LCM and HCF

LCM (Least Common Multiple)

LCM of two or more numbers is their least common multiple. LCM of 4 and 6 is 12, it means, 12 is the least common multiple of 4 and 6, therefore, 12 is exactly divisible by each of 4 and 6.

LCM by Prime Factorization Method

The following steps are used to determine the LCM of two or more numbers by prime factorisation method:
Step 1: Find the prime factors of each number.
Step 2: Product of highest power of prime factors is their LCM.

LCM by Division Method

The following steps are used to determine the LCM of two or more numbers by division method:
Step 1: Numbers are arranged or separated in a row by commas.
Step 2: Find the number which divides exactly atleast two of the given numbers.
Step 3: Follow step 2 till there are no numbers (atleast two) divisible by any number.
Step 4: LCM is the product of all divisors and indivisible numbers.

Example:
Find the least number which is exactly divisible by each of 28 and 42.
(a) 64 (b) 84
(c) 52 (d) All of these
(e) None of these
Answer (b)

Explanation: $28 = 2 \times 2 \times 7,\ 42 = 2 \times 3 \times 7$
$\text{LCM} = 2 \times 2 \times 3 \times 7 = 84$

HCF (Highest Common Factor)

Highest Common Factor is also called Greatest Common Measure (GCM) or Greatest Common Divisor (GCD). H.C.F of two or more numbers is the greatest number which exactly divides each of the numbers.

HCF by Prime Factorization Method

The HCF of two or more numbers is obtained by the following steps:
Step 1: Find the prime factors of each of the given number.
Step 2: Find the common prime factors from prime factors of all the given numbers.
Step 3: The product of the common prime factors is their HCF.

HCF by Continued Division Method

The HCF of two or more numbers can also be obtained by continued division method. The greatest number is considered as dividend and smallest number as divisor.

Follow the following steps to perform the HCF of the given numbers:
Step 1: Divide the greatest number by smallest.
Step 2: If remainder is zero, then divisor is the HCF of the given number.
Step 3: If remainder is not zero then, divide again by considering divisor as new dividend and remainder as new divisor till remainder becomes zero.
Step 4: The HCF of the numbers is last divisor which gives zero remainder.

HCF of more than two Numbers

The HCF of more than two numbers is the HCF of resulting HCF of two numbers with third number. Therefore, HCF of more than two numbers is obtained by finding the HCF of two numbers with third, fourth and so on.

HCF of Larger Numbers

The HCF of smaller number (One or two digit numbers) is simply obtained by division but division of larger numbers take more time, therefore, the shortest method for finding the HCF of larger numbers is performed by the following method.

Step 1: Divide all the given numbers by the common divisor which divide all numbers exactly till last.

Step 2: Divide the numbers which are obtained in step 1 by another divisor if divisible.

Step 3: The required HCF is the product of common divisors.

Properties of HCF and LCM

- The product of HCF and LCM of two numbers a and b is always equal to their product, therefore, LCM of a and $b \times$ HCF of a and $b = a \times b$
- HCF of two or more numbers is not greater than any of the numbers.
- LCM of two or more numbers is not less than any of the numbers.
- HCF of two co-prime numbers is 1.
- LCM of co-primes is equal to their product.
- The HCF of two or more numbers is always a factor of their LCM.

Example:

Find the HCF of 89, 32 and 11.

(a) 2 (b) 5

(c) 1 (d) 23

(e) None of these

Answer (c)

Explanation: $89 = 1 \times 89, 32 = 1 \times 2 \times 2 \times 2 \times 2 \times 2,\ 11 = 1 \times 11$

So, HCF $= 1$

Example:

Find the product of LCM and HCF of 45 and 35.

(a) 1575 (b) 1685

(c) 1525 (d) 1765

(e) None of these

Answer (a)

Explanation: As, we know that the product of two numbers

$=$ their HCF $\times$ their LCM

So, required product $= 45 \times 35 = 1575$