01. Absolute Value:

>> Hint:

Absolute value of an integer is the non-negative value of an integer without regard to its sign.

02. Convert Celsius To Fahrenheit:

>> Hint:

Following is simple formula to convert Celsius (°C) to Fahrenheit (°F)

°F = °C x 9/5 + 32

Take care of the floating numbers.

03. Quadratic Equation Roots:

>> Hint:

Use the quadratic equation roots formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

If **b^2-4ac >=0**, then roots are real else imaginary.

04. Factorial Of Number:

>> Hint:

Useful links to help you understand the concepts of this problem:

- https://www.geeksforgeeks.org/program-for-factorial-of-a-number/

Factorial of x is the product of all numbers from 1 to x. That is 1*2*3*....*x

Factorial of x can be written as F(x)=x*F(x-1). That is x*(x-1)!

Try using long long in C++ and long in Java instead of int to handle larger numbers.

05. Digits In Factorial:

>> Hint:

Useful links to help you understand the concepts of this problem:

- https://www.geeksforgeeks.org/count-digits-factorial-set-2/

Use logarithm to calculate digits.

Use this method to compute the value of log

C++

`log10(n)`

Java

`Math.log10(n)`

Python

`math.log10(n)`

Javascript

`Math.log10(n)`

we know

log(a*b) = log(a) + log(b)

therefore,

log(n!) = log(1*2*3....... * n) we can write is as log(1) + log(2) + ... +log(n)

Now, observe that the floor value of log base 10 increased by 1, of any number, gives the number of digits present in that number.

Hence, the output would be :

floor(log(n!)) + 1

Example: n = 5

log(5!) = log(1) + log(2) + ... log(5)

0.3 + 0.47 + 0.6 + 0.69 = 2 (floor value)

After adding 1 to the result,

floor(log(n!)) + 1 = 3

06. GP Term:

>> Hint:

Useful links to help you understand the concepts of this problem:

- https://www.geeksforgeeks.org/find-nth-term-geometric-progression-series/

A typical Geometric series can be written as **a, ar, ar^2, ar^3**....... Here 'a' is the first term and 'r' is the common ratio.

n-th term of gp is given by $a_n = ar^{n-1}$

ratio is given by r= (n+1)term/(n)term

07. Primality Test:

>> Hint:

Check for the number of factors. If the factors of a number is 1 and itself, then the number is prime.

You can check this optimally by iterating from 2 to sqrt(n) as the factors from 2 to sqrt(n) have multiples from sqrt(n)+1 to n. So, by iterating till sqrt(n) only, you can check if a number is prime.

08. Exactly 3 Divisors:

>> Hint:

Not many numbers have exactly 3 divisors. You may try writing some numbers (from 1 to 25) with pen and paper and may notice a pattern.

The answer has to do something with prime numbers and perfect squares

The logic behind this is, such numbers can have only three numbers as their divisor and also that include 1 and that number itself resulting into just a single divisor other than number, so we can easily conclude that required are those numbers which are squares of prime numbers so that they can have only three divisors (1, number itself and sqrt(number)). So all primes i, such that i*i is less than equal to N are three-prime numbers.

Now implementation can be better as the constrains are high. Find all the perfect squares less than N (Ofcourse it is sqrt(N)) and iterate over it to check if its prime or not using seive method in sqrt(i) time (where 'i' is the number you checking prime for and it will be less than equal to sqrt(1e9)).

Complexity: sqrt(N)*sqrt(sqrt(N))
Note: We can generate all primes within a set using any sieve method efficiently and then we should all primes i, suct that **i*i <=N.**

09. Addition Under Modulo:

>> Hint:

Use the modulo distributive property:

(a+b)%m = (a%m+b%m) % m

10. Multiplication Under Modulo:

>> Hint:

(a*b)%m=((a%m)*(b%m))%m

11. Modular Multiplicative Inverse:

>> Hint:

a x ≡ 1 (mod m)

The value of x should be in {0, 1, 2, … m-1}, i.e., in the ring of integer modulo m.

The multiplicative inverse of “a modulo m” exists if and only if a and m are relatively prime (i.e., if gcd(a, m) = 1).

A Naive method is to try all numbers from 1 to m. For every number x, check if (a*x)%m is 1.