

Unit 5 Sequences and Series Review

For each sequence, state if it is arithmetic, geometric, or neither.

1) $\frac{3}{4}, \frac{3}{8}, \frac{3}{16}, \frac{3}{32}, \frac{3}{64}, \dots$

Geometric

2) $-3, -\frac{9}{4}, -\frac{9}{5}, -\frac{3}{2}, -\frac{9}{7}, \dots$

Neither

3) $\frac{25}{4}, 5, \frac{25}{6}, \frac{25}{7}, \frac{25}{8}, \dots$

Neither

4) $-\frac{13}{9}, -\frac{7}{9}, -\frac{1}{9}, \frac{5}{9}, \frac{11}{9}, \dots$

Arithmetic

Find the explicit formula and the recursive formula.

5) $-24, 76, 176, 276, \dots$

$$a_n = 100n - 124$$

$$a_n = a_{n-1} + 100$$

$$a_1 = -24$$

7) $-14, 186, 386, 586, \dots$

$$a_n = 200n - 214$$

$$a_n = a_{n-1} + 200$$

$$a_1 = -14$$

9) $-3, -15, -75, -375, \dots$

$$a_n = -3(5)^{n-1}$$

$$a_n = 5a_{n-1}$$

$$a_1 = -3$$

6) $4, -2, -8, -14, \dots$

$$a_n = -6n + 10$$

$$a_n = a_{n-1} - 6$$

$$a_1 = 4$$

8) $4, -8, 16, -32, \dots$

$$a_n = 4(-2)^{n-1}$$

$$a_n = -2a_{n-1}$$

$$a_1 = 4$$

10) $1, 2, 4, 8, \dots$

$$a_n = 2^{n-1}$$

$$a_n = 2a_{n-1}$$

$$a_1 = 1$$

Given the recursive formula, find the explicit formula.

11) $a_n = a_{n-1} + 200$
 $a_1 = -18$

$$a_n = 200n - 218$$

12) $a_n = a_{n-1} - 8$
 $a_1 = -26$

$$a_n = -8n - 18$$

13) $a_n = a_{n-1} - 6$
 $a_1 = -30$

$$a_n = -6n - 24$$

14) $a_n = a_{n-1} \cdot 4$
 $a_1 = 2$

$$a_n = 2 \cdot 4^{n-1}$$

15) $a_n = a_{n-1} \cdot 3$
 $a_1 = 4$

$$a_n = 4 \cdot 3^{n-1}$$

16) $a_n = a_{n-1} \cdot -2$
 $a_1 = -4$

$$a_n = -4(-2)^{n-1}$$

Evaluate each series described.

$$17) \sum_{i=1}^8 (9i - 1) \quad 316$$

$$18) \sum_{i=1}^{13} (8i + 2) \quad 754$$

$$19) \sum_{i=1}^7 (6i + 1) \quad 175$$

$$20) \sum_{k=1}^7 4 \cdot (-3)^{k-1} \quad 2,188$$

$$21) \sum_{m=1}^{10} 3^{m-1} \quad 29,524$$

$$22) \sum_{k=1}^7 (-3)^{k-1} \quad 547$$

Write the following series in summation notation.

$$23) 1 + (-2) + (-5) + (-8) \dots, n = 19$$

$$\sum_{n=1}^{19} -3n + 4$$

$$24) 12 + 19 + 26 + 33 \dots, n = 20$$

$$\sum_{n=1}^{20} 7n + 5$$

$$25) (-21) + (-27) + (-33) + (-39) \dots, n = 18$$

$$\sum_{n=1}^{18} -8n - 13$$

$$26) (-5) + (-7) + (-9) + (-11) \dots, n = 8$$

$$\sum_{n=1}^8 -2n - 3$$

Write the following series in summation notation.

$$27) -2 - 10 - 50 - 250 \dots, n = 9$$

$$\sum_{n=1}^9 -2 \cdot 5^{n-1}$$

$$28) -4 - 12 - 36 - 108 \dots, n = 9$$

$$\sum_{n=1}^9 -4 \cdot 3^{n-1}$$

$$29) -2 - 6 - 18 - 54 \dots, n = 7$$

$$\sum_{n=1}^7 -2 \cdot 3^{n-1}$$

$$30) -4 - 8 - 16 - 32 \dots, n = 8$$

$$\sum_{n=1}^8 -4 \cdot 2^{n-1}$$

Evaluate each arithmetic series described.

$$31) 11 + 17 + 23 + 29 \dots, n = 13$$

$$611$$

$$32) 28 + 38 + 48 + 58 \dots, n = 15$$

$$1,470$$

Evaluate each geometric series described.

$$33) -1 - 3 - 9 - 27 \dots, n = 9$$

$$-9,841$$

$$34) -3 + 6 - 12 + 24 \dots, n = 9$$

$$-513$$

- 35) A marching band formation consists of 6 rows. The first row has 9 musicians, the second has 11, the third has 13 and so on. How many musicians are in the last row and how many musicians are there in all?

78 musicians

- 36) This month, your friend deposits \$400 to save for a vacation. She plans to deposit 10% more each successive month for the next 11 months. How much will she have saved after the 12 deposits?

\$1141.25

- 37) A colony of bacteria doubles every minute. If there are 5 bacteria to begin with, how much bacterial will there be after half an hour?

5,368,709,120

- 38) Each year, a volunteer organization expects to add 5 more people to the number of shut-ins for whom the group provides home maintenance services. This year, the organization provides the service for 32 people.

a. Write a recursive formula for the number of people the organization expects to serve each year.

$$a_n = a_{n-1} + 5$$
$$a_1 = 32$$

b. Write the first five terms of the sequence.

32, 37, 42, 47, 52

c. Write an explicit formula for the number of people the organization expects to serve each year.

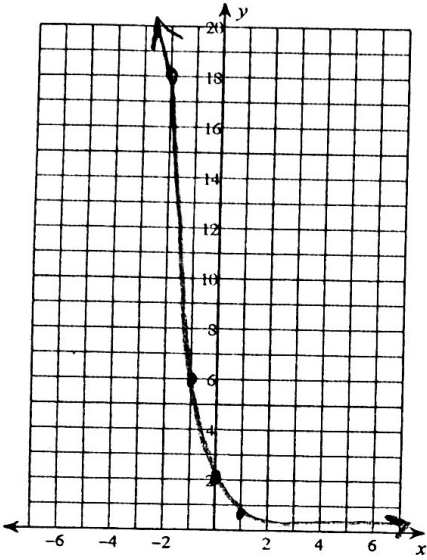
$$a_n = 5n + 27$$

d. How many people would the organization expect to serve in the 20th year?

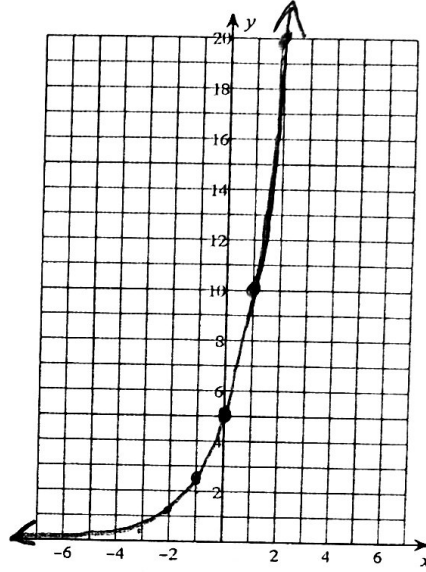
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Sketch the graph of each function.

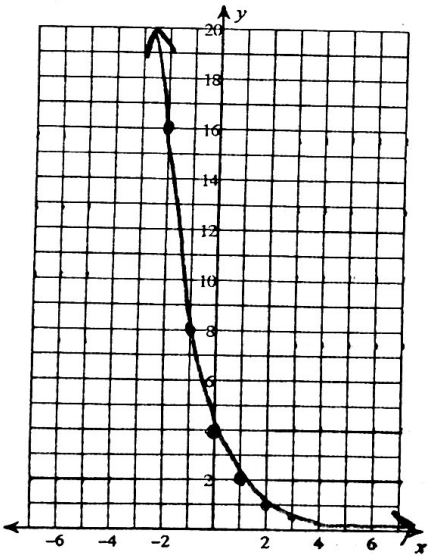
39) $y = 2 \cdot \left(\frac{1}{3}\right)^x$



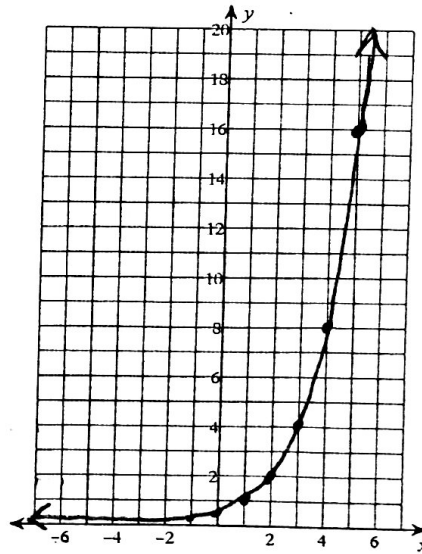
40) $y = 5 \cdot \left(\frac{1}{2}\right)^x$



41) $y = 4 \cdot \left(\frac{1}{2}\right)^x$

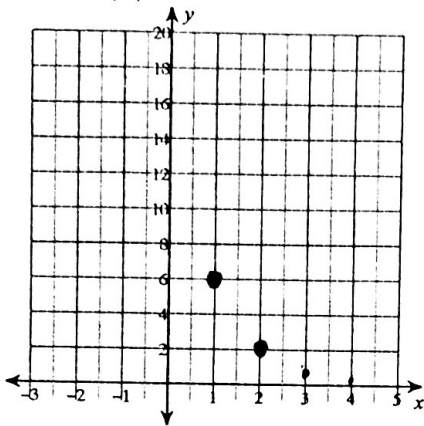


42) $y = \frac{1}{2} \cdot 2^x$

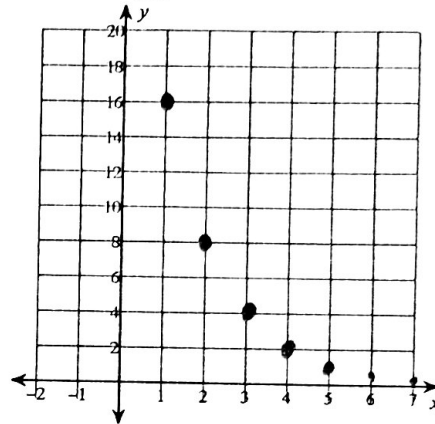


Represent each sequence graphically.

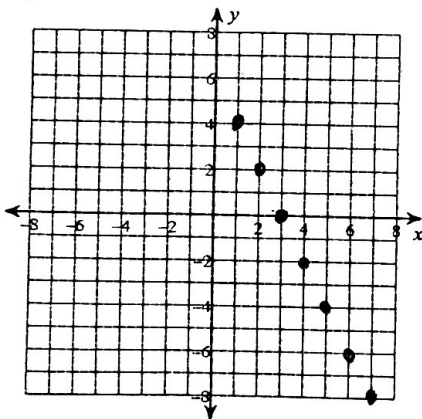
43) $a_n = 6 \cdot \left(\frac{1}{3}\right)^{n-1}$



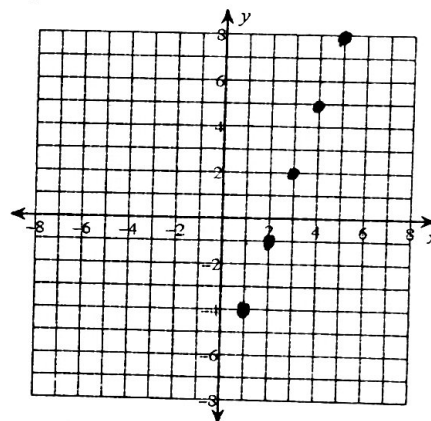
44) $a_n = 16 \cdot \left(\frac{1}{2}\right)^{n-1}$



45) $a_n = -2n + 6$



46) $a_n = 3n - 7$



Determine the initial value, growth/decay factor, and growth/decay rate.

47) $y = 1200 \cdot 1.04^x$

Initial value: 1200

Growth factor: 1.04

Growth rate: 4%

48) $y = 51 \cdot 1.11^{3x}$

Initial value: 51

Growth factor:

Growth rate:

49) $y = 635 \cdot 0.84^x$

Initial value: 635

Decay factor: 0.84

Decay rate: 16%

50) $y = 78 \cdot 0.53^{5x}$

Initial value: 78

Decay factor:

Decay rate: