* **Natural numbers**: Counting numbers are called Natural numbers. These numbers are denoted by N = {1, 2, 3, ………}
* **Whole numbers**: The collection of natural numbers along with 0 is the collection of Whole number and is denoted by W.
* **Integers**: The collection of natural numbers, their negatives along with the number zero are called Integers. This collection is denoted by Z.
* **Rational number**: The numbers, which are obtained by dividing two integers, are called Rational numbers. **Division by zero is not defined**.
* **Coprime**: If HCF of two numbers is 1, then the two numbers area called relatively prime or coprime.

1. **Euclid’s division lemma :**

For given positive integers ‘a’ and ‘b’ there exist unique whole numbers ‘q’ and ‘r’ satisfying the relation https://elpiscart.com/cgi-bin/mathtex.cgi?%7b\text%7ba%20%7d%7d%20=%20\;%7b\text%7bbq%20%7d%7d%20+%20\;%7b\text%7br%7d%7d,%7b\text%7b%20%7d%7d0\;%20\leqslant%20\;%7b\text%7br%20%7d%7d%20&lt;%20\;%7b\text%7bb%7d%7d..

Theorem: If https://elpiscart.com/cgi-bin/mathtex.cgi?a and https://elpiscart.com/cgi-bin/mathtex.cgi?b are non-zero integers, the least positive integer which is expressible as a linear combination of https://elpiscart.com/cgi-bin/mathtex.cgi?a and https://elpiscart.com/cgi-bin/mathtex.cgi?b is the HCF of https://elpiscart.com/cgi-bin/mathtex.cgi?a and https://elpiscart.com/cgi-bin/mathtex.cgi?b, i.e., if https://elpiscart.com/cgi-bin/mathtex.cgi?d is the HCF of https://elpiscart.com/cgi-bin/mathtex.cgi?a and https://elpiscart.com/cgi-bin/mathtex.cgi?b, then these exist integers https://elpiscart.com/cgi-bin/mathtex.cgi?x_1 and https://elpiscart.com/cgi-bin/mathtex.cgi?y_1, such that https://elpiscart.com/cgi-bin/mathtex.cgi?d%20=%20a%7bx_1%7d%20+%20b%7by_1%7d and https://elpiscart.com/cgi-bin/mathtex.cgi?d is the smallest positive integer which is expressible in this form.

The HCF of https://elpiscart.com/cgi-bin/mathtex.cgi?a and https://elpiscart.com/cgi-bin/mathtex.cgi?b is denoted by HCFhttps://elpiscart.com/cgi-bin/mathtex.cgi?\left(%20%7ba,b%7d%20\right).

2. **Euclid’s division algorithms :**

HCF of any two positive integers a and b. With a > b is obtained as follows:

**Step 1** : Apply Euclid’s division lemma to a and b to find q and r such that

https://elpiscart.com/cgi-bin/mathtex.cgi?%7b\text%7ba%20%7d%7d%20=%20\;%7b\text%7bbq%20%7d%7d%20+%20\;%7b\text%7br%7d%7d\;,%7b\text%7b%20%7d%7d0\;%20\leqslant%20\;%7b\text%7br%20%7d%7d%20&lt;%20\;%7b\text%7bb%7d%7d.

b = Divisor

q = Quotient

r =  Remainder

**Step II**: If r  = 0, HCF (a,b)=b if https://elpiscart.com/cgi-bin/mathtex.cgi?r%20\ne%200, apply Euclid’s lemma to b and r.

**Step III:** Continue the process till the remainder is zero. The divisor at this stage will be the required HCF.

3. **The Fundamental Theorem of Arithmetic :**

Every composite number can be expressed (factorized) as a product of primes and this factorization is unique, apart from the order in which the prime factors occur.

https://elpiscart.com/cgi-bin/mathtex.cgi?Ex:\;\;24%20=%202%20\times%202%20\times%202%20\times%203%20=%203%20\times%202%20\times%202%20\times%202

4. Let https://elpiscart.com/cgi-bin/mathtex.cgi?x%20=%20%7bp%20\over%20q%7d, https://elpiscart.com/cgi-bin/mathtex.cgi?q%20\ne%200  to be a rational number, such that the prime factorization of ‘q’ is of the form 2m+5n, where m, n are non-negative integers. Then x has a decimal expansion which is terminating.

5. Let https://elpiscart.com/cgi-bin/mathtex.cgi?x%20=%20\frac%7bp%7d%7bq%7d,\;\;q%20\ne%200 be a rational number, such that the prime factorization of q is not of the form 2m+5n, where m, n are non-negative integers. Then x has a decimal expansion which is non-terminating repeating.

6. https://elpiscart.com/cgi-bin/mathtex.cgi?\sqrt%20p is irrational, which p is a prime. A number is called irrational if it cannot be written in the form https://elpiscart.com/cgi-bin/mathtex.cgi?\frac%7bP%7d%7bq%7d where p and q are integers and https://elpiscart.com/cgi-bin/mathtex.cgi?%7b\text%7bq%7d%7d\;\,\,%20\ne%20%7b\text%7b%20%7d%7d0.

8. If a and b are two positive integers, then HCF(a, b) x LCM(a, b) = a x b

i.e., (HCF x LCM) of two intergers = Product of intergers.

9. A rational number which when expressed in the lowest term has factors 2 or 5 in the denominator can be written as terminating decimal otherwise a non-terminating recurring decimal. In other words, if the rational number https://elpiscart.com/cgi-bin/mathtex.cgi?%7ba%20\over%20b%7d is, such that the prime factorization of b is of form https://elpiscart.com/cgi-bin/mathtex.cgi?%7b2%5em%7d%7b.5%5en%7d, where m and n are natural numbers, then https://elpiscart.com/cgi-bin/mathtex.cgi?%7ba%20\over%20b%7d has a terminating decimal expansion.

10. We conclude that every rational number can be represented in the form of terminating or non-terminating recurring decimal.