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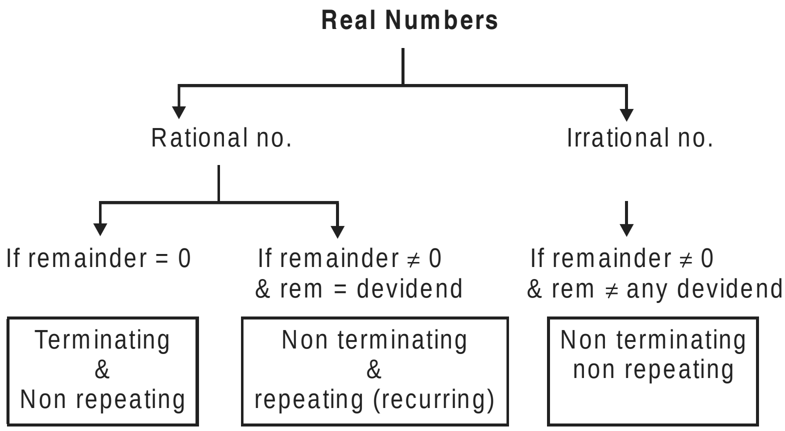
Real Number

Fundamentals:



Eg : $\frac{18}{5} = 3.6$ Eg : $\frac{1}{3} = 0.33....$ Eg : 0.671234.....

- If a is a real number, modulus a is written as |a|; |a| is always positive or zero.
- All natural number which cannot be divided by any number other than 1 and itself is called a prime number.
- A non-negative integer *'p'* is said to be divided by an integer *'q'* if there exists an integer *'d'* such that:
  $p = qd$
- ±1 divides every non-zero integer.
- 0 does not divide any integer.

Euclid's Division Lemma: Let *a* and *b* be any two positive integers, then there exists unique integers *q* and *r* such that: $a = bq + r,\ 0 = r < b$

Euclid's Division Algorithm: Let *a* and *b* be any two positive integers such that $a > b$ and *'q'* and *'r'* as quotient and remainder

Take *a* as dividend and *b* as divisor $a = bq + r,\ 0 < r < b$

Then every common divisor of *a* and *b* is a common divisor of *b* and *r*.

- Finding HCF of two positive integers using Euclid's Division Algorithm:
  Step 1: *Apply Euclid's lemma to a and b:* $a = bq_1 + r_1$
  Step 2: *If* $r_1 = 0$*, then HCF = b.*
  Step 3: *If* r_1 *? 0, then again apply Euclid's lemma:* $b = q_1r_1 + r_2$
  Step 4: *If* $r_2 = 0$*, then HCF =* r_1.
  Step 5: If r_2 ? 0, then again apply Euclid's lemma till remainder $r_n = 0$, then the divisor is *HCF*.

Fundamental Theorem of Arithmetic:

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

Important Theorems:

1. Let *p* be a prime number and *a* be a positive integer. If *p* divides a^2, then *p* divides
2. Consider two positive integers *a* and *b*, then $LCM \times HCF = a \times b$.

3. Let x be a rational number whose decimal expansion terminates. Then we can express x in the form $\frac{p}{q}$, where p and q are co-prime and the prime factorisation of q is of the form 2^n5^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^n5^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 2^n5^m, where n, m are non-negative integers. Then x has a decimal expansion which is non-terminating repeating.