Cube Root.

The Cube root of a given number is the number whose cube is the given number. It is denoted by $\sqrt[3]{\ }$

Eg.

$$\sqrt[3]{8} = \sqrt[3]{2^3} \cdot \sqrt[3]{2\times2\times2}$$

$$= 2$$

$$\sqrt[3]{512} = \sqrt[3]{8\times8\times8} \cdot \sqrt[3]{8^3} = 8$$

Methods

1. Prime factorisation Method.

Q1. Find the Cube root of 9261

3	9261
3	3087
3	1029
7	343
7	49
7	7
	1

$$\sqrt[3]{9261} = \sqrt[3]{3\times3\times3\times7\times7\times7}$$

$$= \sqrt[3]{3^3\times7^3}$$

$$= 3\times7 = 21$$

Shortcut Method

4, 5, 6 digits — 2 digits

1) $\sqrt[3]{39|304}$ $\underline{3}$ $\underline{4}$ = 34

1) unit digits 4. in cube

2) 39 lies between 3 & 4

take least

2) $\sqrt[3]{94|192}$ $\underline{9}$ $\underline{8}$

3) $\sqrt[3]{13|824}$ $\underline{2}$ $\underline{4}$

4) $\sqrt[3]{148877}$ $\underline{5}$ $\underline{3}$

Numbers	Cube	
1	1	1
2	8	8
3	27	7
4	64	4
5	125	5
6	216	6
7	343	3
8	512	2
9	729	9
10	1000	0

Note

if $\frac{p}{q}$ is a fraction, then $\sqrt[3]{p/q} = \frac{\sqrt[3]{p}}{\sqrt[3]{q}}$, p & q is Integer

if p is a Integer, then $\sqrt[3]{-p} = -\sqrt[3]{p}$

Q1. Find the Value of $\sqrt[3]{\frac{0.000729}{0.085184}}$

$$\sqrt[3]{\frac{0.000729}{0.085184}} = \sqrt[3]{\frac{729}{85184}} = \frac{\sqrt[3]{729}}{\sqrt[3]{85184}} \cdot \frac{9}{44}$$

85184 $\underline{4}$ = $\underline{4}$ $\underline{4}$

Q2. Find Cube root of −5832.

$\sqrt[3]{-5832} = -\sqrt[3]{5832} = -\underline{1}\ \underline{8} = -18$

Q3 Find the Cube root of -17576

$$\sqrt[3]{-17536} = -\sqrt[3]{17536}$$

$$= -\underline{2}\ \underline{6}$$

$$= -26$$

Q4. If $2 * 3 = \sqrt{13}$ and $3 * 4 = 5$ then the value of $5 * 12$ is

By observing, we see

$$2 * 3 = \sqrt{2^2 + 3^2}$$

$$= \sqrt{4 + 9}$$

$$= \sqrt{13}$$

$$3 * 4 = \sqrt{3^2 + 4^2}$$

$$= \sqrt{9 + 16} = \sqrt{25} = 5$$

$$\therefore 5 * 12 = \sqrt{5^2 + 12^2}$$

$$= \sqrt{25 + 144}$$

$$= \sqrt{169} = 13$$

$\sqrt{169} = \underline{1}\ \underline{3}/7$

1 x 2 = 2.

1 & 2. = Smaller

05. if $\left(\frac{x}{y}\right) = \left(\frac{z}{w}\right)$ then what is $(xy + zw)^2$ equal to

$$\frac{x}{y} = \frac{z}{w} = k.$$

$$x = yk \quad \& \quad z = wk$$

$$(xy + zw)^2 = (y^2k + w^2k)^2$$

$$= k^2(y^2 + w^2)2$$

$$= (y^2 + w^2)(k^2y^2 + k^2w^2)$$

$$= (y^2 + w^2)(x^2 + z^2) \quad [\because x = yk \ \& \ z = wk$$

Square root of decimal numbers.

$\sqrt{46.94}$. $\underline{6}$. $\underline{2/8}$ = 6.8

$6 \times 7 = 42$

$46 > 42$:

$\sqrt{0.4} = \sqrt{0.40}$

$\therefore 0.6 < \sqrt{0.40} < 0.67$

$\sqrt{0.4} \approx 0.6$

Exercise Problem

1. Find the square root of 144.

$1\underline{44}$: $\underline{1}$ $\underline{2/8}$ = 12

$\therefore 1 \times 2 = 2$

$1 < 2$.

2 What will be the square root of 7921

$$7921 \cdot \underline{8} \quad \underline{1/9} \cdot 89$$

$$8 \times 9 = 72$$

$$79 > 72 = \text{highest}$$

4. Find the square root of $105\frac{4}{64}$

$$\sqrt{105\tfrac{4}{64}} = \sqrt{\frac{105 \times 4}{64}}$$

$$105\tfrac{4}{64} = \frac{6720+4}{64}$$

$$= \frac{6724}{64}$$

$$\sqrt{\frac{6724}{64}} = \frac{\sqrt{6724}}{\sqrt{64}} = \frac{8}{8} \cdot \frac{2/8}{} \cdot \frac{82}{8}$$

$$= 10\tfrac{2}{8}$$

$$= 10\tfrac{1}{4}$$

5 $\sqrt{\frac{324}{81}} + \sqrt{\frac{324}{81}} = ?$

$$\sqrt{\frac{324}{81}} = \frac{\sqrt{324}}{\sqrt{81}} = \frac{1}{9} \cdot \frac{2/6}{} \cdot \frac{18}{9} = 2$$

$$= 2 + 2 = 4.$$

$8 \times 9 =$

$1 \times 2 = 2$

$3 > 2$

18

6 Find the Square root of $\frac{1}{4} \times \frac{1}{49} + \frac{25}{121}$

$\sqrt{\frac{1}{4}} = \frac{1}{2}$

$\sqrt{\frac{1}{49}} = \frac{1}{7}$

$\sqrt{\frac{25}{121}} = \frac{5}{\sqrt{121}} = \frac{5}{1\ 1/9} = \frac{5}{11}$

1x2=2

1<2

$\frac{1}{4} \times \frac{1}{49} + \frac{25}{121} = \left(\frac{1}{2} \times \frac{1}{7}\right) + \frac{5}{11}$

$= \frac{1}{14} + \frac{5}{11}$

5x14
70 2
14
14

$= \frac{11 + 70}{154}$

$= \frac{81}{154}$.

LCM & HCF H/w Problems

1. Seven bells rings at intervals of 2, 3, 4, 6, 8, 9, & 12 mins respectively. They started ringing Simultaneously at 5.00 in the moorning. What will be the next time when they all ring Simultaneously.

Sol:-

LCM 2, 3, 4, 6, 8, 9, 12

2	2	3	4	6	8	9	12
2	1	3	2	3	4	9	6
3	1	3	1	3	2	9	3
	1	1	1	1	2	3	1

LCM = $2^3 \times 3^2 = 8 \times 9 = 72$ Mins

(1 hr. 12 sec.

5 + 1.12 = 6:12'0 Clock in the mooning

2. Six bells ring at intervals of 2, 4, 6, 8, 10 and 12 secs. They started ringing simultaneously. How many times will they ring together in 30 Mins?

LCM 2, 4, 6, 8, 10 & 12

2	2	4	6	8	10	12
2	1	2	3	4	5	6
3	1	1	3	2	5	3
	1	1	1	2	5	1

LCM = $2^3 \times 3 \times 5$ = ~~[illegible]~~ =

$= 8 \times 3 \times 5 = 24 \times 5 = 120$s

Bells ring together after every 120s ie., 2 Mi

Required Number of time = $\frac{30}{2} + 1 = 16$ times.