

## 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

Date \_\_\_\_\_ Period \_\_\_\_\_

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

12, 36

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

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

**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