Chapter- 5

Natural Numbers and Whole Numbers

- All the positive counting numbers starting from one are called **Natural Numbers**.
- *N* = {1, 2, 3, 4, ...}
- 1 is the smallest natural number. There is no largest natural number.
- Predecessor and Successor
- If we add 1 to any natural number, we get the next number, which is called the **Successor** of that number.
- If we subtract 1 from any natural number, we get the **predecessor** of that number.

Remark: There is no predecessor of 1 in natural numbers

- Natural numbers together with the number zero are called whole numbers.
- W = {0, 1, 2, 3, 4.....}
- Zero is the smallest whole number. There is no largest whole number.

Remark: There is no predecessor of 0 in whole numbers.

- Closure property for addition and multiplication

  For any two whole numbers a and b

  i) a+ b is a whole number.

  ii) a x b is also a whole number.
- Commutative property for addition and multiplication.

  For any two whole numbers a and b

i) a + b =b + a

ii) ax b=b x a

- Associative property for addition and multiplication.

  For any three whole numbers a, b and c

  i) (a + b) +c = a+ (b+ c)

  iii) (a x b)xc = a x (b x c)

- Distributive property of multiplication over addition.

  For any three whole numbers a, b and c

  i) a (b + c) = a x b + a x c
- Distributive property of multiplication over subtraction.

  For any three whole numbers a, b and c

  i) a (b - c) = a x b - a x c
- Identity for Addition
- If we add zero to any whole number the result will the same number only. So zero is the additive identity of whole numbers.
- **a + 0 = 0 + a = a**
- Identity for Multiplication
- If we multiply one to any whole number the result will be the same whole number. So one is the multiplicative identity of whole numbers.
- ax1 = 1xa = a

If we subtract 1 from any natural number, we get the **predecessor** of that number.

12 – 1 = 11

So 11 is the predecessor of 12.

Remark: There is no predecessor of 1 in natural numbers.

Whole Numbers

Whole numbers are the collection of natural numbers including zero

So zero is the predecessor of 1 in the whole numbers.