CBSEASSISTANCE.COM

REAL NUMBERS
CLASS 10

Basic Concepts

1. Given positive integers a and b, there exist unique integers q and r satisfying $a = bq + r,\ 0 \leq r < b$. This result is known as **Euclid's division lemma**.
2. An algorithm is a series of well defined steps which gives a procedure for solving a type of problem.
3. A lemma is a proven statement used for proving another statement.
4. HCF of two positive integers a and b is the largest positive integer d that divides a and b.
5. **Euclid's Division Algorithm:** To obtain the HCF of two positive integers, say c and d with $c > d$, we follow the steps below:
   Step 1. Apply Euclid's division lemma to find q and r where $c = dq + r$, $0 \leq r < d$.
   Step 2. If $r = 0$, then, d is the HCF of c and d. If $r \neq 0$, then apply Euclid's division lemma to d and r.
   Step 3. Continue this process till the remainder is zero. The divisor at this stage will be the required HCF.
6. **The Fundamental Theorem of Arithmetic:** Every composite number can be expressed (factorised) as a product of primes, and this factorisation is unique, apart from the order in which the prime factors occur.
   OR
   The prime factorisation of a natural number is unique, except for the order of its factors.
7. Any number which cannot be expressed in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$ is called an irrational number.
8. Let p be a prime number. If p divides a^2, then p divides a, where a is a positive integer.
9. The sum or difference of a rational and an irrational number is irrational.

10. The product and quotient of a non – zero rational number and an irrational number is irrational.
11. Let x be a rational number whose decimal expansion terminates. Then x can be expressed in the form $\frac{p}{q}$, where p and q are coprime and the prime factorisation of q is of the $2^n 5^m$, where n and m are non – negative integers.
12. Let $x = \frac{p}{q}$ be a rational number, such that the prime factorisation of q is of the form $2^n 5^m$, where n and m are non negative inteegers. Then x has a decimal expansion which terminates.
13. If $x = \frac{p}{q}$ is a rational number, such that the prime factorisation of q is of the form $2^n 5^m$, where m and n are whole numbers. If $m = n$, then the decimal expansion of x will terminate after m decimal places of decimal. If $m > n$, then the decimal expansion of x will terminate after m places of decimal. If $n > m$, then the decimal expansion of x will terminate after n places of decimal.
14. Let $x = \frac{p}{q}$ be a rational number, such that the prime factorisation of q is not of the form $2^n 5^m$, where n and m are non – negative integers. Then x has a decimal expansion which is non – terminating repeating (recurring).
15. The decimal expansion of every rational number is either terminating or non – terminating repeating.