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Real Numbers Class 10 Notes: Chapter 1

1. Find the HCF (using Euclid's division algorithm)

(a) 12576 & 4052

(b) 404 & 96

(c) 126, 312 & 448

(d) 4578, 3256 & 1254

2. Find the HCF (using Euclid's division algorithm) of 404 and 96 , also find the value of x and y if HCF = 404x + 96y.
3. Find the HCF (using Euclid's division algorithm) of 12576 and 4052, also find the value of m and n if HCF = 12576 m + 4052n.

Method of Finding HCF

H.C.F can be found using two methods – Prime factorisation and Euclid's division algorithm.

- Prime Factorisation:
    - Given two numbers, we express both of them as products of their respective prime factors. Then, we select the prime factors that are common to both the numbers

- Example – To find the H.C.F of 20 and 24
  20=2×2×5 and 24=2×2×2×3
- The factor common to 20 and 24 is 2×2, which is 4, which in turn is the H.C.F of 20 and 24.

Euclid's Division Algorithm:

- It is the repeated use of Euclid's division lemma to find the H.C.F of two numbers.
- Example: To find the HCF of 18 and 30
  Finding the HCF of 18 and 30
- The required HCF is **6**.

Revisiting Irrational Numbers

Irrational Numbers

Any number that cannot be expressed in the form of p/q (where p and q are integers and q≠0.) is an irrational number. Examples √2,π, e and so on.

Number theory: Interesting results

- If a number p (a prime number) divides a_2, then p divides a. Example: 3 divides 6_2 i.e 36, which implies that 3 divides 6.
- The sum or difference of a rational and an irrational number is irrational
- The product and quotient of a non-zero rational and irrational number are irrational.
- √p is irrational when 'p' is a prime. For example, 7 is a prime number and √7 is irrational. The above statement can be proved by the method of "Proof by contradiction".

Proof by Contradiction

In the method of contradiction, to check whether a statement is TRUE

(i) We assume that the given statement is TRUE.

(ii) We arrive at some result which contradicts our assumption, thereby proving the contrary.

Eg: Prove that √7 is irrational.

Assumption: √7 is rational.

Since it is rational √7 can be expressed as

√7 = a/b, where a and b are co-prime Integers, b ≠ 0.

On squaring, $a^2/b^2=7$

$\Rightarrow a^2=7b^{2.}$

Hence, 7 divides a. Then, there exists a number c such that a=7c.

Then, $a^2=49c^2$.

Hence, $7b^{2.}= 49c^2$ or $b^{2.}= 7c^2$

Hence 7 divides b.

Since 7 is a common factor for both a and b,

it contradicts our assumption that a and b are co-prime integers.

Hence, our initial assumption that √7 is rational is wrong. Therefore, √7 is irrational.