

## 4-5 Writing a Function Rule

### Quick Review

To write a function rule describing a real-world situation, it is often helpful to start with a verbal model of the situation.

### Example

At a bicycle motocross (BMX) track, you pay \$40 for a racing license plus \$15 per race. What is a function rule that represents your total cost?

total cost = license fee + fee per race • number of races

$$C = 40 + 15 \cdot r$$

A function rule is  $C = 40 + 15 \cdot r$ .

### Exercises

Write a function rule to represent each situation.

17. **Landscaping** The volume  $V$  remaining in a  $243\text{-ft}^3$  pile of gravel decreases by  $0.2\text{ ft}^3$  with each shovelful  $s$  of gravel spread in a walkway.
18. **Design** Your total cost  $C$  for hiring a garden designer is \$200 for an initial consultation plus \$45 for each hour  $h$  the designer spends drawing plans.

## 4-6 Formalizing Relations and Functions

### Quick Review

A **relation** pairs numbers in the **domain** with numbers in the **range**. A relation may or may not be a function.

### Example

Is the relation  $\{(0, 1), (3, 3), (4, 4), (0, 0)\}$  a function?

The  $x$ -values of the ordered pairs form the domain, and the  $y$ -values form the range. The domain value 0 is paired with two range values, 1 and 0. So the relation is not a function.

### Exercises

Tell whether each relation is a function.

19.  $\{(-1, 7), (9, 4), (3, -2), (5, 3), (9, 1)\}$
20.  $\{(2, 5), (3, 5), (4, -4), (5, -4), (6, 8)\}$

Evaluate each function for  $x = 2$  and  $x = 7$ .

21.  $f(x) = 2x - 8$                       22.  $h(x) = -4x + 61$
23. The domain of  $t(x) = -3.8x - 4.2$  is  $\{-3, -1.4, 0, 8\}$ . What is the range?

## 4-7 Arithmetic Sequences

### Quick Review

A **sequence** is an ordered list of numbers, called terms, that often forms a pattern. A sequence can be represented by a **recursive formula** or an **explicit formula**.

### Example

Tell whether the sequence is arithmetic.

5, 2, -1, -4, ...

-3   -3   -3

The sequence has a common difference of -3, so it is arithmetic.

### Exercises

For each sequence, write a recursive and an explicit formula.

24. 3, 8, 13, 18, ...                      25. -2, -5, -8, -11, ...
26. 4, 6.5, 9, 11.5, ...                      27. 18, 11, 4, -3, ...

For each recursive formula, find an explicit formula that represents the same sequence.

28.  $A(n) = A(n - 1) + 3$ ;  $A(1) = 4$
29.  $A(n) = A(n - 1) + 11$ ;  $A(1) = 13$
30.  $A(n) = A(n - 1) - 1$ ;  $A(1) = 19$

**Do you know HOW?**

- Recreation** You ride your bike to the park, sit to read for a while, and then ride your bike home. It takes you less time to ride from the park to your house than it took to ride from your house to the park. Draw a sketch of a graph that shows your possible distance traveled over time. Label each section.
- Identify the independent and dependent variables in the table below. Then describe the relationship using words, an equation, and a graph.

Speed of Sound in Air				
Temperature (°C)	10	15	20	25
Velocity (m/s)	337	340	343	346

Graph the function shown by each table. Tell whether the function is *linear* or *nonlinear*.

3.

x	y
-3	-5
-1	-1
1	3
3	7

4.

x	y
0	1
1	2
2	5
3	10

Make a table of values for each function rule. Then graph the function.

5.  $y = 1.5x - 3$

6.  $y = -x^2 + 4$

Identify the domain and range of each relation. Use a mapping diagram to determine whether the relation is a function.

7.  $\{(-2, 5), (8, 6), (3, 12), (5, 6)\}$

8.  $\{(9, 6), (3, 8), (4, 9.5), (9, 2)\}$

- Baking** A bottle holds 48 tsp of vanilla. The amount  $A$  of vanilla remaining in the bottle decreases by 2 tsp per batch  $b$  of cookies. Write a function rule to represent this situation. How much vanilla remains after 12 batches of cookies?

- Party Favors** You are buying party favors that cost \$2.47 each. You can spend no more than \$30 on the party favors. What domain and range are reasonable for this situation?

Find the range of each function for the domain  $\{-4, -2, 0, 1.5, 4\}$ .

11.  $f(x) = -2x - 3$

12.  $f(x) = 5x^2 + 4$

Find the second, fourth, and eleventh terms of the sequence described by each explicit formula.

13.  $A(n) = 2 + (n - 1)(-2.5)$

14.  $A(n) = -9 + (n - 1)(3)$

Tell whether each sequence is arithmetic. Justify your answer. If the sequence is arithmetic, write a recursive formula and an explicit formula to represent it.

15. 128, 64, 32, 16, ...

16. 3, 3.25, 3.5, 3.75, ...

**Do you UNDERSTAND?**

- Vocabulary** Tell whether each relationship should be represented by a *continuous* or *discrete* graph.

- the price of turkey that sells for \$.89 per pound

- the profit you make selling flowers at \$1.50 each when each flower costs you \$.80

- Reasoning** Can a function have an infinite number of values in its domain and only a finite number of values in its range? If so, describe a real-world situation that can be modeled by such a function.

- Writing** What is the difference between a relation and a function? Is every relation a function? Is every function a relation? Explain.