

---

## Chapter – 6

### Squares and Square Roots

- **Square:** Number obtained when a number is multiplied by itself. It is the number raised to the power 2.  $2^2 = 2 \times 2 = 4$  (square of 2 is 4).
  - If a natural number  $m$  can be expressed as  $n^2$ , where  $n$  is also a natural number, then  $m$  is a **square number**.
  - All square numbers end with 0, 1, 4, 5, 6 or 9 at unit's place.
  - Square numbers can only have even number of zeros at the end.
  - Square root is the inverse operation of square.
  - There are two integral square roots of a perfect square number.
  - Positive square root of a number is denoted by the symbol  $\sqrt{\quad}$ . For example,  $3^2 = 9$  gives  $\sqrt{9} = 3$ .
  - **Perfect Square or Square number:** It is the square of some natural number. If  $m = n^2$ , then  $m$  is a perfect square number where  $m$  and  $n$  are natural numbers. Example:  $1 = 1 \times 1 = 1^2$ ,  $4 = 2 \times 2 = 2^2$ .
  - **Properties of Square number:**
    - (i) A number ending in 2, 3, 7 or 8 is never a perfect square. Example: 152, 1028, 6593 etc.
    - (ii) A number ending in 0, 1, 4, 5, 6 or 9 may not necessarily be a square number. Example: 20, 31, 24, etc.
    - (iii) Square of even numbers are even. Example:  $2^2 = 4$ ,  $4^2 = 16$ , etc.
    - (iv) Square of odd numbers are odd. Example:  $5^2 = 25$ ,  $9^2 = 81$ , etc.
    - (v) A number ending in an odd number of zeroes cannot be a perfect square. Example: 10, 1000, 900000, etc.
    - (vi) The difference of squares of two consecutive natural number is equal to their sum.  $(n+1)^2 - n^2 = n+1+n$ . Example:  $4^2 - 3^2 = 4+3=7$ ,  $12^2 - 11^2 = 12+11=23$ , etc.
    - (vii) A triplet  $(m, n, p)$  of three natural numbers  $m, n$  and  $p$  is called Pythagorean triplet, if  $m^2 + n^2 = p^2$ ;  $3^2 + 4^2 = 25 = 5^2$
-