EXERCISES

Practice and Problem Solving

A **Practice by Example**

Example 1
(page 4)

Find a pattern for each sequence. Use the pattern to show the next two terms.

1. $5, 10, 20, 40, \ldots$ **2.** $3, 33, 333, 3333, \ldots$ **3.** $1, -1, 2, -2, 3, \ldots$

4. $1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \ldots$ **5.** $15, 12, 9, 6, \ldots$ **6.** $81, 27, 9, 3, \ldots$

7. $O, T, T, F, F, S, S, E, \ldots$ **8.** $J, F, M, A, M, \ldots$ **9.** $1, 2, 6, 24, 120, \ldots$

10. $2, 4, 8, 16, 32, \ldots$ **11.** $1, \frac{1}{4}, \frac{1}{9}, \frac{1}{16}, \frac{1}{25}, \ldots$ **12.** $1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \ldots$

13. George, John, Thomas, James, . . .   **14.** Martha, Abigail, Martha, Dolley, . . .

15. George, Thomas, Abe, Alexander, . . .   **16.** Aquarius, Pisces, Aries, Taurus, . . .

Draw the next figure in each sequence.

17.   **18.**
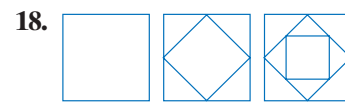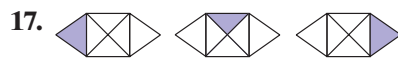
Example 2
(page 5)

Use the table and inductive reasoning. Make a conjecture about each value.

19. the sum of the first 6 positive even numbers

20. the sum of the first 30 positive even numbers

21. the sum of the first 100 positive even numbers

2	$= 2$	$= 1 \cdot 2$
$2 + 4$	$= 6$	$= 2 \cdot 3$
$2 + 4 + 6$	$= 12$	$= 3 \cdot 4$
$2 + 4 + 6 + 8$	$= 20$	$= 4 \cdot 5$
$2 + 4 + 6 + 8 + 10$	$= 30$	$= 5 \cdot 6$

22. Use the pattern in Example 2 to make a conjecture about the sum of the first 100 odd numbers.

Predict the next term in each sequence. Use your calculator to verify your answer.

23. $12345679 \times 9 = 111111111$
$12345679 \times 18 = 222222222$
$12345679 \times 27 = 333333333$
$12345679 \times 36 = 444444444$
$12345679 \times 45 = \blacksquare$

24. $1 \times 1 = 1$
$11 \times 11 = 121$
$111 \times 111 = 12321$
$1111 \times 1111 = 1234321$
$11111 \times 11111 = \blacksquare$

Example 3
(page 5)

Find one counterexample to show that each conjecture is false.

25. The sum of two numbers is greater than either number.

26. The product of two positive numbers is greater than either number.

27. The difference of two integers is less than either integer.

28. The quotient of two proper fractions is a proper fraction.

Example 4
(page 6)

29. **Weather** The speed with which a cricket chirps is affected by the temperature. If you hear 20 cricket chirps in 14 seconds, what is the temperature?

Chirps per 14 Seconds

5 chirps	45°F
10 chirps	55°F
15 chirps	65°F

30. Physical Fitness Dino works out regularly. When he first started exercising, he could do 10 push-ups. After the first month he could do 14 push-ups. After the second month he could do 19, and after the third month he could do 25. Predict the number of push-ups Dino will be able to do after the fifth month of working out. How confident are you of your prediction? Explain.

B Apply Your Skills

Find a pattern for each sequence. Use the pattern to show the next two terms.

31. 1, 3, 7, 13, 21, . . .   **32.** 1, 2, 5, 6, 9, . . .   **33.** 0.1, 0.01, 0.001, . . .

34. 2, 6, 7, 21, 22, 66, 67, . . .   **35.** 1, 3, 7, 15, 31, . . .   **36.** 0, $\frac{1}{2}$, $\frac{3}{4}$, $\frac{7}{8}$, $\frac{15}{16}$, . . .

**37.** M, V, E, M, . . .   **38.** AL, AK, AZ, AR, . . .   **39.** H, He, Li, Be, . . .

40. Writing Choose two of the sequences in Exercises 31–36 and describe the patterns.

41. Draw two parallel lines on your paper. Locate four points on the paper, each an equal distance from both lines. Describe the figure you get if you continue to locate points, each an equal distance from both lines.

Draw the next figure in each sequence.

42.   **43.**

44.   **45.**
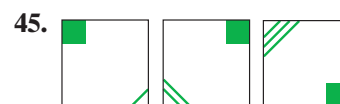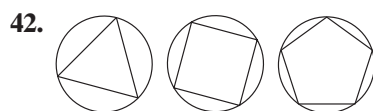
46. Use inductive reasoning. Find the perimeter when 100 triangles are put together in the pattern shown. Assume that all triangle sides are 1 cm long.
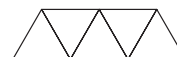
47. Math in the Media Read this exert from a news article.

> **Top female runners** have been improving about twice as quickly as the fastest men, a new study says. If this pattern continues, women may soon outrun men in competition!
>
> The study is based on world records collected at 10-year intervals, starting in 1905 for men and in the 1920s for women. If the trend continues, the top female and male runners in races ranging from 200 m to 1500 m might attain the same speeds sometime between 2015 and 2055.
>
> Women's marathon records date from 1955 but their rapid fall suggests that the women's record will equal that of men even more quickly, perhaps by 2005.

a. What conclusion was reached in the study?
b. How was inductive reasoning used to reach the conclusion?
c. Explain why the conclusion that women may soon be outrunning men may be incorrect. For which race is the conclusion most suspect? For what reason?