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square of sum

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Related topic	ContraharmonicMeansAndPythagoreanHypotenuses
Related topic	CompletingTheSquare
Related topic	TriangleInequalityOfComplexNumbers

The well-known for squaring a sum of two numbers or is

$$(a+b)^2 = a^2+2ab+b^2. \quad (1)$$

It may be derived by multiplying the binomial $a+b$ by itself.

Similarly one can get the squaring for a sum of three summands:

$$(a+b+c)^2 = a^2+b^2+c^2+2bc+2ca+2ab \quad (2)$$

Its contents may be expressed as the

Rule. The square of a sum is equal to the sum of the squares of all the summands plus the sum of all the double products of the summands in twos:

$$\left(\sum_i a_i\right)^2 = \sum_i a_i^2 + 2\sum_{i<j} a_i a_j.$$

This is true for any number of summands. The rule may be formulated also as

$$(a+b+c+\dots)^2 = (a)a + (2a+b)b + (2a+2b+c)c + \dots \quad (3)$$

which in the case of four summands is

$$(a+b+c+d)^2 = (a)a + (2a+b)b + (2a+2b+c)c + (2a+2b+2c+d)d. \quad (4)$$

One can use the idea of (3) to find the , when one tries to arrange the polynomial into the form of the right hand <http://planetmath.org/Equationside> of (3).