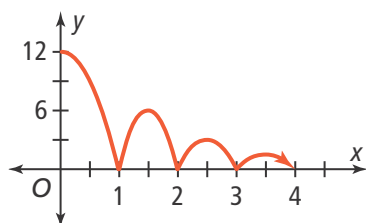


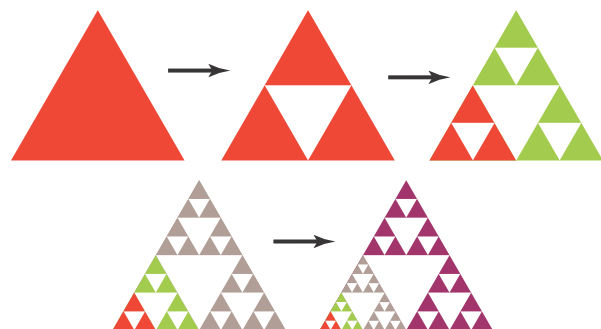


UNDERSTAND

11. **Reason** True or False: If the first two terms of a geometric sequence are positive, then the third term is positive. Explain your reasoning.
12. **Error Analysis** The first term of a geometric sequence is 4 and grows exponentially by a factor of 3. Murphy writes out the terms and says that the sum of the 4th and 5th terms is 1,296. Explain Murphy's error and correct it.
13. **Construct Arguments** Write a geometric sequence with at least four terms and describe it using both an explicit and recursive definitions. How can you confirm that your sequence is geometric?
14. **Higher Order Thinking** Adam drops a ball from a height of 12 feet. Each bounce is 50% as high as the previous bounce. What is the total vertical distance the ball has traveled when it hits the ground for the 4th time?



15. **Model with Mathematics** The Sierpinski Triangle is a fractal made by cutting an equilateral triangle into four congruent pieces and removing the center piece, leaving three smaller triangles. The process is repeated on each triangle, creating more triangles that are even smaller. Continuing this pattern, how many triangles would there be after the tenth step in the process?



PRACTICE

Is the sequence geometric? If so, write a recursive definition for the sequence. SEE EXAMPLE 1

16. 1, -3, 9, -27, ...
17. 3, -15, 75, -375, ...
18. 4, 5, 6, 7, ...
19. 24, 8, $\frac{8}{3}$, $\frac{8}{9}$, ...
20. 2, 4, 6, 8, ...
21. 10, 40, 160, 640, ...

Translate between the recursive and explicit definitions for each sequence. SEE EXAMPLE 2

22. $a_n = 1,024\left(\frac{1}{2}\right)^{n-1}$
23. $a_n = \begin{cases} 2, & n = 1 \\ -2a^{n-1}, & n > 1 \end{cases}$
24. $a_n = 35(2)^{n-1}$
25. $a_n = -6(-3)^{n-1}$
26. $a_n = \begin{cases} 1, & n = 1 \\ \frac{2}{3}a_{n-1}, & n > 1 \end{cases}$

27. In an experiment, the number of bacteria present each day form a geometric sequence. On the first day, there were 100 bacteria. On the eighth day, there were 12,800 bacteria. How many bacteria were there on the fourth day? SEE EXAMPLE 3

Write the expansion of each series. What is the sum? SEE EXAMPLE 4





28. $\sum_{n=1}^6 4(2)^{n-1}$
29. $\sum_{n=1}^{20} 6(2)^{n-1}$
30. $\sum_{n=1}^7 -4(3)^{n-1}$
31. $\sum_{n=1}^{12} (-4)^{n-1}$

Write each series using sigma notation. Find the sum. SEE EXAMPLE 4

32. $8 + 16 + 32 + \dots + 1,024$
33. $-7 - 42 - 252 - \dots - 54,432$
34. $\frac{1}{5} + \frac{1}{10} + \frac{1}{20} + \dots + \frac{1}{80}$
35. $4 - 12 + 36 - \dots + 2,916$
36. The sum of a geometric series is 31.75. The first term of the series is 16, and its common ratio is 0.5. How many terms are in the series? SEE EXAMPLE 5
37. What is the monthly payment for a \$12,000 loan for 7 years with an annual interest rate of 2.7%? SEE EXAMPLE 6

APPLY

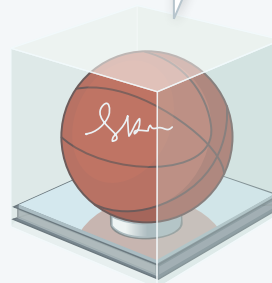
- 38. Model With Mathematics** Kelley opens a bank account to save for a down payment on a car. Her initial deposit is \$250, and she plans to deposit 10% more each month. Kelley's goal is to have \$2,000 in the account after six months. Will she meet her goal?
- 39. Make Sense and Persevere** Henry just started his own cleaning business. He is using word-of-mouth from his current clients to promote his business. He currently has seven clients.
- Five of his clients really like Henry's work and each told two friends the following month. This group each told two friends the following month, and so on for a total of five months. Assuming no one heard twice, how many people have had or heard of a positive experience with Henry's cleaning business?
 - The two unhappy clients each told five people the following month. This group each told five people, and so on, for five months. Assuming no one heard twice, how many people have had or heard of a negative experience with Henry's cleaning business?
- 40. Model with Mathematics** Ricardo bought a motorcycle for \$15,000. The value depreciates 15% at the start of every year. What is the value of the motorcycle after three years?

Time	Value
0 Yr	 \$15,000
1 Yr	
2 Yr	
3 Yr	

ASSESSMENT PRACTICE

- 41.** The first term of a geometric series is -1 , and the common ratio is -2 . Fill in the number to complete the sentence.
- If the sum of the series is -43 , there are _____ terms in the series.
- 42. SAT/ACT** What is the value of the 11th term in the following geometric sequence?
- $$\frac{1}{27}, \frac{1}{9}, \frac{1}{3}, \dots$$
- 3^4
 - 3^5
 - 3^6
 - 3^7
 - 3^8
- 43. Performance Task** An avid collector wants to purchase a signed basketball from a particular playoff game. He plans to put away 4% more money each year, in a safe at his home, to save up for the basketball. In the sixth year, he puts \$580 in the safe and realizes that he has exactly enough money to purchase the basketball.

$$\text{Price} = \text{Year 5 savings} + \$580.00$$



- Part A** How much money did the collector put into the safe the first year?
- Part B** To the nearest dollar, how much did the collector pay for the signed playoff basketball?