tice by Example

Example 1 (page 268)

Use inductive reasoning to describe each pattern. Then find the next two numbers in each pattern.

1. 4, 6, 8, 10, . . .
2. $4, 6, 9, 13\frac{1}{2}, \ldots$
3. 4, 6, 9, 13, . . .
4. 3, 3.04, 3.08, 3.12, . . .
5. 3, 3.3, 3.63, 3.993, . . .
6. 3, 1, −1, −3, . . .
7. 1.1, 2.2, 3.3, 4.4, . . .
8. 0.001, 0.01, 0.1, 1, . . .
9. 2, 8, 32, 128, . . .
10. $1, \frac{1}{4}, \frac{1}{9}, \frac{1}{16}, \ldots$
11. 9, −5, −19, −33, . . .
12. 1.5, 7.5, 37.5, 187.5, . . .

Example 2 (page 269)

Find the common difference of each arithmetic sequence.

13. −5, −2, 1, 4, . . .
14. −6, −10, −14, −18, . . .
15. 18, 7, −4, −15, . . .
16. 8, 21, 34, 47, . . .
17. $\frac{1}{2}, \frac{1}{3}, \frac{1}{6}, 0, \ldots$
18. 0.7, 1.5, 2.3, 3.1, . . .
19. 8, 6, 4, 2, . . .
20. 10, 22, 34, 46, . . .
21. −9, −4, 1, 6, . . .

Example 3 (page 270)

Find the second, fifth, and ninth terms of each sequence.

22. $A(n) = 2 + (n - 1)(3)$
23. $A(n) = -9 + (n - 1)(6)$
24. $A(n) = -7 + (n - 1)(4)$
25. $A(n) = 8 + (n - 1)(9)$
26. $A(n) = 0.5 + (n - 1)(3)$
27. $A(n) = -5 + (n - 1)(7)$
28. $A(n) = 9 + (n - 1)(-6)$
29. $A(n) = -2.1 + (n - 1)(-5)$
30. $A(n) = 65 + (n - 1)(-7)$
31. $A(n) = 21 + (n - 1)(-4)$
32. $A(n) = -5 + (n - 1)(-3)$
33. $A(n) = 0.2 + (n - 1)(-1)$

Apply Your Skills

Find the next two terms in each sequence.

34. 20, 14, 8, 2, . . .
35. $2, 2\frac{1}{4}, 2\frac{1}{2}, 2\frac{3}{4}, 3, \ldots$
36. 2, 5, 10, 17, . . .
37. $12, 4, 1\frac{1}{3}, \frac{4}{9}, \ldots$
38. 0, 3, 8, 15, 24, . . .
39. −5, 4, 13, 22, . . .
40. 40, 20, 10, 5, . . .
41. $7, 7\frac{1}{4}, 7\frac{1}{2}, 7\frac{3}{4}, \ldots$
42. $12, -4, \frac{4}{3}, -\frac{4}{9}, \ldots$

43. a. **Writing** Explain the difference between inductive and deductive reasoning.
b. **Open-Ended** Give an example of inductive reasoning and of deductive reasoning.

Real-World Connection

About 15% of all trips on mass transit are students going to or from school.

44. Transportation Buses on your route run every 7 minutes from 6:30 A.M. to 10:00 A.M. You get to the bus stop at 7:56 A.M. How long will you have to wait for a bus?

45. Open-Ended Write a function rule for a sequence that has −30 as the eighth term.

For Exercises 46 and 47, write the first five terms in each sequence. Explain what the fifth term means in the context of the situation.

46. A baby's birth weight is 7 lb 4 oz. The baby gains 5 oz each week.

47. The balance of a car loan starts at $4,500 and decreases $150 each month.

48. Use the sequence 1, 2, 4, . . .

a. Find the difference between consecutive terms in the sequence. Use inductive reasoning to make a conjecture about the next term in the sequence.

b. Find the quotient of consecutive terms in the sequence. Use inductive reasoning to make a conjecture about the next term in the sequence.

c. Critical Thinking Explain why having more than three terms in a sequence can help you make a conjecture that is more likely to be correct.

Is each given sequence arithmetic? Justify your answer.

49. 0.3, 3, 30, 300, . . .

50. −3, −7, −11, −15, . . .

51. 1, 8, 27, 64, . . .

52. 2, 4, 8, 16, 32, . . .

53. 46, 31, 16, 1, . . .

54. 0.2, −0.6, −1.4, −2.2, . . .

55. The first five rows of Pascal's Triangle are at the right.

a. Predict the numbers in the sixth row.

b. Find the sum of the numbers in each of the first five rows. Predict the sum of the numbers in the sixth row.

```
          1
        1   1
      1   2   1
    1   3   3   1
  1   4   6   4   1
```

Find the second, fourth, and eighth terms of each sequence.

56. $A(n) = 11 + (n - 1)\left(\frac{1}{3}\right)$

57. $A(n) = 9 + (n - 1)(-4.5)$

58. $A(n) = -2 + (n - 2)(-1.6)$

59. $A(n) = \frac{1}{5} + (n - 1)\left(\frac{4}{5}\right)$

60. a. Complete the table at the right for an arithmetic sequence.

b. Graph the ordered pairs (term number, term) on a coordinate plane.

c. What do you notice about the points on your graph?

x	y
1	5
2	8
3	■
4	■

61. Music There are 52 white keys on a piano. The frequency produced when a key is struck is the number of vibrations per second the key's string makes.

a. Reasoning Is this relation a function? Explain.

b. Writing Describe the pattern in the relation.

62. Number Theory The Fibonacci sequence is 1, 1, 2, 3, 5, 8, 13, . . . After the first two numbers, each number is the sum of the two previous numbers.

a. What is the next term of the sequence?

b. What is the eleventh term of the sequence?

c. **Open-Ended** Choose two other numbers to start a Fibonacci-like sequence. Write the first seven terms of your sequence.

Need Help?
Recursive formulas can use operations other than addition.

A *recursive formula* relates a new term of a sequence to the previous term of the sequence. Describe each of the sequences using a recursive formula.

Sample 3, 7, 11, 15, . . .

value of new term = value of previous term + 4

63. 12, 18, 24, 30, . . .

64. 12, 18, 27, 40.5, . . .

65. 54, 51.5, 49, 46.5

66. 1.1, 5.1, 9.1, 13.1, . . .

67. 98, 14, 2, $\frac{2}{7}$, . . .

68. −8, 20, −50, 125

Challenge

Find the common difference of each sequence. Then find the next term.

69. $4, x + 4, 2x + 4, 3x + 4, \ldots$

70. $a + b + c, 4a + 3b + c, 7a + 5b + c, \ldots$

71. Use the sequence 10, 4, −2, −8, . . .

a. What is the first term of the sequence?

b. What is the common difference of the sequence?

c. Write a function rule $A(n)$ for the sequence.

72. a. Draw the next figure in the pattern.

b. **Reasoning** What is the color of the 20th figure? Explain.

c. How many sides does the 28th figure have? Explain.

73. Use the arithmetic sequence −5, 1, 7, 13, . . .

a. What is the first term?

b. What is the common difference?

c. Use your answers from parts (a) and (b) to write a rule for the sequence.