

Geometric Sequences and Series

Determine if the sequence is geometric. If it is, find the common ratio, the 8th term, and the explicit formula.

1) $-1, -3, -9, -27, \dots$

2) $2, \frac{1}{2}, \frac{1}{8}, \frac{1}{32}, \dots$

3) $148, 1488, 14888, 148888, \dots$

4) $0.75, 3, 12, 48, \dots$

Given the explicit formula for a geometric sequence find the common ratio, the term named in the problem, and the recursive formula.

5) $a_n = -3 \cdot \left(\frac{1}{2}\right)^{n-1}$
Find a_{11}

6) $a_n = -1.5 \cdot (-2)^{n-1}$
Find a_{10}

Given two terms in a geometric sequence find the common ratio, the explicit formula, and the recursive formula.

7) $a_4 = -\frac{1}{4}$ and $a_1 = 2$

8) $a_5 = -24$ and $a_4 = -12$

Find the missing term or terms in each geometric sequence.

9) $\dots, 4, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, 108, \dots$

10) $\dots, -25, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, -\frac{1}{25}, \dots$

Evaluate each geometric series described.

11) $-3 + 15 - 75 + 375\dots, n = 8$

12) $2 + 8 + 32 + 128\dots, n = 8$

13) $a_1 = 1, r = 4, n = 7$

14) $a_1 = 3, r = 2, n = 7$

15) $\sum_{k=1}^8 -2 \cdot 6^{k-1}$

16) $\sum_{m=1}^8 32 \cdot \left(\frac{1}{2}\right)^{m-1}$

17) $\sum_{i=1}^{10} 0.2 \cdot 5^{i-1}$

18) $\sum_{n=1}^{10} -2 \cdot 2^{n-1}$

Determine the number of terms n in each geometric series.

19) $\sum_{i=1}^n -4^{i-1} = -341$

20) $a_1 = -1, r = -5, S_n = 104$

Determine if each geometric series converges or diverges.

21) $-1 + 2 - 4 + 8\dots$

22) $-16 - 4 - 1 - \frac{1}{4}\dots$

23) $\sum_{k=1}^{\infty} -3 \cdot \left(\frac{2}{5}\right)^{k-1}$

24) $\sum_{i=1}^{\infty} 2 \cdot 2^{i-1}$

Evaluate each infinite geometric series described.

25) $\sum_{i=1}^{\infty} \left(\frac{1}{3}\right)^{i-1}$

26) $\sum_{i=1}^{\infty} 0.4 \cdot 0.9^{i-1}$

27) $\sum_{m=1}^{\infty} \left(-\frac{2}{3}\right)^{m-1}$

28) $\sum_{k=1}^{\infty} -4^{k-1}$

Geometric Sequences and Series

Determine if the sequence is geometric. If it is, find the common ratio, the 8th term, and the explicit formula.

1) $-1, -3, -9, -27, \dots$

Common Ratio: $r = 3$

$a_8 = -2187$

Explicit: $a_n = -3^{n-1}$

2) $2, \frac{1}{2}, \frac{1}{8}, \frac{1}{32}, \dots$ Common Ratio: $r = \frac{1}{4}$

$a_8 = \frac{1}{8192}$

Explicit: $a_n = 2 \cdot \left(\frac{1}{4}\right)^{n-1}$

3) $148, 1488, 14888, 148888, \dots$

Not geometric

4) $0.75, 3, 12, 48, \dots$

Common Ratio: $r = 4$

$a_8 = 12288$

Explicit: $a_n = 0.75 \cdot 4^{n-1}$

Given the explicit formula for a geometric sequence find the common ratio, the term named in the problem, and the recursive formula.

5) $a_n = -3 \cdot \left(\frac{1}{2}\right)^{n-1}$ Common Ratio: $r = \frac{1}{2}$

Find a_{11}

$a_{11} = -\frac{3}{1024}$

Recursive: $a_n = a_{n-1} \cdot \frac{1}{2}$

$a_1 = -3$

6) $a_n = -1.5 \cdot (-2)^{n-1}$

Find a_{10}

Common Ratio: $r = -2$

$a_{10} = 768$

Recursive: $a_n = a_{n-1} \cdot -2$

$a_1 = -1.5$

Given two terms in a geometric sequence find the common ratio, the explicit formula, and the recursive formula.

7) $a_4 = -\frac{1}{4}$ and $a_1 = 2$ Common Ratio: $r = -\frac{1}{2}$

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

Recursive: $a_n = a_{n-1} \cdot -\frac{1}{2}$

$a_1 = 2$

8) $a_5 = -24$ and $a_4 = -12$

Common Ratio: $r = 2$

Explicit: $a_n = -1.5 \cdot 2^{n-1}$

Recursive: $a_n = a_{n-1} \cdot 2$

$a_1 = -1.5$

Find the missing term or terms in each geometric sequence.

9) $\dots, 4, \underline{\quad}, \underline{\quad}, 108, \dots$

$12, 36$

10) $\dots, -25, \underline{\quad}, \underline{\quad}, \underline{\quad}, -\frac{1}{25}, \dots$

$-5, -1, -\frac{1}{5}$

Evaluate each geometric series described.

11) $-3 + 15 - 75 + 375\dots, n = 8$

195312

12) $2 + 8 + 32 + 128\dots, n = 8$

43690

13) $a_1 = 1, r = 4, n = 7$

5461

14) $a_1 = 3, r = 2, n = 7$

381

15) $\sum_{k=1}^8 -2 \cdot 6^{k-1}$

-671846

16) $\sum_{m=1}^8 32 \cdot \left(\frac{1}{2}\right)^{m-1}$

$\frac{255}{4}$

17) $\sum_{i=1}^{10} 0.2 \cdot 5^{i-1}$

488281.2

18) $\sum_{n=1}^{10} -2 \cdot 2^{n-1}$

-2046

Determine the number of terms n in each geometric series.

19) $\sum_{i=1}^n -4^{i-1} = -341$

5

20) $a_1 = -1, r = -5, S_n = 104$

4

Determine if each geometric series converges or diverges.

21) $-1 + 2 - 4 + 8\dots$

Diverges

22) $-16 - 4 - 1 - \frac{1}{4}\dots$

Converges

23) $\sum_{k=1}^{\infty} -3 \cdot \left(\frac{2}{5}\right)^{k-1}$

Converges

24) $\sum_{i=1}^{\infty} 2 \cdot 2^{i-1}$

Diverges

Evaluate each infinite geometric series described.

25) $\sum_{i=1}^{\infty} \left(\frac{1}{3}\right)^{i-1}$

$\frac{3}{2}$

26) $\sum_{i=1}^{\infty} 0.4 \cdot 0.9^{i-1}$

4

27) $\sum_{m=1}^{\infty} \left(-\frac{2}{3}\right)^{m-1}$

$\frac{3}{5}$

28) $\sum_{k=1}^{\infty} -4^{k-1}$

No sum