Summation Notation and Summation Formulas

You may find the summation formulas useful:

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

1. Write the sum

$$1 + 4 + 9 + 16 + 25 + \cdots + 196 + 225$$

in summation notation. Then use a summation formula to find the value of the sum.

2. Write the sum

$$15 + 20 + 25 + 30 + 35 + 40 + 45 + 50$$

in summation notation. Then use a summation formula to find the value of the sum.

3.

(a) Write the sum

$$\sum_{k=4}^{10}(2k+1)$$

in expanded form.

(b) Write the sum

$$\sum_{k=1}^{7}(2k+7)$$

in expanded form.

(c) The above two parts show that a sum can be written in Σ notation in different ways. Find b so that

$$\sum_{k=2}^{8}(2k+b)$$

is the same as the sums in parts (a) and (b).

4. (Challenge) Evaluate the sum

$$\sum_{k=1}^{40}(2k-3)^2$$

(Hint: You may need to write the expression $(2k-3)^2$ in a different form in order to make use of the summation formulas.)