REVIEW EXERCISES

8.1

In Exercises 1–6, write the first four terms of each sequence whose general term is given.

1. $a_n = 7n - 4$ 3, 10, 17, 24

2. $a_n = (-1)^n \dfrac{n+2}{n+1}$ $-\frac{3}{2}, \frac{4}{3}, -\frac{5}{4}, \frac{6}{5}$

3. $a_n = \dfrac{1}{(n-1)!}$ $1, 1, \frac{1}{2}, \frac{1}{6}$

4. $a_n = \dfrac{(-1)^{n+1}}{2^n}$ $\frac{1}{2}, -\frac{1}{4}, \frac{1}{8}, -\frac{1}{16}$

5. $a_1 = 9$ and $a_n = \dfrac{2}{3a_{n-1}}$ for $n \geq 2$ $9, \frac{2}{27}, 9, \frac{2}{27}$

6. $a_1 = 4$ and $a_n = 2a_{n-1} + 3$ for $n \geq 2$ 4, 11, 25, 53

7. Evaluate: $\dfrac{40!}{4!38!}$. 65

*See Answers to Selected Exercises.

In Exercises 8–9, find each indicated sum.

8. $\sum_{i=1}^{5} (2i^2 - 3)$ 95

9. $\sum_{i=0}^{4} (-1)^{i+1} i!$ −20

In Exercises 10–11, express each sum using summation notation. Use i for the index of summation.

10. $\dfrac{1}{3} + \dfrac{2}{4} + \dfrac{3}{5} + \cdots + \dfrac{15}{17}$ *

11. $4^3 + 5^3 + 6^3 + \cdots + 13^3$ *

8.2

In Exercises 12–15, write the first six terms of each arithmetic sequence.

12. $a_1 = 7, d = 4$ *

13. $a_1 = -4, d = -5$ *

14. $a_1 = \frac{3}{2}, d = -\frac{1}{2}$ *

15. $a_{n+1} = a_n + 5, a_1 = -2$ *

In Exercises 16–18, find the indicated term of the arithmetic sequence with first term, a_1, and common difference, d.

16. Find a_6 when $a_1 = 5, d = 3$. 20

17. Find a_{12} when $a_1 = -8, d = -2$. −30

18. Find a_{14} when $a_1 = 14, d = -4$. −38

In Exercises 19–21, write a formula for the general term (the nth term) of each arithmetic sequence. Do not use a recursion formula. Then use the formula for a_n to find a_{20}, the 20th term of the sequence.

19. $-7, -3, 1, 5, \ldots$ $a_n = 4n - 11; a_{20} = 69$

20. $a_1 = 200, d = -20$ $a_n = 220 - 20n; a_{20} = -180$

21. $a_n = a_{n-1} - 5, a_1 = 3$ $a_n = 8 - 5n; a_{20} = -92$

22. Find the sum of the first 22 terms of the arithmetic sequence: $5, 12, 19, 26, \ldots$. 1727

23. Find the sum of the first 15 terms of the arithmetic sequence: $-6, -3, 0, 3, \ldots$. 225

24. Find $3 + 6 + 9 + \cdots + 300$, the sum of the first 100 positive multiples of 3. 15,150

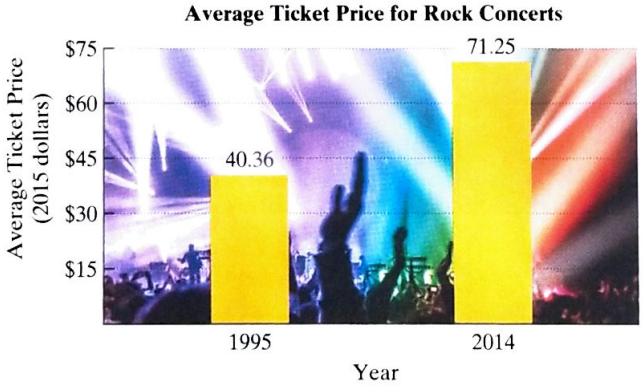
In Exercises 25–27, use the formula for the sum of the first n terms of an arithmetic sequence to find the indicated sum.

25. $\sum_{i=1}^{16} (3i + 2)$ 440

26. $\sum_{i=1}^{25} (-2i + 6)$ −500

27. $\sum_{i=1}^{30} (-5i)$ −2325

28. In 2014, the average ticket price for top rock concerts, adjusted for inflation, had increased by 77% since 1995. This was greater than the percent increase in the cost of tuition at private four-year colleges during the same time period. The bar graph shows the average ticket price, in 2015 dollars, for rock concerts in 1995 and 2014.



Source: *Rolling Stone*

In 1995, the average ticket price, in 2015 dollars, for a rock concert was $40.36. On average, this has increased by approximately $1.63 per year since then.

a. Write a formula for the *n*th term of the arithmetic sequence that describes the average ticket price, in 2015 dollars, for rock concerts *n* years after 1994. $a_n = 1.63n + 38.73$

b. Use the model to project the average ticket price, in 2015 dollars, for rock concerts in 2020. $81.11

29. A company offers a starting salary of $31,500 with raises of $2300 per year. Find the total salary over a ten-year period. $418,500

30. A theater has 25 seats in the first row and 35 rows in all. Each successive row contains one additional seat. How many seats are in the theater? 1470

8.3

In Exercises 31–34, write the first five terms of each geometric sequence.

31. $a_1 = 3, r = 2$ 3, 6, 12, 24, 48

32. $a_1 = \frac{1}{2}, r = \frac{1}{2}$ $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \frac{1}{32}$

33. $a_1 = 16, r = -\frac{1}{2}$ 16, −8, 4, −2, 1

34. $a_n = -5a_{n-1}, a_1 = -1$ −1, 5, −25, 125, −625

In Exercises 35–37, use the formula for the general term (the nth term) of a geometric sequence to find the indicated term of each sequence.

35. Find a_7 when $a_1 = 2, r = 3$. 1458

36. Find a_6 when $a_1 = 16, r = \frac{1}{2}$. 1

37. Find a_5 when $a_1 = -3, r = 2$. −48

In Exercises 38–40, write a formula for the general term (the nth term) of each geometric sequence. Then use the formula for a_n to find a_8, the eighth term of the sequence.

38. $1, 2, 4, 8, \ldots$

39. $100, 10, 1, \frac{1}{10}, \ldots$

40. $12, -4, \frac{4}{3}, -\frac{4}{9}, \ldots$ $a_n = 12\left(-\frac{1}{3}\right)^{n-1}; a_8 = -\frac{4}{729}$

41. Find the sum of the first 15 terms of the geometric sequence: $5, -15, 45, -135, \ldots$. 17,936,135

42. Find the sum of the first 7 terms of the geometric sequence: $8, 4, 2, 1, \ldots$. $\frac{127}{8}$

In Exercises 43–45, use the formula for the sum of the first n terms of a geometric sequence to find the indicated sum.

43. $\sum_{i=1}^{6} 5^i$ 19,530

44. $\sum_{i=1}^{7} 3(-2)^i$ −258

45. $\sum_{i=1}^{5} 2\left(\frac{1}{4}\right)^{i-1}$ $\frac{341}{128}$

In Exercises 46–49, find the sum of each infinite geometric series.

46. $9 + 3 + 1 + \frac{1}{3} + \cdots$ $\frac{27}{2}$

47. $2 - 1 + \frac{1}{2} - \frac{1}{4} + \cdots$

48. $-6 + 4 - \frac{8}{3} + \frac{16}{9} - \cdots$ $-\frac{18}{5}$

49. $\sum_{i=1}^{\infty} 5(0.8)^i$ 20

In Exercises 50–51, express each repeating decimal as a fraction in lowest terms.

50. $0.\overline{6}$ $\frac{2}{3}$

51. $0.\overline{47}$ $\frac{47}{99}$

52. The table shows the population of Florida for 2000 and 2010, with estimates given by the U.S. Census Bureau for 2001 through 2009.

Year	2000	2001	2002	2003	2004	2005
Population in millions	15.98	16.24	16.50	16.76	17.03	17.30

Year	2006	2007	2008	2009	2010
Population in millions	17.58	17.86	18.15	18.44	18.80