Exercise 1.1

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

(i) **140** 140=2×70=2×2×35=22×5×7

(ii) **156** 156=2×78=2×2×39=22×3×13

(iii) **3825** 3825=3×1275=3×3×425=32×5×85=32×5×5×17=32×52×17

(iv) **5005** 5005=5×1001=5×7×143=5×7×11×13

(v) **7429** 7429=17×437=17×19×23

2. Find the LCM and HCF of the following pairs of integers and verify that $LCM \times HCF = $ product of the two numbers.

(i) **26 and 91** Prime factorization: 26=2×13 91=7×13 HCF(26, 91) = 13

LCM(26, 91) =

2×7×13=182

Verification: LCM×HCF=182×13=2366 Product of the numbers = 26×91=2366 Hence, $LCM \times HCF = $ product of the two numbers is verified.

(ii) **510 and 92** Prime factorization: 510=2×3×5×17 92=22×23 HCF(510, 92) = 2

LCM(510, 92) =

22×3×5×17×23=23460

Verification: LCM×HCF=23460×2=46920 Product of the numbers = 510×92=46920 Hence, $LCM \times HCF = $ product of the two numbers is verified.

(iii) **336 and 54** Prime factorization: 336=24×3×7 54=2×33 HCF(336, 54) =

21×31=6

LCM(336, 54) =

24×33×7=16×27×7=3024

Verification: LCM×HCF=3024×6=18144 Product of the numbers = 336×54=18144 Hence, $LCM \times HCF = $ product of the two numbers is verified.

3. Find the LCM and HCF of the following integers by applying the prime factorisation method.

(i) **12, 15 and 21** Prime factorization: 12=22×3 15=3×5 21=3×7 HCF(12, 15, 21) = 3

LCM(12, 15, 21) =

22×3×5×7=4×3×5×7=420

(ii) **17, 23 and 29** Prime factorization: 17=17 (prime) 23=23 (prime) 29=29 (prime) HCF(17, 23, 29) = 1 LCM(17, 23, 29) = 17×23×29=11339

(iii) **8, 9 and 25** Prime factorization: 8=23 9=32 25=52 HCF(8, 9, 25) = 1 (as there are no common prime factors) LCM(8, 9, 25) = 23×32×52=8×9×25=72×25=1800

4. Given that HCF (306, 657) = 9, find LCM (306, 657). We know that for any two positive integers a and b,

HCF(a,b)×LCM(a,b)=a×b.

Given HCF(306, 657) = 9. So, 9×LCM(306,657)=306×657 LCM(306,657)=9306×657 LCM(306,657)=34×657 LCM(306,657)=22338

5. Check whether 6n can end with the digit 0 for any natural number n. If

6n were to end with the digit 0, then it would be divisible by 5. This means that the prime factorization of 6n would contain the prime 5.

However, the prime factorization of 6n is (2×3)n=2n×3n. According to the Fundamental Theorem of Arithmetic, the prime factorization of a number is unique. This means that the only primes in the factorization of

6n are 2 and 3.

Therefore, there is no natural number n for which

6n ends with the digit zero.

6. Explain why 7×11×13+13 and 7×6×5×4×3×2×1+5 are composite numbers.

- **For 7×11×13+13:** We can take 13 as a common factor: 7×11×13+13=13×(7×11+1) =13×(77+1) =13×78 Since 78 can be further factorized as 2×3×13, we have: 13×78=13×2×3×13=2×3×132 Since the number can be expressed as a product of prime numbers (2, 3, and 13), it is a composite number.
- **For 7×6×5×4×3×2×1+5:** We can take 5 as a common factor: 7×6×5×4×3×2×1+5=5×(7×6×4×3×2×1+1) =5×(1008+1) =5×1009 To determine if 1009 is prime, we can try dividing it by small prime numbers. Upon checking, 1009 is a prime number. Since the number can be expressed as a product of two prime numbers (5 and 1009), it is a composite number.

7. There is a circular path around a sports field. Sonia takes 18 minutes to drive one round of the field, while Ravi takes 12 minutes for the same. Suppose they both start at the same point and at the same time, and go in the same direction. After how many minutes will they meet again at the starting point?

To find when they will meet again at the starting point, we need to find the least common multiple (LCM) of the time taken by Sonia and Ravi. Time taken by Sonia = 18 minutes Time taken by Ravi = 12 minutes

Prime factorization: 18=2×32 12=22×3

LCM(18, 12) =

22×32=4×9=36

They will meet again at the starting point after 36 minutes.