Geometric Progression Overview

Here is the conversion of the image to text:

Standard Form of G.P.:
If a is the first term and r is the common ratio, then
$a + ar + ar^2 + ar^3 + ...$ is a standard form of G.P.

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n-th Term or General Term of G.P.:
$T_n = ar^{n-1}$, where $T_1 = a$ and the common ratio $= r$
The above formula has four quantities a, r, n, and T_n. Out of these four, if any three are given, the fourth can be found out.

Sum of n Terms of a G.P.:
If the series is $a + ar + ar^2 + ... + ar^{n-1}$

(i) When $r = 1$, then:

$$S_n = a + a + a + ... + a \text{ (n terms)} = na$$

(ii) When $r \neq 1$, then:

$$S_n = \frac{a(1 - r^n)}{1 - r}, \text{ if } |r| < 1$$

and

$$S_n = \frac{a(r^n - 1)}{r - 1}, \text{ if } |r| > 1$$

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n-th Term from the End of a Finite G.P.:
The G.P. consists of m terms. Therefore, the n-th term from the end is:

$$T_n = ar^{m-n}$$

Selection of Terms in G.P.:

No. of Terms	Terms	Common Difference
3	$\frac{a}{r}, a, ar$	r
4	$\frac{a}{r^3}, \frac{a}{r}, ar, ar^3$	r^2
5	$\frac{a}{r^2}, \frac{a}{r}, a, ar, ar^2$	r

Sum of an Infinite G.P.:

If the product of numbers is not given, then the numbers are taken as $a, ar, ar^2, ar^3, \ldots$

$$S = \frac{a}{1-r}, \text{ where } -1 < r < 1, n \to \infty$$
