

SHOW ALL WORK!

Write the next term in the sequence. Then write a rule for the nth term. Show work.

1. 5, 15, 45, 135, ...
Geom. x3

1. 405
 1. $a_n = 5(3)^{n-1}$

2. $\frac{2}{7}, \frac{6}{10}, \frac{18}{13}, \frac{54}{16}, \dots$
*top *3 Geo*
bottom +3 arithmetic
 $7 + (n-1)(3)$
 $7 + 3n - 3$

2. $\frac{162}{19}$
 2. $a_n = \frac{2(3)^{n-1}}{3n+4}$

Write the first five terms of each sequence.

3. $a_n = 2n^2 - 9$
 $a_1 = 2(1)^2 - 9 = -7$
 $a_2 = 2(2)^2 - 9 = -1$
 $a_3 = 2(3)^2 - 9 = 9$
 $a_4 = 23$
 $a_5 = 41$

4. $a_n = \frac{4n-3}{2^n}$
 $a_1 = \frac{4-3}{2} = \frac{1}{2}$
 $a_2 = \frac{8-3}{4} = \frac{5}{4}$
 $a_3 = \frac{12-3}{8} = \frac{9}{8}$
 $a_4 = \frac{13}{16}$
 $a_5 = \frac{17}{32}$

3. -7, -1, 9, 23, 41
 4. $\frac{1}{2}, \frac{5}{4}, \frac{9}{8}, \frac{13}{16}, \frac{17}{32}$

Find the sum of each series.

5. $\sum_{n=1}^5 4n^2 + 1$
 $a_1 = 4 + 1 = 5$
 $a_2 = 4(4) + 1 = 17$
 $a_3 = 4(9) + 1 = 37$
 $a_4 = 65$
 $a_5 = 101$
add them up

5. 225

6. $\sum_{n=4}^9 \frac{3}{n+2}$
 $\frac{3}{6} + \frac{3}{7} + \frac{3}{8} + \frac{3}{9} + \frac{3}{10} + \frac{3}{11}$

6. $\frac{20417}{9240}$ or $2\frac{1937}{9240}$

7. Write the series using summation notation.

$\frac{3}{4}, \left(-\frac{3}{13}\right), \frac{3}{22}, \left(-\frac{3}{31}\right), \frac{3}{40}$
*top * -1*
bottom +9
 $4 + (n-1)(9)$
 $4 + 9n - 9$

7. $\sum_{n=1}^5 \frac{3(-1)^{n-1}}{9n-5}$

Determine if the sequence is **arithmetic, geometric, or neither** and write a rule for the n th term of a_n of the sequence. Find a_6 and then find the sum of the first 6 terms of the sequence. Use a sum formula when appropriate.

8. 3, 12, 48, 192, ... $\times 4$

$$a_6 = 3(4)^{6-1} = 3(4)^5$$

$$S_6 = 3\left(\frac{1-4^6}{1-4}\right) = 3\left(\frac{-4095}{-3}\right)$$

8. Geometric
 Rule $a_n = 3(4)^{n-1}$
 a_6 3072
 Sum 4095

9. -6, -3, 2, 9, ...
 $+3$ $+5$ $+7$

1 $1^2 - 7 = -6$
 2 $2^2 - 7 = -3$
 3 $3^2 - 7 = 2$
 4 $4^2 - 7 = 9$
 $n^2 - 7$

$$a_6 = (6)^2 - 7 = 36 - 7$$

$$-6 + (-3) + 2 + 9 + 18 + 29$$

9. neither (powers)
 Rule $a_n = n^2 - 7$
 a_6 29
 Sum 49

10. 7, 11, 15, 19, ... $+4$

$$7 + (n-1)4 = 7 + 4n - 4$$

$$a_6 = 4(6) + 3 = 24 + 3$$

$$S_6 = \left(\frac{7+27}{2}\right)6$$

10. arithmetic
 Rule $a_n = 4n + 3$
 a_6 27
 Sum 102

The first row of one section of a stadium has 18 seats. Each row after the first one has 1 more seat than the row before it. There are 40 rows of seats.

11. Write a rule for the number of seats in the n th row.

$a_1 = 18$ $18 + (n-1)1$
 $d = 1$

11. $a_n = n + 17$

12. Find the total number of seats in the auditorium.

$n = 40$ $a_{40} = 57$
 $S_{40} = \left(\frac{18+57}{2}\right)40$

12. 1500 seats

Write a rule for the nth term of the arithmetic sequence using the given information. Show work.

13. $a_5 = 29$ and $d = 4$ need a_1

$$29 = a_1 + (5-1)(4) \rightarrow 13 + (n-1)4$$

$$29 = a_1 + 16 \rightarrow 13 + 4n - 4$$

13. $a_n = 4n + 9$

14. $a_{12} = 56$; $a_{46} = 39$ need a_1 & d

$$\begin{aligned} \textcircled{1} 56 &= a_1 + (12-1)d \rightarrow 56 = a_1 + 11d \\ \textcircled{2} 39 &= a_1 + (46-1)d \rightarrow 39 = a_1 + 45d \end{aligned}$$

$$\left. \begin{array}{l} 56 = a_1 + 11(-\frac{1}{2}) \\ a_1 = 61\frac{1}{2} \end{array} \right\}$$

$$\frac{17}{-34} = \frac{-34d}{-34} \rightarrow d = -\frac{1}{2}$$

14. $a_n = -\frac{1}{2}n + 62$

$$\left. \begin{array}{l} a_n = 61\frac{1}{2} + (n-1)(-\frac{1}{2}) \\ a_n = 61\frac{1}{2} - \frac{1}{2}n + \frac{1}{2} \end{array} \right\}$$

15. In one geometric sequence, $a_7 = 2916$ and $r = 3$.

Write a rule for the sequence. Show work. need a_1

$$a_n = a_1 (r)^{n-1}$$

$$2916 = a_1 (3)^{7-1}$$

$$2916 = a_1 (729)$$

$$a_1 = 4$$

15. $a_n = 4(3)^{n-1}$

A company plans to increase production of a product by 9% each year over the next 11 years. In the first year, they will produce 25,000 units.

16. Write a rule given the number of units produced by the company in year n

16. $a_n = 25,000(1.09)^{n-1}$

since it increases by a 9% each year it's multiplied - so geometric

17. Find the total number of units produced over the next 11 years. Show work for this using a formula.

17. 439,007 units

$n = 11$

$$S = 25,000 \left(\frac{1 - (1.09)^{11}}{1 - 1.09} \right)$$

$$S = 25,000 \left(\frac{-1.5804}{-0.09} \right)$$