Geometric Sequences and Series:

Geometric Sequence: A sequence having the form

$$a_1, \ a_1r, \ a_1r^2, \ a_1r^3, \ a_1r^4, \ \ldots$$

where each term after the first is obtained by multiplying the preceding term by a fixed non zero constant, r. The amount by which we multiply each time is called the common ratio.

The common ratio is found by dividing any term after the first term by the term that directly precedes it.

Find the common ratio of the following sequences:

-2, 6, -18, 54, . . .

$$4, \ \frac{8}{3}, \ \frac{16}{9}, \ \frac{32}{27}, \ \ldots$$

Write the first 4 terms of each geometric sequence given the first term and the common ratio.

$$a_1 = 2, \ r = 4$$

$$a_1 = -\frac{1}{16}, \ r = -4$$

Find the general term (nth term)of a sequence given that the sequence is geometric with first term a_1 and common ratio r.

The nth term of a geometric sequence is given by:

$$a_n = a_1 r^{n-1}$$

Find the indicated term for each geometric sequence described below.

a_8 where $a_1 = 5$ and $r = 3$

a_6 where $a_1 = 8000$ and $r = -\frac{1}{2}$

$3, 15, 75, 375, \ldots$ Find a_7

$5, -1, \dfrac{1}{5}, \dfrac{-1}{25}, \ldots$ Find a_7

The sum of the first n terms (or nth partial sum) of a geomtric sequence is given by

$$S_n = \frac{a_1 - a_1 r^n}{1 - r}$$

Find the sum of the first 12 terms of the geometric sequence: 3, 6, 12, 24, . . .

Find $3 - 1 + \frac{1}{3} - \frac{1}{9} + \ldots + \frac{1}{243}$.

You save $1 the first day of a month, $2 the second day, $4 the third day, and so on. What will you put aside on the 10th day, the 20th day and the 30th day?

A union contract specifies that each worker will receive a 5% pay increase each year for the next 30 years. One worker is paid $20,000 the first year. What is this person's total lifetime salary over a 30-year period?