Vocabulary and Core Concept Check

1. **WRITING** Describe the graph of an arithmetic sequence.

2. **DIFFERENT WORDS, SAME QUESTION** Consider the arithmetic sequence represented by the graph. Which is different? Find "both" answers.

   | Find the slope of the linear function. | Find the difference between consecutive terms of the arithmetic sequence. |

   | Find the difference between the terms a_2 and a_4. | Find the common difference of the arithmetic sequence. |

   Points: (2, 10), (3, 13), (4, 16), (5, 19)
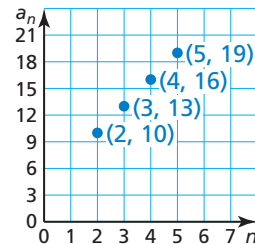
Monitoring Progress and Modeling with Mathematics

In Exercises 3 and 4, write the next three terms of the arithmetic sequence.

3. First term: 2
   Common difference: 13

4. First term: 18
   Common difference: −6

In Exercises 5–10, find the common difference of the arithmetic sequence.

5. 13, 18, 23, 28, . . .   6. 175, 150, 125, 100, . . .

7. −16, −12, −8, −4, . . .   8. $4, 3\frac{2}{3}, 3\frac{1}{3}, 3, \ldots$
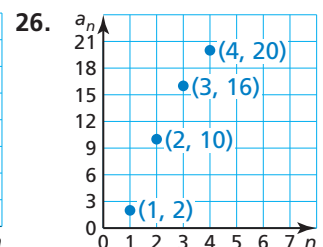
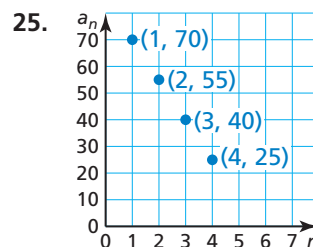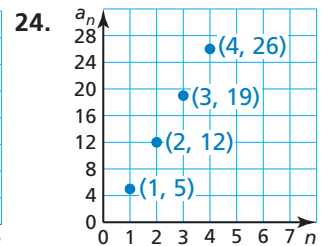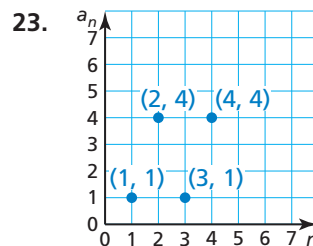9. 6.5, 5, 3.5, 2, . . .   10. −16, −7, 2, 11, . . .

In Exercises 11–16, write the next three terms of the arithmetic sequence. *(See Example 1.)*

11. 19, 22, 25, 28, . . .   12. 1, 12, 23, 34, . . .

13. 16, 21, 26, 31, . . .   14. 60, 30, 0, −30, . . .

15. 1.3, 1, 0.7, 0.4, . . .   16. $\frac{5}{6}, \frac{2}{3}, \frac{1}{2}, \frac{1}{3}, \ldots$

In Exercises 17–22, graph the arithmetic sequence. *(See Example 2.)*

17. 4, 12, 20, 28, . . .   18. −15, 0, 15, 30, . . .

19. −1, −3, −5, −7, . . .   20. 2, 19, 36, 53, . . .

21. $0, 4\frac{1}{2}, 9, 13\frac{1}{2}, \ldots$ 22. 6, 5.25, 4.5, 3.75, . . .

In Exercises 23–26, determine whether the graph represents an arithmetic sequence. Explain. *(See Example 3.)*

23.
Points: (1, 1), (2, 4), (3, 1), (4, 4)

24.
Points: (1, 5), (2, 12), (3, 19), (4, 26)

25.
Points: (1, 70), (2, 55), (3, 40), (4, 25)

26.
Points: (1, 2), (2, 10), (3, 16), (4, 20)

**In Exercises 27–30, determine whether the sequence is arithmetic. If so, find the common difference.**

27. 13, 26, 39, 52, . . .   28. 5, 9, 14, 20, . . .

29. 48, 24, 12, 6, . . .   30. 87, 81, 75, 69, . . .

31. **FINDING A PATTERN** Write a sequence that represents the number of smiley faces in each group. Is the sequence arithmetic? Explain.
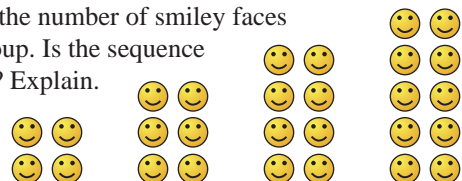
32. FINDING A PATTERN Write a sequence that represents the sum of the numbers in each roll. Is the sequence arithmetic? Explain.

Roll 1   Roll 2   Roll 3   Roll 4
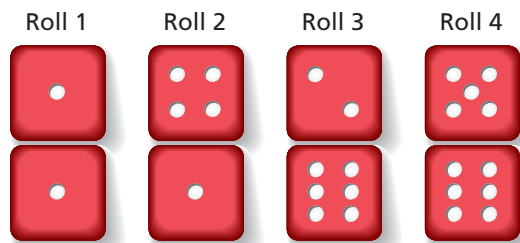
In Exercises 33–38, write an equation for the *n*th term of the arithmetic sequence. Then find a_{10}. *(See Example 4.)*

33. $-5, -4, -3, -2, \ldots$ **34.** $-6, -9, -12, -15, \ldots$

35. $\frac{1}{2}, 1, 1\frac{1}{2}, 2, \ldots$ **36.** $100, 110, 120, 130, \ldots$

37. $10, 0, -10, -20, \ldots$ **38.** $\frac{3}{7}, \frac{4}{7}, \frac{5}{7}, \frac{6}{7}, \ldots$

39. ERROR ANALYSIS Describe and correct the error in finding the common difference of the arithmetic sequence.

> ✗   2,   1,   0, $-1, \ldots$
>
> -1 -1 -1
>
> The common difference is 1.

40. ERROR ANALYSIS Describe and correct the error in writing an equation for the *n*th term of the arithmetic sequence.

> ✗ $14, 22, 30, 38, \ldots$
>
> $a_n = a_1 + nd$
>
> $a_n = 14 + 8n$

41. NUMBER SENSE The first term of an arithmetic sequence is 3. The common difference of the sequence is 1.5 times the first term. Write the next three terms of the sequence. Then graph the sequence.

42. NUMBER SENSE The first row of a dominoes display has 10 dominoes. Each row after the first has two more dominoes than the row before it. Write the first five terms of the sequence that represents the number of dominoes in each row. Then graph the sequence.


REPEATED REASONING In Exercises 43 and 44, (a) draw the next three figures in the sequence and (b) describe the 20th figure in the sequence.

43.

44.
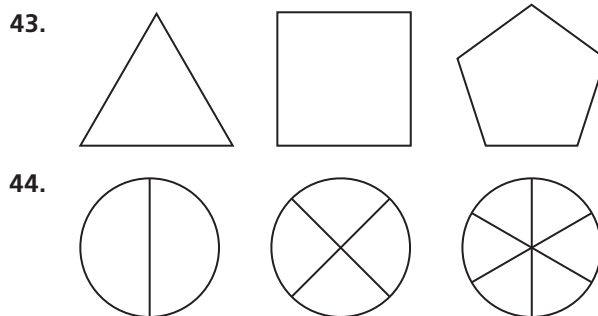
45. MODELING WITH MATHEMATICS The total number of babies born in a country each minute after midnight January 1st can be estimated by the sequence shown in the table. *(See Example 5.)*

| Minutes after midnight January 1st	1	2	3	4
Total babies born	5	10	15	20

a. Write a function that represents the arithmetic sequence.

b. Graph the function.

c. Estimate how many minutes after midnight January 1st it takes for 100 babies to be born.

46. MODELING WITH MATHEMATICS The amount of money a movie earns each week after its release can be approximated by the sequence shown in the graph.
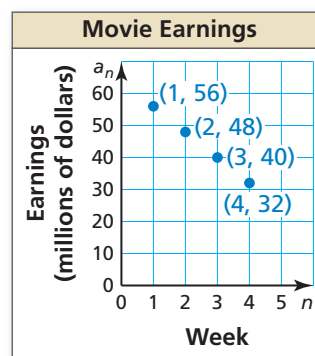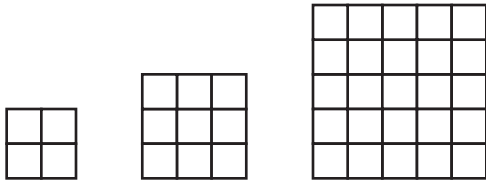

a. Write a function that represents the arithmetic sequence.

b. In what week does the movie earn $16 million?

c. How much money does the movie earn overall?

MATHEMATICAL CONNECTIONS In Exercises 47 and 48, each small square represents 1 square inch. Determine whether the areas of the figures form an arithmetic sequence. If so, write a function f that represents the arithmetic sequence and find $f(30)$.

47.
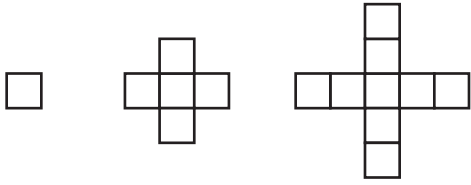
48.

49. **REASONING** Is the domain of an arithmetic sequence discrete or continuous? Is the range of an arithmetic sequence discrete or continuous?

50. **MAKING AN ARGUMENT** Your friend says that the range of a function that represents an arithmetic sequence always contains only positive numbers or only negative numbers. Your friend claims this is true because the domain is the set of positive integers and the output values either constantly increase or constantly decrease. Is your friend correct? Explain.

51. **OPEN-ENDED** Write the first four terms of two different arithmetic sequences with a common difference of -3. Write an equation for the nth term of each sequence.

52. **THOUGHT PROVOKING** Describe an arithmetic sequence that models the numbers of people in a real-life situation.

53. **REPEATED REASONING** Firewood is stacked in a pile. The bottom row has 20 logs, and the top row has 14 logs. Each row has one more log than the row above it. How many logs are in the pile?

54. **HOW DO YOU SEE IT?** The bar graph shows the costs of advertising in a magazine.
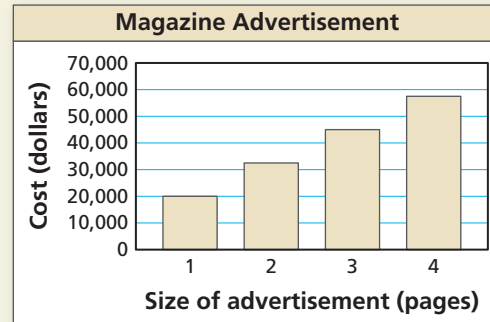
a. Does the graph represent an arithmetic sequence? Explain.

b. Explain how you would estimate the cost of a six-page advertisement in the magazine.

55. **REASONING** Write a function f that represents the arithmetic sequence shown in the mapping diagram.
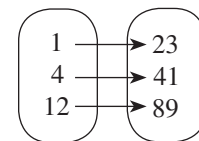
56. **PROBLEM SOLVING** A train stops at a station every 12 minutes starting at 6:00 A.M. You arrive at the station at 7:29 A.M. How long must you wait for the train?

57. **ABSTRACT REASONING** Let x be a constant. Determine whether each sequence is an arithmetic sequence. Explain.

a. $x + 6, 3x + 6, 5x + 6, 7x + 6, \ldots$

b. $x + 1, 3x + 1, 9x + 1, 27x + 1, \ldots$

Maintaining Mathematical Proficiency
Reviewing what you learned in previous grades and lessons

Solve the inequality. Graph the solution. *(Section 2.2)*

58. $x + 8 \geq -9$ 59. $15 < b - 4$ 60. $t - 21 < -12$ 61. $7 + y \leq 3$

Graph f and h. Describe the transformations from the graph of f to the graph of h. *(Section 3.6)*

62. $f(x) = x; h(x) = 4x + 3$

63. $f(x) = x; h(x) = -x - 8$

64. $f(x) = x; h(x) = -\frac{1}{2}x + 5$

65. $f(x) = x; h(x) = \frac{1}{4}x - 1$