PLAYING WITH NUMBERS

toppr

Prime Numbers	Numbers having factors 1 and number itself are known as prime numbers
Composite Numbers	Composite numbers are numbers which have at least one factor other than the number itself and 1.

The number 1 is neither prime nor a composite number.

Sieve Of Eratosthenes To 100

1. Start a number 2, put a circle round the number.
2. Cross out all the multiples of that number.
3. Move on to the next number you have not crossed out (3). Put a circle round the number.
4. Cross out all the multiples of that number.
5. Move on to the next number not crossed out (5). Repeat.

	2	3	3	4	5	6	7	8	9	10
11	12	13	13	14	15	16	17	18	19	20
21	22	23	23	24	25	26	27	28	29	30
31	32	33	33	34	35	36	37	38	39	40
41	42	43	43	44	45	46	47	48	49	50
51	52	53	53	54	55	56	57	58	59	60
61	62	63	63	64	65	66	67	68	69	70
71	72	73	73	74	75	76	77	78	79	80
81	82	83	83	84	85	86	87	88	89	90
91	92	93	93	94	95	96	97	98	99	100

Primes

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97

Prime factorisation means whenever we express a given number as the product of prime factors then we can say that we have done prime factorisation of the given number. So suppose you want to write the prime factors of the number 60, then it can be written as $60 = 2 \times 2 \times 3 \times 5$.

HCF: It is the greatest number which exactly divides two or more given numbers.

The **listing method** involves the process of listing the factors of the given numbers. For example, find the HCF of 20 and 35.

- All possible factors of 20 are 1,2,4,5,10 and 20
- All possible factors of 60 are 1,3,4,5,6,10,12,15,20,30,60

The common factors of the given numbers are : 1,2,4,5,10,20. The greatest among all other numbers is 20, so it shall be the HCF of both the numbers.

LCM: LCM of two numbers say a and b, is denoted as LCM (a,b). And the LCM is the smallest or least positive integer that is divisible by both a and b.

Find the LCM and HCF of 6 and 20 by the prime factorisation method.

Example:

2	6
3	3
	1

$6 = 2 \times 3$

$6 = 2^1 \times 3^1$

2	20
2	10
5	5
	1

$20 = 2 \times 2 \times 5$

$20 = 2^2 \times 5$

H.C.F = Product of smallest power of each prime factor

$= 2^1$

$= 2$

L.C.M = Product of greatest power of each prime factor

$= 2^2 \times 3^1 \times 5$

$= 4 \times 3 \times 5$

$= 60$

Numbers in General Form

In general, any two digit number ab made of digits a and b can be written as $ab = 10 \times a + b = 10a + b$

In general, a 3-digit number abc made up of digits a, b and c is written as $abc = 100 \times a + 10 \times b + 1 \times c = 100a + 10b + c$

Why choose general form?

1. The general form of numbers are helpful in solving puzzles or number games.
2. Reasons for the divisibility of numbers by 10, 5, 2, 9 or 3 can be given when numbers are written in general form.

Letters for Digits

Here we have puzzles in which letters take the place of digits in an arithmetic 'sum', and the problem is to find out which letter represents which digit.

Here are two rules we follow while doing such puzzles:

1. Each letter in the puzzle must stand for just one digit. Each digit must be represented by just one letter.
2. The first digit of a number cannot be zero. Thus, we write the number "sixty three" as 63, and not as 063, or 0063.

Tests of Divisibility

Division Rules

A number is divisible by

2. If last digits is 0, 2, 4, 6, or 8
3. If the sum of the digits is divisible by 3
4. If the last two digits is divisible by 4
5. If the last digits is 0 or 5
6. If the number is divisible by 2 and 3
7. Cross off last digit, double it and subtract. Repeat if you want.
   If new number is divisible by 7, the original number is divisible by 7
8. If last 3 digits are divisible by 8
9. If the sum of the digits is divisible by 9
10. If the last digit is 0
11. Subtract the last digit from the number formed by the remaining digits.
    If new number is divisible by 0 or 11, the original number is divisible by 11
12. If the number is divisible by 3 and 4