

⑥ Given:

$$\text{Surface Area} = 13824 \text{ m}^2$$

$$\text{Volume} = ?$$

① Find Area:

$$\text{Area} = \frac{\text{S.A.}}{6}$$

$$\text{Area} = \frac{13824}{6}$$

$$A = 2304 \text{ m}^2$$

② Find side length

$$\sqrt{2304} = ?$$

$$2304 \Rightarrow 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3$$

$$= 2 \times 2 \times 2 \times 2 \times 3$$

$$= 48 \text{ m}$$

$$\text{length} = 48 \text{ m}$$

③ $V = l \times w \times h$ (All sides are the same)

$$V = 48 \times 48 \times 48$$

$$V = 110592 \text{ m}^3$$

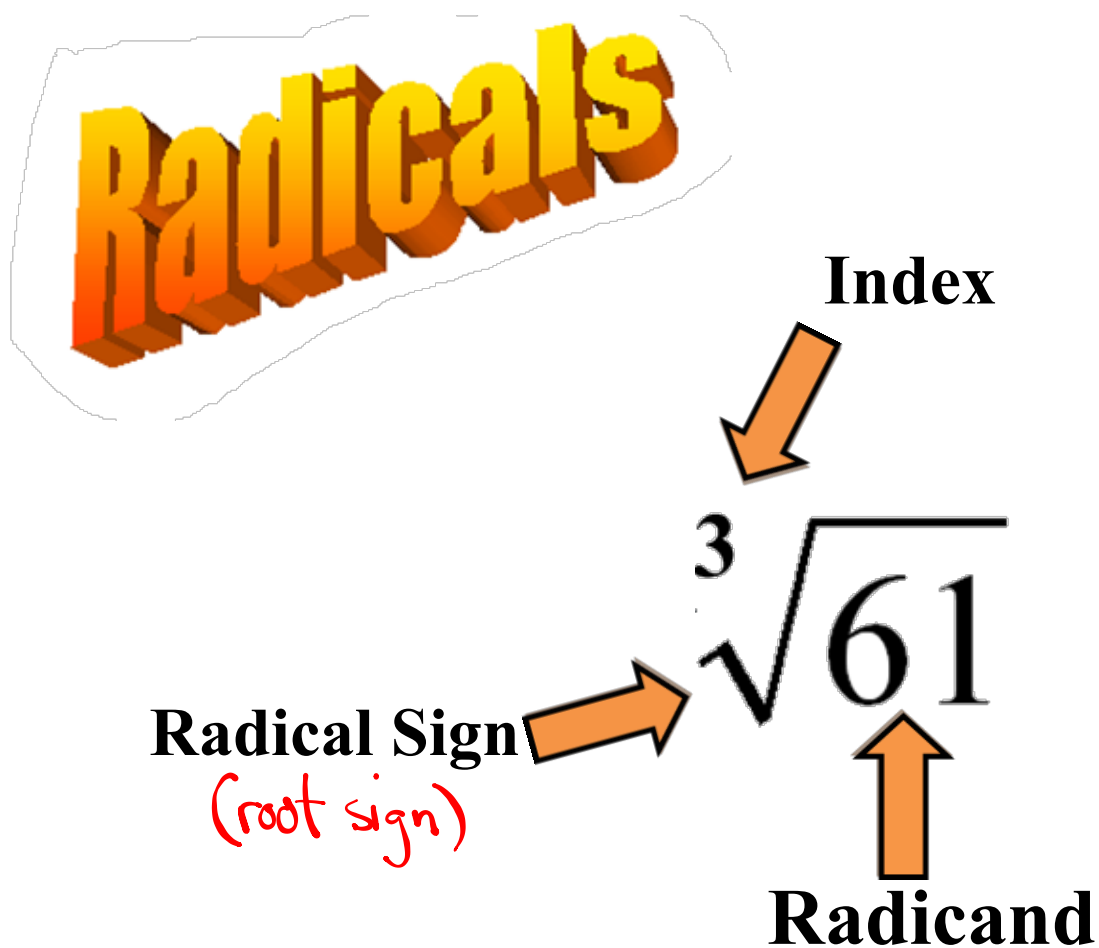
$$\sqrt[3]{27}$$

$$\sqrt[5]{243}$$

ROOTS & POWERS



$$\left(\frac{1}{4}\right)^{-3}$$



* $\sqrt{45}$ → index is 2
radicand is 45

ERASE
FOR
ANSWERS

Let's Check Your Understanding!

1. What is the index of $\sqrt[5]{13}$ $\rightarrow 5$
2. What is the radicand of $\sqrt[7]{24}$ $\rightarrow 24$
3. Explain the meaning of the index.
*it is what root you are taking.
also tells the size of your groupings.*
4. Write 2 as a square root, a cube root, and a fourth root.

$$\begin{array}{l}
 \sqrt{2 \cdot 2} \\
 \sqrt{4} = 2
 \end{array}
 \quad
 \begin{array}{l}
 \sqrt[3]{2 \cdot 2 \cdot 2} \\
 \sqrt[3]{8} = 2
 \end{array}
 \quad
 \begin{array}{l}
 \sqrt[4]{2 \cdot 2 \cdot 2 \cdot 2} \\
 \sqrt[4]{16} = 2 \\
 16 \rightarrow (2 \times 2 \times 2 \times 2) \\
 = 2
 \end{array}$$

**Mixed
&
Entire
Radicals !!**

Mixed Radical

$$2\sqrt{3}$$

A number is in front of the radical sign. “**Mixture**”

Entire Radical

$$\sqrt{54}$$

Everything is
entirely under the
radical sign.

Calculate $\sqrt{75}$

with calculator $\rightarrow \sqrt{75} = \underline{8.660254038}$

What do you notice?

**Your answer is irrational,
therefore lets simplify!!!**

$\sqrt{75}$ (Entire Radical)

$$75 \rightarrow 3 \times \textcircled{5 \times 5}$$

$$= 5\sqrt{3} \text{ (Mixed Radical)}$$

$$\sqrt[3]{40} \text{ (Entire)}$$

$$40 \rightarrow 2 \times 2 \times 2 \times 5$$

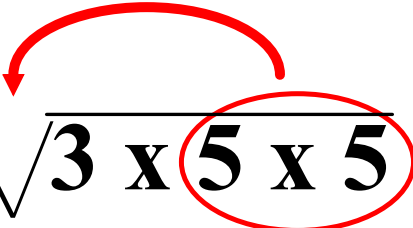
$$= 2\sqrt[3]{5} \text{ Mixed}$$

Simplify $\sqrt{75}$

Use Prime Factorization !!

Prime Factorization

Simplify $\sqrt{75}$

$$\sqrt{75} \quad \sqrt{3 \times 5 \times 5}$$


$$5\sqrt{3}$$

Simplify $\sqrt{63}$

$$\sqrt{3 \times 3 \times 7}$$

$$\sqrt{3 \times 3 \times 7}$$

$$3\sqrt{7}$$

Simplify $\sqrt[3]{1080}$

$$\sqrt[3]{2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 5}$$

$$\sqrt[3]{\underbrace{2 \times 2 \times 2}_{\text{circled}} \times \underbrace{3 \times 3 \times 3}_{\text{circled}} \times 5}$$

$$2 \times 3 \sqrt[3]{5}$$

$$6\sqrt[3]{5}$$

Simplify $\sqrt[3]{120}$ *Entire*

$$\sqrt[3]{2 \times 2 \times 2 \times 3 \times 5}$$

$$\sqrt[3]{\underbrace{2 \times 2 \times 2}_{\text{circled}} \times \underline{\underline{3 \times 5}}}$$

$$2 \sqrt[3]{3 \times 5}$$

$$2 \sqrt[3]{15} \text{ (Mixed Radical)}$$

Try It Yourself!!!

Simplify: Entire \rightarrow Mixed

a) $\sqrt{147}$ b) $\sqrt{80}$ c) $\sqrt{98}$

d) $\overline{81}$ e) $\overline{80}$ f) $\overline{432}$

a) $\sqrt{147}$

b) $\sqrt{80}$

c) $\sqrt{98}$

a) $\sqrt{3 \times (7 \times 7)}$

$7\sqrt{3}$

b) $\sqrt{(2 \times 2) \times (2 \times 2) \times 5}$

$2 \times 2 \sqrt{5}$

$4\sqrt{5}$

c) $\sqrt{2 \times (7 \times 7)}$

$7\sqrt{2}$

$$\text{d) } \sqrt[3]{81} \quad \text{e) } \sqrt[3]{80} \quad \text{f) } \sqrt[3]{432}$$

$$\text{d) } \sqrt[3]{\underbrace{3 \times 3 \times 3}_{\text{circled}} \times 3}$$

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

$$\text{e) } \sqrt[3]{\underbrace{2 \times 2 \times 2}_{\text{circled}} \times 2 \times 5}$$

$$2 \sqrt[3]{2 \times 5}$$

$$2 \sqrt[3]{10}$$

$$\text{f) } \sqrt[3]{\underbrace{2 \times 2 \times 2}_{\text{circled}} \times 2 \times \underbrace{3 \times 3 \times 3}_{\text{circled}}}$$

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

$$6 \sqrt[3]{2}$$

mixed → *entire*
Write $3\sqrt{12}$ as an entire radical

$$3\sqrt{12} \quad \text{mixed}$$

$$\sqrt{12 \times 3 \times 3}$$

$$\sqrt{108} \quad \text{entire}$$

Write $2\sqrt[3]{6}$ as an entire radical

$$2\sqrt[3]{6} \quad \text{mixed}$$

$$\sqrt[3]{\underline{6 \times 2 \times 2 \times 2}}$$

$$\sqrt[3]{48} \quad \text{entire}$$

Write $4\sqrt[4]{3}$ as an entire radical

$$\begin{array}{c} 4\sqrt[4]{3} \\ \hline \sqrt[4]{3 \times 4 \times 4 \times 4 \times 4} \\ \sqrt[4]{768} \end{array}$$

$$\begin{array}{c} 4\sqrt[4]{3} \\ \hline \sqrt[4]{3 \times 256} \\ \sqrt[4]{768} \end{array}$$

Try It Yourself!!!

Mixed \rightarrow Entire

a) $6\sqrt{2}$ b) $4\sqrt[3]{7}$ c) $3\sqrt[4]{11}$

Try It Yourself!!!

a) $6\sqrt{2}$

$$\sqrt{2 \times 6 \times 6}$$

$$\sqrt{72}$$

or $\sqrt{2 \times 36}$

$$\sqrt{72}$$

b) $4\sqrt[3]{7}$

$$\sqrt[3]{7 \times 4 \times 4 \times 4}$$

$$\sqrt[3]{448}$$

$$\sqrt[3]{64 \times 7}$$

$$\sqrt[3]{448}$$

c) $3\sqrt[4]{11}$

$$\sqrt[4]{11 \times 3 \times 3 \times 3 \times 3}$$

$$\sqrt[4]{891}$$

$$\sqrt[4]{11 \times 81}$$

$$\sqrt[4]{891}$$

Homework

Page 218 #4 efgh

#5 efgh

#11 efgh

#12 defg

#14

#15

Reducing or Simplifying Radicals

Method #2

Simplify $\sqrt{125}$

To simplify $\sqrt{125}$, we must determine the greatest perfect square that divides into 125 evenly!!

Use Your Lifeline

Hint: Start at the bottom!!



4
9
16
25
36
49
64
81
100
121

$$25 \times 5 = 125$$

$$\sqrt{125}$$

$$\sqrt{25 \cdot 5}$$

$$5\sqrt{5}$$

