Square:
$A = \ell \times w$ (sides are same)

⑩ Given:

Surface Area = 13824 m²

Volume = ?

Cube:
$V = \ell \times w \times h$ (sides are same)

$SA = 6(\ell \times w)$ (sides are same)

① Find Area.

$Area = \dfrac{S.A.}{6}$

$Area = \dfrac{13824}{6}$

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

② Find side length

$\sqrt{2304} = ?$

$2304 \rightarrow \underbrace{2 \times 2} \times \underbrace{2 \times 2} \times \underbrace{2 \times 2} \times \underbrace{2 \times 2} \times \underbrace{3 \times 3}$

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

$= 48 \text{ m}$

length = 48m

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

$V = 48 \times 48 \times 48$

$V = 110\,592 \text{ m}^3$

$A = l \times w$

$\underline{V = l \times w \times h}$

Given surface Area = 17496 units^2

① Find Area: ② Find length

$A = \dfrac{17496}{6}$

$A = 2916$ units^2

$\sqrt{2916} = ?$

$2916 \rightarrow \boxed{2 \times 2} \; \boxed{3 \times 3} \; \boxed{3 \times 3} \; \boxed{3 \times 3}$

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

$= 54$

length $= 54$ units

③ $V = l \times w \times h$

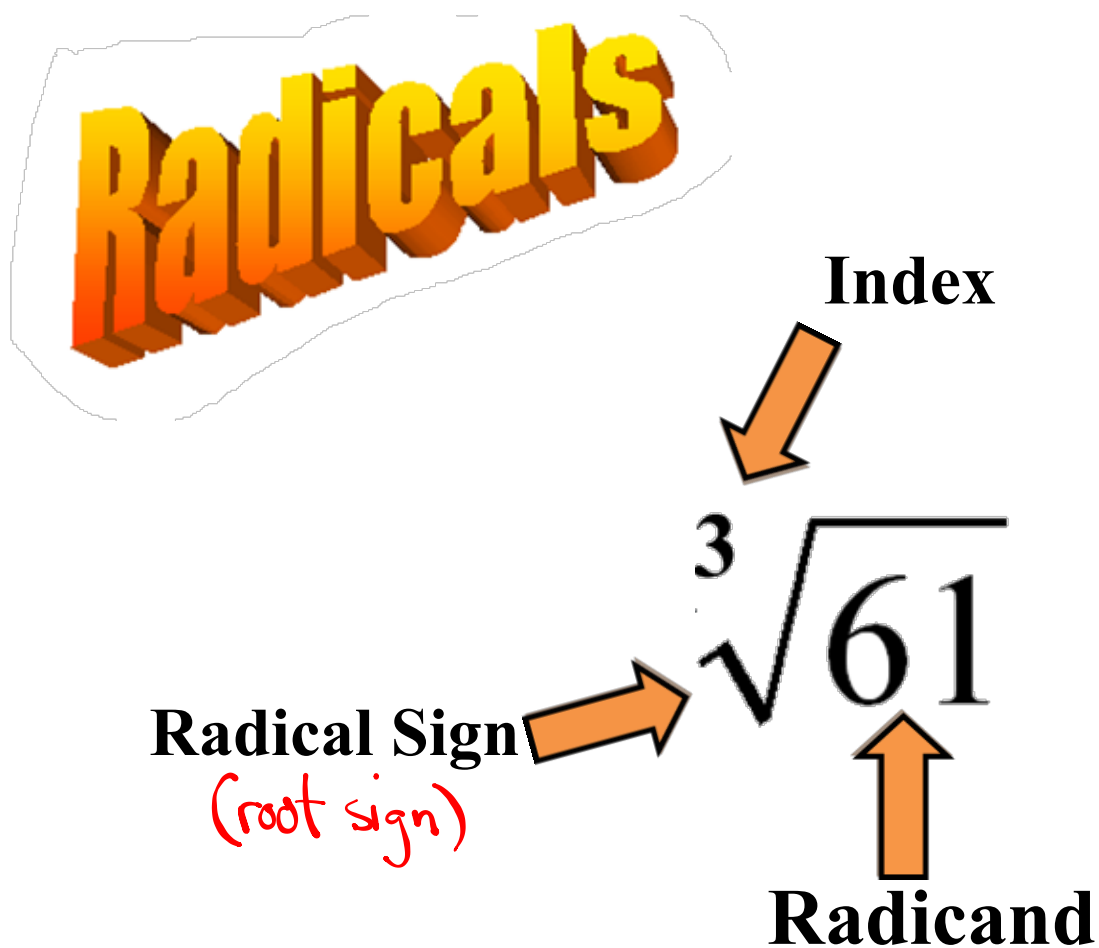$V = 54 \times 54 \times 54$

$\boxed{V = 157\;464 \text{ units}^3}$

$\sqrt[3]{27}$

$\sqrt[5]{243}$

Roots & Powers

$(1/4)^{-3}$

radical MATH

Radicals

Index

$$\sqrt[3]{61}$$

Radical Sign (root sign)

Radicand

✳ $\sqrt{45}$ → Index is 2
radicand is 45

Let's Check Your Understanding!

1. What is the index of $\sqrt[5]{13}$ → 5

2. What is the radicand of $\sqrt[7]{24}$ → 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.

$$\sqrt{2 \cdot 2} =$$
$$\sqrt{4} = 2$$

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

$$\sqrt[4]{2 \cdot 2 \cdot 2 \cdot 2}$$
$$\sqrt[4]{16} = 2$$

$$16 → \boxed{2 \times 2 \times 2 \times 2}$$
$$= 2$$

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 → $\sqrt{75}$ = 8.660254038

What do you notice?

Your answer is irrational, therefore lets simplify!!!

$\sqrt{75}$ (Entire Radical)

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

$= 5\sqrt{3}$ (mixed Radical

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

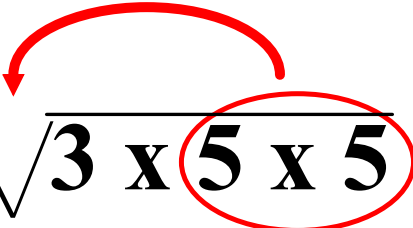$$40 \rightarrow 2 \times 2 \times 2 \times 5$$

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

Simplify $\sqrt{75}$

Use Prime Factorization !!

Prime Factorization

Simplify $\sqrt{75}$

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

$$5\sqrt{3}$$

Simplify $\sqrt{63}$

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

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

$$3\sqrt{7}$$

Simplify $\sqrt[3]{1080}$

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

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

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

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

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

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

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

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

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

Try It Yourself!!!

Simplify: Entire → 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)** $\sqrt{98}$

$= 12.1243S565$

approximate

a) $\sqrt{3 \times 7 \times 7}$ **b)** $\sqrt{2 \times 2 \times 2 \times 2 \times 5}$ **c)** $\sqrt{2 \times 7 \times 7}$

$7\sqrt{3}$ $2 \times 2 \sqrt{5}$ $7\sqrt{2}$

exact value $4\sqrt{5}$

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

d) $\sqrt[3]{3 \times 3 \times 3 \times 3}$ e) $\sqrt[3]{2 \times 2 \times 2 \times 2 \times 5}$

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

$2\sqrt[3]{10}$

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

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

$6\sqrt[3]{2}$

mixed → entire

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

$$3\sqrt[2]{12} \quad \text{mixed}$$

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

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

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

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

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

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

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

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

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

$$\sqrt[4]{768}$$

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

$$\sqrt[4]{3 \times 256}$$

$$\sqrt[4]{768}$$

Try It Yourself!!!

Mixed → Entire

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

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

$$= \sqrt{72}$$

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

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

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

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

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

$$25 \times 5 = 125$$

$$\sqrt{125}$$

$$\sqrt{25 \bullet 5}$$

$$5\sqrt{5}$$