

Squares, Cubes And Their Roots

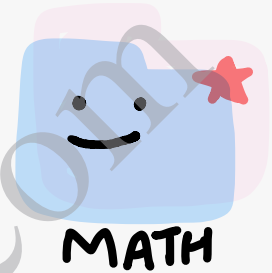
Ex. 3.5

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Ex. 3.5

3a.
$$\begin{array}{r} 11 \overline{) 1331} \\ 11 \overline{) 121} \\ \hline 11 \end{array}$$

$$\begin{aligned} \sqrt[3]{1331} &= \sqrt[3]{\underline{11 \times 11 \times 11}} \\ &= 11 \end{aligned}$$

b.
$$\begin{array}{r} 13 \overline{) 2197} \\ 13 \overline{) 169} \\ \hline 13 \end{array}$$

$$\begin{aligned} \sqrt[3]{2197} &= \sqrt[3]{\underline{13 \times 13 \times 13}} \\ &= 13 \end{aligned}$$

c.
$$\begin{array}{r} 17 \overline{) 4913} \\ 17 \overline{) 289} \\ \hline 17 \end{array}$$

$$\begin{aligned} \sqrt[3]{4913} &= \sqrt[3]{\underline{17 \times 17 \times 17}} \\ &= 17 \end{aligned}$$

d.
$$\begin{array}{r} 2 \overline{) 5832} \\ 2 \overline{) 2916} \\ 2 \overline{) 1458} \\ 3 \overline{) 729} \\ 3 \overline{) 243} \\ 3 \overline{) 81} \\ 3 \overline{) 27} \\ 3 \overline{) 9} \\ \hline 3 \end{array}$$

$$\begin{aligned} \sqrt[3]{5832} &= \sqrt[3]{\underline{2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3}} \\ &= 2 \times 3 \times 3 \\ &= 18 \end{aligned}$$

$$\begin{aligned}
 4a. & \quad \sqrt[3]{64 \times 216} \\
 &= \sqrt[3]{64} \times \sqrt[3]{216} \\
 &= \sqrt[3]{2 \times 2 \times 2 \times 2 \times 2 \times 2} \times \sqrt[3]{2 \times 2 \times 2 \times 3 \times 3 \times 3} \\
 &= 2 \times 2 \times 2 \times 3 \\
 &= 24
 \end{aligned}$$

$$\begin{aligned}
 b. & \quad \sqrt[3]{\frac{1728}{2744}} \\
 &= \frac{\sqrt[3]{1728}}{\sqrt[3]{2744}} \\
 &= \frac{\sqrt[3]{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3}}{\sqrt[3]{2 \times 2 \times 2 \times 7 \times 7 \times 7}} \\
 &= \frac{2 \times 2 \times 3}{2 \times 7} \\
 &= \frac{6}{7}
 \end{aligned}$$

2	1728	2	2744
	2		2
	864		1372
	2		2
	432		686
	2		7
	216		343
	2		7
	108		49
	2		7
	54		
	3		
	27		
	3		
	9		
	3		

$$\begin{aligned}
 c. & \quad \sqrt[3]{1458 \times 108} \\
 &= \sqrt[3]{2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 2 \times 2 \times 3 \times 3 \times 3} \\
 &= \sqrt[3]{2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3} \\
 &= 2 \times 3 \times 3 \times 3 \\
 &= 54
 \end{aligned}$$

2	1458	2	108
	3		2
	729		54
	3		3
	243		27
	3		3
	81		9
	3		3
	27		
	3		
	9		
	3		

$$\begin{aligned}
 d. & \quad \sqrt[3]{\frac{686}{1024} \times \frac{343}{512}} \\
 &= \frac{\sqrt[3]{686}}{\sqrt[3]{1024}} \times \frac{\sqrt[3]{343}}{\sqrt[3]{512}} \\
 &= \frac{\sqrt[3]{2 \times 2 \times 2 \times 7 \times 7 \times 7}}{\sqrt[3]{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2}} \times \frac{\sqrt[3]{7 \times 7 \times 7}}{\sqrt[3]{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2}} \\
 &= \frac{2 \times 7}{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2} \times \frac{7}{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2} \\
 &= \frac{14}{16}
 \end{aligned}$$

$$\begin{array}{r}
 7 \overline{) 343} \\
 \underline{7} \\
 7 \\
 \underline{7} \\
 0
 \end{array}$$

$$\begin{array}{r}
 2 \overline{) 512} \\
 \underline{2} \\
 2 \\
 \underline{2} \\
 0
 \end{array}$$

$$\begin{array}{r}
 2 \overline{) 16} \\
 \underline{2} \\
 2 \\
 \underline{2} \\
 0
 \end{array}$$

$$= \frac{\sqrt[3]{7 \times 7 \times 7}}{\sqrt[3]{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2}}$$

$$= \frac{7}{2 \times 2 \times 2}$$

$$= \frac{7}{8}$$

e. $\sqrt[3]{1331} \times \sqrt[3]{4096}$

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

$$= 11 \times 2 \times 2 \times 2 \times 2$$

$$= 176$$

11	1331	2	4096
11	121	2	2048
	11	2	1024
		2	512
		2	256
		2	128
		2	64
		2	32
		2	16
		2	8
		2	4
			2

f. $\sqrt[3]{729}$

$$= \sqrt[3]{2197}$$

$$= \sqrt[3]{3 \times 3 \times 3 \times 3 \times 3 \times 3}$$

$$= \frac{3 \times 3}{13}$$

$$= \frac{9}{13}$$

5. Volume of cube = 15.625 cm³

or (side)³ = 15.625

or side = $\sqrt[3]{15.625}$

or side = $\sqrt[3]{\frac{15625}{1000}}$

or side = $\frac{\sqrt[3]{15625}}{\sqrt[3]{1000}}$

2	1000	5	15625
2	500	5	3125
2	250	5	625
5	125	5	125
5	25		25
	5		5

$$\text{or side} = \frac{\sqrt[3]{5 \times 5 \times 5 \times 5 \times 5 \times 5}}{\sqrt[3]{2 \times 2 \times 2 \times 5 \times 5 \times 5}}$$

$$\text{or side} = \frac{5 \times 5}{2 \times 5}$$

$$\text{or side} = \frac{25}{10}$$

$$\text{or side} = 2.5$$

\therefore side of cube = 2.5 cm

6. Let the numbers be $x, 2x, 3x$.

$$\therefore x^3 + (2x)^3 + (3x)^3 = 79092 \quad (\text{given})$$

$$\text{or } x^3 + 8x^3 + 27x^3 = 79092$$

$$\text{or } 36x^3 = 79092$$

$$\text{or } x^3 = \frac{79092}{36} = 2197$$

$$\text{or } x^3 = 2197$$

$$\text{or } x = \sqrt[3]{2197}$$

$$\text{or } x = \sqrt[3]{13 \times 13 \times 13}$$

$$\text{or } x = 13$$

\therefore First number = 13

Second number = $2 \times 13 = 26$

Third number = $3 \times 13 = 39$