

1.4 Geometric Series

Geometric Series:

- a sum of terms in a geometric sequence

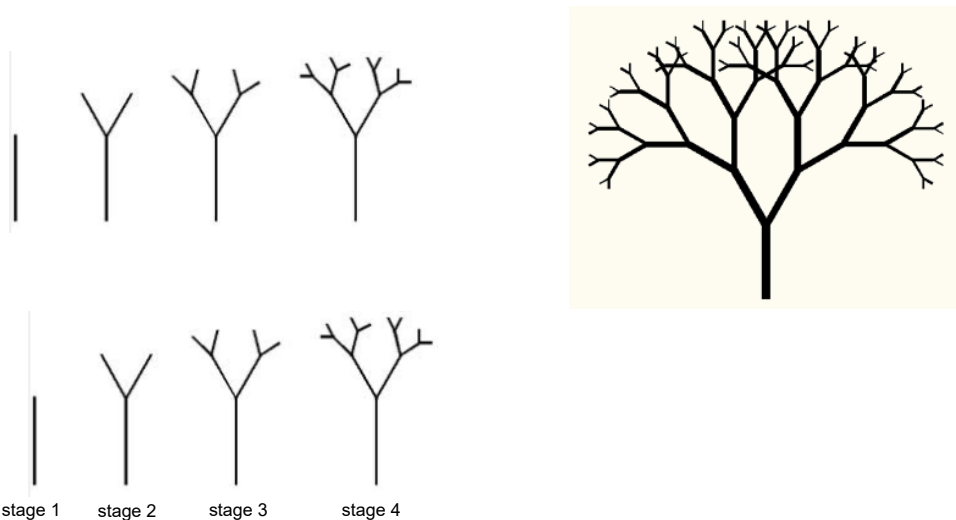
Example: geometric sequence {2, -6, 18, -54}

geometric series $2 \oplus (-6) + 18 + (-54)$

- adding the sum of a few numbers is easy, however, when a lot of terms, we need a more convenient method!

Think About: Fractal Tree

- figure generated by starting with a simple pattern and repeating an infinite number of times



Stage	1	2	3	4	5
Number of New Branches	1	2			

First term: _____

Common Ratio: _____

General Term: $t_n =$ _____

Determine the total number of branches that would be formed by the end of stage 5?

Predict a formula for the sum of a geometric series:

Let's consider the sequence {3, 6, 12, 24, 48}

Multiply each term by r:

Subtract the equations:

Solve for S_5 :

The sum of a geometric series is:

$$S_n = \frac{t_1(r^n - 1)}{r - 1}, r \neq 1$$

$$S_n = \frac{t_1 r^n - t_1}{r - 1}, r \neq 1$$

where t_1 is the first term

n is the number of terms

r is the common ratio

S_n is the sum of the first n terms

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Example 1: Determine the Sum of a Geometric Series

Determine the sum of the first 10 terms of each geometric series.

a) $4 + 12 + 36 + \dots$

b) $t_1 = 5, r = \frac{1}{2}$

Example 2: Determine the Sum of a Geometric Series for an Unspecified Number of Terms

Determine the sum for the geometric series $\frac{1}{27} + \frac{1}{9} + \frac{1}{3} + \dots + 729$

Example 3:

A ball is dropped from a height of 40 m and bounces back up 60% of the original height. Determine the total distance travelled by the ball by the time it hits the ground for the tenth time.

Key Ideas p. 53

Assign p. 53 - 57

1, 2(bc), 3(ac), 4(ac), 5, 6, 7, 8, 9, 10, 17