

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

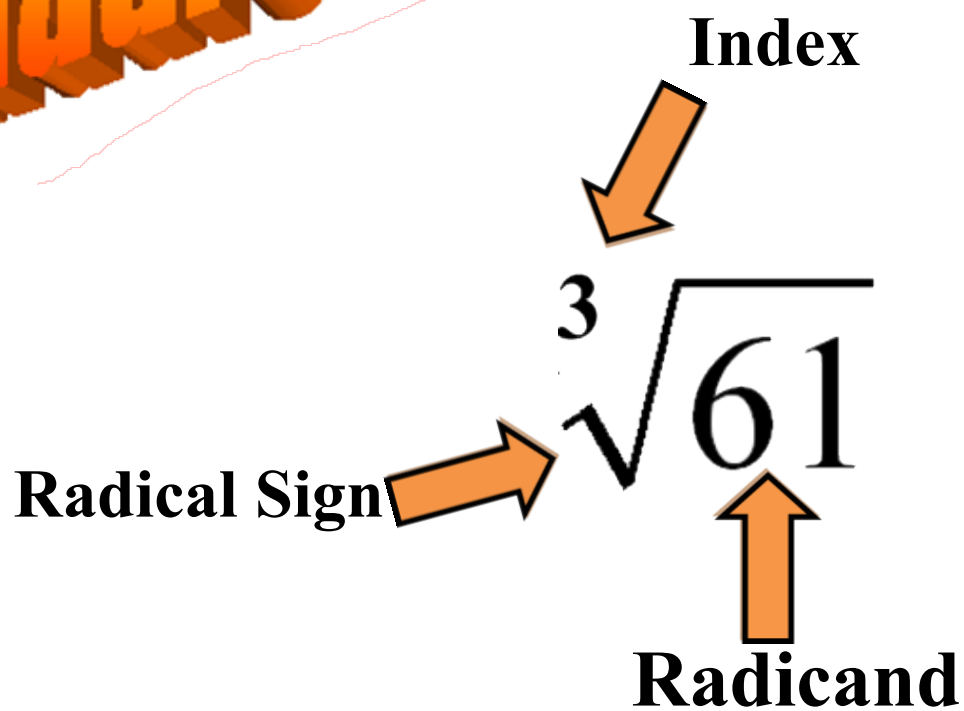
$$\sqrt[5]{243}$$



**Roots &
Powers**

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

Radicals



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 determines what root you take.

4. Write 2 as a square root, a cube root, and a fourth root.

$$\sqrt{4} = 2$$

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

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

Mixed Radical

$$2\sqrt{3}$$

← two times by the square root of 3

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

Entire Radical

$$\sqrt{54}$$

Everything is **entirely** under the radical sign.

Calculate $\sqrt{75}$

$$\sqrt{75} \approx 8.66$$

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

Use Prime Factorization !!

Simplify $\sqrt{75}$ = $\sqrt{3 \cdot \underline{5 \cdot 5}}$

Entire Radical = $5\sqrt{3}$ ← Mixed Radical

Index is 2

Simplify $\sqrt{63} = \sqrt{\underline{3 \cdot 3} \cdot 7}$
 $= 3\sqrt{7}$

Simplify $\sqrt[3]{1080}$ = $\sqrt[3]{\underbrace{2 \cdot 2 \cdot 2}_{\text{sets of 3}} \cdot 5 \cdot \underbrace{3 \cdot 3 \cdot 3}_{\text{sets of 3}}}$

Index is 3 look for sets of 3

$$= 2 \cdot 3 \sqrt[3]{5}$$
$$= 6 \sqrt[3]{5}$$

Simplify $\sqrt[3]{120}$ $= \sqrt[3]{2 \cdot 2 \cdot 3 \cdot 2 \cdot 5}$

$= \sqrt[3]{\underline{2 \cdot 2 \cdot 2} \cdot \underline{3 \cdot 5}}$

$= 2 \sqrt[3]{15}$

Try It Yourself!!!

Simplify:

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

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

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

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

$$7\sqrt{3}$$

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

$$7\sqrt{2}$$

$$4\sqrt{5}$$

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

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

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

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

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

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

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

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

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

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

$$\begin{aligned} \underline{3}\sqrt{12} &= \sqrt{3 \cdot 3 \cdot 12} \\ &= \sqrt{108} \end{aligned}$$

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

$$\begin{aligned} \underline{2}\sqrt[3]{6} &= \sqrt[3]{2 \cdot 2 \cdot 2 \cdot 6} \\ &= \sqrt[3]{48} \end{aligned}$$

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

$$\begin{aligned} \underline{4}\sqrt[4]{3} &= \sqrt[4]{4 \cdot 4 \cdot 4 \cdot 4 \cdot 3} \\ &= \sqrt[4]{768} \end{aligned}$$

Try It Yourself!!!

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

Answers on
page 486.