

Summation Notation

The **sum** of n terms $a_1, a_2, a_3, \dots, a_n$ is written in **summation** notation as...

Diagram illustrating the components of summation notation $\sum_{i=1}^n a_i$:

- upper bound**: n (indicated by a purple arrow)
- sigma sign**: Σ (indicated by a green arrow)
- index**: i (indicated by an orange arrow)
- lower bound**: 1 (indicated by a black arrow)
- i^{th} term**: a_i (indicated by a black arrow)

\leq "the **summation** from $i = 1$ to n of a_i "

Summation Notation

The **sum** of n terms $a_1, a_2, a_3, \dots, a_n$ is written in **summation** notation as...

$$\sum_{i=1}^n a_i = a_1 + a_2 + a_3 + \dots + a_n$$

Write out the following summations and solve.

$$\sum_{i=1}^5 2i$$

$$\sum_{i=4}^7 3i^2$$

Write out the following summations and solve.

$$\sum_{i=3}^8 n \cdot i$$

$$\sum_{i=2}^5 f(i)$$

$$f(x) = 2x + 1$$

Summation Properties

$$\sum_{i=1}^n k \cdot a_i = k \sum_{i=1}^n a_i$$

$$\sum_{i=3}^8 n \cdot i$$

Summation Properties

$$\sum_{i=1}^n (a_i \pm b_i) = \sum_{i=1}^n a_i \pm \sum_{i=1}^n b_i$$

$$\sum_{i=2}^4 i + i^2$$

Summation Formulas

(Lower Bound = 1)

$$\sum_{i=1}^n c = c \cdot n$$

$$\sum_{i=1}^{84} 5$$

Summation Formulas

(Lower Bound = 1)

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

$$\sum_{i=1}^{72} i$$

Summation Formulas

(Lower Bound = 1)

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

$$\sum_{i=1}^{54} i^2$$

Summation Formulas

(Lower Bound = 1)

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

$$\sum_{i=1}^{32} i^3$$

Evaluate the following for $n = 10$ and $n = 100$

$$\sum_{i=1}^n \frac{2i}{n^2}$$

Evaluate the following for $n = 10$ and $n = 100$

$$\sum_{i=1}^n \frac{i^2 + 2}{n^3}$$