

Geometric sequences

1 Write down the next two terms for the following sequences:

a $4, 12, 36, \dots$

b $12, -48, 192, \dots$

c $-1, 8, -64, \dots$

d $-6, 9, -\frac{27}{2}, \dots$

2 Consider the sequence $-1, -7, -49, \dots$

a Find the next term of the sequence.

b Find the 5th term of the sequence.

c Find the 6th term of the sequence.

3 Explain how the common ratio of a geometric sequence can be found.

4 Suppose $u_1, u_2, u_3, u_4, u_5, \dots$ is a geometric sequence.

Is $u_1, u_3, u_5, \dots$ also a geometric sequence? Explain your answer.

5 Consider the first four terms of the following geometric sequences:

i Evaluate $\frac{u_2}{u_1}$.

ii Evaluate $\frac{u_3}{u_2}$.

iii Evaluate $\frac{u_4}{u_3}$.

iv Hence, find u_5 .

a $-8, -16, -32, -64, \dots$

b $-4, -8, -16, -32, \dots$

c $2, -6, 18, -54, \dots$

d $-64, -16, -4, -1, \dots$

6 State the common ratio between the terms of the following sequences:

a $9, 36, 144, 576, \dots$

b $-6, -42, -294, -2058, \dots$

c $2, -16, 128, -1024, \dots$

d $-70.4, -17.6, -4.4, -1.1, \dots$

7 Write the first 5 terms of the following sequences given the first term and the common ratio:

a First term: -2 , common ratio: 3

b First term: 1.3 , common ratio: -4 .

c First term: $700\,000$, common ratio: 1.04 .

8 For each of the following, write the first four terms in the geometric progression:

a The first term is 6 and the common ratio is 4 .

b The first term is 7 and the common ratio is -2 .

c The first term is $700\,000$ and the common ratio is 1.04 .

d The first term is -2 and the common ratio is 3 .

e The first term is 1.3 and the common ratio is -4 .

9 Find the missing terms in the following geometric progressions:

a $-5, x, -80, 320, y$

b $a, b, \frac{3}{25}, -\frac{3}{125}, c$

10 For each of the following pairs of terms in a geometric progression:

i Find the possible values of r .

ii Find the value of u_1 .

iii Find the general rule for u_n , for $r > 0$.

a $u_3 = 18$ and $u_5 = 162$

b $u_4 = 32$ and $u_6 = 128$

Applications

11 Suppose you save \$1 on the first day of a month, \$2 on the second day, \$4 on the third day, \$8 on the fourth day, and so on. That is, each day you save twice as much as you did the day before.

a How much will you put aside for savings on the 6th day of the month?

b How much will you put aside for savings on the 10th day of the month?

12 The average daily growth of a seedling is 10% per day. A seedling measuring 6 cm in height is planted.

a Determine the height of the seedling at the end of Day 1.

b Find the height of the seedling 2 days after it is planted.

c Write a recursive rule for H_n , defining the height of the seedling n days after it is planted, and an initial condition H_0 .