Geometric Sequences and Series … Set 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) $-1,\ -3,\ -9,\ -27,\ \ldots$

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

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

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

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) $\ldots,\ 4,\ \_\_\_,\ \_\_\_,\ 108,\ \ldots$

10) $\ldots,\ -25,\ \_\_\_,\ \_\_\_,\ \_\_\_,\ -\frac{1}{25},\ \ldots$

Geometric Sequences and Series … Set 1

Answers

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

Common Ratio: $r = 3$
$a_8 = -2187$
Explicit: $a_n = -3^{n-1}$

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

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

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

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

Not geometric

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

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

Common Ratio: $r = \frac{1}{2}$

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

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) $\ldots,\ 4,\ \_\_\_,\ \_\_\_,\ 108,\ \ldots$

12, 36

10) $\ldots,\ -25,\ \_\_\_,\ \_\_\_,\ \_\_\_,\ -\frac{1}{25},\ \ldots$

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

Geometric Sequences and Series … Set 1

Evaluate each geometric series described.

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

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

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) $-1 + 2 - 4 + 8...$

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

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 … Set 1

Answers

Evaluate each geometric series described.

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

195312

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

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) $-1 + 2 - 4 + 8...$

Diverges

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

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