Euclid's Algorithm

GCD LCD

$\Rightarrow$ 4 12

Here 4 is GCD

$4 \rightarrow 2^2 \times 3^0$

$12 \rightarrow 2^2 \times 3$

$GCD - 2^2 \times 3^0$

$LCM = 2^2 \times 3$
$= 12$

12 18

Here 6 is GCD

GCD → Greatest Common Divisor

LCM → Least Common Multiple

GCD:

As $12 \rightarrow 2^2 \times 3$
$18 \rightarrow 2 \times 3^2$

$GCD = 2 \times 3 = 6$

LCD:

As $12 \rightarrow 2^2 \times 3$
$18 \rightarrow 2 \times 3^2$

$LCD = 2^2 \times 3^2 = 36$

Relationship of GCD & LCM:

$12 \rightarrow 2^2 \times 3$ — (1)

$18 \rightarrow 2 \times 3^2$ — (2)

Multiply (1) × (2) and remove the minimum

$2^2 \times \cancel{2} \times \cancel{3} \times 3^2$

$\Rightarrow 2^2 \times 3^2$

$\Rightarrow 36$

if (1) is a and (2) is b, then

$$\boxed{\frac{a \times b}{GCD} = LCM}$$

* For n>2: ~~gcd(a,b~~
gcd(gcd(a,b),c)

*GCD in built function __gcd(a, b)

* Long Divison Method:

```
12)18(1
   12
   --
    6)12(2
      12
      --
       0
```

* Divison → Divident
* Remainder → Divisor

Here GCD is 6

This method is also known Eucliers Algorithm

Time complexin O(log N)

a, b min max do not matter. ↓

```
18)12(0
    0
   ---
   12)18(1
      12
      --
```