Brainmatics: More Logic Puzzles

Ivan Moscovich
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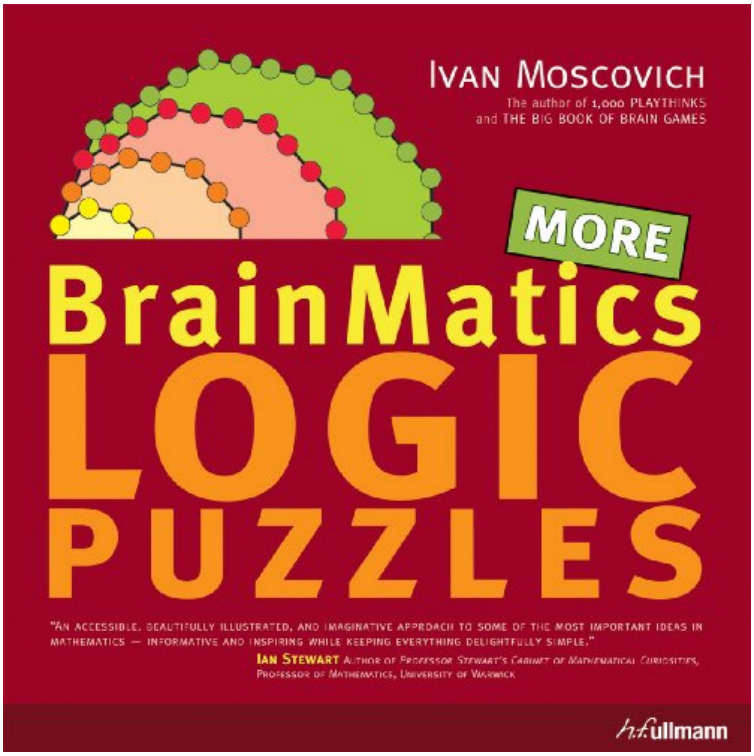

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Ivan Moscovich : Brainmatics: More Logic Puzzles before purchasing it in order to gage whether or not it would be worth my time, and all praised Brainmatics: More Logic Puzzles:

1 of 1 people found the following review helpful. Poorly checked questions and answersBy CustomerI received this book for Xmas, by the careless Ivan Moscovich. The first page I turned to contained a puzzle that is, to all appearances I can discern, simply phrased wrong in the question, and given an answer that is wrong both as phrased and also wrong if the phrasing is modified in the way that the answer would seem to imply. This is honestly the first thing I turned to, but the fact it happened to be so dreadfully wrong is a bad sign (I haven't checked the 200-some other puzzles).Aside from some fairly irrelevant sidebars and illustrations, the puzzle is:"The diagram represents the first 48 prime numbers, from 2 and up to 223. Using the first 48 primes, how many even numbers can you create by adding the prime numbers in different combinations"The purported answer is:"According to Goldbach's Conjecture, every even number bigger than 2 is the sum of two primes. In our staircase of primes we can create all the even numbers up to 446."The assumption in the answer is that the question should say "... by adding TWO OF THE prime numbers ..." Goldbach's Conjecture, as everyone will know, is the conjecture that every even number (greater than two) is the sum of two primes. Note also that the 46th prime is 199, and the 47-48th primes are 211, 223, whose sum is 434, so it's not even really clear why 446 is given as a reference in the answer. Moreover, given that, e.g., 6=3+3, but is not the sum of any *distinct* primes, Goldbach's Conjecture isn't really even germane here.In any case, while 434=223+211, 432 is definitely not obtainable as the sum of two of these first 48 primes, since 223+199=422, and therefor there must be a gap between 422 and 432 in the obtainable primes using sums of these first 48 primes.Of course, as the question is

written, it allows the sum of any N of these initial primes (up to 48 of them). It happens that the sum of ALL the initial 48 primes is 4661, so one might speculate that all the even numbers up to this are the sum of some combination of the primes. However, this is clearly untrue on reflection. Since all the numbers sum to 4661, no subset of them can sum to 4660, since the smallest odd number one can remove is 3, and the smallest prime generally is 2, in either case therefore adding to something less than 4660. I think there are numerous other gaps in the (even) numbers one can obtain by selectively summing a subset of these initial primes.Unfortunately, the nave approach of taking all 2^48 of the subsets and summing each one is extremely computationally expensive. Also note that while there are certainly gaps (at least one demonstrated) in the sums one can reach, there must also be very common overlap in the sums reached, since every one of the 2^48 subsets of primes sums to something less than or equal to 4661 (and 2^48, which is 281,474,976,710,656, is quite a bit larger than 4661).[... I posted this on my social network pages, and offered my friends a bounty of $100 for fixing the puzzle; sorry, the same doesn't apply to review readers ...](a) the correct answer to the question (as actually phrased); or(b) a plausible question and answer that are both similar to those in the actual book and match each other. I.e. changing the question to "what is 223 (446/2)?" doesn't win a bounty.The (b) option is up to me to interpret whether an answer is satisfactory, but I'm not trying to be stingy here. I'm simply looking for something that the author *could have been* thinking of for either question or answer that might through plausible error have lead to what was actually given.The (a) option is the more likely one to my mind. I would accept here either a computational answer that came with the source code used to arrive at it that I could check for plausible accuracy, or possibly a closed-form solution to it that would require far more cleverness than I possess. Notice that even the computational approach is not straightforward to provide tractably. I could write a script of just a few lines that performed candidate 2^48 sums and stored the results; however, that script would take weeks to run on a modern processor. A computational approach that completed in "reasonable" wall-clock time (i.e. in seconds, or minutes perhaps) is less obvious.FWIW, as an answer I'd actually rather know how many *total* numbers might be sums of a subset of the initial 48 primes, not only of how many even numbers. It's not obvious to me how many gaps exist among the reachable odd numbers either (1 doesn't count as a prime here).One note I would add, computationally arriving at the answer to "which (even) numbers are the sum of two of the intial 48 primes" is quite tractable even with very simplistic approach: "48 choose 2" is only 1128 possibilities, and checking that takes little CPU time.---FWIW, I created a computationally tractable solution to stated problem. Obviously, considering all 2^48 subsets is unworkable (as stated), but I realized a simplification that gets us to O(N^2*logN), which is easy enough for N=48 (and even for fairly large numbers).I don't think code posted here will be formatted correctly, so find the code sample at: [...]FWIW, 4652 of the natural numbers no more than 4661 are the sum of some subset of the first 48 primes. 2325 of the 2330 even numbers in that range, if you want that answer.Finding the number of numbers that pair sums give you is easy, just loop over the list of primes in a nested way, and every time you find a new answer, add it to a set. It turns out that 202 even numbers (of the 217 less than or equal to 434) are obtainable (see same source file mentioned above). If you allow adding the same prime to itself, that gets you 208 of the 223 even numbers less than or equal to 446.In other words, there's pretty much no way of phrasing the problem so as to get dense coverage of the space up to the max (although MOST numbers are certainly "reachable" under every variation).

"...Gorgeous puzzles tickle the senses as well as the intellect.BrainMatics contains months worth of elegant play." - Will Shortz, Crossword Editor, The New York Times Brainmatics: More Logic Puzzles is a modern fitness studio for the brain! Inside youll find 150 diverse puzzles that will help keep your mind flexible and train your mental stamina in logical and mathematical thinking. Accept the challenge posed by this newtraining program and discover the fun of finding your own logical path through the puzzle labyrinth- your grey cells will thank you for it! Features:Follow up to Brainmatics: Logic Puzzles with 150 brand new logical puzzles and games of mental agility to keep your mind in tip-top shapeHuge variety of visually appealing puzzles make this suitable for puzzle fans of all ages Extensive solution section

About the AuthorAbout author Ivan MoscovichIvan Moscovich is a designer of games, puzzles, and learning aids of world-wide reputation. He was the founder and first director ofthe Museum for Science and Technology in Tel Aviv; his artistic works have been exhibited in renowned design centers in London, Berlin and Mexico City. His Big Book of Brain Games is an international bestseller and his book 1000 PlayThinks has sold nearly 100,000 copies in the United States!