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**Playing with numbers**

**Generalised form of Numbers:** Generalised form of a number is defined as if the number is expressed as the sum of the product of its digits with their respective place values.

**Generalised Form of two digit number:**

Let a and b be the digits at tens and ones places.

$$10 \times a + b = 10a + b$$

**Generalised form of three digit number:**

Let a, b, c be the digits at hundreds, tens and ones place.

$$= 100 \times a + 10 \times b + c$$

$$= 100a + 10b + c$$

**Magic Square:** In a magic square the sum of the numbers in all rows, columns and diagonals is the same.

**Divisibility Rules:**

**1) Divisibility rule of 2:** If the numbers end with 0, 2, 4, 6, 8 then that particular number is divisible by 2.

**For example:** 23456, last digit is 6, this number is surely divisible by 2.

4567, last digit is 7, this number is not divisible by 2.

**2) Divisibility rule of 3:** If the sum of digits of a given number is divisible by 3 then that number is also divisible by 3.

**For example:**  $123 = 1 + 2 + 3 = 6$

6 is divisible by 3, then yes this number is divisible by 3.

$$4295 = 4 + 2 + 9 + 5 = 20$$

20 is not divisible by 3, so this number is not divisible by 3.

**3) Divisibility rule of 4:** If the last 2 digits of a number is divisible by 4, then that number is divisible by 4.

**For example:** 456720, last two digits are 20 and 20 is divisible by 4, so this number is also divisible by 4.

78946 last two digits are 46 and 46 is not divisible by 4, so this number is not divisible by 4.

**4) Divisibility rule of 5:** If the number ends with 0 or 5, then the number is divisible by 5.

**For example:** 456785, last digit is 5, so this number is divisible by 5.

98743, last digit is 3, so this number is not divisible by 5.

**5) Divisibility rule of 6:** If the number is divisible by 2 and 3 both, then the number is divisible by 6.

**6) Divisibility rule of 8:** If the last three digits of a number is divisible by 8, then the complete number is divisible by 8.

**For example:** 549874840 last three digits are 840, and it is divisible by 8, so, the whole number is divisible by 8.

98765 last three digits are 765 which is not divisible by 8, so this number is not divisible by 8.

**7) Divisibility rule of 9:** If the sum of digits of a number is divisible by 9, then the number is divisible by 9.

**For example:**  $5678=5+6+7+8=26$

26 is not divisible by 9, so this number is not divisible by 9

$87651=8+7+6+5+1=27$

27 is divisible by 9, so this number is divisible by 9.

**8) Divisibility rule of 10:** If the number ends with 0, then the number is divisible by 10.

**For example:** 65890, last digit is 0, then the number is divisible by 10.

4567889 last digit is 9, then the number is not divisible by 10.

**9) Divisibility rule of 11:** If the difference of the alternating sum of digits of a number is a multiple of 11 then the number is divisible by 11.

**For Example:** 2343 is divisible by 11 because  $2 - 3 + 4 - 3 = 0$ , which is a multiple of 11)