

| CUBES      |                        |
|------------|------------------------|
| Number (n) | Cube (n <sup>3</sup> ) |
| 2          | 2 <sup>3</sup> = 8     |
| 3          | 3 <sup>3</sup> = 27    |
| 4          | 4 <sup>3</sup> = 64    |
| 5          | 5 <sup>3</sup> = 125   |
| 6          | 6 <sup>3</sup> = 216   |
| 7          | 7 <sup>3</sup> = 343   |
| 8          | 8 <sup>3</sup> = 512   |
| 9          | 9 <sup>3</sup> = 729   |

| SHORT CUT TABLE   |                        |
|-------------------|------------------------|
| If a Cube Ends in | Then Cube Root Ends in |
| 0                 | → 0                    |
| 1                 | → 1                    |
| 8                 | → 2                    |
| 7                 | → 3                    |
| 4                 | → 4                    |
| 5                 | → 5                    |
| 6                 | → 6                    |
| 3                 | → 7                    |
| 2                 | → 8                    |
| 9                 | → 9                    |

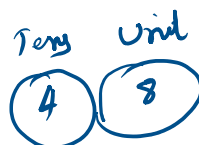
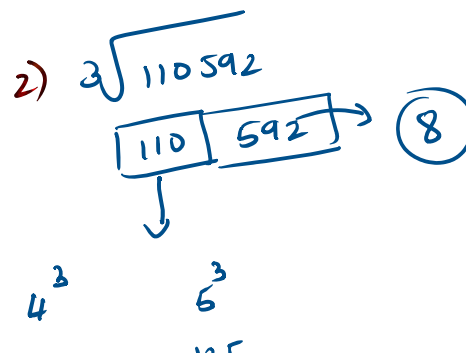
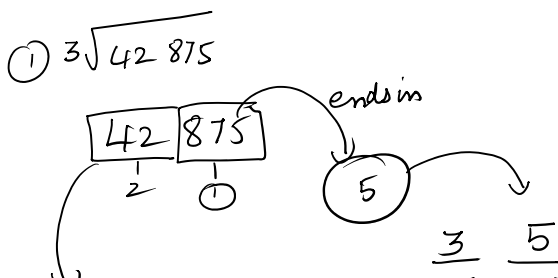
## CUBE ROOT BY ESTIMATION METHOD

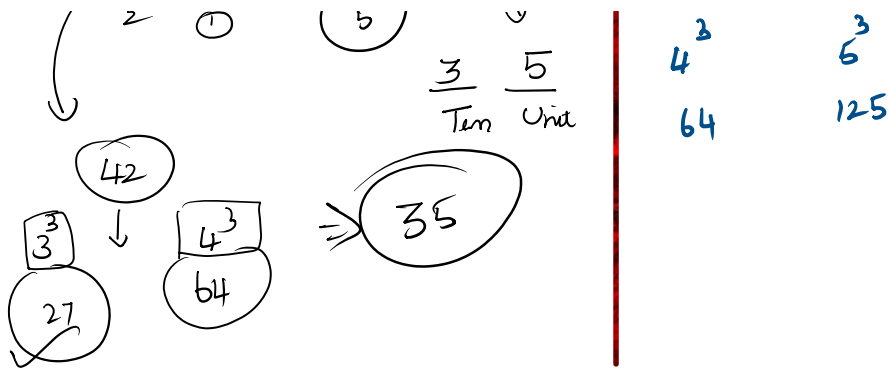
This method is used to find the cube root of a perfect cube in a quick and easy way.

| STEPS                                                                                                                                                                                                           | EXAMPLE : Find $\sqrt[3]{614125}$                                                                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| 1 Make groups of three digits each starting from the right most.                                                                                                                                                | 614125<br>↓<br>614   125<br>2nd group 1st group (right most)                                                       |
| 2 The 1st (right most) group gives the unit's digit of the cube root. (Use the shortcut table)                                                                                                                  | 125 ends in 5. From the shortcut table, unit's digit = 5.                                                          |
| 3 The 2nd group gives the ten's digit of the cube root. Compare this group with the cubes of numbers (... , 7 <sup>3</sup> , 8 <sup>3</sup> , 9 <sup>3</sup> , 10 <sup>3</sup> , ... ) to find the ten's digit. | Compare 614 with cubes:<br>8 <sup>3</sup> = 512    9 <sup>3</sup> = 729<br>Since 512 < 614 < 729, ten's digit = 8. |
| 4 If there is a 3rd group (and so on), it gives the hundred's digit and higher digits in the same way.                                                                                                          | Combine the digits.<br>$\sqrt[3]{614125} = 85$                                                                     |

| MORE EXAMPLES                                                                                                                                                                                                                            |                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Find $\sqrt[3]{42875}$                                                                                                                                                                                                                | 2. Find $\sqrt[3]{110592}$                                                                                                                                                                                                                    | 3. Find $\sqrt[3]{250047}$                                                                                                                                                                                                                      | 4. Find $\sqrt[3]{970299}$                                                                                                                                                                                                                         |
| 42875 → 42   875<br>2nd group 1st group                                                                                                                                                                                                  | 110592 → 110   592<br>2nd group 1st group                                                                                                                                                                                                     | 250047 → 250   047<br>2nd group 1st group                                                                                                                                                                                                       | 970299 → 970   299<br>2nd group 1st group                                                                                                                                                                                                          |
| <ul style="list-style-type: none"> <li>1st group (875) ends in 5<br/>∴ Unit's digit = 5</li> <li>2nd group (42)<br/>3<sup>3</sup> = 27 and 4<sup>3</sup> = 64<br/>27 &lt; 42 &lt; 64 ∴ Ten's digit = 3</li> </ul> $\sqrt[3]{42875} = 35$ | <ul style="list-style-type: none"> <li>1st group (592) ends in 8<br/>∴ Unit's digit = 8</li> <li>2nd group (110)<br/>4<sup>3</sup> = 64 and 5<sup>3</sup> = 125<br/>64 &lt; 110 &lt; 125 ∴ Ten's digit = 4</li> </ul> $\sqrt[3]{110592} = 48$ | <ul style="list-style-type: none"> <li>1st group (047) ends in 7<br/>∴ Unit's digit = 3</li> <li>2nd group (250)<br/>6<sup>3</sup> = 216 and 7<sup>3</sup> = 343<br/>216 &lt; 250 &lt; 343 ∴ Ten's digit = 6</li> </ul> $\sqrt[3]{250047} = 63$ | <ul style="list-style-type: none"> <li>1st group (299) ends in 7<br/>∴ Unit's digit = 3</li> <li>2nd group (970)<br/>9<sup>3</sup> = 729 and 10<sup>3</sup> = 1000<br/>729 &lt; 970 &lt; 1000 ∴ Ten's digit = 9</li> </ul> $\sqrt[3]{970299} = 99$ |

Note: This method works only for perfect cubes.





**Find the cube root of the following number by estimation.**

### Challenge Question ★

**1 Find the cube root of each of the following numbers by prime factorization method :**  
(i) 64

**1 Find the cube root of each of the following numbers by prime factorization method :**  
(ii) 512

- 1 Find the cube root of each of the following numbers by prime factorization method :  
(iii) 10648

Sol.  $10648 = 2 \times 2 \times 2 \times 11 \times 11 \times 11$

$\therefore \sqrt[3]{10648} = 2 \times 11$

$\therefore \sqrt[3]{10648} = 22$

Thus, Cube root of 10648 is 22.



|    |       |
|----|-------|
| 2  | 10648 |
| 2  | 5324  |
| 2  | 2662  |
| 11 | 1331  |
| 11 | 121   |
| 11 | 11    |
|    | 1     |

- 1 Find the cube root of each of the following numbers by prime factorization method :  
(iv) 27000

Sol.  $27000 = 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 5 \times 5 \times 5$

$\therefore \sqrt[3]{27000} = 2 \times 3 \times 5$

$\therefore \sqrt[3]{27000} = 30$

Thus, Cube root of 27000 is 30.



|   |       |
|---|-------|
| 2 | 27000 |
| 2 | 13500 |
| 2 | 6750  |
| 3 | 3375  |
| 3 | 1125  |
| 3 | 375   |
| 5 | 125   |
| 5 | 25    |
| 5 | 5     |
|   | 1     |

- 1 Find the cube root of each of the following numbers by prime factorization method :  
(v) 15625

Sol.  $15625 = 5 \times 5 \times 5 \times 5 \times 5 \times 5$

$\therefore \sqrt[3]{15625} = 5 \times 5$

$\therefore \sqrt[3]{15625} = 25$

Thus, Cube root of 15625 is 25.



|   |       |
|---|-------|
| 5 | 15625 |
| 5 | 3125  |
| 5 | 625   |
| 5 | 125   |
| 5 | 25    |
| 5 | 5     |
|   | 1     |

**1** Find the cube root of each of the following numbers by prime factorization method :  
(vi) 13824

**Sol.**  $13824 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3$

$\therefore \sqrt[3]{13824} = 2 \times 2 \times 2 \times 3$

$\therefore \sqrt[3]{13824} = 24$

Thus, Cube root of 13824 is 24.



|   |       |
|---|-------|
| 2 | 13824 |
| 2 | 6912  |
| 2 | 3456  |
| 2 | 1728  |
| 2 | 864   |
| 2 | 432   |
| 2 | 216   |
| 2 | 108   |
| 2 | 54    |
| 3 | 27    |
| 3 | 9     |
| 3 | 3     |
|   | 1     |