

## 10-3B 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 formulas:

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

or

(when  $n$  is unknown)

$$S_n = \boxed{\phantom{a_1 - a_1 r^n}}$$

how do we get this new formula?

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

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

## Examples

*Find the sum of the following geometric series.*

1.  $a_1 = 16, r = \frac{1}{2}, n = 7$

2.  $a_1 = 4, a_n = 256, r = 4$

3. Find  $a_1$  for the series if  $S_8 = 13,120$  and  $r = 3$ .

*Find the sum of the following series.*

4. 
$$\sum_{n=1}^{12} 3(2)^{n-1}$$

5. 
$$\sum_{t=5}^8 2(4)^{t-1}$$