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Real Number

Fundamental Theorem of Arithmetic:

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

This theorem also says that the prime factorisation of a natural number is unique, except for the order of its factors.

For example, 20 can be expressed as 2×2×52×2×5

Using this theorem, the LCM and HCF of the given pair of positive integers can be calculated.

LCM = Product of the greatest power of each prime factor, involved in the numbers.

HCF = Product of the smallest power of each common prime factor in the numbers.

Exercise 1.2 (NCERT)

Question 1: Express each number as a product of its prime factors:

(i) 140   (ii) 156   (iii) 3825   (iv) 5005   (v) 7429

Solution:

   i. $140 = 2 \times 2 \times 5 \times 7 = 2^2 \times 5 \times 7$

Question 2: Find the LCM and HCF of the following pairs of integers and verify that

LCM × HCF = product of the two numbers.

(i) 26 and 91   (ii) 510 and 92   (iii) 336 and 54

Q. (i) 26 and 91

Solution: The prime factors of $26 = 2^1 \times 13^1 = 2^1 \times 7^0 \times 13^1$

       The prime factors of $91 = \times 7 \times 13 = 2^0 \times 7^1 \times 13^1$

Therefore, LCM = [**Product of the greatest power of each prime factor, involved in the numbers.**]

      LCM = $2^1 \times 7^1 \times 13^1 = 182$

And, HCF = [**Product of the smallest power of each common prime factor in the numbers.**]

    HCF = $2^0 \times 7^0 \times 13^1 = 1 \times 1 \times 13^1 = 13$

verify

Now, LCM×HCF=182×13=2366

Product of given numbers =26×91=2366

Therefore, LCM × HCF = Product of the given two numbers *Verified*

Question 3: Find the LCM and HCF of the following integers by applying the prime factorization method.

(i) 12, 15 and 21   (ii) 17, 23 and 29   (iii) 8, 9 and 25

(i) 12, 15 and 21

Solution: Prime factors of $12=2×2×3=2^2×3^1 ×5^0×7^0$

Prime factors of $15=3^1×5^1 =2^0×3^1 ×5^1×7^0$

Prime factors of $21=3^1×7^1 =2^0×3^1 ×5^0×7^1$

Therefore, LCM = [Product of the greatest power of each prime factor, involved in the numbers.]

LCM $=2^2×3^1 ×5^1×7^1$ = 420 *Answer*

HCF = [Product of the smallest power of each common prime factor in the numbers.]

HCF = $2^0×3^1 ×5^0×7^0$= 3 *Answer*

Remaining questions do your self