

Practice 11-1

Simplifying Radicals

Simplify each radical expression.

1. $\sqrt{32}$
2. $\sqrt{22} \cdot \sqrt{8}$
3. $\sqrt{147}$
4. $\sqrt{\frac{17}{144}}$
5. $\sqrt{a^2b^5}$
6. $\frac{2}{\sqrt{6}}$
7. $\sqrt{80}$
8. $\sqrt{27}$
9. $\frac{\sqrt{256}}{\sqrt{32}}$
10. $\frac{8}{\sqrt{7}}$
11. $\sqrt{12x^4}$
12. $\frac{\sqrt{96}}{\sqrt{12}}$
13. $\sqrt{200}$
14. $\sqrt{\frac{12}{225}}$
15. $\sqrt{15} \cdot \sqrt{6}$
16. $\sqrt{120}$
17. $\frac{4}{\sqrt{2a}}$
18. $(3\sqrt{2})^3$
19. $\sqrt{250}$
20. $\frac{\sqrt{65}}{\sqrt{13}}$
21. $\sqrt{84}$
22. $\sqrt{\frac{18}{225}}$
23. $\sqrt{48s^3}$
24. $3\sqrt{24}$
25. $\sqrt{15} \cdot \sqrt{35}$
26. $\sqrt{160}$
27. $\frac{6}{\sqrt{3}}$
28. $\frac{\sqrt{48n^6}}{\sqrt{6n^3}}$
29. $\sqrt{136}$
30. $\sqrt{\frac{27x^2}{256}}$
31. $\sqrt{m^3n^2}$
32. $\frac{\sqrt{180}}{\sqrt{9}}$
33. $\sqrt{18} \cdot \sqrt{8}$
34. $(10\sqrt{3})^2$
35. $\sqrt{\frac{17}{64}}$
36. $\sqrt{50}$
37. $\sqrt{48}$
38. $\sqrt{20}$
39. $\sqrt{8}$
40. $\sqrt{25x^2}$
41. $\sqrt{\frac{7}{9}}$
42. $\sqrt{\frac{17}{64}}$
43. $\frac{\sqrt{48}}{\sqrt{8}}$
44. $\frac{\sqrt{120}}{\sqrt{10}}$
45. $\frac{5}{\sqrt{2}}$
46. $\sqrt{75}$
47. $\sqrt{300}$
48. $\sqrt{49a^3}$
49. $\sqrt{125}$
50. $\sqrt{28x^4}$
51. $\frac{7}{\sqrt{3}}$
52. $\sqrt{\frac{15}{49}}$
53. $\frac{\sqrt{60}}{\sqrt{12}}$
54. $\frac{3}{\sqrt{3}}$
55. $\frac{4}{\sqrt{8}}$
56. $\sqrt{72x^3}$
57. $\sqrt{50y^3}$
58. $\sqrt{45x^2y^3}$
59. $\sqrt{\frac{44x^3}{9x}}$
60. $\frac{\sqrt{4}}{\sqrt{3x}}$
61. $6\sqrt{20}$
62. $\sqrt{ab^3}$
63. $\sqrt{a^5b^6}$
64. $12\sqrt{60x^2}$
65. $(2\sqrt{3})^2$
66. $\sqrt{12} \cdot \sqrt{27}$
67. $(7\sqrt{5})^2$
68. $\sqrt{14} \cdot \sqrt{8}$
69. $(5\sqrt{5})^2$
70. $\sqrt{8x^6y^7}$
71. $\sqrt{16a^3} \cdot \sqrt{5a^2}$
72. $\sqrt{8} \cdot \sqrt{7}$
73. $\sqrt{3x} \cdot \sqrt{5x}$
74. $2\sqrt{5} \cdot 2\sqrt{5}$
75. $4\sqrt{3} \cdot 2\sqrt{2}$
76. $6\sqrt{3} \cdot 7\sqrt{8}$
77. $\frac{10}{\sqrt{x}}$
78. $\frac{\sqrt{9}}{\sqrt{2x}}$
79. $\frac{4}{\sqrt{20}}$
80. $\frac{\sqrt{12x}}{\sqrt{27x}}$
81. $\frac{3\sqrt{7}}{\sqrt{20x}}$
82. $\frac{4\sqrt{5}}{\sqrt{8y}}$

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Practice 11-2**Operations With Radical Expressions**

Simplify each expression.

1. $3\sqrt{7} + 5\sqrt{7}$
2. $10\sqrt{4} - \sqrt{4}$
3. $4\sqrt{2}(2 + 2\sqrt{3})$
4. $\sqrt{45} + 2\sqrt{5}$
5. $12\sqrt{11} + 7\sqrt{11}$
6. $\sqrt{2}(2\sqrt{3} - 4\sqrt{2})$
7. $\sqrt{28} + \sqrt{63}$
8. $3\sqrt{6} - 8\sqrt{6}$
9. $\sqrt{3}(\sqrt{6} - \sqrt{12})$
10. $\sqrt{18} - \sqrt{50}$
11. $4\sqrt{2} + 2\sqrt{8}$
12. $13\sqrt{15} - 11\sqrt{15}$
13. $3(8\sqrt{3} - 7)$
14. $8(2\sqrt{5} + 5\sqrt{2})$
15. $17\sqrt{21} - 12\sqrt{21}$
16. $\sqrt{6}(7 + 3\sqrt{3})$
17. $8(4 - 3\sqrt{2})$
18. $2\sqrt{12} + 6\sqrt{27}$
19. $19\sqrt{3} + \sqrt{12}$
20. $8\sqrt{26} + 10\sqrt{26}$
21. $\sqrt{10}(3 - 2\sqrt{6})$
22. $9\sqrt{2} - \sqrt{50}$
23. $10\sqrt{13} - 7\sqrt{13}$
24. $12\sqrt{6} - 4\sqrt{24}$
25. $5\sqrt{7} + \sqrt{28}$
26. $8\sqrt{13} - 12\sqrt{13}$
27. $13\sqrt{40} + 6\sqrt{10}$
28. $-3\sqrt{3}(\sqrt{6} + \sqrt{3})$
29. $12\sqrt{29} - 15\sqrt{29}$
30. $10\sqrt{6} - 2\sqrt{6}$
31. $8\sqrt{3} - \sqrt{75}$
32. $3\sqrt{6}(2\sqrt{3} + \sqrt{6})$
33. $17\sqrt{35} + 2\sqrt{35}$
34. $\sqrt{19} + 4\sqrt{19}$
35. $12\sqrt{9} - 4\sqrt{9}$
36. $\sqrt{8}(\sqrt{2} - 7)$

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Practice 11-3**Solving Radical Equations**Solve each radical equation. Check your solutions. If there is no solution, write *no solution*.

1. $\sqrt{x} + 3 = 11$
2. $\sqrt{x + 2} = \sqrt{3x - 6}$
3. $x = \sqrt{24 - 10x}$
4. $\sqrt{4x - 7} = 1$
5. $\sqrt{x} = \sqrt{4x - 12}$
6. $x = \sqrt{11x - 28}$
7. $\sqrt{x} = 12$
8. $x = \sqrt{12x - 32}$
9. $x = \sqrt{13x - 40}$
10. $\sqrt{3x + 5} = \sqrt{x + 1}$
11. $\sqrt{x + 3} = 5$
12. $\sqrt{6x - 4} = \sqrt{4x + 6}$
13. $2 = \sqrt{x + 6}$
14. $x = \sqrt{2 - x}$
15. $\sqrt{4x + 2} = \sqrt{x + 14}$
16. $\sqrt{x + 8} = 9$
17. $x = \sqrt{7x + 8}$
18. $\sqrt{3x + 8} = \sqrt{2x + 12}$
19. $\sqrt{2x + 3} = 5$
20. $\sqrt{3x + 13} = \sqrt{7x - 3}$
21. $x = \sqrt{6 + 5x}$
22. $\sqrt{3x - 5} = 4$
23. $\sqrt{3x + 4} = \sqrt{5x}$
24. $x = \sqrt{x - 12}$
25. $\sqrt{x - 4} + 3 = 9$
26. $x = \sqrt{8x + 20}$
27. $12 = \sqrt{6x}$
28. $x = \sqrt{60 - 7x}$
29. $\sqrt{x + 14} = \sqrt{6x - 1}$
30. $\sqrt{5x - 7} = \sqrt{6x + 11}$
31. $7 + \sqrt{2x} = 3$
32. $\sqrt{x + 56} = x$
33. $5 + \sqrt{x + 4} = 12$

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