

Eight by eight multiplication

Business



There is a mental calculation world cup every year and one of the tasks they have to do is to multiply ten eight by eight problems as quickly as they can. Also they have to add ten sets of 10 digit numbers together, calculate the day of the week anything occurred on given a random date between 1600 and 2100, extract the 13th root of a 200 digit number, usually a 16 digit number, and find the square root, cube root, and fourth root of a random eight digit number, so I recall. Now let's say the random eight digit number was 74, 737, 787. You are given another random eight digit number say 74, 657, 484 and are supposed to multiply them together. In our case we have seventy four million seven-hundred thirty seven thousand seven hundred eighty seven multiplied by seventy four million, six hundred fifty seven thousand four hundred eighty four.

Well what methods have we learned so far? There has been the addition method, the subtraction method, the factoring method, and finding the difference method. I would not recommend the addition method, nor would I recommend the subtraction method. The factoring method is definitely out of the question and so is finding the difference method. So what method can we use? Well it's time the reader learned another method. This one is the cross multiplication method.

1. The cross multiplication is just how it sounds, multiply sets of numbers together. To give you an understanding, let's try 56, 421 times 82, 094. This may look hard but it really isn't. With those two numbers try and visualize them as a regular 5 by 5 on paper.

The way we can multiply these together by multiplying by sets. 2. Take the thousands and multiply them together. 3. 56(000) times 82(000) is what.

We'll use one of our four methods to figure out. The best one here might be the addition method. 50(000) times 82(000) is 41(00000000). 4. That is the same thing as 4, 100, 000, 000 but we still have to add the product of 6(000) times our 82(000). 5.

6(000) times 82(000) is 492(000000). 6. When we add 41(00000000) to 492(000000) we get 4592(000000). This is also 4 billion 592 million. 7.

Now keep that number in your brain. 8. Next multiply 56(000) times 94. 9. Now would probably be a good time to use the subtraction method. 1(00) times 56(000) is 56(00000), or 5 million 600 thousand.

10. Now subtract the product of -6 times 56(000) for a product of -336(000). 11. 56(00000) minus 336(000) makes a final result of 5264(000). 12.

Now keep that number in your brain as well. Our next step should be to multiply 82(000) by 421. 13. Now 421 times 8(0000) is 421 times 8 is 3368(0000). 14.

Last 421 times 2(000) is 842(000). 15. Now add 33, 680, 000 to 842, 000 to get 34, 522, 000. 16. The last step is 421 times 94.

17. That is 421 times 100 minus 421 times 6 so we end up with 42, 100 minus 2, 526. 18. When the two numbers are subtracted the total is 40, 000 minus 426 so we get 39, 574. 19.

Now finally add up all of the numbers. $20. 4, 592, 000, 000 + 34, 522, 000 + 5, 264, 000 + 39, 574$ equals 4 billion 631 million, 825 thousand 574.

Without further ado, let's try that beginning problem. 1. $74(000000)$ times $74(000000)$ is $5476(000000000000)$ or 5 quadrillion 476 trillion.

(74 squared is 5476). 2. Next let's multiply $74(000000)$ times $737(000)$. Let's break up 737 to $700 + 37$ and solve. 3.

$74(000000)$ times $7(00000)$ will give you $518(000000000000)$ and now we are left with $37(000)$ times $74(000000)$. 4. 74 is broken apart to 37 times 2 and is then solved. 37 squared is 1369 and multiplying that by 2 gives us 2738. 5.

After adding our dropped off zeros we get $2738(0000000000)$. 6. Now add our two numbers. 7. $518(000000000000) + 2738(0000000000)$ equals $54538(0000000000)$.

8. 5 quadrillion 476 trillion + 54 trillion 538 billion will give us 5 quadrillion 530 trillion 538 billion. 9. We are not done however. Next multiply $74(000000)$ times 787. 10.

Probably best would be to round to 800 and then multiply. When we do that we find that $74(000000)$ times $8(00)$ is $592(00000000)$. 11. After subtracting the product of $74(000000)$ and 13 we find that we end up subtracting $962(000000)$. 12. When we subtract we get $58238(000000)$.

13. Now 5 quadrillion 530 trillion 538 billion plus 58 billion 238 million will give us 5 quadrillion 530 trillion 596 billion 238 million. 14. However we still aren't done yet. Next comes $74(000000)$ times $657(000)$. 15.

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That comes out to be $600(000) + 57(000)$. 16. $74(000000)$ times $6(00000)$ is $444(0000000000) + 74(000000)$ times $57(000)$. 17. I used the addition method to break apart 57 in to $50 + 7$. 18.

$74(000000)$ times $7(000)$ is $518(000000000)$ while $74(000000)$ times $50(000)$ is $3700(000000000)$. 19. $518(000000000) + 3700(000000000)$ is $4218(000000000)$. 20. $4218(000000000)$ plus $444(0000000000)$ equals $48618(000000000)$ 21.

5 quadrillion 530 trillion 596 billion 238 million plus 48 trillion 618 billion gives us 5 quadrillion 579 trillion 214 billion 238 million. 22. Next comes $74(000000)$ times 484. 23. Break apart 484 in to 500 minus 16 and solve.

24. $74(000000)$ times $5(00)$ is $370(00000000)$ and then we subtract $1184(000000)$. 25. 37 billion minus 1 billion 184 million is 35 billion 816 million. 26.

35 billion 816 million + 5 quadrillion 579 trillion 214 billion 238 million equals 5 quadrillion 579 trillion 250 billion 54 million. 27. Next comes $657(000)$ times $737(000)$. 28. $657(000)$ times $737(000)$ is $657(000)$ times $7(00000) +$ the product of $657(000)$ and $37(000)$.

29. When we add these we get $4599(00000000) + 24309(000000)$. 30. 459 billion 900 million plus 24 billion 309 million equals 484 billion 209 million.

31. When we add that to 5 quadrillion 579 trillion 250 billion 54 million we get 5 quadrillion 579 trillion 734 billion 263 million.

32. There is still more! Next is 657(000) times 787. 33. I broke apart 787 in to 800 minus 13 and solved. 34. 657(000) times 8(00) will give you 5256(00000).

35. Now subtract the product of 657(000) times 13. 36. 5256(00000) minus 8541(000) gives us 517059(000) 37. 5 quadrillion 579 trillion 734 billion 263 million plus 517 million 59 thousand equals 5 quadrillion 579 trillion 734 billion 780 million 59 thousand. 38.

Now comes 484 times 787. 39. Break apart 484 into 500 minus 16 and solve. 40. 787 times 500 is 393500.

41. Now multiply 787 times 16 and solve. 42. 787 times 16 is broken apart to 800 times 16 minus 13 times 16. 43.

12800 minus 208 equals 12592. 44. 393500 minus 12592 equals 380908 and add that to 5 quadrillion 579 trillion 734 billion 780 million 59 thousand to get 5 quadrillion 579 trillion 734 billion 780 million 439 thousand 908. 45. And we now are left with one more step.

737(000) times 484. 46. Break apart 484 in to 500 minus 16 and multiply. 737(000) times 5(00) is 3685(00000) 47. Now multiply -16 times 737. 48.

Factor 16 and solve. 49. 737(000) times 4 is 2948(000). Multiply that by 4 to get 11792(000). 50.

3685(00000) minus 11792(000) equals 356708(000) or 356 million 708 thousand. 51. And finally add that to 5 quadrillion 579 trillion 734 billion 780

million 439 thousand 908. 52. If I did everything correct, our answer should be 5 quadrillion 579 trillion 735 billion 137 million 147 thousand 908.

That's how you do cross multiplication!