Real Numbers Definition Examples Properties Symbol Chart

1. Euclid's Division lemma:- Given Positive integers a and b there exist unique integers q and r satisfying

a=bq +r, where 0 $\leq$r<b, where a, b, q and r are respectively called as dividend, divisor, quotient and remainder.

2. Euclid's division Algorithm:- To obtain the HCF of two positive integers say c and d, with c>0, follow the steps below:

Step I: Apply Euclid's division lemma, to c and d, so we find whole numbers, q and r such that c =dq+r, 0 $\leq r < d$

Step II: If r=0, d is the HCF of c and d. If r $\neq 0$, *apply the* division lemma to d and r.

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

3. The Fundamental theorem of Arithmetic:-

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

Ex.: $24 = 2\ X\ 2\ X\ 2\ X\ 3 = 3\ X\ 2\ X\ 2\ X\ 2$

Theorem: LET x be a rational number whose decimal expansion terminates. Then x can be expressed in the form

Of $\frac{p}{q}$ where p *and* q are co-prime and the prime factorisation of q is the form of $2^n.5^m$, where n, m are non negative integers.

Ex. $\frac{7}{10} = \frac{7}{2\,X\,5} = 0.7$

1. If the H C F of 657 and 963 is expressible in the form of 657x + 963x - 15 find x.Definition (Ans:x=22)

Ans: Using Euclid's Division Lemma

$$a = bq + r,\ o \leq r < b$$
$$963 = 657 \times 1 + 306$$
$$657 = 306 \times 2 + 45$$
$$306 = 45 \times 6 + 36$$
$$45 = 36 \times 1 + 9$$
$$36 = 9 \times 4 + 0$$
$$\therefore \text{HCF}(657, 963) = 9$$
$$\text{now}\quad 9 = 657x + 963 \times (-15)$$
$$657x = 9 + 963 \times 15$$
$$= 9 + 14445$$
$$657x = 14454$$
$$x = 14454/657$$
$$\boxed{x = 22}$$

2. Express the GCD of 48 and 18 as a linear combination. (Ans: Not unique)

$A = bq + r$, where $o \leq r < b$

$48 = 18 x 2 + 12$

$18 = 12 x 1 + 6$

$12 = 6 x 2 + 0$

$\therefore$ HCF $(18,48) = 6$

now $6 = 18 - 12 x 1$

$6 = 18 - (48 - 18 x 2)$

$6 = 18 - 48 x 1 + 18 x 2$

$6 = 18 x 3 - 48 x 1$

$6 = 18 x 3 + 48 x (-1)$

i.e. $6 = 18x + 48y$

$\therefore$ $\boxed{x = 3,\ y = -1}$

$6 = 18 \times 3 + 48 \times (-1)$

$= 18 \times 3 + 48 \times (-1) + 18 \times 48 - 18 \times 48$

$= 18(3 + 48) + 48(-1 - 18)$

$= 18 \times 51 + 48 \times (-19)$

$6 = 18x + 48y$

$\therefore$ $\boxed{x = 51,\ y = -19}$