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Divisibility rule of 13 17 19

A number is divisible by 2 if it is also its last digit (i.e. 0,2,4,6 or 8). A number is divisible by 3 if it is also the sum of its digits. Example: 534: 5 + 3 + 4 = 12 and 1 + 2 = 3 SO 534 is divisible by 3. A number is divisible by 5 if the last digit is 5 or 0. Most people know (only) those 3 rules. Here are my rules for divisibility from the first up to 50. Why only PREMES and not even composite numbers? A number is divisible by a composite if it is also divisible by all major factors (e.g. it is divisible by 21 if divisible by 3 and 7). Small numbers are used in these worked examples, so you may have used a pocket calculator. But my rules apply to any number of digits, while you can't test a number of 30 or more digits on your pocket calculator otherwise. Test for divisibility by 7. Double the last digit and subtract it from the remaining number of truncated leader. If the result is divisible by 7, then it was the original number. Apply this rule over and over as needed. Example: 826. Two times 6 is 12. So take 12 from truncated 82. Now 82-12 is 70. This is divisible by 7, so 826 is divisible by 7 also. Similar rules exist for the first remaining under 50 years of age, namely 11,13, 17,19,23,29,31,37,41,43.31,37,41,43 and 47. Test for divisibility of 11. subtract the last digit from the remaining truncated number. If the result is divisible by 11, then it was the first number. Apply this rule over and over as needed. Example: 19 151 -> 1915-1 = 1914 -> 191-4 = 187 -> 18-7 = 11, so yes, 19 151 is divisible by 11. Test for divisibility by 13. Add four times the last digit to the remaining number of truncated leaders. If the result is divisible by 13, then it was the first number. Apply this rule over and over as needed. Example: 50 661 -> 5066 + 4 = 5070 -> 507 + 0 = 507 -> 50 + 28 = 78 and 78 is 6 * 13, so 50 661 is divisible by 13. Test for divisibility by 17. Subtract five times the last digit from the remaining leader truncated number. If the result is divisible by 17, then it was the first number. Apply this rule over and over as needed. Example: 3978 -> 397-5 * 8 = 357 -> 35-5 * 7 = 0. So 3978 is divisible by 17. Test for the deity by the 19. Add twice the last digit to the remaining leader truncated number. If the result is divisible by 19, then it was the first number. Apply this rule over and over as needed. For example: 101 156 -> 10 115 + 2 * 6 = 10 115 + 2 * 6 = 10 127 -> 1012 + 2 * 7 = 1026 -> 102 + 2 * 6 = 114 and 114 = 6 * 19, so 101 156 is divisible by 19. My original Divisibilty The web page stopped here. However, I have had a number of emails that require divisibility tests for the first larger ones, so I have extended the list up to 50. In fact, even with 37 the most people can't easily do the necessary mental arithmetic, because they can't recognize even a single digit Multiples of two-digit numbers at sight. People no longer taught the multiplication table up to 20*20 as I was as a child. Nowadays we are lucky if they know it up to 10*10. Test for the divinity of 23. 3 times 23 = 69, ends in a 9, then add. Add 7 times the figure to the remaining truncated number. If the result is divisible by 23, then so was the first number. Apply this rule more and more times if necessary. Example: 17 043-->1704+7*3=1725-->172+7*5=207 is 9*23, so 17 043 is also divisible by 23. Divisibility test for 29. Add three times the last digit to the remaining truncated number. If the result is divisible by 29, then so was the first number. Apply this rule more and more times if necessary. Example: 15 689-->1568+3*9=1595-->159+3*5=174-->17+3*4=29, so also 15 689 is divisible by 29. Proof of divisibility by 31. Subtract the last digit from the remaining truncated number three times. If the result is divisible by 31, then so was the first number. Apply this rule more and more times if necessary. Example: 7998-->799-3*8=775-->77-3*5=62 which is two times 31, so also 7998 is divisible by 31. Proof of divisibility by 37. This is (slightly) more difficult, as it necessarily uses a two-digit multiplier, i.e. eleven. Usually people can do multiples to a digit of 11, so we can use the same technique. Subtract eleven times the last digit from the remaining truncated initial number. If the result is divisible by 37, then so was the first number. Apply this rule more and more times if necessary. Example: 23 384-->2338-11*4=2294-->229-11*4=185 which is 5 times 37, so 23 384 is also divisible by 37. Proof of divisibility by 41. Subtract four times the last digit from the remaining truncated number. If the result is divisible by 41, then so was the first number. Apply this rule more and more times if necessary. Example: 30 873-->3087-4*3=3075-->307-4*5=287-->28-4*7=0, the rest is zero and so also 30 873 is divisible by 41. Divisibility test for 43. Now it's starting to get really hard for most people, because the multiplier to use is 13 and most people can't even recognize multiples of 13 to a single digit. It is advisable to make a small list of 13*N first. However, for the sake of completeness, we will use the same method. Add thirteen times the last digit to the remaining truncated number. If the result is divisible by 43, then so was the first number. Apply this rule more and more times if necessary. Example: 3182-->318+13*2=344-->34+13*4=86 which is recognizably double 43, so 3182 is also divisible by 43. Update: Bill Malloy pointed out that since we are working on form43, instead of adding the factor 13 times the last digit, we can subtract 30 times, because 13+30=43. Because I didn't think about it!!! :- (Finally, the divisibility test for 47. This is also difficult for most people, since the multiplier to use is 14 and most people can't even recognize multiples of 14 to a single digit. It is recommended to First a small list of 14 * n. However, for reasons of completeness, we will use the same method. Subtract fourteen times the last digit from the remaining truncated number. If the result is for 47, so also the first number. Apply this rule more and more times if necessary. Example: 34 827-->3482-14*7=3384-->338-14*4=282-->28-14*2=0 , the rest is zero and so 34 827 is divisible by 47. I stopped here at the last first under 50, for arbitrary but pragmatic reasons as explained above. Other blog readers (unfortunately also people from .edu domains, who should be able to do elementary algebra on their own) wondered why sometimes I say ADD and sometimes I say SUBTRACT, and asked me where the seemingly arbitrary factors come from. So let's do some algebra to show the method in my madness. We visualized the recursive divisibility test of the number N as f-M*r where f is the front digits of N, r is the back digit of N and M is some multiplier. And we want to see if N is divisible by some P prime. We need a method to calculate the values of M. What you need to do is calculate (mentally) the smallest multiple of P that ends with a 9 or a 1. If it is a 9 that we are for ADD, then we will use the initial digit (e) of the multiple +1 as our multiplier M. If it's a 1 we'll go to SUBTRACT later. then we'll use the initial number (e) of the multiple as our multiplier M. Example for P=17: three times 17 is 51 which is the smallest multiple of 17 ending with a 1 or 9. Since it's a 1 we'll go to SUBTRACT later. The initial digit is a 5, so we're going to SUBTRACT five times the remainder r. The algorithm has been shown above. Now let's do the algebraic check. By writing N=10f+r, we can multiply by -5 (as shown in the example by 17), getting -5N=-50f-5r. Now we add 51f to both sides (because 51 was the smallest multiple of P=17 to end in a 1 or a 9), giving an f (which we want), so 51f-5N=f-5r. Now, if N is divisible by P (here P=17), we can substitute to get 51f-5*17*x=f-5r and rearrange the left side as 17* (3f-5x) =f-5r and so f-5r is also a multiple of P=17. Now please visit my blog, or take a look at some more interesting math information:-) Index/Home Impressum Sitemap Search A positive integer NNN is divisible by 2\color{#20A900}{\boxed{\mathbf{2}}}}2¢ if the last digit of N NNN is 2, 4, 6, 8, or 0; 3\color{ #20A900}{\boxed{\mathbf{3}}}}3Â¢ â1 if the sum of the NNN digits is a multiple of 3; 4\color{#20A900}{\boxed{\mathbf{4}}}}4Â¢ 900}{\boxed{\mathbf{5}}}5Â¢ if the last digit of NNN is 0 or 5; 6\color{#20A900}{\boxed{\mathbf{6}}}6Â¢Â§ if NNN is divisible by both 2 and 3; 7\color{#20A900}{\boxed{\mathbf{7}}}7Â¢Æ if subtracting twice the last digit of NNN from the remaining digits gives a multiple of 7 (e.g. 658 is divisible by 7 because 65 â 2 x 8 = 49, which is a multiple of 7); 8\color{#20A900}{\boxed{\mathbf{8}}}}}8Â¢ If the last 3 digits of NNN are a multiple of 8; 9\color{#20A900}{\boxed{\mathbf{9}}}9Â¢Â§ If the sum of the NNN digits is a of 9; 10 color {# 20A900} {boxed {mathbf {10}}} 10â € ™ last digit of the nnn is 0; 11 color {# 20a900} {boxed {mathbf {11}}} 11Â »If the IL of the alternating sum of nnn digits is a multiple of 11 (for example, 2343 is divisible for 11 because 2 – 3 + 4 – 3 = 0, which is a multiple of 11;) 12\color{#20A900}{\boxed{\mathbf{12}}12â ï se nnn is divisible both for 3 and for 4. here are some examples questions that can be resolved by oando some of the above divisibility rules. without making the actual division, it shows that the number below is an entire: 1,481,481,46 812.\dfrac{1,481,481,468}{12}.121,481,481,468â§. from the rules of divisibility, we know that a number is divisible for 12 if it is divisible both for 3 and for 4. So, we just have to check that 1,481,481,468 is divisible for 3 and 4. by applying the divisibility test for 3, we obtain this 1+4+8+1+4+6+8=45,1+4+8+1+4+8+1+4+6+8=45,1+4+8+1+4+8+1+4+6+8=45, which is divisible for 3. therefore 1,481,481,468 is divided for 3. applying the divisibility test for 4, we get that the last two digits, 68, are divisible for 4. therefore 1,481,481,468 is also divisible for 4. Now, since we know that 1,481,481,468 is divisible for both 3 and 4, it is divisible for 12. Therefore, 1,481,481,46 812\frac{1,481,481,468}{12}121,481,481,468" will be an entire. "I_\quadrato" finds all possible aa values so that the number 98a6"3⁄4 \overline{98a6}98a6 is a multiple of 3.3.3. according to the rules of divisibility, the number 98a6â,3⁄4 \overline{98a6}98a6 is a multiple of 333 if and only if the sum of its figures 9+8+a+6=23+a 9 + 8 + a + 6 = 23+a9+8+a+6=23+a is a multiple of 3.3.3. since 0â¤aâ¤9 0 \leq a \leq 90â¤a¤9, this means that a=1,4,7 a = 1, 4, 7a=1,4,7 are all possible values. 987 + 987 + 987 + 945 + 5 applying the divisibility rule of 11,11,11, the difference between the sum of figures in odd positions (8+4+6+9=27) (8+4+6+9=27) (8+4+6+9=27) and the sum of figures in equal positions (7+5+3+9=24) (7+5+3+9=24) is 27âvisi ¦3,24=27-24=27â Therefore 874 563 998 745 639 987 456 399 is not divisible for 111 111. «Quadrate» for what values of aaa and bbb is 12abâ¡3⁄4 \overline{12ab} 12ab a multiple of 99?99?99?99?99? Since 99=9#11 99 = 9 \times 11 99=9#11, the number must be a multiple of 999 and 11.11.11. the divisibility rule of 999 tells us that 1+2+a+b 1 + 2 + a + b 1+2+a+b is a multiple of 9.9.9.9. since it is a number from 333 to 21, 21, 21, 21, it must be 999 or 18.18. Now, the rule of divisibility of 111 tells us that 1â¤2+aâ¤b 1 – 2 + a – b 1â¤2+aâ¤b is a multiple of 11.11.11. since it's a number10.10-10-10-10 to 8.8.8.8, must be 0.0.0. Solve {1+2+a+b=91â¤2+aâ¤b=0, \begin{casi} 1 + 2 + a + b = 9 \\ 1 – 2 + a – b0, End {custodies} {1 + 2 + A + B = 91Â¢â'¬ 2 + AÂ¢â'¬ b = 0, Â¢â'¬

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