Prime

N times $O(N)$

NOT PRIME

i

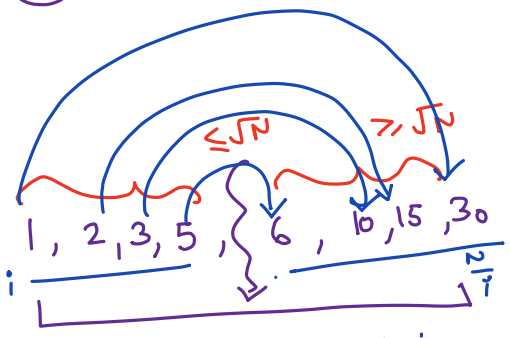
2, 3, 4, 5, 6, 7, 8, 9, 10 →

N

11 → PRIME

Square Root $\sqrt{N}$

30 =



divisors occur in pairs

$i \times x = N$

$1 \times 30 \; x = (N/i)$

2×15

3×10

5×6

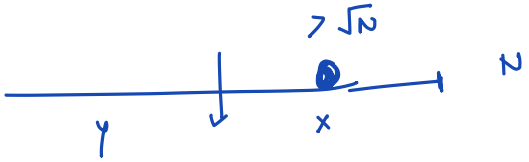
Prove a no is non-prime we must have atleast 1 div $\leq \sqrt{N}$

$a \times b = N$

$\Rightarrow \sqrt{N} \times \sqrt{N} = N$

$x > \sqrt{N}$

$N \% x == 0$



$y \times x = N$

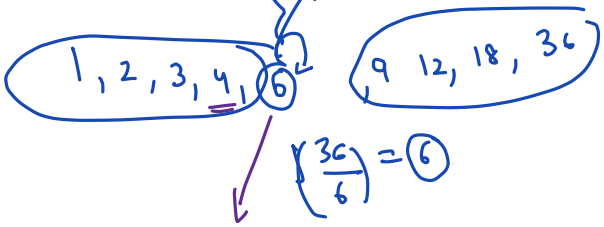
y: less than $\sqrt{N}$

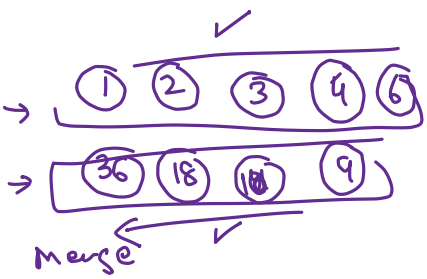
x: $> \sqrt{N}$

36 =

↑ perfect square

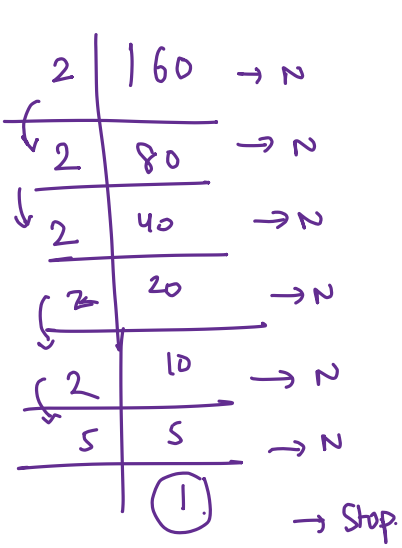
$\sqrt{N}$ Special case

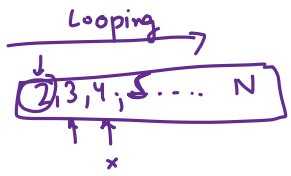




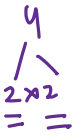

```
if i*i == N:
    print(i)
else
    print(i, n/i)
```

Prime Factorisation



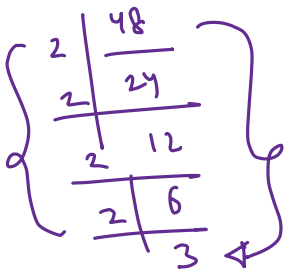


for (i=2 ; i<=N ; i++)



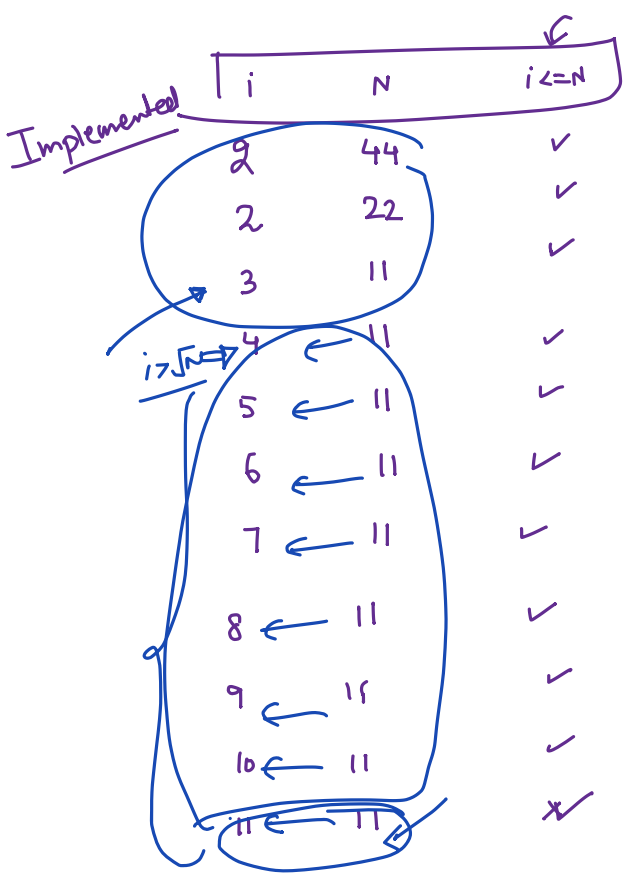
48 = 4 x 12

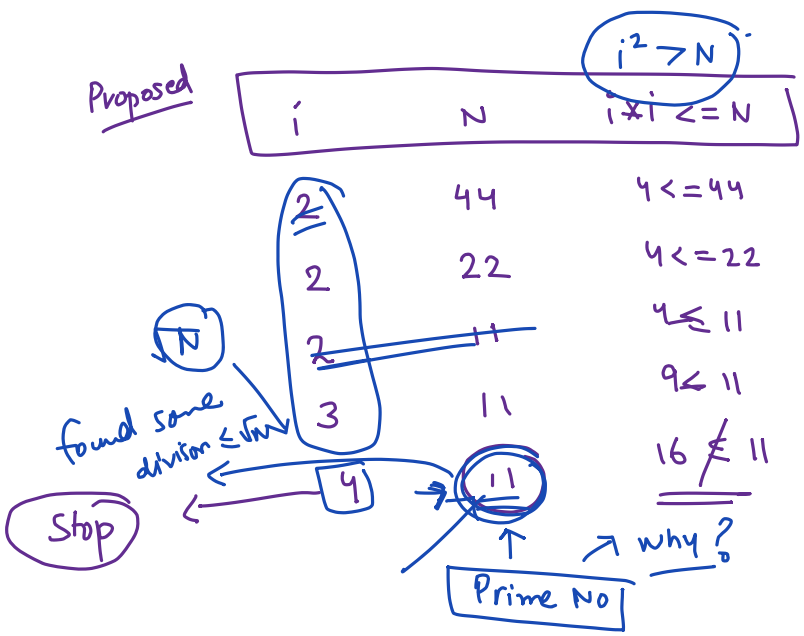
= 2x2x2x2x3



N = 44

i=2 to N






```
if( N != 1) {
    print(N);
```

2x2x11

12 (1) ← (Stop)

i	N	$i^2 <= N$
(2)	10	$4 <= 10$
3	5	$4 <= 10$
(Stop) ← 4	[5] ↑	$16 <= 10$

[2 × 5]

[Least Lowest Common Multiple]

gcd = 4

8 (a) , 12 (b)

LCM formula

GCD * LCM = a * b

$LCM = \frac{a*b}{gcd} = \frac{12 \times 8}{4} 2 = [24]$

Algorithm

12 ← 8

24 ← 8

~~36~~

~~48~~

LCM

20, 30 ← 20

60 ← 20

↑ LCM

20, 25 ← 20

50 ← 20

75 ← 20

100 ← 20 ✓

GCD

	8	12
1		
2	✓	✓
3	x	x
4	✓	✓
5	x	x
6	x	x
7	x	x
min(8,12)		

gcd = 4

GCD ↔ HCF

i = 2 —— min(a,b)

↳ find largest i that divides both a & b.

min(a,b) → Steps

Pen & Paper

a = 25

b = 70

gcd(25,70)

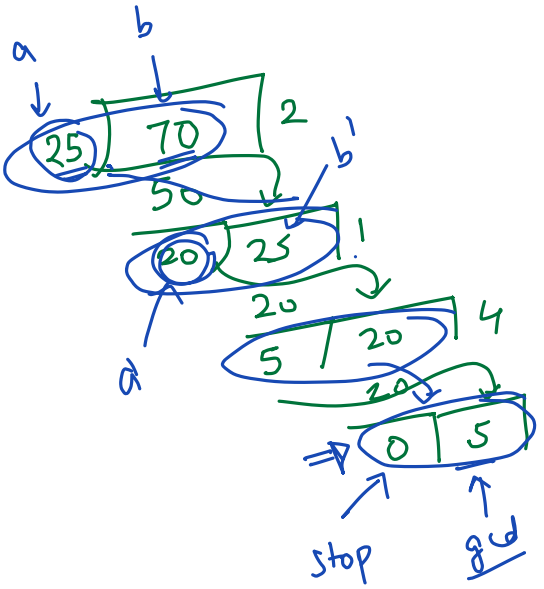
= gcd(20,25)

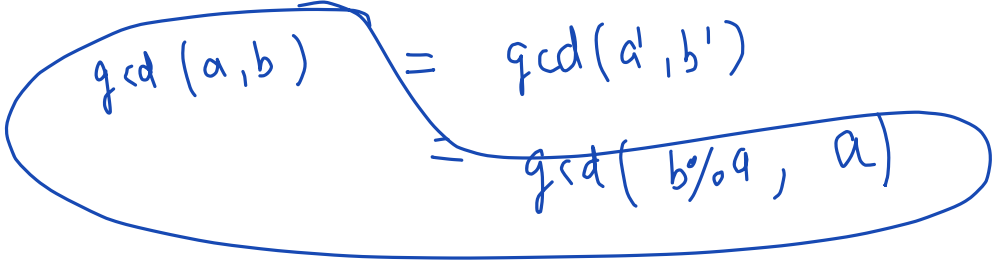
= gcd(5,20)

= gcd(0,5)

gcd = b

a = 0






```
if a==0
    return b;
```