Algebra

I am going to assume that you are already aware of the topics in this lesson. However, I will go over them briefly to brush up and as a reference if and when you need them.

We'll cover the following

- Natural numbers
  - Sum
- Factorial
- Factors and multiples
- Prime numbers
- Modulus operator

Natural numbers

All positive integers starting from 1 $1, 2, 3, 4, 5, 6, 7, 8, \ldots$

Sum

Sum of first n natural numbers is $\frac{n*(n+1)}{2}$

Factorial

Denoted by the exclamation mark symbol.

`n!` is called `n` factorial and its value is defined as:

$n! = 1 \times 2 \times 3 \times \ldots \times n$

i.e., `n!` is the product of the first `n` natural numbers.

Factors and multiples

Factors: A factor of a number is a smaller or equal number such that it divides the

number exactly and gives the remainder zero. For example:

Factors of $12 \rightarrow 1, 2, 3, 4, 6, 12$ **Multiples**: A multiple of a number, n, is a larger number such that the n is a factor of that number. For example:

Multiples of $4 \rightarrow 4, 8, 12, 16, \ldots$

Prime numbers

Prime numbers are natural numbers greater than 1 that cannot be expressed as a product of two smaller natural numbers.

They are natural numbers greater than 1 with only two factors, 1 and the number itself.

$2, 3, 5, 7, 11, \ldots$

Note: A good estimation of the number of primes $< N$ is $logN$. This is useful for complexity analysis.

Modulus operator

The modulus operation between two integers, `a % b`, returns the remainder when `a` is divided by `b`. For example:

5 % 2 = 1

100 % 89 = 11

2 % 5 = 2

9 % 3 = 0

21 % 21 = 0

The result of the modulus operator is 0 if `a` is a factor of `b`.

> We can easily check if a number is even with if `if (x % 2 == 0)`.

In the next lesson, we'll go over some basic geometry topics useful in easy and easy-medium problems that don't require computational geometry.