CCGPS Adv Alg Name Key

6.1 Geometric Sequences

Determine if the sequence is geometric. If it is, find the common ratio, the term named in the problem, and the explicit formula.

1) $-3,\ 12,\ -48,\ 192,\ \ldots$ Common Ratio: $r = -4$
Find a_9 $a_9 = -196608$
Explicit: $a_n = -3 \cdot (-4)^{n-1}$

2) $-3,\ -6,\ -12,\ -24,\ \ldots$ Common Ratio: $r = 2$
Find a_{12} $a_{12} = -6144$
Explicit: $a_n = -3 \cdot 2^{n-1}$

3) $-2,\ 6,\ -18,\ 54,\ \ldots$ Common Ratio: $r = -3$
Find a_{11} $a_{11} = -118098$
Explicit: $a_n = -2 \cdot (-3)^{n-1}$

4) $2,\ 6,\ 18,\ 54,\ \ldots$ Common Ratio: $r = 3$
Find a_9 $a_9 = 13122$
Explicit: $a_n = 2 \cdot 3^{n-1}$

5) $1,\ 2,\ 6,\ 24,\ \ldots$
Find a_{10}
Not geometric

6) $4,\ 16,\ 36,\ 64,\ \ldots$
Find a_{10}
Not geometric

7) $18,\ 10,\ 6,\ 4,\ \ldots$
Find a_{11}
Not geometric

8) $-1,\ 4,\ -16,\ 64,\ \ldots$ Common Ratio: $r = -4$
Find a_9 $a_9 = -65536$
Explicit: $a_n = -(-4)^{n-1}$

9) $-4,\ -8,\ -16,\ -32,\ \ldots$ Common Ratio: $r = 2$
Find a_{12} $a_{12} = -8192$
Explicit: $a_n = -4 \cdot 2^{n-1}$

10) $35,\ 356,\ 3566,\ 35666,\ \ldots$
Find a_{11}
Not geometric

Given the explicit formula for a geometric sequence find the first five terms.

11) $a_n = -2 \cdot (-3)^{n-1}$
$-2,\ 6,\ -18,\ 54,\ -162$

12) $a_n = -4 \cdot (-2)^{n-1}$
$-4,\ 8,\ -16,\ 32,\ -64$

13) $a_n = (-6)^{n-1}$
$1,\ -6,\ 36,\ -216,\ 1296$

14) $a_n = -(-6)^{n-1}$
$-1,\ 6,\ -36,\ 216,\ -1296$

15) $a_n = 2 \cdot 6^{n-1}$
$2,\ 12,\ 72,\ 432,\ 2592$

16) $a_n = -3 \cdot 5^{n-1}$
$-3,\ -15,\ -75,\ -375,\ -1875$

Evaluate each geometric series described.

17) $2 + 6 + 18 + 54\ldots,\ n = 6$
728

18) $1 + 4 + 16 + 64\ldots,\ n = 7$
5461

19) $2 + 8 + 32 + 128..., \; n = 9$

174762

20) $1 + 6 + 36 + 216..., \; n = 7$

55987

21) $1 + 3 + 9 + 27..., \; n = 9$

9841

22) $2 + 8 + 32 + 128..., \; n = 6$

2730

23) $1 + 3 + 9 + 27..., \; n = 8$

3280

24) $4 - 8 + 16 - 32..., \; n = 6$

−84

Determine the number of terms *n* in each geometric series.

25) $a_1 = 4, \; r = 2, \; S_n = 124$

5

26) $a_1 = 4, \; r = 2, \; S_n = 508$

7

27) $a_1 = 4, \; r = -3, \; S_n = 244$

5

28) $a_1 = 4, \; r = 3, \; S_n = 52$

3

Evaluate each geometric series described.

29) $\sum_{m=1}^{8} -4 \cdot 4^{m-1}$

−87380

30) $\sum_{k=1}^{9} -81 \cdot \left(-\frac{1}{3}\right)^{k-1}$

$-\frac{4921}{81}$

31) $\sum_{k=1}^{8} (-4)^{k-1}$

−13107

32) $\sum_{i=1}^{9} (-3)^{i-1}$

4921

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

976562

34) $\sum_{n=1}^{9} 2^{n-1}$

511

Given two terms in a geometric sequence find the formula.

35) $a_6 = -16$ and $a_4 = -4$ $a_n = a_{n-1} \cdot -2$, $a_1 = 0.5$

36) $a_4 = 12$ and $a_6 = \frac{1}{3}$ $a_n = a_{n-1} \cdot \frac{1}{6}$, $a_1 = 2592$

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37) $a_4 = -32$ and $a_3 = -16$ $a_n = a_{n-1} \cdot 2$, $a_1 = -4$

38) $a_6 = \frac{1}{32}$ and $a_3 = -\frac{1}{4}$ $a_n = a_{n-1} \cdot -\frac{1}{2}$, $a_1 = -1$

39) $a_3 = -8$ and $a_4 = 32$ $a_n = a_{n-1} \cdot -4$, $a_1 = -0.5$

40) $a_1 = 3$ and $a_5 = 3888$ $a_n = a_{n-1} \cdot 6$, $a_1 = 3$

35. $a_n = a_1 r^{n-1}$

$a_6 = a_4 r^{6-4}$

$-16 = -4(r)^2$

$4 = r^2$

$\boxed{2 = r}$

$a_4 = a_1 r^{4-1}$

$-4 = a_1 (2)^3$

$-4 = a_1 \cdot 8$

$\frac{-4}{8} = a_1$

$\boxed{-\frac{1}{2} = a_1}$

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

36. $a_n = 2592\left(\frac{1}{6}\right)^{n-1}$

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

38. $a_n = -1\left(\frac{-1}{2}\right)^{n-1}$

39. $a_n = -\frac{1}{2}(-4)^{n-1}$

40. $a_n = 3(6)^{n-1}$