Square: The square of a number is the product of the number with the number itself. For example: the square of 2 is $2^2 = 2\times2=4$

Perfect squares: When the exponent of a natural number is 2, the number so obtained is called a square number or a perfect square. Thus, when a number is multiplied by itself, the product is a perfect square. For example: $1=1^{2,}$ $4=2^2$, and $9=3^2$

To find whether a number is a perfect square or not:

(a) Write the prime factors of the given number.
(b) Group the prime factors in such a way that in each pair, both factors are the same.
(c) If no factor is left over after grouping, the number is a perfect square.
(d) If any number or numbers are left whose grouping is not possible, then the number is not a perfect square.

1. Find whether the following numbers are perfect square?
(a) 441 (b) 14641 (c) 7688
2. Find the smallest number by which 1800 must be multiplied so that the product is a perfect square.
3. Find the smallest number by which 4056 be divided to make it a perfect square.

Properties of square numbers:

Property 1:
(I) no perfect square will end with 2, 3, 7 or 8 at the units place.
(ii) A number having 0, 1, and 4,5,6,9 in the units place may or may not be a perfect square.

Property 2:
(I) if a number has 1 or 9 in the units place, and then its square ends with 1.
(ii) The square of a number which has 4 or 6 in the units place will end in 6.

Property 3: A number ending in an odd number of zeros is never a perfect square.

Property 4: Between the square of the numbers n and n+1, there are 2n non-perfect square numbers.

Property 5: The square of an even number is always an even number and the square of an odd number is always an odd number.

1. Show that the following numbers are not perfect squares.
(a) 54473 (b) 4058 (c) 24257 (d) 3332
2. What will be the unit's digit of the squares of the following numbers?
(a) 1234 (b) 4329 (c) 8724
3. Which of the following squares end with digit 1?
(a) $(37)^2$ (b) $(321)^2$ (c) $(549)^2$ (d) $(427)^2$
4. Determine whether the square of the following odd or even:
(a) 2826 (b) 7779 (c) 30018 (d) 8204
5. Find the squares of the following numbers without actual multiplication.
(a) 65 (b) 95 (c) 205

Square roots: The square root of a number x is that number which when multiplied by itself gives x as the product. We denote the square root of a number x by √x.

To find square root by Prime Factorization Method

1. Find the square root of

(i) 625 (ii) 1225 (iii) 50625

2. Find the square root of the following numbers by Prime factorization Method:

(a) 38416 (b) 47089

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