

# On the Goldbach conjecture

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**Abstract:** An exploration of prime-number summing grids

**The Strong Goldbach conjecture:** “Every even integer greater than 2 can be expressed as the sum of two primes”

**Goal:** To find an exception to this rule thus proving it false

					A				
		2	3	5	7	11	13	17	19
	2	4	5	7	9	13	15	19	21
	3	5	6	8	10	14	16	20	22
	5	7	8	10	12	16	18	22	24
B	7	9	10	12	14	18	20	24	26
	11	13	14	16	18	22	24	28	30
	13	15	16	18	20	24	26	30	32
	17	19	20	22	24	28	30	34	36
	19	21	22	24	26	30	32	36	38

Fig 1: A prime-number summing grid

By inspection, it would seem that every even sum  $> 2$  is represented. We see no exceptions, which tends to suggest that the strong conjecture is true.

It could also be that every **odd** integer  $> 2$  can be expressed as the sum of **upto** 2 primes

The Weak Goldbach conjecture says “Every odd number  $> 5$  can be expressed as the sum of 3 primes” (A prime may be used more than once in the same sum)

If we add a third prime C, the sum can be incremented by 2, 3, 5, 7...

We will try to find a total that is **not** the sum of 3 primes A, B & C

Starting at  $A+B=4$  we add C of 2, 3...

Fig 2:

		+2	+3
A+B			
4		6	7
A+B+C	5	7	8
Totals in Red	6	8	9
	7	9	10
	8	10	11
	9	11	12
	10	12	13

We see all values represented for  $A+B+C > 5$

We see no exceptions so the weak conjecture must be true.

“Every odd number  $> 5$  **can** be expressed as the sum of 3 primes”

And by extension:

“Every **even** number  $> 5$  can be expressed as the sum of 3 primes”  
because of the full representation of even numbers in Fig 2

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