
Chapter – 16

Playing With Numbers

- **Number in general form:** A number is said to be in a general form if it is expressed as the sum of the products of its digits with their respective place values.
 - Numbers can be written in general form. Thus, a two digit number ab will be written as $ab = 10a + b$.
 - The general form of numbers are helpful in solving puzzles or number games.
 - The reasons for the divisibility of numbers by 10, 5, 2, 9 or 3 can be given when numbers are written in general form.
 - **Tests of Divisibility:**
 - (i) **Divisibility by 2:** A number is divisible by 2 when its one's digit is 0, 2, 4, 6 or 8.
Explanation: Given number $abc = 100a + 10b + c$. $100a$ and $10b$ are divisible by 2 because 100 and 10 are divisible by 2. Thus given number is divisible by 2 only when $a = 0, 2, 4, 6$ or 8 .
 - (ii) **Divisibility by 3:** A number is divisible by 3 when the sum of its digits is divisible by 3. Example: given number = 61785. Sum of digits = $6+1+7+8+5 = 27$ which is divisible by 3. Therefore, 61785 is divisible by 3.
 - (iii) **Divisibility by 4:** A number is divisible by 4 when the number formed by its last two digits is divisible by 4. Example: 6216, 548, etc.
 - (iv) **Divisibility by 5:** A number is divisible by 5 when its ones digit is 0 or 5. Example: 645, 540 etc.
 - (v) **Divisibility by 6:** A number is divisible by 6 when it is divisible by both 2 and 3. Example: 246, 7230, etc.
 - (vi) **Divisibility by 9:** A number is divisible by 9 when the sum of its digits is divisible by 9. Example: consider a number 215847. Sum of digits = $2+1+5+8+4+7 = 27$ which is divisible by 9. Therefore, 215847 is divisible by 9.
 - (vii) **Divisibility by 10:** A number is divisible by 10 when its ones digit is 0. Example: 540, 890, etc.
 - (viii) **Divisibility by 11:** A number is divisible by 11 when the difference of the sum of its digits in odd places and the sum of its digits in even places is either 0 or a multiple of 11.
Example: consider a number 462.
Sum of digits in odd places = $4+2 = 6$
Sum of digits in even places = 6
Difference = $6-6=0$, which is zero. So, the number is divisible by 11.
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