CHAPTER : 1 REAL NUMBERS

MIND MAPS
LEARNING MADE SIMPLE

Real Numbers

Theorems

1. Let p be a prime number. If p divides a^2, then p divides a, where a is a positive integer

2. $\sqrt{2}, \sqrt{3}$ are irrational

3. Let x be a rational number whose decimal expansion terminates. Then x can be expressed in the form, $\frac{p}{q}$ where p & q are coprime, the prime factorisation of q is of the form $2^n 5^m$ where n, m are non-negative integers

4. 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, m are non-negative integers. Then, x has a decimal expansion which terminates.

5. Let $x = \frac{p}{q}$ be a rational number, such that the prime factorisation of q is not of the form of $2^n 5^m$ where n, m are non-negative integers. Then, x has a decimal expansion which is non-terminating repeating

Euclid's

Division Lemma
Given positive integers a and b, there exist unique integers q and r satisfying $a = bq + r$; $0 \le r < b$

Division Algorithm
Steps to obtain the HCF of two positive integers, say c and d, with $c > d$

Step 1: Apply Euclid's Division Lemma, to c & d. $c = dq + r$

Step 2: If r = zero, d is the HCF of c and d If $r \neq 0$, apply Euclid' s Division to d and r

Step 3: Continue the process till the remainder is zero

Prime Factorization Method

For any two positive integers, a and b
HCF $(a, b) \times$ LCM $(a, b) = a \times b$
For Example
$f(x) = 3x^2y$
$g(x) = 6xy^2$
HCF $= 3xy$
LCM $= 6x^2y^2$

Fundamental Theorem of Arithmetic

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

Composite Number
$x = P_1 \times P_2 \times P_3 \ldots \times P_n$, where $P_1 P_2 \ldots P_n$ are prime numbers