

# Square Root by Using of Vedic Mathematics

Divykant Maheshbhai Parmar\*

Assistant Teacher, Vasai Primary Boy School No.1, Vijapur, India

\*Corresponding author: parmardivya44@gmail.com

**Abstract:** Vedic Mathematics can definitely solve mathematical numerical calculations in faster way. Some Vedic Math Scholars mentioned that Using Vedic Math tricks you can do calculations 10-15 times faster than our usual methods. I agree this to some extent because some methods in Vedic Mathematics are really very fast. But some of this methods are dependent on the specific numbers which are to be calculated. They are called specific methods. In this paper we use a method Vedic mathematics to find a roots of numbers.

**Keywords:** Vedic Mathematics, Square roots, Method, Number.

## 1. Introduction

Vedic Mathematics is the name given to the ancient system of Indian Mathematics which was rediscovered from the Vedas between 1911 and 1918 by Sri Bharati Krishna Tirthaji (1884-1960). According to his research all of mathematics is based on sixteen Sutras, or word-formulae. For example, 'Vertically and Crosswise' is one of these Sutras. These formulae describe the way the mind naturally works and are therefore a great help in directing the student to the appropriate method of solution.

## 2. Methods

Tirthaji Maharaja has classified tricks to find square roots in Vedic Mathematics in Specific and General Methods. Specific Multiplication Methods can be applied to a Perfect Square. While General Square Root Methods can be applied to any type of number.

Vedic Mathematics with its roots in Atharvaveda is an ancient Indian system of doing calculations, which is fast and accurate.

In all there are 16 sutras, meaning principles, which once understood can be applied in different calculations with different interpretations. The same sutra can be utilized in solving different calculations.

Hence to understand Vedic Math it is essential

1. To understand the sutras.
2. To understand the application of the sutra in various calculations.

The prerequisite is that the user should know the mathematical table from 1 to 9. With just this basic information you can go ahead and be an expert in Vedic mathematics, just by persistence and practice.

In all there are sixteen sutras and 13 up sutras which is good enough to solve any kind of quantitative problems.

The major difference between the prevailing mathematical system and the Vedic system is that, prevalent system depends on formulas, whereas the Vedic system depends on logic.

*What do you mean by square root?*

A number when multiplied by itself produces a specified number.

So the problem is when a number is given, we have to determine which is the number which when multiplied by itself will result in the given number.

*How to calculate square root by Vedic mathematics?*

Before we actually explore and understand the Vedic math methods, there are certain simple but important facts, which have to be borne in mind.

1. We have to look at the numbers from 1 to 10.

Squares of these numbers are

1,4,9,16,25,36,49,64,81,100

From this we can infer that

Square root of any number which ends with 1 will end with 1 or 9 (1 and 9 add up to 10)

Square root of any number which ends with 4 will end with 2 or 8 (2+8=10)

Square root of any number which ends with 9 will end with 3 or 7 (3+7=10)

Square root of any number which ends with 6 will end with 6 or 4 (6 + 4=10)

The above stated fact is very logical and rather than remembering it, you have to understand the logic behind it. In Vedic mathematics, the stress is in understanding the principles rather than rote learning.

2. In Vedic mathematics to find the square root of any number, two distinct methods can be applied.

For numbers which are perfect squares, the specific method is applied.

For numbers, which may or may not be perfect squares, the general method is applied.

*Specific Method:*

This method is suitable for numbers which are perfect square.

Let us take the number 2304.

This number ends with 4,

In the next step we have to find two squares of multiple of 10 between which this number lies.

So  $10 \times 10 = 100$  and  $20 \times 20 = 400$  but, our number 2304 does not lie between 100 and 400.

On the contrary 2304 lies between  $(40)^2$  and  $(50)^2$

i.e. between 1600 and 2500. And it is also closer to 50.

Now since the number 2304 ends with 4 we understand the square root should end with either 2 or 8.

The square root lies between 40 and 50 and should end with either 2 or 8.

With this understanding we can conclude that the square root could be either 42 or 48.

But we already saw that it should be closer to 50, hence the square root of 2304 is 48.

As explained earlier, the working of vedic mathematics is more focused and based on logical thinking rather than putting variables into formulas and finding results.

Let us find another number to find square root.

Let us take the number 2704.

2704 definitely lies between  $2500 = (50)^2$  and  $3600 = (60)^2$

So obviously the square root will lie between 50 and 60.

Since the given number is 2704 and it ends with 4, the square root should end in 2 or 8. (refer to the notes above).

Analysing point no 2 and point no 3 above, we can conclude that the square root could be 52 or 58.

The given number 2704 is closer to 2500 rather than 3600.

Hence the square root should also be closer to 50 rather than 60.

Analyzing the point 4 and point 6 above, we can safely arrive at the conclusion that the square root of 2704 is 52.

*Facts for Square Roots Math tricks:*

- Squares of numbers from 1 to 9 are 1, 4, 9, 16, 25, 36, 49, 64, 81, and 100.
- Square of a number cannot end with 2, 3, 7, and 8. OR number ending with 2, 3, 7 and 8 cannot have perfect square root.
- Square root of a number ending with 1 (1, 81) ends with either 1 or 9 (10's compliment of each other).
- Square root of a number ending with 4 (4, 64) ends with either 2 or 8 (10's compliment of each other).
- Square root of a number ending with 9 (9, 49) ends with either 3 or 7 (10's compliment of each other).
- Square root of a number ending with 6 (16, 36) ends with either 4 or 6 (10's compliment of each other).
- If number is of 'n' digits then square root will be 'n/2' OR '(n+1)/2' digits.

Based on the facts, square root method can be calculated as follows:

- This shortcut method of Square Roots can be applied whenever number is perfect square.

*Example:*

*Square root of 2209*

1. Number ends with 9, Since it's a perfect square, square root will end with 3 or 7.
2. Need to find 2 perfect squares (In Multiplies of 10) between which 2209 exists.  
Numbers are  $1600 = (40)^2$  and  $2500 = (50)^2$ .
3. Find to whom 2209 is closer. 2209 is closer to 2500. Therefore square root is nearer to 50.

Now from Step 2, possibilities are 43 or 47 out of which 47 is closer to 50

4. Hence square root = 47.

*General Method:*

This method is a more general method, which can be used to find the square root of any number irrespective of the fact, whether it is a perfect square or not.

Like in the earlier method, before we go into understanding this method, there is one more small technique that needs to be understood. That technique is known as "Dwanda."

The calculation of Dwanda will depend on the number of digits of the number. That is whether it is single digit, two digit, three digit, four digit and so.

Dwanda is represented by D,

So,

$$D(6) = 6 \times 6 = 36$$

$$D(24) = 2 \times 2 \times 4 = 16$$

$$D(345) = (2 \times 3 \times 5) + (4 \times 4) = 38$$

$$D(2356) = (2 \times 2 \times 6) + (2 \times 3 \times 5) = 54$$

We shall now generalise the Dwanda formulas,

$$D(a) = a \ a$$

$$D(ab) = 2 \ a \ a \ b$$

$$D(abc) = (2 \ a \ a \ c) + (b \ b)$$

$$D(abcd) = (2 \ a \ a \ d) + (2 \ b \ b \ c)$$

Please practice this Dwanda formula with some numbers before you go further.

Let us now look at the using the general method to find:  $\sqrt{12544}$

1. first divide the number into sets of 2,

So we get,

1 25 44

The above table will get formed if we apply DSD Dwanda Subtraction from above number and division.

So the digits of the answer turns out to be 1 12 00

*Where would the decimal point come?*

Look at the basic number 12544.....since it has odd number of digits we use the formula

$$\text{Number of digits in square root} = (n+1)/2 = (5+1)/2 = 3$$

So the final square root answer would be 112.00 or just 112.

Till now we have seen two ways of finding square roots. One was for perfect squares and the other for any number.

The method for perfect square is relatively easier to understand and use.

Remember the following:

1. You should know the squares of all numbers from 1 to 9
2. You should be able to easily calculate the square of multiples of 10s, i.e. 10 square, 20 square, 30 square and so on.
3. You should remember, depending on the last digit of the given number, how to arrive at the last digit of the

answer.

4. Use logical decisions, rather than formula to arrive at the right answer.

### 3. Uses

#### *Advantages of Using Vedic Math Tricks*

- Easy Way to Learn. *Vedic Math* is a simpler and interesting way of learning the *Math* tricks than the usual *Math*.
- Helps in Cross-Checking.
- Enhance Logical Thinking.
- Improve Confidence.
- More Systematic Way of Learning.
- Improves the performance in *Competitive Level Exams*.

*Benefits of Vedic Math* is beneficial for both who likes and dislikes the calculation. It makes the learning of mathematics extremely easy and fast.

- The most existing Benefits of Vedic Maths is its simplicity and integration of rule which is some time looks like magic to the student, and its create interest in student to learn math.
- The many tedious or cumbersome problem can be solved through the Vedic mathematics in mind, so don't need to write too much.
- The Very Most Benefits of Vedic Math is It gives You the 10-15 times faster result as compared to the Western way of calculation.
- Vedic Mathematics Tricks is very useful in the

aptitude section of the competitive exam.

- No need to remember any formula and dependency on the calculator will become almost zero.
- By applying the concept of Vedic mathematics, one problem has many solutions.
- Most of the Vedic Mathematics Tricks apply to many types of problem.
- It makes you creative to find the most efficient or fast Tricks to solve your problem Quick. It encourages the student to see his unique way to solve the problem.
- Vedic Mathematics helps to Develop the Intuition ability of the student.
- Through the concept of digital roots, everybody can check the validity of answer to the question.
- A most cumbersome problem like Square, cube, Square root or Cubic root of the larger number can be solved through mentally if you know Vedic mathematics.

### 4. Conclusion

This paper presented an overview on square root by using of Vedic mathematics.

### References

- [1] <https://ziyyara.in/blog/easy-learn-vedic-mathematics-square-root-tips-trick.html>
- [2] <http://mathlearners.com/vedic-mathematics/square-roots/>
- [3] <https://vedicmathschool.org/benefits-of-vedic-maths/>