10th CBSE Math

01. Real Numbers

Lecture 1

Natural Numbers (N)

→ Counting numbers

$N = \{1, 2, 3, 4, 5, \ldots\ldots \infty\}$

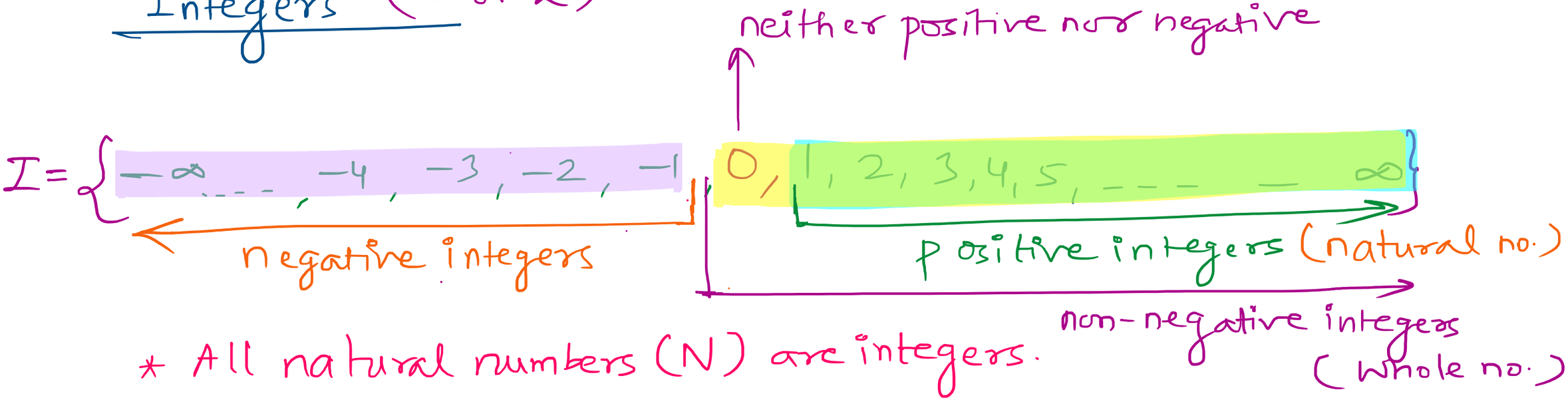
↑ Infinity

Whole numbers (W)

$W = \{0, 1, 2, 3, 4, 5, \ldots\ldots \infty\}$

* All 'N' are 'W'
* But all 'W' are not 'N'

Integers (I or Z)



* All natural numbers (N) are integers.

* All whole numbers (W) are integers

Factors

It is a number which divides the given no. completely.

1 ⟶ 1

2 ⟶ 1, 2

3 ⟶ 1, 3

4 ⟶ 1, 2, 4

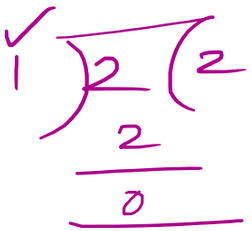
5 ⟶ 1, 5

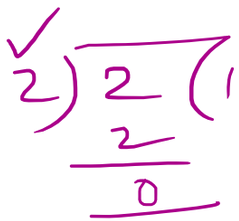
6 ⟶ 1, 2, 3, 6

7 ⟶ 1, 7

8 ⟶ 1, 2, 4, 8

9 ⟶ 1, 3, 9





for any given number, 1 & the number itself is always a factor.

Factors

It is a number which divides the given no. completely.

1 ⟶ 1

2 ⟶ 1, 2

3 ⟶ 1, 3

4 ⟶ 1, 2, 4

5 ⟶ 1, 5

6 ⟶ 1, 2, 3, 6

7 ⟶ 1, 7

8 ⟶ 1, 2, 4, 8

9 ⟶ 1, 3, 9

Prime no.

A number which has exactly two factors

Eg: 2, 3, 5, 7, etc.

Composite no.

A number which has more than two factors.

Eg: 4, 6, 8, 9, etc.

* 1 is neither prime nor composite
* 2 is the smallest prime number.
* 4 is the smallest composite number.

Multiples

2 ⟶ 2, 4, 6, 8, 10, 12, 14, _ _ _ _ _ _ _ _ _ _

4 ⟶ 4, 8, 12, 16, 20, 24, 28, _ _ _ _ _ _

HCF (Highest Common Factor)

6 → 1, 2, 3, 6

12 → 1, 2, 3, 4, 6, 12

HCF (6, 12) = 6

HCF is the largest number which divides the given no.

9 → 1, 3, 9

18 → 1, 2, 3, 6, 9, 18

HCF (9, 18) = 9

9 is the largest no. which divides 9 & 18

LCM (Least Common Multiples)

2 ⟶ 2, 4, 6, 8, 10, 12, 14, 16, 18, ---------

3 ⟶ 3, 6, 9, 12, 15, 18, 21, 24, ---------

LCM (2, 3) = 6

LCM is the smallest number which is divisible by the given no. (2 & 3)

LCM (5,6)

5 ⟶ 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, ...

6 ⟶ 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, ...

LCM (5,6) = 30

30, which is the LCM is the smallest no. which is divisible by the given no. (5 & 6)

Fundamental Theorem of Arithmetic :

Every composite number can be expressed (factorised) as a product of primes, and this factorisation is unique, apart from the order in which the prime factors occur

~~1~~, 2, 3, 5, 7, 11, 13, ____

$18 = 2 \times 3 \times 3 = 2^1 \times 3^2$

$18 = 3 \times 2 \times 3 = 2^1 \times 3^2$

$18 = 3 \times 3 \times 2 = 2^1 \times 3^2$

18

3 | 18
3 | 6
2 | 2
1

2 | 18
3 | 9
3 | 3
1

3 | 18
2 | 6
3 | 3
1

$7 \times 7 \times 7 \times 7 = 7^4$

4 ← power

7 ← base

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

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

$20 = 2^2 \times 5^1$

$HCF(6,20) = 2^1 = 2$

$LCM(6,20) = 2^2 \times 3^1 \times 5^1 = 4 \times 3 \times 5 = 60$

$HCF(6,20) \times LCM(6,20) = 6 \times 20$

$2 \times 60 = 120$

$120 = 120$

$HCF(a,b) \times LCM(a,b) = a \times b$

2 | 6
3 | 3
1

2 | 20
2 | 10
5 | 5
1

The HCF and LCM of 12, 21 and 15 respectively are

(a) 3,140 (b) 12,420 (c) 3,420 (d) 420,3

$12 = 2^2 \times 3^1 \times 5^1$

$21 = 3^1 \times 7^1 \times 5^1$

$15 = 3^1 \times 5^1$

2 | 12
2 | 6
3 | 3
1

3 | 21
7 | 7
1

5 | 15
3
1

$HCF(12, 21, 15) = 3^1 = 3$

$LCM(12, 21, 15) = 2^2 \times 3^1 \times 5^1 \times 7^1 = 4 \times 3 \times 5 \times 7 = 420$

HCF = Product of the smallest power of each common prime factor in the numbers.

LCM = Product of the greatest power of each prime factor, involved in the numbers

The total number of factors of a prime number is

(a) 1 (b) 0 (c) 2 (d) 3

10 4

The LCM of smallest two digit composite number and smallest composite number is

(a) 12
(b) 4
(c) 20
(d) 44

$10 = 2^1 \times 5^1$

$4 = 2^2$

$LCM(10,4) = 2^2 \times 5 = 4 \times 5 = 20$