

# CALCULATION-03

## SQUARE ROOT

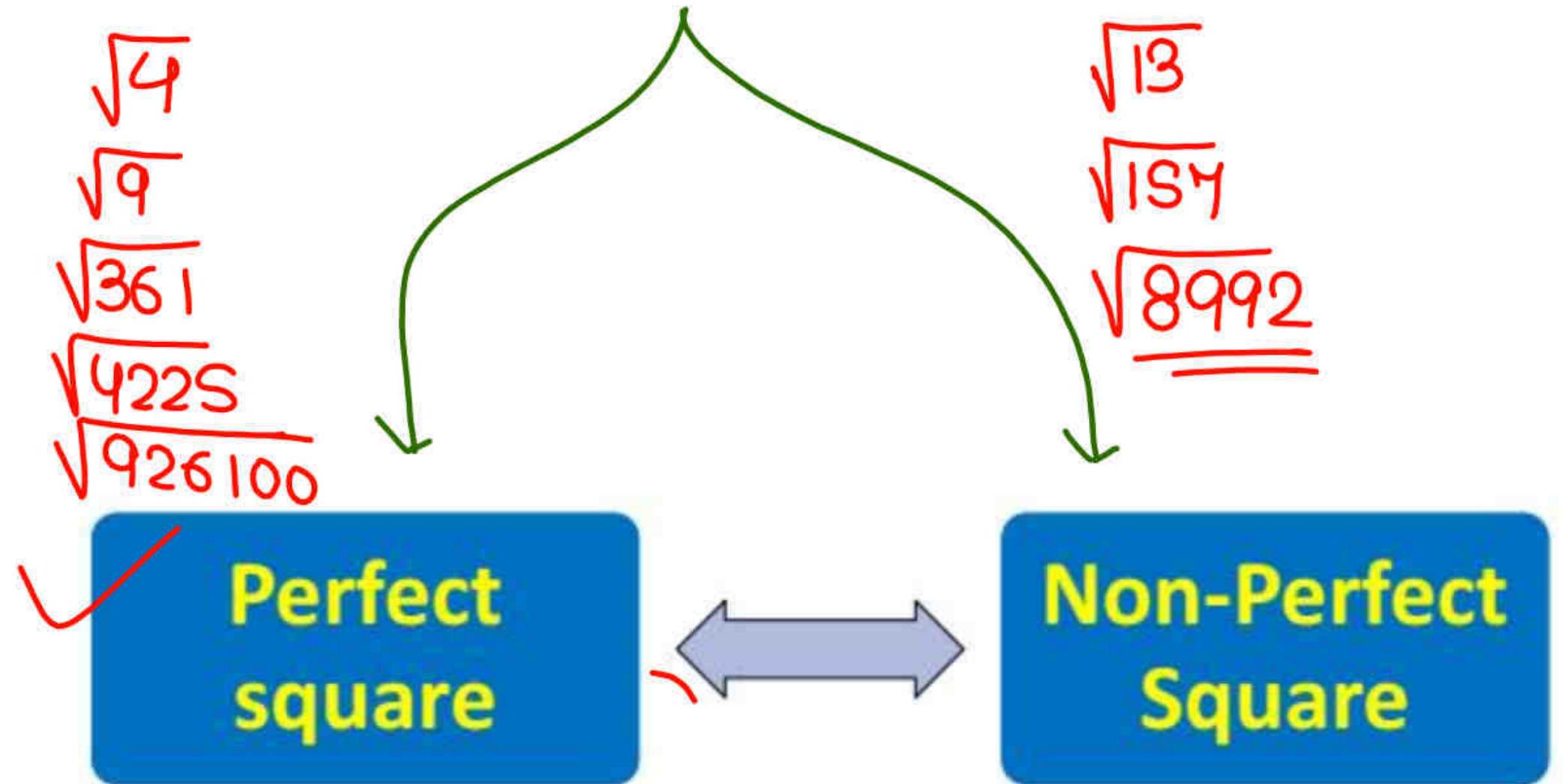
(वर्ग मूल)

CLASS NOTES

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# Square Root / वर्गमूल



**Square Root of perfect square**  
**पूर्ण वर्ग का वर्गमूल**

$1^2 = 1$   
 $2^2 = 4$   
 $3^2 = 9$   
 $4^2 = 16$   
 $5^2 = 25$   
 $6^2 = 36$   
 $7^2 = 49$   
 $8^2 = 64$   
 $9^2 = 81$   
 $10^2 = 100$

**Example: Calculate the square root of 5184**

**Step 01:** The unit digit of 5184 is 4, so its square root will be end on 2 or 8.

**Step 02:** Now leave two digits from end and check the remaining number. In this, case it is 51.

$$7^2 < 51 < 8^2$$

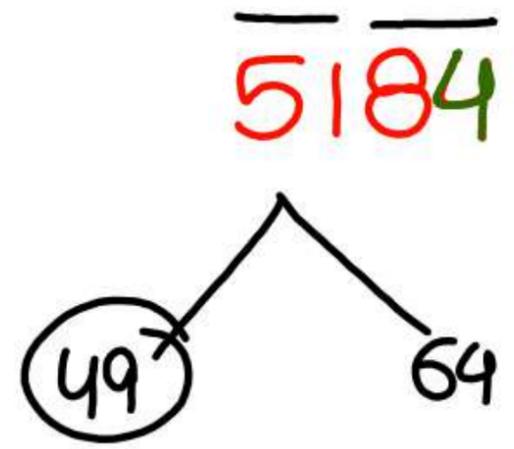
So, the tens digit of square root is 7.

**Step 03:** Now the square root of 5184 can be 72 or 78.

For this, we have to check whether 51 is closer to  $7^2$  or  $8^2$

As 51 is closer to  $7^2$ .

Square root of 5184 is 72.



$\overline{72}$  ✓  
or  
 $\overline{78}$

**Example: Calculate the square root of 3136**

**Step 01:** The unit digit of 3136 is 6, so its square root will be end on 4 or 6.

**Step 02:** Now leave two digits from end and check the remaining number. In this, case it is 31.

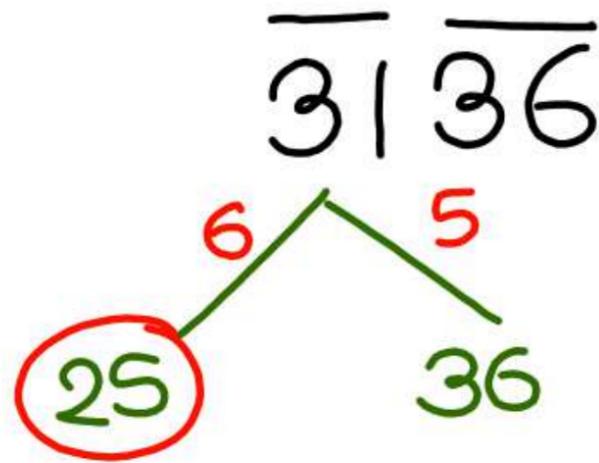
$$5^2 < 31 < 6^2$$

So, the tens digit of square root is 5.

**Step 03:** Now the square root of 3136 can be 54 or 56. For this, we have to check whether 31 is closer to  $5^2$  or  $6^2$

As 31 is closer to  $6^2$ .

**Square root of 3136 is 56.**



## Find the square root of

$$\sqrt{7744} =$$

$\begin{array}{c} 13 \quad 4 \\ \swarrow \quad \searrow \\ 64 \quad 81 \end{array}$

$$82 \quad \text{or} \quad \boxed{88} \checkmark$$

$$\sqrt{1764} =$$

$\begin{array}{c} 16 \quad 25 \\ \swarrow \quad \searrow \\ 16 \quad 25 \end{array}$

$$\boxed{42} \checkmark \quad \text{or} \quad 48$$

$$\sqrt{6561} =$$

$\begin{array}{c} 64 \quad 81 \\ \swarrow \quad \searrow \\ 64 \quad 81 \end{array}$

$$\boxed{81} \checkmark \quad \text{or} \quad 89$$

$$\sqrt{7396} =$$

$\begin{array}{c} 64 \quad 8 \quad 81 \\ \swarrow \quad \searrow \\ 64 \quad 8 \quad 81 \end{array}$

$$84 \quad \text{or} \quad \boxed{86} \checkmark$$

$$\sqrt{2916} =$$

$$\sqrt{7569} =$$

Handwritten annotations: 64, 81 (circled), and arrows pointing to the 5 and 6 digits of 7569.

83 or 87 ✓

$$\sqrt{4489} =$$

$$\sqrt{4225} =$$

$$\sqrt{9216} =$$

Diagram illustrating the prime factorization of 9216. The number 9216 is written with a square root symbol over it. Red arrows point from the number to the factors 81 and 100. The number 8 is written above the arrow pointing to 100. The number 11 is written to the left of the arrow pointing to 81.

$$\underline{94} \quad \text{or} \quad \underline{96} \checkmark$$

$$\checkmark \sqrt{3249} =$$

$$\checkmark \sqrt{1764} =$$

$$\checkmark \sqrt{4624} =$$

$$\sqrt{9216} =$$

**Example: Calculate the square root of 15129**

**Step 01:** The unit digit of 15129 is 9, so its square root will be end on 3 or 7.

**Step 02:** Now leave two digits from end and check the remaining number. In this, case it is 151.

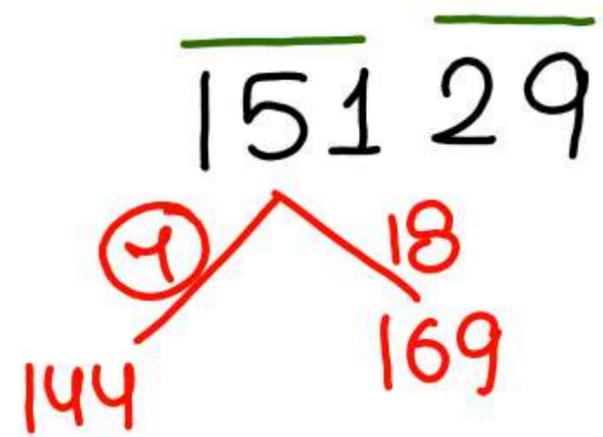
$$12^2 < 151 < 13^2$$

So, the first two digits of square root of 15129 is 12.

**Step 03:** Now the square root of 15129 can be 123 or 127. For this, we have to check whether 151 is closer to  $12^2$  or  $13^2$

As 151 is closer to  $12^2$ .

**Square root of 15129 is 123.**



12 3 ✓ or 12 7

$$\sqrt{18769} = \underline{133} \text{ or } \underline{137} \checkmark$$

169 ← 13<sup>2</sup>      196 ← 14<sup>2</sup>

$$\sqrt{63001} = \underline{251} \text{ or } \underline{259} \checkmark$$

625      676

$$\sqrt{24964} =$$

$$\sqrt{70225} = \underline{265} \checkmark$$

$$\text{Ans } \sqrt{54756} =$$

$$\sqrt{33489} =$$

$$\sqrt{69169} =$$

676    729

$$\sqrt{26308267}$$

$$\sqrt{75076} =$$

$$\sqrt{75076} =$$

21  
729

34  
784

✓  
274 or 276

Find the square root of  $\overline{923521}$

$$\overline{923521} = 22 = 4 \checkmark$$

$$\overline{9} \quad \overline{6} \quad \overline{1} \rightarrow 7 \rightarrow 49 \checkmark$$

$$\overline{9} \quad \overline{6} \quad \overline{9} \rightarrow 6 \rightarrow 36 \rightarrow 9 \checkmark$$

Find the square root of **173056**

$$\sqrt{173056} = 416$$

Handwritten long division method for finding the square root of 173056:

17 30 56

4 1 30

16 121 900

130 956

9 → 9

90 → 30

Ans

in

comment

Box

Find the square root of **552049**

# Square Root of Non-perfect square

## अपूर्ण वर्ग का वर्गमूल

$$\sqrt{13}$$

$x$  (under 13)  
 $9 \rightarrow y$  (with arrow from 13)

$$\frac{x+y}{2\sqrt{y}}$$

$$= \frac{13+9}{2\sqrt{9}}$$

$$= \frac{\cancel{22}}{2 \times 3} = \frac{11}{3} = 3.66$$

$$\text{Ex. } \sqrt{10} = \begin{matrix} \nearrow 9 \rightarrow y \\ \downarrow x \end{matrix}$$

$$\frac{x+y}{2\sqrt{y}}$$

$$\frac{10+9}{2 \times 3} = \frac{19}{6} = 3.1\dot{6}$$

Ex.  $\sqrt{14} =$

$\downarrow$   
 $x$

$\nearrow 9 \rightarrow y$

$$\frac{x+y}{2\sqrt{y}}$$

$$\frac{14+9}{2 \times 3} = \frac{23}{6} = 3.8 \dots$$

$$\text{Ex. } \sqrt{18} = \begin{matrix} \nearrow 16 \rightarrow y \\ \downarrow x \end{matrix} = \frac{18+16}{2 \times 4} = \frac{34}{8} = 4.2 \dots$$

$$\frac{x+y}{2\sqrt{y}}$$

$$\text{Ex. } \sqrt{29} = \nearrow 25 = \frac{29+25}{2 \times 5} = \underline{5.4}$$

$$\checkmark \text{Ex. } \sqrt{57} = \nearrow 49 = \frac{57+49}{2 \times 7} = \frac{106}{14} = 7.5$$

$$\text{Ex. } \sqrt{265} = \frac{265 + 256}{2 \times 16} = \frac{521}{32} = 16.3$$

$\downarrow$   $x$                        $256 \rightarrow y$

$$= \frac{\frac{x+y}{2\sqrt{y}}}{32} = 16.3$$

$$\text{Ex. } \sqrt{374} = \frac{374 + 361}{2 \times 19} = \frac{735}{38} = 19.3$$

$$\checkmark \text{Ex. } \sqrt{445} =$$