Chapter 3:

Playing with Numbers

Factors and Multiples:

A factor of a number is exact divisor of that number. For example, the number 6 can be written as 6=1 x 6; 6=2 x 3. Here the numbers 1, 2, 3 and 6 are exact divisor of 6. These numbers are called factors of 6.

A multiple is the product result of one number multiplied by another number. For example 3 x 1 = 3; 3 x 2 = 6; 3 x 3 = 9; 3 x 4 = 12, here we say that 3, 6,9,12 are multiples of 3.

Some facts about Factors and Multiples

1. 1 is the only number which is the factor of every number.
2. Every number is the factor of itself.
3. Every factor of any number is the exact divisor of that number.
4. Every factor is less than or equal to the given number.
5. There are limited numbers of factors of any given number.
6. All the multiples of any number are greater than or equal to the given number.
7. There are unlimited multiples of any given numbers.
8. Every number is a multiple of itself.

Perfect Number

If the sum of all the factors of any number is equal to the double of that number then that number is called a **Perfect Number.**

Perfect Number	Factors	Sum of all the factors
6	1, 2, 3, 6	1+2+3+6 = 12

Prime Numbers

The numbers whose only factors are 1 and the number itself are called the **Prime Numbers**.

Like 2, 3, 5, 7, 11, 13, 17 etc.

Composite Numbers

All the numbers with more than 2 factors are called **Composite Numbers**.

Like 4, 6, 8, 10, 12 etc.

Remark: 1 is neither a prime nor a composite number.

Even number: A number which is a multiple of 2 is called an even number. For example 2,4,6,8,10 .....

Odd number: A number which is not a multiple of 2 is called an odd number. For example 1,3,5,7,9.....

Remark: 2 is the smallest even prime number. All the prime numbers except 2 are odd numbers.

Tests for Divisibility of Numbers

1. Divisibility by 2:

A number is divisible by 2 if it has any of the digits 0, 2, 4, 6 or 8 in its ones place.

2. Divisibility by 3:

A number is divisible by 3 if the sum of the digits is a multiple of 3.

3. Divisibility by 4:

A number with 3 or more digits is divisible by 4 if the number formed by its last two digits (i.e. ones and tens) is divisible by 4.

4. Divisibility by 5:

A number which has either 0 or 5 in the ones place is divisible by 5.

5. Divisibility by 6:

If a number is divisible by both 2 and 3 then it is divisible by 6.

6. Divisibility by 7:

Any given number will be divisible by 7 if we double the last digit of the number and then subtract the result from the rest of the digits and check whether the remainder is divisible by 7 or not. If there is a large number of a digit then we have to repeat the process until we get the number which could be checked for the divisibility of 7.

7. Divisibility by 8:

A number with 4 or more digits is divisible by 8, if the number formed by the last three digits is divisible by 8. The divisibility for numbers with 1, 2, or 3 digits by 8 has to be checked by actual division.

8. Divisibility by 9:

Any given number will be divisible by 9 if the total of all the digits of that number is divisible by 9.

9. Divisibility by 10:

Any given number will be divisible by 10 if the last digit of that number is zero.

10. Divisibility by 11:

A number is divisible by 11 if the difference between the sum of the digits at the odd places (from the right) and the sum of the digits at the even places (from the right) of the number is either 0 or divisible by 11.

Common Factors and Common Multiples

Example: 1

What are the common factors of 4 and 18?

Solution:

Factors of 4 are 1, 2 and 4

Factors of 18 are 1, 2, 3, 6, 9 and 18

Common factors of 4 and 18 are 1 and 2.

Co-prime Numbers

If 1 is the only common factor between two numbers then they are said to be **Co-prime Numbers**.

Example

Check whether 7 and 15 are co-prime numbers or not.

Solution:

Factors of 7 are 1 and 7.

Factors of 15 are 1, 3, 5 and 15.

The common factor of 7 and 15 is 1 only. Hence they are the co-prime numbers.

Some more Divisibility Rules

1. If a number is divisible by another number then it is divisible by each of the factors of that number.
2. If a number is divisible by two co-prime numbers then it is divisible by their product also.
3. If two given numbers are divisible by a number, then their sum is also divisible by that number.
4. If two given numbers are divisible by a number, then their difference is also divisible by that number.

Prime Factorisation

Prime Factorisation is the process of finding all the prime factors of a number.

Highest Common Factor (HCF)

The highest common factor (HCF) of two or more given numbers is the greatest of their common factors. Its other name is **(GCD) Greatest Common Divisor**.

Lowest Common Multiple (LCM)

The lowest common multiple of two or more given number is the smallest of their common multiples.
