

6	9	13	7
12	10	5	
3	1	4	14
15	8	11	2

Mathematics for Computer Science
MIT 6.042J/18.062J

Arithmetic Sums



Albert R Meyer, April 10, 2013

arithmetic-sum.1

6	9	13	7
12	10	5	
3	1	4	14
15	8	11	2

Sum for Children

$$\begin{array}{r}
 89 + 102 + 115 + 128 + 141 + \\
 154 + \quad \quad \quad \dots + \\
 193 + \quad \quad \quad \dots + \\
 232 + \quad \quad \quad \dots + \\
 323 + \quad \quad \quad \dots + \\
 414 + \quad \quad \quad \dots + 453 + 466
 \end{array}$$



Albert R Meyer, April 10, 2013

arithmetic-sum.2

6	9	13	7
12	10	5	
3	1	4	14
15	8	11	2

C. F. Gauss



Photo from http://commons.wikimedia.org/wiki/File:Carl_Friedrich_Gauss.jpg (in public domain).



Albert R Meyer, April 10, 2013

arithmetic-sum.3

6	9	13	7
12	10	5	
3	1	4	14
15	8	11	2

Sum for Children

Nine-year old Gauss saw
30 numbers, each 13 greater
than the previous one.
(So the story goes.)



Albert R Meyer, April 10, 2013

arithmetic-sum.4

6	9	13	7
12	10	5	
3	1	4	14
15	8	11	2

Sum for Children

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

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

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

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

$$A = \frac{(F+L)}{2} \cdot (\# \text{ terms})$$

average term



Albert R Meyer,

April 10, 2013

arithmetic-sum.7

6	9	13	7
12	10	5	
3	1	4	14
15	8	11	2

Sum for Children

Example:

$$1 + 2 + \dots + (n-1) + n =$$

$$\frac{n(1+n)}{2}$$



Albert R Meyer,

April 10, 2013

arithmetic-sum.10

MIT OpenCourseWare
<http://ocw.mit.edu>

6.042J / 18.062J Mathematics for Computer Science
Spring 2015

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.