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\*Misfit Mama Bear Haven is reader supported. This means that when you purchase through affiliate links on this site, I may receive a small commission, at no cost to you. Misfit Mama Bear Haven is a participant in the Amazon Services LLC Associates Program, an affiliate advertising program designed to provide a means for sites to earn advertising fees by advertising and linking to amazon.com.\* As we have been changing up some of our homeschool routine, we recently added IXL Learning to the mix. Before having the opportunity to review of IXL, I heard great things from a few friends who used it with their kids for math, language arts, social studies, and science. My friends were not wrong! IXL has been a super beneficial addition to our homeschool mix! For this review, I will be sharing about the IXL Annual Membership which we received for each of the older kids in exchange for this honest review. What is IXL? IXL is a comprehensive K-12 curriculum providing education for Language Arts, Math, Science, Social Studies, and even Spanish! It is adaptive in that it adjusts its difficulty to fit your child's needs. It's interactive and offers incentives to your child to keep going. For homeschooling families, it works as a nice addition to your homeschooling routine as it provides a way for your child to get extra practice on various subjects. You can also get notifications via email and can track your child's progress via the website. If you are concerned about state standards, IXL is a super handy tool to have at your disposal because this program is set to state standards. We were provided an annual membership for each of my older kids to IXL. How We Use It with Bubby My son has been using IXL primarily to help with his math capabilities. While he excels at many subjects, math has not come to him naturally. He hopes to go into engineering someday, so he wants to do all he can to catch up and excel in math. Currently he is at 8th/9th level with most of his subjects. He has been using it to test his math skills and find out where he needs more practice. He actually looks forward to spending time every day doing this, and he loves the rewards system. He says it is easy to use, and he likes the interface. How we Use it with Sissy My older daughter is at a 6th/7th grade level with her subjects. She mostly uses IXL for Language Arts and Math practice. She loves the pins, and she says that getting a new pin is motivation for her to do more. She uses IXL for practice, and I don't even have to tell her to get on the computer and do it. She likes it enough to log on independently. She also likes how simple it is to use. Final Thoughts I love using IXL as a tool to enhance the kids' education. The design, structure and fact that they teach state standards helps my kids learn and gain confidence in learning. While we don't use this as a core curriculum, having this as a supplement has helped my kids enhance their skills and gain confidence! You can find out more by checking out their website and also finding them on Facebook, Pinterest, Twitter, and YouTube. Also, don't forget to check out some of the other reviews by the Homeschool Review Crew about IXL Learning! The answer: 2 and 9. Is that what you came up with? Here's how we get there. Get ready—this is a real tour de force of logic! First of all, the numbers are greater than 1. The second student has already been told the sum and knows it's less than 14. Here are the possible sums he will consider right away (and what he will consider as options for the two numbers): 4 (2 + 2) 5 (2 + 3) 6 (2 + 4, or 3 + 3) 7 (2 + 5, or 3 + 4) 8 (2 + 6, or 3 + 5, or 4 + 4) 9 (2 + 7, or 3 + 6, or 4 + 5) 10 (2 + 8, or 3 + 7, or 4 + 6, or 5 + 5) 11 (2 + 9, or 3 + 8, or 4 + 7, or 5 + 6) 12 (2 + 10, or 3 + 9, or 4 + 8, or 5 + 7, or 6 + 6) 13 (2 + 11, or 3 + 10, or 4 + 9, or 5 + 8, or 6 + 7) If a product is made up of only two prime factors (primes being 2, 3, 5, 7, 11, 13, etc.—i.e., numbers that are divisible by only 1 and themselves), then the sum of its factors is unique. For example, in our list above, 4 can only be made by 2 + 2. The product 2x2 is also 4. So, the second student would assume that if the first student was told that the product is "4," then he would know the sum. The same happens with 5: 5 can only be made by 2 + 3. The product 2x3 is 6. If the first student was told that the product is 6, he would have broken it down into a product of two prime numbers, 2 and 3, and concluded the numbers as 2 and 3. The second student would go through the list of all remaining possibilities and eliminate any pairs of prime numbers: Sum: 6 (2 + 4, or 3 + 3) Sum: 7 (2 + 5, or 3 + 4) Sum: 8 (2 + 6, or 3 + 5, or 4 + 4) Sum: 9 (2 + 7, or 3 + 6, or 4 + 5) Sum: 10 (2 + 8, or 3 + 7, or 4 + 6, or 5 + 5) Sum: 11 (2 + 9, or 3 + 8, or 4 + 7, or 5 + 6) Sum: 12 (2 + 10, or 3 + 9, or 4 + 8, or 5 + 7, or 6 + 6) Sum: 13 (2 + 11, or 3 + 10, or 4 + 9, or 5 + 8, or 6 + 7) But the second student is also very smart. He would also think about what possible products the remaining numbers could make, so he can guess what the first student might be thinking: Sum: 6 (2 + 4 [product: 8]) Sum: 7 (3 + 4 [product: 12]) Sum: 8 (2 + 6 [product: 12], or 4 + 4 [product: 16]) Sum: 9 (3 + 6 [product: 18], or 4 + 5 [product: 20]) Sum: 10 (2 + 8 [product: 16], or 4 + 6 [product: 24]) Sum: 11 (2 + 9 [product: 18], or 3 + 8 [product: 24], or 4 + 7 [product: 28], or 5 + 6 [product: 30]) Sum: 12 (2 + 10 [product: 20], or 3 + 9 [product: 27], or 4 + 8 [product: 32], or 6 + 6 [product: 36]) Sum: 13 (3 + 10 [product: 30], or 4 + 9 [product: 36], or 5 + 8 [product: 40], or 6 + 7 [product: 42]) Now, he will also eliminate any products that only show up once, because otherwise, the first student would have been able to guess the numbers (so, cut 8, 27, 28, 40, and 42—and as a result, that eliminates sum 6 as a possibility): Sum: 7 (3 + 4 [product: 12]) Sum: 8 (2 + 6 [product: 12], or 4 + 4 [product: 16]) Sum: 9 (3 + 6 [product: 18], or 4 + 5 [product: 20]) Sum: 10 (2 + 8 [product: 16], or 4 + 6 [product: 24]) Sum: 11 (2 + 9 [product: 18], or 3 + 8 [product: 24], or 5 + 6 [product: 30]) Sum: 12 (2 + 10 [product: 20], or 4 + 8 [product: 32], or 6 + 6 [product: 36]) Sum: 13 (3 + 10 [product: 30], or 4 + 9 [product: 36]) But also, knowing that the first student knows the sum is less than 14, he'd eliminate any products that could possibly have factors adding to greater than 14: 2x12 = 24 = 3x8 = 4x6 2x14 = 28 = 4x7 2x15 = 30 = 3x10 = 5x6 2x16 = 32 = 4x8 2x18 = 36 = 3x12 = 4x9 = 6x6 2x20 = 40 = 4x10 = 5x8 2x21 = 42 = 3x14 = 6x7 His updated list now looks like this: Sum: 7 (3 + 4 [product: 12]) Sum: 8 (2 + 6 [product: 12], or 4 + 4 [product: 16]) Sum: 9 (3 + 6 [product: 18], or 4 + 5 [product: 20]) Sum: 10 (2 + 8 [product: 16]) Sum: 11 (2 + 9 [product: 18]) Sum: 12 (2 + 10 [product: 20]) Now, since the first student was able to guess the number, this means his product can't be 12 either or else he wouldn't know if the second student's sum is 7 or 8: Sum: 8 (4 + 4 [product: 16]) Sum: 9 (3 + 6 [product: 18], or 4 + 5 [product: 20]) Sum: 10 (2 + 8 [product: 16]) Sum: 11 (2 + 9 [product: 18]) Sum: 12 (2 + 10 [product: 20]) The product can't be 16 either, since otherwise, the first student wouldn't be able to know if the second student's sum is 8 or 10: Sum: 9 (3 + 6 [product: 18], or 4 + 5 [product: 20]) Sum: 11 (2 + 9 [product: 18]) Sum: 12 (2 + 10 [product: 20]) Last, there are two factors at work in how the students know the number: 1. If the product were 20, then the first student would have been stuck (not knowing if the second student had a sum of 18 or 20) 2. If the product is 18, then that eliminates the possibility of a product of 20—which eliminates the possibility of a sum of 9 or 12. The only possibility, then, is a sum of 11, with the product being 18. Which means the numbers have to be 2 and 9. And there is the true beauty of deductive logic in the form of addition and multiplication! Share with friends This is level 1: Given two numbers find their sum and product. You will be awarded a trophy if you get at least 12 answers correct and you do this activity online. Add the two numbers in the orange area and put the sum below the plus sign arrow. Multiply the two numbers in the orange area and put the product below the multiplication sign arrow. © Transum Mathematics 1997-2025 Scan the QR code below to visit the online version of this activity. Close Level 1 - Given two numbers find their sum and productLevel 2 - Given one number and the sum find the other number and the productLevel 3 - Given one number and the product find the other number and the sumLevel 4 - Given the sum and the product find the two numbersLevel 5 - Given the sum and the product find the two numbers (negative numbers)Level 6 - Two Numbers Starter - The numbers will change if you refresh the page. Sum = Product Starter - In the context of family sizes. Oblongs Exercise - Level 2, similar idea but involving the area and perimeter of rectangles. More Number Activities including lesson Starters, visual aids, investigations and self-marking exercises. Answers to this exercise are available lower down this page when you are logged in to your Transum account. If you don't yet have a Transum subscription one can be very quickly set up if you are a teacher, tutor or parent. Log in Sign up I talked about an interesting problem in this post. I had onsite-interviews from Wolfram at the end of April this year, and I decided to talk how to solve the problem using Mathematica. I did some research and realized that the problem is a well-known one which is called the Sum and Product Puzzle (aka the Impossible Puzzle). The Sum and Product Puzzle has several different versions. I reframe the one mentioned in my previous post as follows. Two numbers (not necessarily unique) between 2 and 99 are chosen. The sum of them is told to Sam and the product of them is told to Peter . Sam: "Now I don't know what the 2 numbers are, but I'm sure you don't know either." Peter: "I have to thank you for the information, because I did have no idea of what the 2 numbers are, but now I already know." Sam: "Now the same here." Question: what are the two numbers? Notations R: range of the 2 numbers, which is {2,3,...,99} in this case x0, y0: a (the) solution to the Puzzle "Now I don't know what the 2 numbers are, but I'm pretty sure you don't know either." (exists) multiple pairs of (x, y in R) such that (x+y=x\_0+y\_0) For each pair of (x,y in R) such that (x+y=x\_0+y\_0), (exists) multiple pairs of (x',y' in R) such that (x'times y'=x times y) Let's called the above conditions set I. "I have to thank you for the information, because I did have no idea of what the 2 numbers are, but now I already know." (exists) multiple pairs of (x, y in R) such that (x'times y=x\_0times y\_0) (already in conditions set I). Among all pairs (x,y in R) such that (x'times y=x\_0times y\_0), (exists) an unique pair satisfying conditions set I. Let's called the above conditions set II. "Now the same here" (exists) multiple pairs of (x, y in R) such that (x+y=x\_0+y\_0) (already in conditions set I). Among all pairs (x,y in R) such that (x+y=x\_0+y\_0), (exists) an unique pair satisfying conditions set II. Let's called the above conditions set III. Algorithm to Solve the Sum and Product Puzzle A/The solution (pair of (x\_0, 0) and (y\_0, 0)) must satisfies conditions set I, II and III at the same time. Construct all possible combinations of (x,y in R). Select pairs (among all possible pairs) that satisfy conditions set I, II and III at the same time. Mathematica Code for the Sum and Product Puzzle TwoAddends[s Integer, range\_List] := Module[{lower, upper}, lower = range[[1]]; upper = range[[2]]; Table[{i, s - i}, {i, Max[lower, s - upper], Min[upper, s - lower, s/2]}]; TwoFactors[p Integer, range\_List] := Module[{lower, upper, div, n}, lower = range[[1]]; upper = range[[2]]; div = Select[Divisors[p], # >= Max[lower, p/upper] && # 1 && Apply[And, Length[TwoFactors[Times @@ #, range]] > 1 &/@ candidates]]; P1[pair\_List, range\_List] := Module[{p, candidates}, p = Times @@ pair; candidates = TwoFactors[p, range]; Length[candidates] > 1 && Total[Boole[S1[#, range] &/@ candidates]] == 1]; S2[pair\_List, range\_List] := Module[{s, candidates}, s = Total[pair]; candidates = TwoAddends[s, range]; Length[candidates] > 1 && Total[Boole[P1[#, range] &/@ candidates]] == 1]; SumProductPuzzle[range\_List] := Module[{lower, upper, candidates}, lower = range[[1]]; upper = range[[2]]; candidates = Flatten[Table[{i, j}, {i, lower, upper}, {j, i, upper}], 1]; Select[candidates, S1[#, range] && S2[#, range] &] All code and results for this project are hosted on GitHub at sum.prod. As I will continue to study this problem, it is the best place to find the most updated code and results for this problem. Result Run the function SumProductPuzzle to find a/the solution to the puzzle. SumProductPuzzle[{2, 99}] {{4, 13}} Some Discussions about the Sum and Product Puzzle It is of great interest to find all ranges of the form (l, U) such that there is an unique solution to the puzzle in these ranges. Use the following code to do computation in parallel DistributeDefinitions[TwoAddends, TwoFactors, S1, P1, S2, SumProductPuzzle] r = Table[ParallelSubmit[{i}, SumProductPuzzle][2, i]], {i, 61, 600}] WaitAll[r] The solution depends on the range (can have no, unique or multiple answers). There is no solution in (2, U] for (2 Ue U le 610). As the Mathematica code I wrote is more for illustrating my ideas and runs slowly. I will reimplement the algorithm with previous calculated results cached in Java to further study this problem. Working forwards... These puzzles are useful as a starter or quick introductory activity for expanding standard quadratic expressions. Working backwards... Once students have got the hang of how these work, ask them to work the other way around and provide the product and sum to give the required answers. When dealing with negatives, I ask students to initially ignore the signs and just focus on finding two factors of the top number that they can "use to make" the bottom number. This way of phrasing the process helps them to get round the ever-present issues with negative numbers. We then discuss how the signs can be added to make the puzzle work. Share — copy and redistribute the material in any medium or format for any purpose, even commercially. Adapt — remix, transform, and build upon the material for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the license terms. 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