## **CHAPTER 1 TEST**

In Exercises 1 and 2, decide whether the reasoning involved is an example of inductive or deductive reasoning.

- 1. Otis Taylor is a salesman for a publishing company. For the past 14 years, he has exceeded his annual sales goal, primarily by selling mathematics textbooks. Therefore, he will also exceed his annual sales goal this year.
- **2.** For all natural numbers n,  $n^2$  is also a natural number. 101 is a natural number. Therefore,  $101^2$  is a natural number.
- **3.** What are the fourth and fifth numbers in this sequence?

1, 4, 27, \_\_\_\_\_, 46656,...

(From *Mathematics Teacher* monthly calendar, April 25, 1994)

**4.** Use the list of equations and inductive reasoning to predict the next equation, and then verify your conjecture.

 $65,359,477,124,183 \times 17 = 1,111,111,111,111,111$ 

 $65,359,477,124,183 \times 34 = 2,222,222,222,222,222$ 

 $65,359,477,124,183 \times 51 = 3,333,333,333,333,333$ 

**5.** Use the method of successive differences to find the next term in the sequence

- 6. Find the sum  $1 + 2 + 3 + \cdots + 250$ .
- **7.** Consider the following equations, where the left side of each is an octagonal number.

$$1 = 1$$
  

$$8 = 1 + 7$$
  

$$21 = 1 + 7 + 13$$
  

$$40 = 1 + 7 + 13 + 19$$

Use the pattern established on the right sides to predict the next octagonal number. What is the next equation in the list?

- **8.** Use the result of Exercise 7 and the method of successive differences to find the first eight octagonal numbers. Then divide each by 4 and record the remainder. What is the pattern obtained?
- **9.** Describe the pattern used to obtain the terms of the Fibonacci sequence 1, 1, 2, 3, 5, 8, 13, 21, ....

Use problem-solving strategies to solve each of the following problems, taken from the date indicated in the monthly calendar of Mathematics Teacher.

**10.** *Burning Candles* One whole candle can be made from four candle "stubs" left in the candleholder after the candles burn down. If each candle burns down to a stub after one night and if you have purchased sixteen candles, then for how many nights will you have candles to burn? (October 17, 2001)



- Units Digit of a Power of 9 What is the units digit (ones digit) in the decimal representation of 9<sup>1997</sup>? (January 27, 1997)
- **12.** *Counting Puzzle (Triangles)* How many triangles are in this figure? (January 6, 2000)



**13.** *Devising a Correct Addition Problem* Can you put the digits 1 through 9, each used once, in the boxes of the problem below to make an addition problem that has carrying and that is correct? If so, find a solution. If not, explain why no solution exists. (April 10, 2002)



- 14. *Missing Pages in a Newspaper* A sixty-page newspaper, which consists of only one section, has the sheet with page 7 missing. What other pages are missing? (February 6, 1998)
- **15.** Units Digit of a Sum Find the units digit (ones digit) of the decimal numeral representing the number  $11^{11} + 14^{14} + 16^{16}$ . (February 14, 1994)
- 16. Based on your knowledge of elementary arithmetic, describe the pattern that can be observed when the following operations are performed: 9 × 1, 9 × 2, 9 × 3, ..., 9 × 9. (*Hint:* Add the digits in the answers. What do you notice?)

*Use your calculator to evaluate each of the following. Give as many decimal places as the calculator displays.* 

**17.**  $\sqrt{98.16}$ 

**18.** 3.25<sup>3</sup>

19. Basketball Scoring Results During the 1998–99 NCAA basketball season, Shawnta Rogers of George Washington University made 195 of his 503 field goal attempts. This means that for every 5 attempts, he made approximately \_\_\_\_\_ of them.
A. 1 B. 2 C. 4 D. 3

20. Women in Mathematics The accompanying graph shows the number of women in mathematics or computer science professions during the past three decades.

WOMEN IN MATH OR COMPUTER



Source: U.S. Bureau of the Census and Bureau of Labor Statistics.

- (a) In what decade (10-year period) did the percent of women in math or computer science professions decrease?
- (b) When did the percent of women in math or computer science professions reach a maximum?
- (c) In what year was the percent of women in math or computer science professions about 27%?