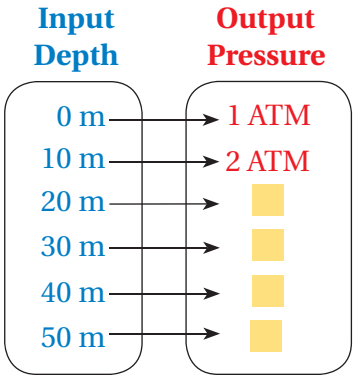
18. SCUBA DIVING The normal pressure at sea level is one atmosphere of pressure (1 ATM). As you dive below sea level, the pressure increases by 1 ATM for each 10 meters of depth.

a. Complete the mapping diagram.

b. List the ordered pairs. Then plot the ordered pairs in a coordinate plane.

c. Compare the mapping diagram and graph. Which do you prefer? Why?

d. RESEARCH What are common depths for people who are just learning to scuba dive? What are common depths for experienced scuba divers?



19. MOVIES A store sells previously viewed movies. The table shows the cost of buying 1, 2, 3, or 4 movies.

a. Use the table to draw a mapping diagram.

b. Describe the pattern. How does the cost per movie change as you buy more movies?

Movies	Cost
1	$10
2	$18
3	$24
4	$28

20. Critical Thinking The table shows the outputs for several inputs. What do you think the output would be for an input of 200? Explain.

Input, x	0	1	2	3	4
Output, y	25	30	35	40	45

Fair Game Review What you learned in previous grades & lessons

Write the word sentence as an equation. Then solve. SECTION 7.2 SECTION 7.3

21. The sum of a number x and 7 is 15.

22. 3 times a number n is 24.

23. MULTIPLE CHOICE Which inequality represents the word sentence? SECTION 8.1

"The sum of a number x and 7 is at least 25."

(A) $x + 7 > 25$ (B) $x + 7 \leq 25$ (C) $x + 7 \geq 25$ (D) $x + 7 < 25$