Board – CBSE	Class – 8th	Topic – Square and Square Roots

SQUARES:

When a number is multiplied by itself the product is called the square of the number. for e.g., $2 \times 2 = 4$ or $2^2 = 4$. We say that the square of 2 is 4. Similarly, $3 \times 3 = 9$ or $3^2 = 9$, etc.

Definition: - A natural number is said to be a perfect square if it is the square of another natural number.

For Ex., $5 \times 5 = 5^2 = 25$, $6 \times 6 = 6^2 = 36$, $7 \times 7 = 7^2 = 49$, etc. So, 4, 9, 16, 25, 36.... are all perfect squares.

The squares of the first 30 natural numbers are:

$1^2 = 1$	$2^2 = 4$	$3^2 = 9$
$4^2 = 16$	$5^2 = 25$	$6^2 = 36$
$7^2 = 49$	$8^2 = 64$	$9^2 = 81$
$10^2 = 100$	$11^2 = 121$	$12^2 = 144$
$13^2 = 169$	$14^2 = 196$	$15^2 = 225$
$16^2 = 256$	$17^2 = 289$	$18^2 = 324$
$19^2 = 361$	$20^2 = 400$	$21^2 = 441$
$22^2 = 484$	$23^2 = 529$	$24^2 = 576$
$25^2 = 625$	$26^2 = 676$	$27^2 = 729$
$28^2 = 784$	$29^2 = 841$	$30^2 = 900$

SQUARE ROOTS

Since,

- $2^2 = 4$, or the square root of 4 is $\sqrt{2}$.
- $3^2 = 9$, or the square root of 9 is $\sqrt{3}$.
- $9^2 = 81$, or the square root of 81 is $\sqrt{9}$.

- So, the square root of a number x is that number which when multiplied by itself gives the number x itself. The number x under consideration is a perfect square.

- The symbol of a square root is $\sqrt{x}$ or $(x)^{1/2}$
- Thus, the facts such as the square root of 4 is 2, of 81 is 9, etc., can be mathematically represented as:

  $\sqrt{4} = 2$ and -2,

  $\sqrt{81} = 9$ and -9

Note:

(1) The square of a number is always positive.

(2) Square root of a number is + and –

(3) In this class, we consider only positive square root

Square Roots of Perfect Squares

There are two methods for finding out the square root of a number,

1. Prime Factorization Method
2. Long Division Method

- **PRIME FACTORISATION METHOD:**

  Step 1. Find the prime factors of the number.

  Step 2. Then, pair the factors and choose one prime from each pair.

  Step 3. Find the product of all such primes so taken. This gives the square root of the given number.

- **LONG DIVISION METHOD:**

  Step 1. The digits of the number are paired-off, starting from the unit's place. Each pair is called a period.

  Step 2. Find a digit whose square is less than or equal to the left-most period which is the first dividend. This digit is the divisor as well as the quotient.

  Step 3. Subtract the product of the divisor and the quotient from the first period. Bring down the next period to the right of the remainder. This is the new dividend.

  Step 4. Now double the quotient to get the new divisor with blank space on the right and assign the largest possible digit both in the quotient and in the blank space, such that the product of this digit with the new divisor having the same digit in the blank space is equal to or less than the dividend.

Repeat steps 3 and 4 till all the periods are over. The quotient thus obtained is the square root of the given number.