Mathematics for Computer Science
MIT 6.042J/18.062J

Arithmetic Sums

Sum for Children

89 + 102 + 115 + 128 + 141 +
154 + ⋯ +
193 + ⋯ +
232 + ⋯ +
323 + ⋯ +
414 + ⋯ + 453 + 466

C. F. Gauss

Picture source: http://www-groups.dcs.st-and.ac.uk/~history/PictDisplay/Gauss.html

Sum for Children

Nine-year old Gauss saw

30 numbers, each 13 greater than the previous one.

(So the story goes.)

Sum for Children

$89 + (89+13) + \cdots + (89+29\cdot 13)$

$F + (F+d) + \cdots + (L-d) + L =: A$

$L + (L-d) + \cdots + (F+d) + F = A$

$(F+L)+(F+L) + \cdots + (F+L) + (F+L) = 2A$

$$A = \underbrace{\frac{(F+L)}{2}}_{\text{average term}} \cdot (\#\,\text{terms})$$

Sum for Children

Example:

$$1 + 2 + \cdots + (n-1) + n = \frac{n(1+n)}{2}$$