12 CHAPTER TEST

Tell whether the sequence is *arithmetic*, *geometric*, or *neither*. *Explain*.

1. 5, 9, 13, 17, . . .
2. 3, 6, 12, 24, . . .
3. 40, 10, $\frac{5}{2}$, $\frac{5}{8}$, . . .
4. 4, 7, 12, 19, . . .

1. Arithmetic; there is a common difference of 4.
2. Geometric; there is a common ratio of 2.
3. Geometric; there is a common ratio of $\frac{1}{4}$.
4. Neither; there is no common ratio or common difference.

Write the first six terms of the sequence.

5. $a_n = 6 - n^2$ — 5, 2, −3, −10, −19, −30
6. $a_n = 7n^3$ — 7, 56, 189, 448, 875, 1512
7. $a_1 = 4$, $a_n = 5a_{n-1}$ — 4, 20, 100, 500, 2500, 12,500
8. $a_1 = -1$, $a_n = a_{n-1} + 6$ — −1, 5, 11, 17, 23, 29, 35

Write the next term of the sequence, and then write a rule for the *n*th term.

9. 5, 11, 17, 23, . . . — 29, $a_n = -1 + 6n$
10. 3, 15, 75, 375, . . . — 1875, $a_n = 3 \cdot 5^{n-1}$
11. $\frac{6}{5}, \frac{7}{10}, \frac{8}{15}, \frac{9}{20}, \ldots$ — $\frac{10}{25}$, $a_n = \frac{n+5}{5n}$
12. 1.6, 3.2, 4.8, 6.4, . . . — 8, $a_n = 1.6n$

Find the sum of the series.

13. $\sum_{i=1}^{48} i$ — 1176
14. $\sum_{n=1}^{28} n^2$ — 7714
15. $\sum_{i=1}^{10} (4i - 9)$ — 130
16. $\sum_{i=1}^{19} (2i + 5)$ — 475
17. $\sum_{i=1}^{5} 9(2)^{i-1}$ — 279
18. $\sum_{i=1}^{6} 12\left(\frac{1}{3}\right)^{i-1}$ — $\frac{1456}{81}$
19. $\sum_{i=1}^{\infty} 8\left(\frac{3}{4}\right)^{i-1}$ — 32
20. $\sum_{i=1}^{\infty} 20\left(\frac{3}{10}\right)^{i-1}$ — $\frac{200}{7}$

Write the repeating decimal as a fraction in lowest terms.

21. 0.111. . . — $\frac{5}{9}$
22. 0.464646. . . — $\frac{46}{99}$
23. 0.187187187. . . — $\frac{187}{999}$
24. 0.3252525. . . — $\frac{161}{495}$

Write a recursive rule for the sequence.

25. 2, 12, 72, 432, . . . — $a_1 = 2$, $a_n = 6a_{n-1}$
26. 3, 10, 17, 24, . . . — $a_1 = 3$, $a_n = a_{n-1} + 7$
27. 135, 45, 15, 5, . . . — $a_1 = 135$, $a_n = \frac{1}{3}a_{n-1}$
28. 1, −3, 9, −27, . . . — $a_1 = 1$, $a_n = -3a_{n-1}$

Find the first three iterates of the function for the given initial value.

29. $f(x) = 3x - 7, x_0 = 4$ — 5, 8, 17
30. $f(x) = 8 - 5x, x_0 = 1$ — 3, −7, 43
31. $f(x) = x^2 + 2, x_0 = -1$ — 3, 11, 123

32. **QUILTS** Use the pattern of checkerboard quilts shown.

$n = 1, a_n = 1$ $n = 2, a_n = 2$ $n = 3, a_n = 5$ $n = 4, a_n = 8$

32a. the number of rows and columns; the number of blue squares

   a. What does n represent for each quilt? What does a_n represent?

   b. Make a table that shows n and a_n for $n = 1, 2, 3, 4, 5, 6, 7$, and 8. See margin.

32c. 1, 2, 5, 8, 13, 18, 25, 32; the values are the same; the rule defines the sequence represented by the checkerboard quilts.

   c. Use the rule $a_n = \frac{n^2}{2} + \frac{1}{4}[1 - (-1)^n]$ to find a_n for $n = 1, 2, 3, 4, 5, 6, 7$, and 8. *Compare* these values with the results in your table. What can you conclude about the sequence defined by this rule?

33. **AUDITIONS** Several rounds of auditions are being held to cast the three main parts in a play. There are 3072 actors at the first round of auditions. In each successive round of auditions, one fourth of the actors from the previous round remain. Find a rule for the number a_n of actors in the nth round of auditions. For what values of n does your rule make sense? $a_n = 3072\left(\frac{1}{4}\right)^{n-1}$; $1 \le n \le 5$

32b.

n	1	2	3	4	5	6	7	8
a_n	1	2	5	8	13	18	25	32

Additional Resources

Assessment Book

- Chapter Test, Levels A, B, C, pp. 170–175
- Standardized Chapter Test, pp. 176–177
- SAT/ACT Chapter Test, pp. 178–179
- Alternative Assessment, pp. 180–181

Test Generator CD-ROM

Chapter Test

Easily-readable reduced copies (with answers) of Chapter Test B, the Standardized Chapter Test, and the Alternative Assessment from the Assessment Book can be found on pp. 792E–792F.