

4-7

Sequences and Functions



Vocabulary

Review

1. Circle the name of the next shape in the *pattern* at the right.

rectangle circle hexagon octagon



Find the next number in each *pattern*.

2. $1, \frac{1}{3}, \frac{1}{9}, \square$

3. $6, 4, 2, 0, \square$

4. $2, 10, 50, 250, \square$

Vocabulary Builder

sequence (noun) SEE kwuns

Definition: A **sequence** is an ordered list of numbers that often form a pattern. Each number in the list is called a *term* of the **sequence**.

Example: The Fibonacci sequence is a **sequence** of numbers where the first number is 0, the second number is 1, and each subsequent number is equal to the sum of the previous two numbers.

Origin: from the Latin word *sequentia*, which means “to follow”

Fibonacci **sequence**
 $0, 1, 1, 2, 3, 5, 8, 13, 21, \dots$

Use Your Vocabulary

The following sets of numbers are *sequences*. Explain each pattern.

5. set of whole numbers greater than or equal to 5: $\{5, 6, 7, 8, 9, \dots\}$

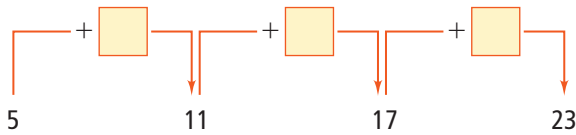
6. $\{40, 42, 44, 46, 48, \dots\}$



Problem 1 Extending Sequences

Got It? Describe a pattern in the sequence 5, 11, 17, 23, What are the next two terms of the sequence?

7. Complete the diagram. What number is added to each term?



8. Describe the pattern in the sequence.

9. Find the next two terms in the sequence.

5, 11, 17, 23, , , ...

In an **arithmetic sequence**, the difference between consecutive terms is constant. This difference is called the **common difference**.



Problem 2 Identifying an Arithmetic Sequence

Got It? Tell whether the sequence 8, 15, 22, 30, ... is arithmetic. If it is, what is the common difference?

10. Complete the table.

Consecutive Terms	8 and 15	15 and <input type="text"/>	22 and <input type="text"/>
Difference	<input type="text"/>	<input type="text"/>	<input type="text"/>

11. Do the consecutive terms have a common difference? Yes / No

12. Is the sequence an arithmetic sequence? If so, what is the common difference?

Got It? Tell whether the sequence 7, 9, 11, 13, ... is arithmetic. If it is, what is the common difference?

13. Complete the table.

Consecutive Terms	7 and 9	9 and <input type="text"/>	11 and <input type="text"/>
Difference	<input type="text"/>	<input type="text"/>	<input type="text"/>

14. Do the consecutive terms have a common difference? Yes / No

15. Is the sequence an arithmetic sequence? If so, what is the common difference?

Got It? Tell whether the sequence 10, 4, -2, -8, ... is arithmetic. If it is, what is the common difference?

16. Do the consecutive terms have a common difference? Yes / No

17. Is the sequence an arithmetic sequence? If so, what is the common difference?

take note

Key Concept Rule for an Arithmetic Sequence

The n th term of an arithmetic sequence with the first term $A(1)$ and common difference d is given by this rule:

$$A(n) = A(1) + (n - 1)d$$

\uparrow \uparrow \uparrow \leftarrow
 n th term first term term number common difference

18. The equation $A(5) = 3 + (5 - 1)7$ generates the fifth term in a sequence. Draw a line from each number in Column A to its description in Column B.

Column A

7
5
3

Column B

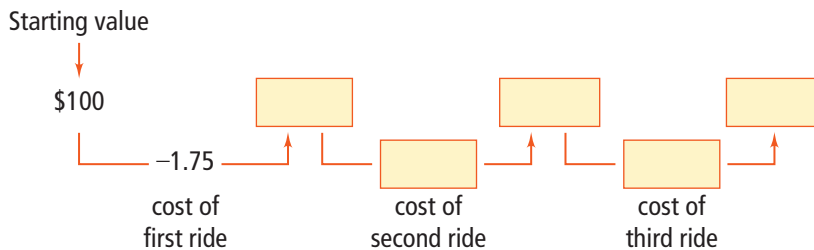
first term of the sequence
term number
common difference



Problem 3 Writing a Rule for an Arithmetic Sequence

Got It? A subway pass has a starting value of \$100. After one ride, the value of the pass is \$98.25. After two rides, its value is \$96.50. After three rides, its value is \$94.75. Write a rule to represent the remaining value on the card as an arithmetic sequence. What is the value of the pass after 15 rides?

19. Complete the diagram.



20. Complete each sentence. Then complete the formula.

The first term of the sequence is . The common difference is .

$$A(n) = \text{} + (n - 1) \cdot (\text{$$

21. Use the formula from Exercise 20 to find the value of the pass after 15 rides. Note that the term *after* 15 rides are used is the *16th* term.

22. The value of the pass after 15 rides is \$.



Lesson Check • Do you UNDERSTAND?

Reasoning Can you use the rule below to find the n th term of an arithmetic sequence with a first term $A(1)$ and a common difference d ? Explain.

$$A(n) = A(1) + nd - d$$

23. Use the Distributive Property to write an equivalent formula.

$$A(n) = A(1) + nd - d$$

24. Can you use the rule $A(n) = A(1) + nd - d$ to find the n th term of an arithmetic sequence? Explain.



Math Success

Check off the vocabulary words that you understand.

sequence term of a sequence arithmetic sequence common difference

Rate how well you can *understand arithmetic sequences*.

