EXERCISES

Practice and Problem Solving

For more practice, see *Extra Practice.*

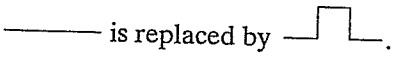
A Practice by Example

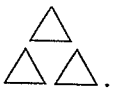
Examples 1 and 2 (page 589)

Describe each pattern formed. Find the next three terms.

1. 80, 77, 74, 71, 68, . . .
2. 4, 8, 16, 32, 64, . . .
3. 0, 3, 7, 12, 18, . . .
4. 1, 4, 7, 10, 13, . . .
5. 100, 10, 1, 0.1, 0.01, . . .
6. $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \frac{1}{32}, \ldots$
7. 4, −8, 16, −32, 64, . . .
8. 1, 2, 6, 24, 120, . . .
9. $0, 1, 0, \frac{1}{3}, 0, \frac{1}{5}, \ldots$

Fractal Geometry **Draw the first four figures of the sequence described.**

10. _____ is replaced by  .

11.  is replaced by  .

Example 3 (page 590)

Write a recursive formula for each sequence. Then find the next term.

12. −2, −1, 0, 1, 2, . . .
13. 43, 41, 39, 37, 35, . . .
14. $40, 20, 10, 5, \frac{5}{2}, \ldots$
15. 6, 1, −4, −9, . . .
16. $144, 36, 9, \frac{9}{4}, \ldots$
17. $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \frac{1}{32}, \ldots$

Example 4 (page 590)

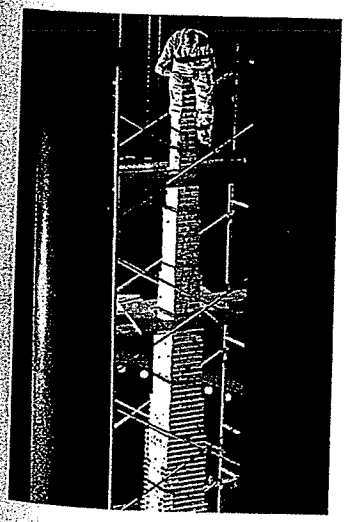
Write an explicit formula for each sequence. Then find a_{12}.

18. 4, 5, 6, 7, 8, . . .
19. $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{1}{6}, \ldots$
20. 4, 7, 10, 13, 16, . . .
21. 3, 7, 11, 15, 19, . . .
22. $-2\frac{1}{2}, -2, -1\frac{1}{2}, -1, \ldots$
23. 2, 5, 10, 17, 26, . . .

B Apply Your Skills

Decide whether each formula is *explicit* or *recursive*. Then find the first five terms of each sequence.

24. $a_n = 2a_{n-1} + 3$, where $a_1 = 3$
25. $a_n = \frac{1}{2}(n)(n-1)$
26. $(n-5)(n+5) = a_n$
27. $a_n = -3a_{n-1}$, where $a_1 = -2$
28. $a_n = -4n^2 - 2$
29. $a_n = 2n^2 + 1$
30. $a_n = 5n$
31. $a_n = a_{n-1} - 17$, where $a_1 = 340$

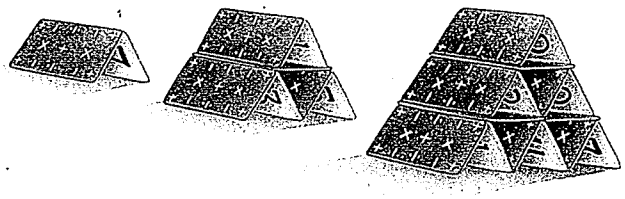


Real-World Connection

Berg built a 24-ft 4-in. [illegible]-story freestanding house of cards.

32. **Entertainment** Suppose you are building a tower of cards with levels as displayed below. Complete the table, assuming the pattern continues.

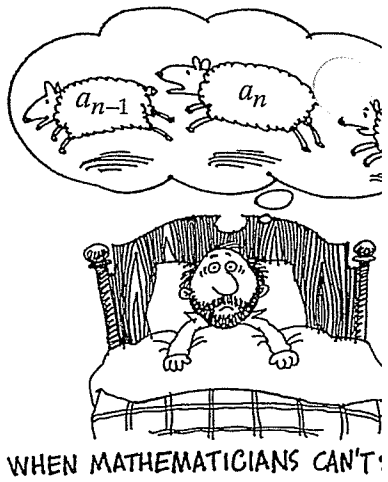
Levels	1	2	3	4	5
Cards Needed	2	7	▨	▨	▨



Find the next two terms in each sequence. Write a formula for the *n*th term. Identify each formula as *explicit* or *recursive*.

33. 5, 8, 11, 14, 17, . . .
34. 3, 6, 12, 24, 48, . . .
35. 1, 8, 27, 64, 125, . . .
36. 4, 16, 64, 256, 1024, . . .
37. 49, 64, 81, 100, 121, . . .
38. −1, 1, −1, 1, −1, 1, . . .
39. −16, −8, −4, −2, . . .
40. −75, −68, −61, −54, . . .
41. 21, 13, 5, −3, . . .

42. Suppose the cartoon at the right included one sheep to the left and another sheep to the right of the three shown. What "names" would you give these sheep?



43. **Writing** Explain the difference between a recursive formula and an explicit formula.

44. **a. Open-Ended** Write four terms of a sequence of numbers that you can describe both recursively and explicitly.
b. Write a recursive formula and an explicit formula for your sequence.
c. Find the 20th term of the sequence by evaluating one of your formulas. Use the other formula to check your work.

Use the given rule to write the 4th, 5th, 6th, and 7th terms of each sequence.

45. $a_1 = -1, a_n = (a_{n-1})^2 + 1$

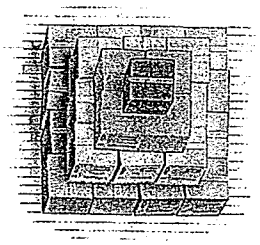
46. $a_1 = -2, a_n = 3(a_{n-1} + 2)$

47. $a_n = (n + 1)^2$

48. $a_n = 2(n - 1)^3$

49. $a_n = \frac{n^2}{n + 1}$

50. $a_n = \frac{n + 1}{n + 2}$



51. **Geometry** Suppose you are stacking boxes in levels that form squares. The numbers of boxes in successive levels form a sequence. The figure at the left shows the top four levels as viewed from above.
a. How many boxes of equal size would you need for the next lower level
b. How many boxes of equal size would you need to add three levels?
c. Suppose you are stacking a total of 285 boxes. How many levels will you have?

Challenge

Use each recursive formula to write an explicit formula for the sequence.

52. $a_1 = 10, a_n = 2a_{n-1}$

53. $a_1 = -5, a_n = a_{n-1} - 1$

54. $a_1 = -2, a_n = \frac{1}{2}a_{n-1}$

55. $a_1 = 1, a_n = a_{n-1} + 4$

56. **Finance** Use the information in the ad.
a. Suppose you start a savings account at Mun e-Bank. Write both a recursive formula and an explicit formula for the amount of money you would have in the bank at the end of any week.
b. How much money would you have in the bank after four weeks?
c. Assume the bank pays interest every four weeks. To calculate your interest, multiply the balance at the end of the four weeks by 0.005. Then add that much to your account on the last day of the four-week period. Write a recursive formula for the amount of money you have after each interest pay
d. Critical Thinking What is the bank's annual interest rate?