CHAPTER 16

Playing with Numbers

Tests of divisibility:

Divisibility by ‘2’:

- We know that even numbers are 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22… and odd numbers are 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21…
- We see that a natural number is even, if its one’s digit is 2, 4, 6, 8 or 0. A number is odd, if its one’s digit is 1, 3, 5, 7 or 9.
- Number is divisible by 2 if its one’s digit is divisible by ‘2’.

i.e. 0, 2, 4, 6 or 8

Explanation:

- The generalized form of a 2 digit number ‘ab’ is 10a + b. In this, 10a is divisible by ‘2’. If ‘b’, the digit in the one’s place is divisible by ‘2’, then (10a + b) is divisible by ‘2’.
- Similarly, the generalized form of a 3 digit number ‘abc’ is 100a + 10b + c. In this, 100a and 10b are divisible by ‘2’. If ‘c’, the digit in the one’s place is divisible by ‘2’. Then (100a + 10b + c) is divisible by ‘2’.

Divisibility by 3 or 9:

A number is divisible by ‘3’ or ‘9’, if the sum of its digits is divisible by ‘3’ or ‘9’.

Explanation:

- The generalized form of a 2 digit number ‘ab’ is 10a + b, which can be written as 10a + b = (a + b) + 9a. In this, 9a is divisible by ‘3’ or ‘9’. Hence, if (a + b) is divisible by ‘3’ or ‘9’, then the number ‘abc’ is divisible by ‘3’ or ‘9’ respectively.
- The generalized form of a 3 digit number ‘abc’ is 100a + 10b + c, which can be written as 100a + 10b + c = (a + b + c) + (99a + 9b). In this, (99a + 9b) is divisible by ‘3’ and ‘9’. Hence, if (a + b + c) is divisible by ‘3’ or ‘9’, then the number ‘abc’ is divisible by ‘3’ or ‘9’ respectively.

Ex.

As 513 is divisible by 3, since the sum of the digits (5 + 1 + 3 = 9) is divisible by 3 or 9.

Divisibility by 4:

A number is divisible by ‘4’, if the number formed by its last two digits is divisible by ‘4’.

Explanation:

The generalized form of a 3 digit number ‘abc’ is 100a + 10b + c. In this, 100a is divisible by ‘4’. The divisibility of (100a + 10b + c) depends on (10b + c). Hence, if ‘bc’ is divisible by ‘4’, then the number ‘abc’ is divisible by ‘4’.

Example:

78916 since 16 is divisible by '4'. So, the number 78916 is divisible by '4'.

Divisibility by '5':

A number is divisible by '5' if its one's digit is '5' or '0'.

Explanation:

- The generalized form of a 2 digit number 'ab' is 10a + b. In this, 10a is divisible by '5'. The number (10a + b) is divisible by '5'. If 'b' the digit in the one's place is either 0 or 5.
- Similarly, the generalized form of a 3 digit number 'abc' is 100a + 10b + c. In this, both 100a and 10b are divisible by '5'. Hence, (100a + 10b + c) is divisible by 5. If c, the digit in the one's place is 0 or 5.

Examples:

10, 20, 25, 35, 55 etc.