

**PRINCIPAL SHANKAR BAGDE'S METHOD OF SQUARE ROOT****Principal Shankar Narayan Bagde_{Retd.}**

Coordinator and Development Officer,

Abhinav Education Society, Ambegaon Bk, Tal. Haveli, Pune 411 046.

*If n is non zero integer, then $n \times n$ written as n^2 is called square of n .**Hence square of a number can be found by multiplying it by itself.**Only perfect squares have square roots, finding the square root is just inverse operation to finding the square. Every natural number does not have a square root. No number multiplied by itself gives 57, so 57 does not have a square root. Only perfect squares have square roots.**At present, there are two methods of finding square root at secondary and junior college level*i) *By Prime factors method and*ii) *By Long Division method**At the time of teaching perfect squares in mathematics, The Author flashed a new method of finding square root.**Let us study the table of squares up to nine.*

$$\begin{array}{lll}
 1^2 = 1 & & 6^2 = 36 \\
 2^2 = 4 & 5^2 = 25 & 7^2 = 49 \\
 3^2 = 9 & & 8^2 = 64 \\
 4^2 = 16 & & 9^2 = 81
 \end{array}$$

Observing the above table we get, two squares of digit having the same digit at its unit place.

<i>The digit at unit place</i>	<i>Number</i>	<i>Number</i>
<i>1</i>	<i>$1^2 = 1$</i>	<i>$9^2 = 81$</i>
<i>4</i>	<i>$2^2 = 4$</i>	<i>$8^2 = 64$</i>
<i>9</i>	<i>$3^2 = 9$</i>	<i>$7^2 = 49$</i>

16	$4^2 = 16$	$6^2 = 36$
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Remember, $5^2 = 25$ has no partner having unit place digit 5.

Now to find square root of any perfect square.

PRINCIPAL SHANKAR BAGDE'S METHOD OF SQUARE ROOT

We have seen that there are some numbers having same unit place digit, so there must be two trials to find square roots of perfect squares.

Find the square root of 541696 i.e.

$$\sqrt{541696} = ?$$

The given number has unit place digit is 6

Hence there are two trials if necessary, because there are two numbers 16 and 36 having unit place digit 6

Solution:- Trial one for 16

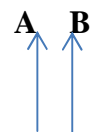
- Given number 541696
- Subtract number 16 16
- ---
- We get answer and cancelled zero 54168~~0~~
- Here $5329 < 5416 > 5476$ i.e. $73^2 < 5416 > 74^2$
- So divide by 73 54168 / 73
- Here 54168 is not divisible by 73 so we have
- To go trial No. Two

Solution:- Trial two for 36

- Given number 541696
- Subtract number 36 36
- ---
- We get answer and cancelled zero 54166~~0~~
- Here $5329 < 5416 > 5476$ i.e. $73^2 < 5416 > 74^2$
- So divide by 73 54166 / 73
- Here 54166 is divisible by 73
- We get answer 742
- Now subtract by $36 = 6$

- We get square root of 541696 736

$541696 = \pm 736$ To write the above solution as –



$$541696 - 36 = 541660 = 54166 \div 73 = 742 - 6 = \overline{736}$$

\downarrow
A

\downarrow
B

Note A and B must be tally with the answer.

$$\overline{541696} = \pm 736$$

Example Two:- find the square root of 625.

In the given number 5 is at unit place therefore there is only one trial.

Solution $625 - 25 = 600 \div 2 = 300 - 5 = 25$

\downarrow
A

\downarrow
B

\downarrow
A

\downarrow
B

Answer $\overline{625} = \pm 25$

Example Three $\overline{1002001} = ?$

$$1002001 = 1002001 - 1 = 1002000 \div 100 = 1002 - 1 = 1001$$

\downarrow
A

\downarrow
B

\downarrow
A

\downarrow
B

A B

Answer $\overline{1002001} = \pm 1001$

Example Four $\overline{6561} = ?$

Solution for 81

$$6561 - 81 = 6480 = 648 \div 8 = 81 - 9 = 72$$

\downarrow
A₁

\downarrow
B₁

\downarrow
A₂

\downarrow
B₂

Here **A₁ A₂ and B₂ B₁** And hence $\overline{6561} = 72$

So Trial No. Two Solution for 1

$$6561 - 1 = 6560 \mid = 656 \div 8 = 82 - 1 = 81$$

$\downarrow \qquad \qquad \qquad \downarrow \qquad \downarrow \downarrow$
A \qquad \qquad \qquad B \qquad A B

Answer $\overline{6561} = \pm 81$