# SQUARES AND SQUARE ROOTS

## SQUARE

## INTRODUCTION

Numbers which can be expressed as the product of two identical numbers are known as square numbers. These numbers are also known as perfect squares.

Let p and q are natural numbers such that  $p = q^2$  then we say 'p' is the square of number 'q' e.g.  $9 = 3^2$ , so 9 is square of 3 and we call 9 as a perfect square number. Table below shows number and their squares from 1 to 10.

Number	1	2	3	4	5	6	7	8	9	10
Square	1	4	9	16	25	36	49	64	81	100

## Properties of square numbers :

If you examine the table of square numbers, you will observe the following :

- (1) If a number ends with 1 or 9, its square ends with the digit 1.
- (2) If a number ends with 2 or 8, its square ends with the digit 4.
- (3) If a number ends with 3 or 7, its square ends with the digit 9.
- (4) If a number ends with 4 or 6, its square ends with the digit 6.
- (5) If a number ends with 5, its square also ends with the digit 5.
- (6) If a number ends with 0, its square also ends with 0.
- (7) No perfect square number can end with 2, 3, 7 or 8.
- (8) If a number is even, then its square is also even.
- (9) If a number is odd, then its square is also odd.
- (10) From above we known perfect square numbers ends with either 0 or 1 or 4 or 5 or 6 or 9.

#### CLASS 8

## **SQUARES**

When a number is multiplied by itself the product is called the square of the number.

for eg.,  $2 \times 2 = 4$  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 :

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

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Note : For a number to be a perfect square, it should not have 2, 3, 7 or 8 in its units place. Also, a number is not a perfect square if it ends with odd number of zeros. It should have even number of zeros at the end.

Eg. 
$$9^2 = 9 \times 9 = 81$$
;  $13^2 = 13 \times 13 = 169$   
 $16^2 = 16 \times 16 = 256$ ;  $17^2 = 17 \times 17 = 289$   
 $20^2 = 20 \times 20 = 400$   $21^2 = 21 \times 21 = 441$   
 $35^2 = 35 \times 35 = 1225$   $90^2 = 90 \times 90 = 8100$   
 $100^2 = 100 \times 100 = 10000$ 

**Tip** :  $15^2 = (1 \times 2)25 = 225$ ,  $25^2 = (2 \times 3)25 = 625$  etc