

In this Video, we are going to learn some Mathematical concepts required for solving problems :

- Find Prime number using Sieve method
- GCD/LCM or Euclid's Algo
- Modular Arithmetics/ Fast Exponentiation

There is a lot to learn, Keep in mind “ Mnn boot karega k chor yr apne se nahi yoga ya maza nahi para, Just ask 1 question “ Why I started ? “

Visit Crio: <https://www.crio.do/redeem/94185a5/>

GCD reference: <https://www.codingninjas.com/blog/202...>

Modular Arithmetics Reference: <https://codeforces.com/blog/entry/72527>

Discord Server Link: <https://discord.gg/feSQvVXMrd>

Course Flow: <https://whimsical.com/dsa-4-placement...>

Homework: at the end of the video.

Notes Link: <https://drive.google.com/file/d/1loIO...>

Code Links: <https://github.com/loveBabbar/CodeHel...>


Question Links:

- Count primes: <https://leetcode.com/problems/count-p...>
- Modular Exponentiation: <https://bit.ly/3peOT9i>

Do provide you feedback in the comments, we are going to make it best collectively.

Telegram Group Link: Love Babbar CODE HELP

<https://telegram.me/lovebabbarcodehelp>



Maths for DSA

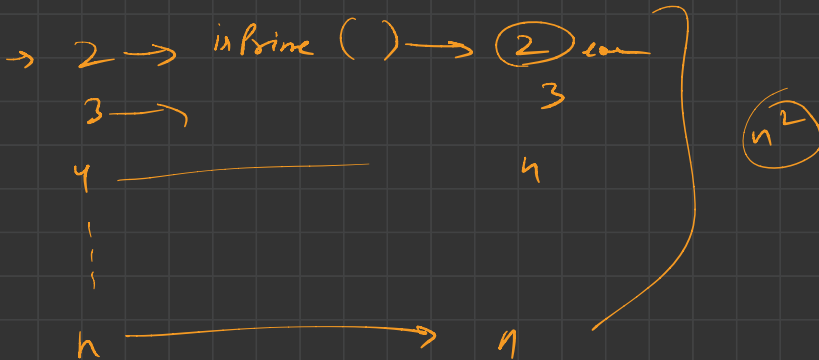
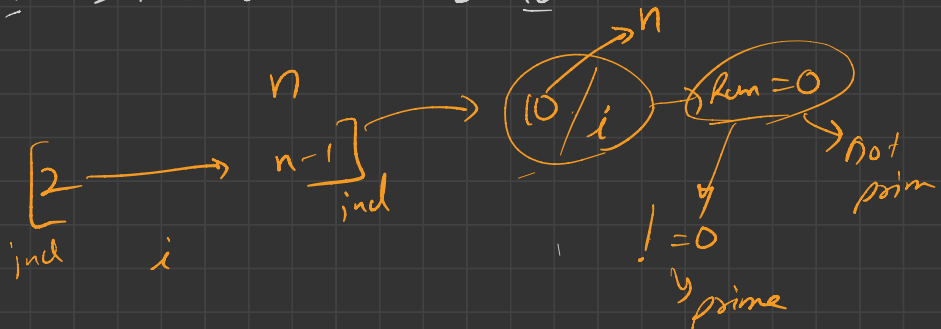
① Prime numbers:-

i/p \rightarrow n

o/p \rightarrow is prime or not

$n \rightarrow 10$

1 2 3 4 5 6 7 8 9 10



→ Sieve of Eratosthenes:-

$$n = 40 \rightarrow o/p - 12$$

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40

App:

① Mark every no as a Prime Number

② Table in acc \downarrow
upto min prime mark
Kardo

→ Complexity $\rightarrow n \rightarrow \text{total}$

$$\left(\frac{n}{2} + \frac{n}{3} + \frac{n}{5} + \frac{n}{7} + \frac{n}{11} - \dots \right)$$

$$n \times \left(\frac{1}{2} + \frac{1}{3} + \frac{1}{5} + \frac{1}{7} + \frac{1}{11} - \dots \right)$$



H.P \rightarrow prime no)



$$\boxed{O(n * \log(\log n))} \rightarrow \text{T.C}$$

Homework \rightarrow Segmented Sieve

GCD / HCF

a & b
↑ ↑

24, 72

$$\begin{array}{r|l} 2 & 24 \\ 2 & 12 \\ 2 & 6 \\ 3 & 3 \\ & 1 \end{array}$$

$$\begin{array}{r|l} 2 & 72 \\ 2 & 36 \\ 2 & 18 \\ 3 & 9 \\ 3 & 3 \\ & 1 \end{array}$$

$$24 := (2 \times 2 \times 2 \times 3)$$

$$72 := (2 \times 2 \times 2 \times 3 \times 3)$$

$$2 \times 2 \times 2 \times 3$$

$$4 \times 6$$

$$= \underline{\underline{24}}$$

$$\gcd(a, b) = \gcd(a - b, b)$$

$$\downarrow$$
$$\gcd(a \% b, b)$$

$$\begin{aligned} \gcd(72, 24) &= \gcd(48, 24) \\ &= \gcd(24, 24) \end{aligned}$$

$$= \gcd(0, 24)$$

↓

24

$$\begin{aligned} \text{lcm}(a, b) \times \gcd(a, b) \\ = a \times b \end{aligned}$$

Relation

$$\boxed{a \% m} \rightarrow \left[\underset{\text{ind}}{0} \rightarrow \underset{\text{ind}}{(n-1)} \right]$$

3 \rightarrow Print as modulo $\boxed{10^9 + 7}$

1st

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

$$a \% m - b \% m = (a - b) \% m$$

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

x, n, m

$$O(n)$$

$$(x^n) \% m$$

$$O(\log n) \rightarrow \underline{\underline{T.C}}$$

→ Sieve of Eratosthenes — / Segmented Sieve

→ GCD / LCM → Code → Article

→ Fast Power → Code → (Modular Arithmetic)
↓
Article

Homeworks

- Pigeonhole Principle
- Catalan numbers
- Inc-Excl Principle

ϕ - Factorial of n

$$(212!) \% m$$

$$ans = 10^9 + 7$$

→ CRT

→ Lucas

→ FL

→ P