

# GEOMETRIC SERIES

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**RECALL:** The word "SERIES" refers to the SUM of all the terms of any kind of sequence.

- Specifically, an ARITHMETIC SERIES will be the sum of the terms that form an arithmetic sequence.
- Similarly, a GEOMETRIC SERIES will be the sum of the terms that form a geometric sequence.

## THE GENERAL FORMULA

$$S_n = \frac{a(r^n - 1)}{r - 1} \quad \text{or} \quad S_n = \frac{a(1 - r^n)}{1 - r}$$

Where ***a*** represents \_\_\_\_\_

***n*** represents \_\_\_\_\_

***r*** represents \_\_\_\_\_

**EXAMPLE 1** - For the geometric series with  $a = 7$  and  $r = 2$ , determine the series of the first 9 terms.

**EXAMPLE 2** - Determine the sum of the geometric series  $15 - 45 + 135 - 405 + \dots - 32805$

## GEOMETRIC SERIES *continued..*

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**EXAMPLE 3** – The first term of a sequence is 9. The terms of the sequence decrease by a factor of  $\frac{1}{3}$ . Find  $S_6$ .

**EXAMPLE 4** – The first prize in a lottery is \$100 000. Each succeeding winning number pays 40% as much as the winning number before it. **How much is paid out** in prizes if 6 numbers are drawn?

**EXAMPLE 5** – Some companies use a telephone chain to notify employees that the company is closing because of bad weather. Suppose that, in the first round of calls, the first person in the chain calls four people. Each person called then makes four calls, and so on. What is the total number of people called in the first eight rounds of calls?