NAME _____ DATE _____

Reteaching Worksheet

Geometric Series

The indicated sum of the terms of a geometric sequence is called a
geometric series.

Sum of a Geometric Series
The sum, S_n, of the first n terms of a geometric series is given by the following formula. $$S_n = \frac{a_1 - a_1 r^n}{1 - r} \text{ or } S_n = \frac{a_1(1 - r^n)}{1 - r}$$

Example: Find the sum of the first seven terms of the geometric
series for which $a_1 = 4$ and $r = -3$.
$$S_n = \frac{a_1 - a_1 r^n}{1 - r}$$
$$S_7 = \frac{4 - 4(-3)^7}{1 - (-3)}$$
$$= 2188$$
The sum of the first seven terms is 2188.

Sigma notation can also be used to express a geometric series.

Example: Write $\sum_{j=1}^{5} 2(3^j)$ in expanded form and find the sum.
$$\sum_{j=1}^{5} 2(3^j) = 2(3^1) + 2(3^2) + 2(3^3) + 2(3^4) + 2(3^5)$$
$$= 6 + 18 + 54 + 162 + 486$$
$$= 726$$

Find the sum of each geometric series.

1. $6 + 18 + 54 + \ldots$ to 6 terms

2. $10 + 5 + \frac{5}{2} + \ldots$ to 5 terms

3. $a_1 = 3, r = \frac{1}{3}, n = 4$

4. $a_1 = 8, r = -2, n = 7$

5. $a_1 = 2, r = -3, a_5 = 162$

6. $a_1 = \frac{2}{3}, r = 6, a_5 = 864$

Use sigma notation to express each series.

9. $1 + 3 + 9 + 27 + 81$

10. $1 - 2 + 4 - 8 + 16 - 32$