(1) optimization — upto 25

first unmarked number would be : * i
& others would be marked by 2 to (: - 1)

2 → 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24

3 → 6, 9, 12, 15, 18, 21, 24

5 → 10, 15, 20, 25
(10, 15, 20 already marked)

7 → 14, 21
(marked)

We don't start from j := 2 * i

↓ start from

j := i * i

j := i * 2, i * 3, i * 4, ... i * i

i * 2, i * 3, 2 * 2 * i — already marked

2 → (: - 1)

2 → i = 1 ⇒ 2 → 4 marked

Optimization -2

outer loop

↓

i = 2 → $\sqrt{n}$

2 → 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24

3 → 6, 9, 12, 15, 18, 21, 24

5 → 10, 15, 20, 25
(already marked)

7 → 14, 21
(marked)

According to [j = i * i]

↳ 7 → 7*7 → 49

↓

We don't need to check

Suppose we have range & find the prime no.

If range more than 10^6 we doesnot array.

```
fun ( )
{
    int a [size];
}
```

Function

int, double, char, array → max size → 10^6
bool → max size → 10^7

Global array

int, double, char, → max size → 10^7
bool → 10^8

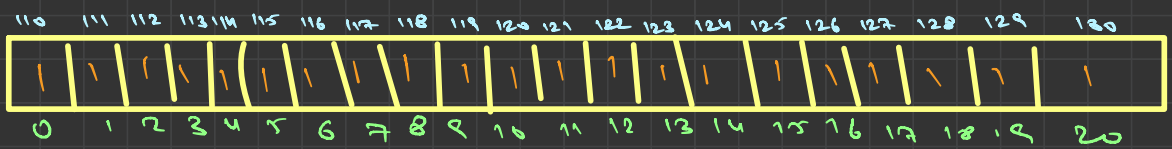
$\Rightarrow \quad 1 \leq (L, R) \leq 10^9$

$\hookrightarrow (R-L) \leq 10^6$

$L = 110, \quad R = 130$

$(R-L+1) = 21$

we make array for $L \rightarrow R$ → segment sieve



① Generate all prime responsible to mark seg sieve

② Mark all prime before $L \rightarrow 110$

↳ using normal sieve

↳ $n = \sqrt{R}$

$n = \sqrt{130} \Rightarrow 11$

hmne nhi pata kon kon non-prime hoga usske liy hmne pehle prime nikol liye sqrt(R) se fir prime ko use krke non-prime hotoyege

```
vector<bool> segSieve(int L, int R){
    vector<bool> sieve = Sieve(sqrt(R));
    vector<int> basePrime;
    for(int i=0; i<sieve.size(); i++){
        if(sieve[i]){
            baseprime.push_back[i];
        }
    }
}
```

③ BasePrime = { 2, 3, 5, 7, 11 }

find first index to start marking

index 0 ⟶ Resemble 110

index 20 ⟶ Resemble 130

Start → ?

↳ Pick base Prime → 2 → first multiple

$L = 110$

$\left(\frac{110}{2}\right) * 2 \Rightarrow 55 * 2 = 110$

Prime = 2 → start marking with 110

Prime 3

↳ $\left(\frac{110}{3}\right) * 3 \Rightarrow 36.6 * 3$

↳ $36 * 3 \Rightarrow 108$

```
if ( first_mul < L )
{
    first_mul += Prime
}
```