Divisibility Tests

A number is divisible by	if and only if
2 ❖ᵖ	**The number ends in 0, 2, 4, 6, or 8.**
3 ❖ᵖ	**The sum of its digits is divisible by 3.** Example: 49,362 is divisible by 3 because 4 + 9 + 3 + 6 + 2 = 24 which is divisible by 3. Note that the 24 is divisible by 3 because 2 + 4 = 6 which is divisible by 3. If the number is greater than 0 and is divisible by 3, then successively taking its digit sums until you get to a single digit will give you a final single digit of 3, 6, or 9. Example: 614,903 is *not* divisible by 3 because 6 + 1 + 4 + 9 + 0 + 3 = 23 which is *not* divisible by 3. Note: Testing divisibility by taking the sum of all the digits only works for 3 and 9. Do not try to use this method for any other numbers.
4	**The number formed by the last two digits is divisible by 4.** Example: 13,796 is divisible by 4 because 96 is divisible by 4. Example: 40,862 is *not* divisible by 4 because 62 is not divisible by 4.
5 ❖ᵖ	**The number ends in 0 or 5.**
6	**The number is divisible by 2 and by 3.**
7 ᵖ	**Note: While there are several divisibility tests for 7, they are usually so involved that it is easier just to divide by 7. One test is as follows:** **Take the two left-most digits, multiply the left digit by 3 and add it to the second digit. Replace these two digits with the result. Then we can keep repeating, always dealing with only the two left-most digits, until we end up with a small number which is either divisible by 7 or not.** Example: 651. 3×6 + 5 = 23. Replace the 65 with 23 so that you now have 231. 3×2 + 3 = 9. Replace the 23 with 9 so that you now have 91. 3×9 + 1 = 28. 28 is divisible by 7, so 651 is divisible by 7.
8	**The number formed by the last three digits is divisible by 8.** Example: 91,576 is divisible by 8 because 576 is divisible by 8. Example: 13,796 is *not* divisible by 8 because 762 is not divisible by 8.
9	**The sum of its digits is divisible by 9.** Example: 65,763 is divisible by 3 because 6 + 5 + 7 + 6 + 3 = 27 which is divisible by 9. Note that the 27 is divisible by 9 because 2 + 7 = 9 which is divisible by 9. If the number is greater than 0 and is divisible by 9, then successively taking its digit sums until you get to a single digit will give you a final single digit of 9. Example: 624,903 is *not* divisible by 3 because 6 + 2 + 4 + 9 + 0 + 3 = 24 which is *not* divisible by 9.
10 ❖	**The number is divisible by 2 and by 5 which means it must end in 0.**
11 ❖ᵖ	**The difference between the sums of alternate digits is divisible by 11.** Example: In performing this test, remember that 0 is also divisible by 11. Example: In 69,514 the sum of one set of alternate digits is 6 + 5 + 4 = 15 and the sum of the other set of alternate digits is 9 + 1 = 10. The difference between these sums is 15 – 10 = 5 which is not divisible by 11, so 69,514 is *not* divisible by 11.
12	**The number is divisible by 3 and by 4.**

❖ These tests will generally be the most useful to you.

ᵖ These tests are for prime numbers.

Math 41A

Divisibility-Test Worksheet # 1

Circle the divisors in the third column of the number in the ~~first~~ second column.

1.	276,543,200	10, 5, 2, 3, 6, 9, 4, 8, 11, 12
2.	865,594,321	10, 5, 2, 3, 6, 9, 4, 8, 11, 12
3.	801,009,550	10, 5, 2, 3, 6, 9, 4, 8, 11, 12
4.	729,360,546	10, 5, 2, 3, 6, 9, 4, 8, 11, 12
5.	821,191,112	10, 5, 2, 3, 6, 9, 4, 8, 11, 12
6.	864,592,354	10, 5, 2, 3, 6, 9, 4, 8, 11, 12
7.	711,001,111	10, 5, 2, 3, 6, 9, 4, 8, 11 12
8.	821,345,761	10, 5, 2, 3, 6, 9, 4, 8, 11, 12
9.	111,111,111	10, 5, 2, 3, 6, 9, 4, 8, 11, 12
10.	955,646,655	10, 5, 2, 3, 6, 9, 4, 8, 11, 12
11.	169,416,516	10, 5, 2, 3, 6, 9, 4, 8, 11, 12
12.	654,548,986	10, 5, 2, 3, 6, 9, 4, 8, 11, 12
13.	222,222,222	10, 5, 2, 3, 6, 9, 4, 8, 11, 12
14.	737,373,832	10, 5, 2, 3, 6, 9, 4, 8, 11, 12
15.	856,286,592	10, 5, 2, 3, 6, 9, 4, 8, 11, 12
16.	656,200,000	10, 5, 2, 3, 6, 9, 4, 8, 11, 12
17.	849,488,826	10, 5, 2, 3, 6, 9, 4, 8, 11, 12
18.	621,621,683	10, 5, 2, 3, 6, 9, 4, 8, 11, 12
19.	655,332,265	10, 5, 2, 3, 6, 9, 4, 8, 11, 12
20.	412,214,442	10, 5, 2, 3, 6, 9, 4, 8, 11, 12