

September 6th, 2007

Radicals

$\sqrt{\quad}$ → square root

$\sqrt[3]{\quad}$ → cubed root

Squared

2 → 4

3 → 9

4 → 16

5 → 25

6 → 36

7 → 49

8 → 64

9 → 81

10 → 100

11 → 121

12 → 144

13 → 169

14 → 196

15 → 225

16 → 256

17 → 289

18 → 324

19 → 361

20 → 400

Simplify (Reduce)

Ex. 1 : $\sqrt{8} = \sqrt{4} \sqrt{2}$
 $= 2\sqrt{2}$

Ex. 2 : $\sqrt{98}$
 $\sqrt{98} = \sqrt{49} \sqrt{2}$
 $= 7\sqrt{2}$

Ex. 3 : $\sqrt{32} = \sqrt{4} \sqrt{8}$
 $= 2\sqrt{8}$
 $= 2\sqrt{4} \sqrt{2}$
 $= 2 \cdot 2 \sqrt{2}$
 $= 4\sqrt{2}$

$\sqrt{32} = \sqrt{16} \sqrt{2}$
 $= 4\sqrt{2}$

Ex. 4 : $\sqrt{112}$
 $= \sqrt{16} \sqrt{7}$
 $= 4\sqrt{7}$

$\sqrt{112}$
 $= \sqrt{4} \sqrt{28}$
 $= 2\sqrt{28}$
 $= 2\sqrt{4} \sqrt{7}$
 $= 2 \cdot 2 \sqrt{7}$
 $= 4\sqrt{7}$

Ex 5: $\sqrt{108}$
 $= \sqrt{9} \sqrt{12}$
 $= 3 \sqrt{4} \sqrt{3}$
 $= 3 \cdot 2 \sqrt{3}$
 $= 6 \sqrt{3}$

Ex 6: $\sqrt{75}$
 $= \sqrt{25} \sqrt{3}$
 $= 5 \sqrt{3}$

Ex 7: $\sqrt{128}$
 $= \sqrt{64} \sqrt{2}$
 $= 8 \sqrt{2}$

$\sqrt{128}$
 $= \sqrt{16} \sqrt{8}$
 $= 4 \sqrt{4} \sqrt{2}$
 $= 4 \cdot 2 \sqrt{2}$
 $= 8 \sqrt{2}$

September 7th, 2007

Radical : Variables

$$\sqrt{x^2} = x$$

$$\sqrt{x^4} = x^2$$

$$\sqrt{x^6} = x^3$$

$$\begin{aligned}\sqrt{x^5} &= \sqrt{x^4} \sqrt{x} \\ &= \sqrt{x^2} \sqrt{x}\end{aligned}$$

$$\begin{aligned}\sqrt{x^7} &= \sqrt{x^6} \sqrt{x} \\ &= x^3 \sqrt{x}\end{aligned}$$

$$\begin{aligned}\sqrt{x^{11} y^{10} z^3} \\ &= \sqrt{x^6} \sqrt{x} \sqrt{y^6} \sqrt{z^2} \sqrt{z} \\ &= x^3 y^5 z^2 \sqrt{xz}\end{aligned}$$

$$\begin{aligned}\text{Ex 1: } \sqrt{2a^3b^2c^5} \\ &= \sqrt{4} \sqrt{3} \sqrt{a^2} \sqrt{a} \sqrt{b^2} \sqrt{c^4} \sqrt{c} \\ &= 2abc^2\sqrt{3ac}\end{aligned}$$

$$\begin{aligned}\text{Ex 2: } \frac{1}{2} \sqrt{8x^3y^2} \\ &= \frac{1}{2} \sqrt{4} \sqrt{2} \sqrt{x^2} \sqrt{x} \sqrt{y^2} \\ &= \frac{1}{2} \cdot 2 \cdot x \cdot y \sqrt{2x} \\ &= xy\sqrt{2x}\end{aligned}$$

$$\begin{aligned}\text{Ex 3: } \frac{2}{3} \sqrt{49x^5} \\ &= \frac{2}{3} \cdot \frac{2}{3} \sqrt{x^4} \sqrt{x} \\ &= \frac{4}{9} x^2 \sqrt{x}\end{aligned}$$

MULTIPLICATION

$$\begin{aligned}\sqrt{3} \sqrt{3} &= 3 \\ \sqrt{8} \sqrt{8} &= 8\end{aligned}$$

$$\begin{aligned}\sqrt{5} \sqrt{5} &= 5 \\ \sqrt{x} \sqrt{x} &= x\end{aligned}$$

Ex 1: $\sqrt{3} \sqrt{6}$ METHOD 1

$$\begin{aligned}\sqrt{3} \sqrt{6} \\ &= \sqrt{\cancel{3}} \sqrt{\cancel{3} \cdot 2} \\ &= 3\sqrt{2}\end{aligned}$$

METHOD 2

$$\begin{aligned}\sqrt{3} \sqrt{6} \\ &= \sqrt{18} \\ &= \sqrt{9 \cdot 2} \\ &= 3\sqrt{2}\end{aligned}$$

Ex 2:

$$\begin{aligned}\sqrt{3} \sqrt{18} \sqrt{6} \sqrt{2} \\ &= \sqrt{3} \sqrt{3} \sqrt{6} \sqrt{6} \sqrt{2} \\ &= 3 \cdot 6 \sqrt{2} \\ &= 18\sqrt{2}\end{aligned}$$

$$\begin{aligned}\sqrt{3} \sqrt{18} \sqrt{6} \sqrt{2} \\ &= \sqrt{3} \sqrt{9} \sqrt{2} \sqrt{3} \sqrt{2} \sqrt{2} \\ &= 3 \cdot 2 \cdot 3 \sqrt{2} \\ &= 18\sqrt{2}\end{aligned}$$

Ex 3:

$$\begin{aligned}\sqrt{3a^3b^3c} \sqrt{18a^3bc^2} \sqrt{4b} \\ &= \sqrt{3} \sqrt{9} \sqrt{2} \sqrt{4} \sqrt{a^3b^3c^3} \\ &= 3 \cdot 2 \sqrt{2} \sqrt{3} \sqrt{a^4} \sqrt{a} \sqrt{b^4} \sqrt{b} \sqrt{c^2} \sqrt{c} \\ &= 6a^2b^2c \sqrt{6abc}\end{aligned}$$

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$\sqrt[3]{\quad}$ → cube root

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$$\begin{aligned}\sqrt{x^{11} y^{10} z^3} &= \sqrt{x^{10}} \sqrt{x} \sqrt{y^8} \sqrt{y^2} \sqrt{z^2} \sqrt{z} \\ &= x^5 y^5 z^2 \sqrt{xz}\end{aligned}$$

$$\begin{aligned}\text{Ex 1: } \sqrt{2a^3 b^2 c^5} &= \sqrt{4} \sqrt{3} \sqrt{a^2} \sqrt{a} \sqrt{b^2} \sqrt{c^4} \sqrt{c} \\ &= 2abc^2 \sqrt{3ac}\end{aligned}$$

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Ex 1: $\sqrt{3}\sqrt{6}$ METHOD 1

$$\begin{aligned}&\sqrt{3}\sqrt{6} \\ &= \sqrt{\cancel{3}}\sqrt{\cancel{3}}\sqrt{2} \\ &= 3\sqrt{2}\end{aligned}$$

METHOD 2

$$\begin{aligned}&\sqrt{3}\sqrt{6} \\ &= \sqrt{18} \\ &= \sqrt{9}\sqrt{2} \\ &= 3\sqrt{2}\end{aligned}$$

Ex 2: $\sqrt{3}\sqrt{18}\sqrt{6}\sqrt{2}$

$$\begin{aligned}&= \sqrt{3}\sqrt{3}\sqrt{6}\sqrt{6}\sqrt{2} \\ &= 3 \cdot 6\sqrt{2} \\ &= 18\sqrt{2}\end{aligned}$$

$$\begin{aligned}&\sqrt{3}\sqrt{18}\sqrt{6}\sqrt{2} \\ &= \sqrt{3}\sqrt{9}\sqrt{2}\sqrt{3}\sqrt{2}\sqrt{2} \\ &= 3 \cdot 2 \cdot 3\sqrt{2} \\ &= 18\sqrt{2}\end{aligned}$$

Ex 3: $\sqrt{3a^3b^3c}\sqrt{18a^3bc^2}\sqrt{4b}$

$$\begin{aligned}&= \sqrt{3}\sqrt{9}\sqrt{2}\sqrt{4}\sqrt{a^3b^3c^3} \\ &= 3 \cdot 2\sqrt{2}\sqrt{3}\sqrt{a^4}\sqrt{a}\sqrt{b^4}\sqrt{b}\sqrt{c^2}\sqrt{c} \\ &= 6a^2b^2c\sqrt{6abc}\end{aligned}$$