

Radical
 $\sqrt[n]{m}$ → Radical
 index → n
 Radicand → m

Number System

Integers
 $\dots, -3, -2, -1, 0, 1, 2, 3, \dots$

Natural Numbers
 $1, 2, 3, 4, \dots$

Whole numbers
 $0, 1, 2, 3, 4, 5, \dots$

Rational numbers
 $-\frac{1}{2}, \frac{1}{2}, 0, 2, \frac{5}{2}, \dots$

Irrational numbers
 $\sqrt{5}, \sqrt{7}, \dots$

Irrational numbers:
 → never ending
 → non-repeating decimal
 \sqrt{n} where n is not a perfect square
 $\sqrt[3]{m}$ where m is not a perfect cube
 $\sqrt{5} = 2.236067977\dots$
 approximation

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Simplifying Radicals

Radical
 $\sqrt{ab} = \sqrt{a} \times \sqrt{b}$

radical symbol → $\sqrt{\quad}$
radicand → \quad

$\sqrt{20} = \sqrt{4 \times 5} = 2\sqrt{5}$

$\sqrt{12} = \sqrt{4 \times 3} = 2\sqrt{3}$

$3\sqrt{5} \times 7\sqrt{2} = 21\sqrt{10}$

$2\sqrt{6} \times 3\sqrt{2} = 6\sqrt{12}$

$2^2 = 4$
 $3^2 = 9$
 $4^2 = 16$
 $5^2 = 25$

$11^2 = 121$
 $12^2 = 144$
 $13^2 = 169$

$2\sqrt{3} = \sqrt{4 \times 3}$
 $\sqrt{12} = 2\sqrt{3}$

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$\sqrt{12} = \sqrt{4 \times 3} = 2\sqrt{3} = 3.464105615$

$\sqrt{64} = 8$
 $\sqrt{4 \times 16} = 2 \times 4 = 8$

$2\sqrt{3} = \sqrt{4 \times 3} = \sqrt{12}$

$\sqrt{48} = \sqrt{16 \times 3} = 4\sqrt{3}$

$2^2 = 4$
 $4^2 = 16$

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$\sqrt{75} = \sqrt{25 \times 3} = 5\sqrt{3}$

$\sqrt{54} = \sqrt{9 \times 6} = 3\sqrt{6}$

$2\sqrt{18} = 2\sqrt{9 \times 2} = 2 \times 3 \times \sqrt{2} = 6\sqrt{2}$

$2^2 = 4$
 $3^2 = 9$
 $4^2 = 16$
 $5^2 = 25$
 $6^2 = 36$

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$\sqrt{48} = \sqrt{16 \times 3} = \sqrt{6 \times 8} = \sqrt{6} \times \sqrt{8} = 4\sqrt{3}$
 ENTIRE RADICAL → MIXED RADICAL

$\sqrt[3]{7} = 3^2 \sqrt{7} = \sqrt{9} \times \sqrt{7} = \sqrt{9 \times 7} = \sqrt{63}$
 MIXED RADICAL → ENTIRE RADICAL

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

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Perfect Squares

$2^2 = 4$
 $3^2 = 9$
 $4^2 = 16$
 $5^2 = 25$

$11^2 = 121$
 $12^2 = 144$
 $13^2 = 169$

Perfect Cubes

$2^3 = 2 \times 2 \times 2 = 8$
 $3^3 = 27$
 $4^3 = 64$
 $5^3 = 125$
 $6^3 = 216$

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$\sqrt[3]{8} = 2$ (cubed root)
 $2^3 = 8$
 $\sqrt{4} = 2$
 $2^2 = 4$
 $2^4 = 16$
 $\sqrt[4]{16}$
 $\sqrt[5]{32} = 2$ (5th root)
 $2^5 = 32$

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We can apply the Radical Property
 to cube roots:
 $\sqrt[3]{24} = \sqrt[3]{8 \times 3} = \sqrt[3]{8} \times \sqrt[3]{3} = 2\sqrt[3]{3}$
 $\sqrt[3]{54} = \sqrt[3]{27 \times 2} = \sqrt[3]{27} \cdot \sqrt[3]{2} = 3\sqrt[3]{2}$
 p. 218 # 4[✓], 5[✓], 10, 11, 12
 + Q's...

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