

Simplifying Radical Expressions

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Simplify. Note: Some radicals cannot be simplified (but not many).

$$1) \sqrt{8} = \sqrt{4} \cdot \sqrt{2}$$

$$2\sqrt{2}$$

$$2) \sqrt{180}$$

$$\sqrt{36} \cdot \sqrt{5}$$

$$6\sqrt{5}$$

$$3) \sqrt{384}$$

$$\sqrt{64} \sqrt{6} = 8\sqrt{6}$$

$$4) \sqrt{294}$$

$$\sqrt{49} \sqrt{6} = 7\sqrt{6}$$

$$5) \sqrt{80}$$

$$\sqrt{16} \sqrt{5} = 4\sqrt{5}$$

$$6) \sqrt{42}$$

$$\sqrt{42}$$

$$7) \sqrt{128}$$

$$\sqrt{64} \sqrt{2} = 8\sqrt{2}$$

$$8) \sqrt{320}$$

$$\sqrt{64} \sqrt{5} = 8\sqrt{5}$$

$$9) \sqrt{210}$$

$$\sqrt{210}$$

$$10) \sqrt{252}$$

$$\sqrt{36} \sqrt{7} = 6\sqrt{7}$$

$$11) \sqrt{63}$$

$$\sqrt{9} \sqrt{7} = 3\sqrt{7}$$

$$12) \sqrt{512}$$

$$\sqrt{2} \sqrt{256} = 16\sqrt{2}$$

$$13) \sqrt{12}$$

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

$$14) \sqrt{24}$$

$$\sqrt{4} \sqrt{6} = 2\sqrt{6}$$

$$15) \sqrt{392}$$

$$\sqrt{196} \sqrt{2} = 14\sqrt{2}$$

$$16) \sqrt{50}$$

$$\sqrt{25} \sqrt{2} = 5\sqrt{2}$$

$$17) \sqrt{30}$$

$$\sqrt{30}$$

$$18) \sqrt{144}$$

$$12$$

$$19) \sqrt{200}$$

$$\sqrt{100} \sqrt{2}$$

$$10\sqrt{2}$$

$$20) \sqrt{288}$$

$$\sqrt{36} \sqrt{8} \quad \text{or} \quad \sqrt{144} \sqrt{2}$$

$$6\sqrt{8} \quad 12\sqrt{2}$$

$$6\sqrt{4} \sqrt{2}$$

$$12\sqrt{2}$$

Simplify.

$$\begin{aligned} 21) & -5\sqrt{294} \\ & -5\sqrt{49 \cdot 6} \\ & -5(7)\sqrt{6} \end{aligned} \quad \textcircled{-35\sqrt{6}}$$

$$\begin{aligned} 23) & 2\sqrt{320} \\ & 2\sqrt{64 \cdot 5} \\ & 2(8)\sqrt{5} \end{aligned} \quad \textcircled{16\sqrt{5}}$$

$$\begin{aligned} 25) & 8\sqrt{98} \\ & 8\sqrt{49 \cdot 2} \\ & 8(7)\sqrt{2} \end{aligned} \quad \textcircled{56\sqrt{2}}$$

$$\begin{aligned} 27) & 8\sqrt{112} \\ & 8\sqrt{16 \cdot 7} \\ & 8(4)\sqrt{7} \end{aligned} \quad \textcircled{32\sqrt{7}}$$

$$\begin{aligned} 29) & -\sqrt{20} \\ & -\sqrt{4 \cdot 5} \\ & -2\sqrt{5} \end{aligned} \quad \textcircled{-2\sqrt{5}}$$

$$\begin{aligned} 31) & 6\sqrt{144} \\ & 6(12) \\ & 72 \end{aligned} \quad \textcircled{72}$$

$$\begin{aligned} 33) & 6\sqrt{512} \\ & 6\sqrt{256 \cdot 2} \\ & 6(16)\sqrt{2} \end{aligned} \quad \textcircled{96\sqrt{2}}$$

$$\begin{aligned} 35) & 5\sqrt{256} \\ & 5(16) = \end{aligned} \quad \textcircled{80}$$

$$\begin{aligned} 37) & -5\sqrt{175} \\ & -5\sqrt{25 \cdot 7} \\ & -5(5)\sqrt{7} \end{aligned} \quad \textcircled{-25\sqrt{7}}$$

$$\begin{aligned} 39) & -4\sqrt{54} \\ & -4\sqrt{9 \cdot 6} \\ & -4(3)\sqrt{6} \end{aligned} \quad \textcircled{-12\sqrt{6}}$$

$$\begin{aligned} 22) & -8\sqrt{392} \\ & -8\sqrt{196 \cdot 2} \\ & -8(14)\sqrt{2} \end{aligned} \quad \textcircled{-112\sqrt{2}}$$

$$\begin{aligned} 24) & 3\sqrt{8} \\ & 3\sqrt{4 \cdot 2} \\ & 3(2)\sqrt{2} \end{aligned} \quad \textcircled{6\sqrt{2}}$$

$$\begin{aligned} 26) & 5\sqrt{200} \\ & 5\sqrt{100 \cdot 2} \\ & 5(10)\sqrt{2} \end{aligned} \quad \textcircled{50\sqrt{2}}$$

$$\begin{aligned} 28) & -8\sqrt{384} \\ & -8\sqrt{64 \cdot 6} \\ & -8(8)\sqrt{6} \end{aligned} \quad \textcircled{-64\sqrt{6}}$$

$$\begin{aligned} 30) & -2\sqrt{180} \\ & -2\sqrt{36 \cdot 5} \\ & -2(6)\sqrt{5} \end{aligned} \quad \textcircled{-12\sqrt{5}}$$

$$\begin{aligned} 32) & 6\sqrt{27} \\ & 6\sqrt{9 \cdot 3} \\ & 6(3)\sqrt{3} \end{aligned} \quad \textcircled{18\sqrt{3}}$$

$$\begin{aligned} 34) & -5\sqrt{27} \\ & -5\sqrt{9 \cdot 3} \\ & -5(3)\sqrt{3} \end{aligned} \quad \textcircled{-15\sqrt{3}}$$

$$\begin{aligned} 36) & 2\sqrt{63} \\ & 2\sqrt{9 \cdot 7} \\ & 2(3)\sqrt{7} \end{aligned} \quad \textcircled{6\sqrt{7}}$$

$$\begin{aligned} 38) & 4\sqrt{64} \\ & 4(8) = \end{aligned} \quad \textcircled{32}$$

$$\begin{aligned} 40) & 2\sqrt{50} \\ & 2\sqrt{25 \cdot 2} \\ & 2(5)\sqrt{2} \end{aligned} \quad \textcircled{10\sqrt{2}}$$

$$41) \sqrt{4} \cdot \sqrt{2}$$

$$2\sqrt{2}$$

$$42) \sqrt{5} \cdot \sqrt{3}$$

$$\sqrt{15}$$

$$43) \sqrt{3} \cdot \sqrt{5}$$

$$\sqrt{15}$$

$$44) \sqrt{6} \cdot \sqrt{15}$$

$$\frac{\sqrt{90}}{\sqrt{9} \sqrt{10}} \quad 3\sqrt{10}$$

$$45) \sqrt{15} \cdot \sqrt{6}$$

$$\frac{\sqrt{90}}{\sqrt{9} \sqrt{10}} \quad 3\sqrt{10}$$

$$46) \sqrt{15} \cdot \sqrt{15}$$

$$15$$

$$47) \sqrt{5} \cdot \sqrt{4}$$

$$2\sqrt{5}$$

$$48) \sqrt{8} \cdot \sqrt{10}$$

$$\frac{\sqrt{80}}{\sqrt{16} \sqrt{5}} \quad 4\sqrt{5}$$

$$49) \sqrt{6} \cdot \sqrt{6}$$

$$\sqrt{36}$$

$$6$$

$$50) \sqrt{3} \cdot \sqrt{3}$$

$$3$$

$$51) \sqrt{10} \cdot \sqrt{8}$$

$$\frac{\sqrt{80}}{\sqrt{16} \sqrt{5}} \quad 4\sqrt{5}$$

$$52) \sqrt{6} \cdot \sqrt{3}$$

$$\frac{\sqrt{18}}{\sqrt{9} \sqrt{2}} \quad 3\sqrt{2}$$

$$53) \sqrt{12} \cdot \sqrt{12}$$

$$12$$

$$54) \sqrt{10} \cdot \sqrt{6}$$

$$\frac{\sqrt{60}}{\sqrt{4} \sqrt{15}} \quad 2\sqrt{15}$$

$$55) \sqrt{10} \cdot \sqrt{10}$$

$$10$$

$$56) \sqrt{15} \cdot \sqrt{10}$$

$$\frac{\sqrt{150}}{\sqrt{25} \sqrt{6}} \quad 5\sqrt{6}$$

$$57) \sqrt{20} \cdot \sqrt{15}$$

$$\frac{\sqrt{4} \sqrt{5} \sqrt{15}}{2\sqrt{75}} \rightarrow \frac{2\sqrt{25} \sqrt{3}}{2(5)\sqrt{3}} \quad 10\sqrt{3}$$

$$58) \sqrt{25} \cdot \sqrt{3}$$

$$5\sqrt{3}$$

$$59) \sqrt{15} \cdot \sqrt{5}$$

$$\frac{\sqrt{75}}{\sqrt{25} \sqrt{3}} \quad 5\sqrt{3}$$

$$60) \sqrt{8} \cdot \sqrt{6}$$

$$\frac{\sqrt{48}}{\sqrt{16} \sqrt{3}} \quad 4\sqrt{3}$$

Simplify. Use absolute value signs when necessary.

61) $\frac{\sqrt{45x}}{\sqrt{9}\sqrt{5}}$

$3\sqrt{5x}$

63) $\frac{\sqrt{128k^2}}{\sqrt{64}\sqrt{2}}$

$8k\sqrt{2}$

65) $\frac{\sqrt{18v}}{\sqrt{9}\sqrt{2}}$

$3\sqrt{2v}$

67) $\frac{\sqrt{112n^4}}{\sqrt{16}\sqrt{7}}$

$4n^2\sqrt{7}$

69) $\frac{\sqrt{98x^4y^2}}{\sqrt{49}\sqrt{2}}$

$7x^2y\sqrt{2}$

71) $\sqrt{70y}$

$\sqrt{70y}$

73) $\frac{\sqrt{108xy^3}}{\sqrt{36}\sqrt{3}}$

$6y\sqrt{3xy}$

75) $\frac{\sqrt{27h^4j^3k^2}}{\sqrt{9}\sqrt{3}}$

$3h^2k\sqrt{3j}$

77) $\frac{\sqrt{27pq^4r}}{\sqrt{9}\sqrt{3}}$

$3q^2\sqrt{3pr}$

79) $\sqrt{42yz}$

$\sqrt{42yz}$

62) $\frac{\sqrt{80b^4}}{\sqrt{16}\sqrt{5}}$

$4b^2\sqrt{5}$

64) $\frac{\sqrt{45n^2}}{\sqrt{9}\sqrt{5}}$

$3n\sqrt{5}$

66) $\frac{\sqrt{24a^2}}{\sqrt{4}\sqrt{6}}$

$2a\sqrt{6}$

68) $\frac{\sqrt{8n^2}}{\sqrt{4}\sqrt{2}}$

$2n\sqrt{2}$

70) $\frac{\sqrt{294u^4v^3}}{\sqrt{49}\sqrt{6}}$

$7u^2v\sqrt{6v}$

72) $\frac{\sqrt{192x^3y^4}}{\sqrt{64}\sqrt{3}}$

$8xy^2\sqrt{3x}$

74) $\frac{\sqrt{216uv^4}}{\sqrt{36}\sqrt{6}}$

$6v^2\sqrt{6u}$

76) $\frac{\sqrt{27mpq}}{\sqrt{9}\sqrt{3}}$

$3\sqrt{3mpq}$

78) $\frac{\sqrt{28x^2yz^4}}{\sqrt{4}\sqrt{7}}$

$2xz^2\sqrt{7y}$

80) $\frac{\sqrt{12p^2q^2r^2}}{\sqrt{4}\sqrt{3}}$

$2pqr\sqrt{3}$

Simplify.

$$81) \frac{4\sqrt{48}}{\sqrt{25}} = \frac{4\sqrt{16} \cdot \sqrt{3}}{5} = \frac{4(4)\sqrt{3}}{5} = \frac{16\sqrt{3}}{5}$$

$$82) \frac{2\sqrt{56}}{5\sqrt{288}} = \frac{2\sqrt{4}\sqrt{14}}{5\sqrt{144}\sqrt{2}} = \frac{2(2)\sqrt{14}}{5(12)\sqrt{2}} = \frac{4\sqrt{14}}{60\sqrt{2}} = \frac{\sqrt{7}}{15}$$

$$83) \frac{\sqrt{40}}{\sqrt{25}} = \frac{\sqrt{4} \cdot \sqrt{10}}{5} = \frac{2\sqrt{10}}{5}$$

$$84) \frac{2\sqrt{8}}{\sqrt{200}} = \frac{2\sqrt{4}\sqrt{2}}{\sqrt{100}\sqrt{2}} = \frac{2(2)\sqrt{2}}{10\sqrt{2}} = \frac{4\sqrt{2}}{10\sqrt{2}} = \frac{2}{5}$$

$$85) \frac{\sqrt{15}}{4\sqrt{48}} = \frac{\sqrt{15}}{4\sqrt{16}\sqrt{3}} = \frac{\sqrt{15}}{4(4)\sqrt{3}} = \frac{\sqrt{15}}{16\sqrt{3}} = \frac{1}{16}\sqrt{\frac{15}{3}} = \frac{\sqrt{5}}{16}$$

$$86) \frac{3\sqrt{5}}{8\sqrt{45}} = \frac{3\sqrt{5}}{8\sqrt{9}\sqrt{5}} = \frac{3}{8(3)} = \frac{1}{8}$$

$$87) \frac{\sqrt{5}}{\sqrt{20}} = \frac{\sqrt{5}}{\sqrt{4}\sqrt{5}} = \frac{1}{2}$$

$$88) \frac{2\sqrt{24}}{\sqrt{36}} = \frac{2\sqrt{4}\sqrt{6}}{6} = \frac{2(2)\sqrt{6}}{6} = \frac{4\sqrt{6}}{6} = \frac{2\sqrt{6}}{3}$$

$$89) \frac{7\sqrt{6}}{5\sqrt{64}} = \frac{7\sqrt{6}}{5(8)} = \frac{7\sqrt{6}}{40}$$

$$90) \frac{6\sqrt{56}}{\sqrt{25}} = \frac{6\sqrt{4}\sqrt{14}}{5} = \frac{6(2)\sqrt{14}}{5} = \frac{12\sqrt{14}}{5}$$

$$91) \frac{\sqrt{10}}{8\sqrt{128}} = \frac{\sqrt{10}}{8\sqrt{64}\sqrt{2}}$$

$$92) \frac{3\sqrt{30}}{5\sqrt{6}} = \frac{3}{5} \sqrt{\frac{30}{6}} = \frac{3}{5} \cdot \sqrt{5} = \frac{3\sqrt{5}}{5}$$

$$\frac{\sqrt{10}}{8(8)\sqrt{2}} = \frac{\sqrt{10}}{64\sqrt{2}} = \frac{1}{64}\sqrt{\frac{10}{2}} = \frac{\sqrt{5}}{64}$$

$$93) \frac{8\sqrt{14}}{2\sqrt{16}} = \frac{8\sqrt{14}}{2(4)} = \frac{8\sqrt{14}}{8} = \sqrt{14}$$

$$94) \frac{7\sqrt{18}}{7\sqrt{64}} = \frac{7(3)\sqrt{2}}{7(8)} = \frac{3\sqrt{2}}{8}$$

~~$$95) \frac{6\sqrt{48}}{\sqrt{392}}$$~~

$$96) \frac{3\sqrt{42}}{\sqrt{49}} = \frac{3\sqrt{42}}{7}$$

$$97) \frac{8\sqrt{30}}{6\sqrt{64}} = \frac{8\sqrt{30}}{6(8)} = \frac{\sqrt{30}}{6}$$

$$98) \frac{7\sqrt{28}}{\sqrt{144}} = \frac{7\sqrt{4}\sqrt{7}}{12} = \frac{7(2)\sqrt{7}}{12} = \frac{14\sqrt{7}}{12} = \frac{7\sqrt{7}}{6}$$

$$99) \frac{\sqrt{28}}{\sqrt{7}} = \frac{\sqrt{4}\sqrt{7}}{\sqrt{7}} = 2$$

$$100) \frac{8\sqrt{12}}{5\sqrt{4}} = \frac{8\sqrt{4}\sqrt{3}}{5(2)} = \frac{8(2)\sqrt{3}}{10} = \frac{16\sqrt{3}}{10} = \frac{8\sqrt{3}}{5}$$

~~$$101) \frac{\sqrt{2}}{7\sqrt{3}}$$~~

~~$$102) \frac{\sqrt{4}}{6\sqrt{14}}$$~~

~~$$103) \frac{\sqrt{5}}{\sqrt{2}}$$~~

~~$$104) \frac{\sqrt{7}}{6\sqrt{2}}$$~~

~~$$105) \frac{\sqrt{28}}{\sqrt{20}}$$~~

~~$$106) \frac{\sqrt{7}}{3\sqrt{21}}$$~~