

# Lesson 1.1 • Recursively Defined Sequences

Name \_\_\_\_\_ Period \_\_\_\_\_ Date \_\_\_\_\_

1. Tell whether each sequence is arithmetic, geometric, or neither.

- a. 1, 5, 9, 13, ...      b. 2, 6, 18, 54, ...      c. 1, 1, 2, 3, 5, 8, ...  
d. 16, 4, 1, 0.25, ...      e. -1, 1, -1, 1, ...      f. 5.6, 2.8, 0, -2.8, ...

2. Find the common difference,  $d$ , for each arithmetic sequence and the common ratio,  $r$ , for each geometric sequence.

- a. 6, 11, 16, 21, ...      b. 100, 10, 1, 0.1, ...      c. 1.5, 1.0, 0.5, 0, -0.5, ...  
d. 0.0625, 0.125, 0.25, ...      e. -1, 0.2, -0.04, 0.008, ...      f. -4, -3.99, -3.98, ...

3. Write the first six terms of each sequence, starting with  $u_1$ .

- a.  $u_1 = -18$   
 $u_n = u_{n-1} + 6$  where  $n \geq 2$   
b.  $u_1 = 0.5$   
 $u_n = 3u_{n-1}$  where  $n \geq 2$   
c.  $u_1 = 35.6$   
 $u_n = u_{n-1} - 4.2$  where  $n \geq 2$   
d.  $u_1 = 8$   
 $u_n = -\frac{1}{2}u_{n-1}$  where  $n \geq 2$

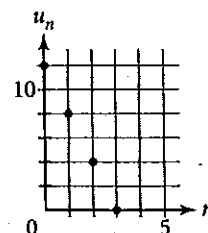
4. Write a recursive formula to generate each sequence. Then find the indicated term.

- a. -15, -11, -7, -3, ... Find the 10th term.  
b. 1000, 100, 10, 1, ... Find the 12th term.  
c. 17.25, 14.94, 12.63, 10.32, ... Find the 15th term.  
d. 0.3, -0.03, 0.003, -0.0003, ... Find the 8th term.  
e.  $0, \frac{1}{6}, \frac{1}{3}, \frac{1}{2}, \dots$  Find the 21st term.  
f. -2, 4, -8, 16, ... Find the 15th term.

5. Indicate whether each situation could be represented by an arithmetic sequence or a geometric sequence. Give the value of the common difference,  $d$ , for each arithmetic sequence and of the common ratio,  $r$ , for each geometric sequence.

- a. Phil rented an apartment for \$850 a month. Each time he renewed his lease over the next 3 years, his landlord raised the rent by \$50.  
b. Leora was hired as a first-year teacher at an annual salary of \$30,000. She received an annual salary increase of 5% for each of the next 4 years.  
c. A laboratory technician observes that the number of bacteria in a colony doubles every 12 hours.  
d. The number of students enrolled in a high school is decreasing at a rate of 75 students per year.

6. Write a recursive formula for the sequence graphed at right. Find the 42nd term.



# Lesson 1.2 • Modeling Growth and Decay

Name \_\_\_\_\_ Period \_\_\_\_\_ Date \_\_\_\_\_

1. Find the common ratio for each sequence.

- |                                     |                                   |
|-------------------------------------|-----------------------------------|
| a. 42, 126, 378, 1134, ...          | b. 19.2, 3.84, 0.768, 0.1536, ... |
| c. 90, 99, 108.9, 119.79, ...       | d. 1800, 1080, 648, 388.8, ...    |
| e. 11.5, 43.7, 166.06, 631.028, ... | f. 375, 142.5, 54.15, 20.577, ... |

2. Identify each sequence in Exercise 1 as growth or decay and give the percent increase or decrease for each.

3. Write a recursive formula for each sequence in Exercise 1 and find the 6th term. Use  $u_1$  for the first term given.

4. Factor each expression so that the variable appears only once.

- |                             |                            |                            |                               |
|-----------------------------|----------------------------|----------------------------|-------------------------------|
| a. $x + 0.25x$              | b. $y - 0.19y$             | c. $2A - 0.33A$            | d. $3B + 0.07B$               |
| e. $u_{n-1} + 0.085u_{n-1}$ | f. $u_{n-1} - 0.72u_{n-1}$ | g. $3u_{n-1} - 0.5u_{n-1}$ | h. $1.5u_{n-1} + 0.25u_{n-1}$ |

5. Find the percent increase or percent decrease in each situation. (Round to the nearest tenth of a percent.) Identify each change as an increase or a decrease.

- The number of students attending a high school grew from 1260 to 1580.
- A computer originally priced at \$2100 was put on sale for \$1850.
- When Melissa renewed her lease, her rent went up from \$780 to \$815.
- After laying off 560 employees, a company had 1266 employees left.
- The value of a car depreciated from \$15,900 to \$12,402.
- The population of a small town changed from 16,350 to 17,331.

6. Match each recursive formula to a graph.

- |   |   |
|---|---|
| a. $u_1 = 35$<br>$u_n = (1 - 0.3) \cdot u_{n-1}$ where $n \geq 2$ | b. $u_1 = 35$<br>$u_n = (1 - 0.5) \cdot u_{n-1}$ where $n \geq 2$ |
| c. $u_1 = 35$<br>$u_n = -0.5 + u_{n-1}$ where $n \geq 2$          |   |

