



Skill: Finite geometric sequences

Questions

Attempt these questions independently showing full and clear solutions. Check each answer as you go.

1. A geometric progression has first term 5 and common ratio 3. Find the sum of the first 9 terms.
2. Find the sum, as far as the term indicated in the brackets, of each of the following geometric progressions:
 - (a) $3 - 6 + 12 - \dots$ [the sum up to the 11th term]
 - (b) $5 + 10 + 20 + \dots$ [the sum up to the 8th term]
3. Find the sum of the terms in each of the following geometric series
[Hint: determining the number of terms in the sequence is essential]:
 - (a) $3 + 6 + 12 + \dots + 384$
 - (b) $36 + 12 + 4 + \dots + \frac{4}{27}$
4. Find the sum of the terms in geometric series:
$$4 - 12 + 36 - \dots - 972$$
5. A geometric progression has a 1st term 1 and a common ratio $\frac{1}{4}$. Find the sum of the first 4 terms and show that the n th term is given by $4^{(1-n)}$.
6. A geometric progression has common ratio -3 . Given that the sum of the first nine terms of the progression is 703, find the first term.
7. A geometric progression is such that the sum of the first eight terms is five times the sum of the first four terms. Determine the value of the common ratio r , given that $r > 1$.
8. Find the first term of the geometric series in which the common ratio is 2 and the sum of the first ten terms is 93.



9. A geometric progression has first term 3 and common ratio 0.4. Given that the sum of the first n terms is 4.97952, show that n satisfies the equation

$$0.4^n = 0.004096$$

Use logarithms to find n .

10. Determine how many terms of the geometric series

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

should be taken in order that the total should equal 10 923.

11. Find the least number of terms of the geometric progression

$$40 + 60 + 90 + \dots$$

which must be taken for the sum to exceed 10 000.

12. A savings plan requires a payment of £30 on a year on the same date for 18 years. All savings earn an interest at a rate of 5% per annum.

Show that, after 18 complete years, the first payment has increased in value to

$$£ 30 \times 1.05^{18}$$

Show that the total value, after 18 complete years of all 18 payments is

$$£ \frac{30 \times 1.05 \times (1.05^{18} - 1)}{1.05 - 1}$$

Evaluate the total to the nearest penny.

13. Show that the sum of the geometric series

$$x + x^3 + x^5 + \dots + x^{15}$$

is

$$x(1 + x^2)(1 + x^4)(1 + x^8)$$