Rules for Divisibility

Divisible means a number goes into another number exactly, with no remainder.

2 – Look at the last digit. If it is a 0, 2, 4, 6, or 8, the number is even, and divisible by 2.

3 – Add the digits together; if the total is divisible by 3, then the original number was divisible by 3. If you repeat the addition until you get a single-digit answer, it will be a 3, 6, or 9 if the original number was divisible by 3.

4 – Look at the last two digits. If they are divisible by 4, then the original number is also.

5 – Numbers divisible by 5 will always end in a 0 or 5.

6 – A number is divisible by 6 if it is divisible by 2 and also by 3. See rules above.

7 – (The rule for divisibility by 7 is so complicated that it is usually easier and faster to just divide the number by 7. The only reason we teach the 7-divisibilty rule is because it is just plain cool!) Actually, there are two rules. 1.) For a very long number, group it into 3-digit groups (from the right) then alternate subtracting and adding the groups (see example on back) 2.) Take the last digit off. Double it (multiply by 2). Subtract this from the rest of the number. If your answer is divisible by 7, then the original number was also. See example below. Combine these two rules by using rule one until your number is three digits or less, then switch to rule two.

8 – Look at the last three digits. If they are divisible by 8, then the original number is also.

9 – Add the digits together. If your answer is divisible by 9, then the original number is also. If you repeat the addition until you get a single digit number, it will always be a 9 if the original number is divisible by 9. The reason this rule is so close to the rule for 3 is because 9 is 3^2.

10 – The easiest rule ever. If a number is divisible by 10, it will end in a zero.

11 – (This rule is another one that is complicated but cool!) Starting at the right end, count the digits in the number. Then add all the digits in the odd-numbered places together. Now add all the digits in the even-numbered places together. If these two totals are equal, OR have a difference of a multiple of 11, then the original number is divisible by 11. See example on back.

12 – A number is divisible by 12 if it is divisible by both 3 and 4. See rules above.

15 – A number is divisible by 15 if it is divisible by 3 and 5. See rules above.

18 – See rules for 2 and 9

25 – Last two digits will be 25, 50, 75, or 00.

100 – Last two digits will be 00. In fact, for any power of ten, look at the number of final zeros. One zero – divisible by 10. Two zeros, divisible by 100. Three? 1000 and so on…

Example for divisibility by 7: Using rule 1 and rule 2.

Using 363084722 Break the number into 3-digit groups. That's 363,084,715

Now alternate subtraction and addition of the groups. 363 – 084 + 715

So 363 – 084 = 279, and 279 + 715 = 994

Now switch to rule two.

994 Remove the last digit, double it, and subtract from the rest.

99
–8
91 91 is divisible by 7 (7 X 13 = 91) but if you didn't know that, just repeat the rule. Remove the 1, double it, and subtract.

9
–2
7 And 7 is definitely divisible by 7!

Example for divisibility by 7: Using only rule 2.

Using 236481 Remove the last digit, double it, and subtract from the rest.

23648
- 2
23646 Still can't tell? Do it again. Remove the 6, double it, and subtract.

2364
- 12
2352 Still can't tell? Do it again. Remove the 2, double it, and subtract.

235
- 4
231 Still can't tell? Do it again. Remove the 1, double it, and subtract.

23
- 2
21 AHA! 21 is 3 x 7, so 236481 is divisible by 7.

Example for divisibility by 11:

Using 912834615. Count the digits. I've underlined the odd-place digits below.

912834615 Odd places add up to 25 (5+6+3+2+9)
Even places add up to 14 (1+4+8+1)
25 – 14 is 11, so the number is divisible by 11

Now try 21374485. Odd places add up to 17 (5+4+7+1)
Even places add up to 17 (8+4+3+2)
17 = 17, so the number is divisible by 11.