DIVISIBILITY RULES

- An integer, N, is a **multiple** of b if b can be evenly divided into N.
- If N is a multiple of b, then N is **divisible** by b.
- If N is a multiple of b, then b is a **factor** of N: $N = b \cdot a$

Divisibility Rule for 1: 1 is a factor of every number, and every number is a factor of itself.

Divisibility Rule for 2: 2 is a factor of every even number.

Divisibility Rule for 3: If the sum of the individual digits of a number is a multiple of 3, then *N* is also a multiple of 3

Divisibility Rule for 4: If the last two digits of a number are a multiple of 4, then the entire number is a multiple of 4. (This rule is used for numbers that have at least three digits.)

Divisibility Rule for 5: 5 is a factor of every number that *ends* in either 5 or 0; in other words, the ones digit is either 0 or 5.

Divisibility Rule for 6: If a number is a multiple of both 2 and 3, then it is also a multiple of 6.

Divisibility Rule for 7: If a number, N, is a multiple of 7, then another multiple of 7 can be found by

(i) subtracting the ones digit from N,
(ii) dividing the result by 10, and
(iii) subtracting, from that result, twice the *original* ones digit.

Divisibility Rule for 8: If the last three digits of a number is a multiple of 8, then the entire number is a multiple of 8. (This rule is used for numbers that have at least four digits.)

Divisibility Rule for 9: If the sum of the individual digits is a multiple of 9, then the original number is also a multiple of 9 (and 9 is a factor of that original number).

Divisibility Rule for 10: 10 is a factor of every number that ends in 0. 10 is a factor of every number that has both 2 and 5 as factors.

Divisibility Rule for 11: In a number, N, if the difference of the sum of the even place digits and the sum of the odd place digits is 0 or a multiple of 11, then N is a multiple of 11.

Exercises

1. Organize each set of digits into a whole number that is a multiple of 11.

   a) 2, 4, 5, 6, 8, 9 b) 1, 2, 4, 5, 5, 8 c) 1, 3, 8, 9, 9

2. Based on the divisibility rules, above, determine which of the numbers 2 through 11 are factors of the following.

   a) 462 b) 8,712 c) 2,310