

Sum of the first  $n$  positive integers:

$$\sum_{k=1}^n k = \frac{n(n+1)}{2}$$

Sum of the first  $n$  squares:

$$\sum_{k=1}^n k^2 = \frac{n(n+1)(2n+1)}{6}$$

Sum of the first  $n$  cubes:

$$\sum_{k=1}^n k^3 = \frac{n^2(n+1)^2}{4}$$

Sum of the first  $n$  terms of an arithmetic sequence:

$$S_n = \frac{n}{2} [2a_1 + (n-1)d] = \frac{n}{2} (a_1 + a_n)$$

Sum of the first  $n$  terms of a geometric sequence:

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

Sum of all of the terms of a geometric sequence with  $|r| < 1$ :

$$S_n \rightarrow \frac{a_1}{1-r}$$