AILET

Maths: HCF and LCM for CLAT

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Some basic Concepts of HCF and LCM for CLAT

Given below are some basic concepts to get you up to speed on HCF and LCM for CLAT and other law entrances.

- Factors/Multiples: Suppose we divide a number a with b, if a gets exactly divided by b then a is a factor of b and b would be a multiple of a.
- Highest Common Factor(HCF) or Greatest Common Divisor(GCD): HCF is a number that divides two or more numbers without leaving a reminder in any of them.

Let’s understand this in a simpler way to retain it without confusion:

Example: Suppose you have **12 green and 16 red balls** and you are asked to form of groups using these balls in such a way that all the groups constitute an equal number of balls, the maximum number of balls of the same colour.

There are different ways of making these groups:-

1. Prime Factorization: Finding all the prime factors of two numbers then comparing those to get the common factors.

Prime Factors of 12: 2*2*3

Prime Factors of 16: 2*2*2*2

Common factors: 2*2 = 4

Hence HCF would be 4 as 4 is the highest number that can divide both 12 and 16 without leaving a remainder.

1. Factorization: Finding all the factors of two numbers then comparing those to get the highest common factor.

Factors of 12: 1, 2, 3, 4, 6, 12

Factors of 16: 1, 2, 4, 8, 16

Now compare the factors to get common factors that are 2 and 4

But as the name suggests we need the highest common number hence 4 would be our answer.

Also in our question, we are asked to make a group with maximum possible balls in one group that way ***again 4 is the only possible answer****.*

1. Division Method: Dividing the bigger number with the smaller one.

Step 1: Higher number is the dividend, the Smaller one is divisor; Divide and get the remainder.

Step 2: Use the remainder as divisor and earlier divisor as dividend.

Step 3: Follow the same steps until you get remainder 0. Whatever the last divisor is you HCF.

Applying the division method in the previous example:

12) 16 (1

12

4) 12 (3

12

0

Divisor 4 will give us the remainder as 0, hence 4 is the HCF.

Let’s take another example to understand division method more clearly:

Example: Find HCF of 64, 136

64) 134 (2

128

6) 64 (10

60

4) 6 (1

4

2) 4 (2

4

0

HCF= 2 (last divisor)

In the above example, we found the **HCF (2) of 134 and 64** using division method. Be careful when you are using this method as a miss in any intermediate step would lead you in wrong direction.

CHECK: **using prime factorization method**

64: 2*2*2*2*2*2

134: 2*67

HCF: 2

If there are more than 2 numbers then it's advised to use factorization or prime factorization method.

- Least Common Multiple(LCM): LCM of two or more numbers is that number which is exactly divisible by each of them.

Example: Consider two numbers 15 and 18

Multiples of 15: 15, 30, 45, 60, 75, **90**, 105, 120, 135, 150, 165, **180**....

Multiples of 18: 18, 36, 54, 72, **90**, 108, 126, 144, 162, **180**, 198,....

Common multiples: 90, 180, 270,... (multiples of 90)

***LCM** would be the smallest number of common multiple list i.e., 90.*

Different methods to calculate LCM :

1. Prime Factorization: For LCM break the numbers in terms of prime factors them compare them to get all the prime numbers from each number combined together.

LCM (15, 18)

Prime factors:

15: 3*5

18: 2*3*3

Prime numbers from both the number: 2,3,5; we write all the prime numbers with the highest power and multiply them to get LCM.

As in number 18 3 appears twice so you have to consider 3 twice in LCM

LCM would be: 2*3*3*5

Here, keep in mind that you are considering all the prime numbers from all numbers.

1. Division Method: Try recalling your 6-7th standard days when you used to divide 3-4 numbers with the prime numbers in column form. Yaa that's how you calculate LCM.

In this method divide all the numbers with the common number until no two numbers are further divisible.

Example: Find LCM of 84, 196, 210

2 | 84, 196, 210

2 | 42, 98, 105

3 | 21, 49, 105

7 | 7, 49, 35

| 1, 7, 5

LCM= product of divisors and the remaining numbers

2*2*3*7*7*5 = 2940

- Relationship between HCF and LCM

Product of LCM and HCF = Product of numbers

Example: LCM (14, 54) = 378 & HCF(14, 54) = 2

LCM * HCF = 756 & Product of numbers = 14*54 = *756*

Products in both cases are equal hence proving the theory we just learned.

- LCM and HCF of Fractions

Example: *LCM of 1/5 and 2/3* = LCM (1,2) / HCF(5,3)

= *2/1 = 2*

HCF of 1/5 and 2/3 = HCF(1,2) / LCM(5,3)

= 1/15

- Note: Numbers whose HCF is 1 are called Co- Primes.

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