# METHOD OF FINDING THE CUBE ROOT OF ANY PERFECT CUBE NUMBER OR QUANTITY

**Manohar Lal Verma**
*Former Principal,*
Y.D. Inter College
OEL (Kheri)-262725.

## Introduction

We can find cube root of any perfect cube number with the method given below.

We know that:

$(a+b)^3 = a^3 + 3ab\,(a+b)+b^3$

The value of $b^3$ is equal to the cube of ones digit of the given quantity or number. Now table of ones digit number and value of b is given below:

| Ones digit of given number | Value of b |
|---|---|
| 0 | 0 |
| 1 | 1 |
| 8 | 2 |
| 7 | 3 |
| 4 | 4 |
| 5 | 5 |
| 6 | 6 |
| 3 | 7 |
| 2 | 8 |
| 9 | 9 |

Now suppose given number is N,

Then:

If

| | N | Value of a |
|---|---|---|
| 1. | $(a+b)^3 < 1000$ | 0 |
| 2. | $(a+b)^3$ 1000 | 10 |
| | and $(a+b)^3 < 8000$ | |
| 3. | $(a+b)^3$ 8000 | |
| | and $(a+b)^3 < 7000$ | 20 |
| 4. | (a+b/ 27000 | |
| | and $(a+b)^3 < 64000$ | 30 |
| 5. | $(a+b)^3$ 64000 | |
| | and $(a+b^{)3} < 125000$ | 40 |
| 6. | $(a+b)^3$ 125000 | |
| | and $(a+b)^3 < 216000$ | 50 |
| 7. | $(a+b)^3$ 216000 | |
| | and $(a+b)^3 < 343000$ | 60 |
| 8. | $(a+b)^3$ 2343000 | |
| | and $(a+b)^3 < 512000$ | 70 |

| | | |
|---|---|---|
| 9. | $(a+b)^3$ 2512000 | |
| | and $(a+b)^3 \leftarrow$729000 | 90 |
| 1o. | $(a+b)^3$ 2729000 | |
| | and $(a+b)^3 \leftarrow$ 10,00000 | 90 |

## First Process

This method is very simple. We can easily get the cube root of any perfect cube number without any Calculation. Only by seeing the values of a and b with the help of tables given above.

Examples:

| **Examples** | | **Process** | |
|---|---|---|---|
| 1. | $(2744)^{1/3}$ =a+b=10+4=14 | 1. | Ones digit = b =4 |
| | | 2. | 2744 > 1000<br>and 2744 < 8000<br>:. a= 10 |
| 2. | $(15625)^{1/3}$ = a+b = 20+5 = 25 | 1. | Ones digit = b = 5 |
| | | 2. | 15625 > 8000 and 15625 < 27000<br>:. a = 20 |
| 3. | (46656)113 = a+b = 30+6 = 36 | 1. | Ones digit = b =6 |
| | | 2. | 46656 > 27000 |
| | | | and 46656 < 64000<br>∴ a= 30 |
| 4. | $(8000)^{113}$ = a+b = (20+0) = 20 | 1. | Ones digit = b = 0 and 8000 < 8000<br>∴a= 20 |

## Second Process

Other Method of finding the value of space:

1. b and $b^3$
2. $(N-b^3)$
3. Find the factor of $(N-b^3)$ in terms of 10, 20, 30 etc. The factors are equal to values of a, respectively. In other words $(N-b^3)=N_1X$ (a-10n) = 0

   Where n = 0, 1, 2, 3, ...

   Now put $N_1$ (a-10n) = 0

| **Examples** | | **Process** | |
|---|---|---|---|
| 1. | (2744)113 =a+b | | |
| | = 10+4 | 2. | $b^3$ = 64 |
| | = 14 | 3. | 2744-64 = 2680 = 268 X 10 |
| | | | ∴ a = 10 |
| 2. | $(15625)^{113}$ = a+b<br>= 20+5<br>= 25 | | 1. Ones digit = b = 5<br>2. 2. b3 ::: 125<br>3. 15625-125=15500=776X20<br>∴ a= 20 |
| 3. | $(46656))^{1/3}$ = a+b<br>= 30+6<br>= 36 | 1.<br>2.<br>3. | Ones digit = b =6<br>$b^3$ ::: 216<br>46656-216 =46440 =1548X30<br>∴ a= 30 |

| | | | |
|---|---|---|---|
| 4. | $(8000)^{1/3} = a+b$<br>$= 20+0$<br>$= 20$ | | 1. Ones digit = b =0<br>2. $b^3 = 0$<br>3. 8000-0=8000<br>= 400 × 20<br>∴ a= 20 |
| 5. | $(15.625)^{1/3} = \left(\frac{15625}{1000}\right)^{1/3}$<br>$\left(\frac{a+b}{10}\right) = \left(\frac{20+5}{10}\right) = 2..$ | | 1. Ones digit= 5 = b<br>2. 15625 > 8000<br>and 15625 < 27000<br>∴ a= 20 |

## Third Process

We know that:

$(a+b)^3 = a^3 + b^3 + 3ab\,(a+b)$

Now finding the cube root, The process is given below:

| | a+b |
|---|---|
| $a^3$ | $a^3+b^3+3ab\,(a+b)$ |
| | $a^3$ |
| | $b^3$ |
| $a^3$ | $-b^3$ |
| | 3ab (a+b) |
| | 3ab (a+b) |
| | × |

∴ Cube root = (a+b)

**Example:**

1. $(15625)^{1/3} = (a+b) = 20+5$

$= 25$

| | 20 + 5 | |
|---|---|---|
| $20^2$ | 15625 | |
| | -8000 | 3ab (a + b) |
| $5^2$ | 7625 | = 3×20×5 (20+5) |
| | -125 | = 7500 |
| 3 × 20 × 5 (20 + 5) | 7500 | |
| | 7500 | |
| | × | |

2. $(0.389017)^{1/3} = a + b$

$= 0.7+.03$

$= 0.73$

| | .7 + .03 |
|---|---|
| $7^2$ | 0.389017 |
| | -.343 |
| $(.03)^2$ | .046017 |
| | .000027 |
| 3 × .7 × .03 (.73) | .045990 |
| = .04599 | .04599 |
| | × |

3. $(15.625)^{1/3} = a+b$

$= 2+0.5$

$= 2.5$

| | 2 + .5 |
|---|---|
| $2^2$ | 15.625 |
| | -8 |
| $5^2$ | 7.625 |
| | -.125 |
| 3 × 2 × .5 (2+5) | 7.500 |
| = 3×2.5 | 7.500 |
| | × |