

Simplify each sum or difference.

16. $3\sqrt{5} + 5\sqrt{5}$

$= 8\sqrt{5}$

17. $4\sqrt{7} - \sqrt{63}$

$= 4\sqrt{7} - \sqrt{9 \cdot 7}$

$= 4\sqrt{7} - 3\sqrt{7}$

$= \sqrt{7}$

18. $8\sqrt{3} + 2\sqrt{48}$

$= 8\sqrt{3} + 2\sqrt{16 \cdot 3}$

$= 8\sqrt{3} + 2 \cdot 4\sqrt{3}$

$= 8\sqrt{3} + 8\sqrt{3} = 16\sqrt{3}$

19. $6\sqrt{8} - 2\sqrt{50}$

$= 6\sqrt{4 \cdot 2} - 2\sqrt{25 \cdot 2}$

$= 6 \cdot 2\sqrt{2} - 2 \cdot 5\sqrt{2}$

$= 12\sqrt{2} - 10\sqrt{2} = 2\sqrt{2}$

20. $3\sqrt{20} - 2\sqrt{45}$

$= 3\sqrt{4 \cdot 5} - 2\sqrt{9 \cdot 5}$

$= 3 \cdot 2\sqrt{5} - 2 \cdot 3\sqrt{5}$

$= 6\sqrt{5} - 6\sqrt{5} = 0$

21. $\sqrt{12} - 7\sqrt{75}$

$= \sqrt{4 \cdot 3} - 7\sqrt{25 \cdot 3}$

$= 2\sqrt{3} - 7 \cdot 5\sqrt{3}$

$= 2\sqrt{3} - 35\sqrt{3} = -33\sqrt{3}$

Simplify each product.

22. $\sqrt{3}(\sqrt{12} + 4)$

$= \sqrt{3}(\sqrt{4 \cdot 3} + 4)$

$= \sqrt{3}(2\sqrt{3} + 4)$

$= 2 \cdot 3 + 4\sqrt{3} = 6 + 4\sqrt{3}$

23. $\sqrt{8}(\sqrt{3} + 3)$

$= \sqrt{4 \cdot 2}(\sqrt{3} + 3)$

$= 2\sqrt{2}(\sqrt{3} + 3)$

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

24. $\sqrt{7}(\sqrt{7} - a)$

$= 7 - a\sqrt{7}$

25. $(2\sqrt{3} + \sqrt{5})(6\sqrt{5} - 4\sqrt{3})$

$= 12\sqrt{15} - 8 \cdot 3 + 6 \cdot 5 - 4\sqrt{15}$

$= 12\sqrt{15} - 24 + 30 - 4\sqrt{15}$

$= 8\sqrt{15} + 6$

26. $(7 + 3\sqrt{5})(7 - 3\sqrt{5})$

$= 49 - 21\sqrt{5} + 21\sqrt{5} - 9 \cdot 5$

$= 49 - 45$

$= 4$

Simplify each quotient.

27. $\frac{12}{\sqrt{11} - \sqrt{7}} \cdot \frac{\sqrt{11} + \sqrt{7}}{\sqrt{11} + \sqrt{7}}$

$= \frac{12(\sqrt{11} + \sqrt{7})}{(\sqrt{11} - \sqrt{7})(\sqrt{11} + \sqrt{7})}$

$= \frac{12\sqrt{11} + 12\sqrt{7}}{11 - 7} = \frac{12\sqrt{11} + 12\sqrt{7}}{4}$

28. $\frac{8}{\sqrt{3} + 1} \cdot \frac{\sqrt{3} - 1}{\sqrt{3} - 1}$

$= \frac{8(\sqrt{3} - 1)}{(\sqrt{3} + 1)(\sqrt{3} - 1)}$

$= \frac{8\sqrt{3} - 8}{3 - 1} = \frac{8\sqrt{3} - 8}{2}$

29. $\frac{-2}{\sqrt{15} - \sqrt{7}} \cdot \frac{\sqrt{15} + \sqrt{7}}{\sqrt{15} + \sqrt{7}}$

$= \frac{-2(\sqrt{15} + \sqrt{7})}{(\sqrt{15} - \sqrt{7})(\sqrt{15} + \sqrt{7})}$

$= \frac{-2\sqrt{15} - 2\sqrt{7}}{15 - 7} = \frac{-2\sqrt{15} - 2\sqrt{7}}{8}$

30. $\frac{30}{\sqrt{5} + \sqrt{2}} \cdot \frac{\sqrt{5} - \sqrt{2}}{\sqrt{5} - \sqrt{2}}$

$= \frac{30(\sqrt{5} - \sqrt{2})}{(\sqrt{5} + \sqrt{2})(\sqrt{5} - \sqrt{2})}$

$= \frac{30\sqrt{5} - 30\sqrt{2}}{5 - 2} = \frac{30\sqrt{5} - 30\sqrt{2}}{3}$

Solve each radical equation. Check your solution.

31. $\sqrt{x+4} = 7$

$\sqrt{x+4} = 7$
 $x+4 = 49$
 $x = 45$
 $45+4 = 49$
 $49 = 49$ ✓

32. $\sqrt{2t-3} = 11$

$\sqrt{2t-3} = 11$
 $2t-3 = 121$
 $2t = 124$
 $t = 62$
 $2(62)-3 = 121$
 $121-3 = 118$
 $118 = 118$ ✓

33. $4-\sqrt{2s} = -6$

$4-\sqrt{2s} = -6$
 $-\sqrt{2s} = -10$
 $\sqrt{2s} = 10$
 $2s = 100$
 $s = 50$
 $4-\sqrt{2(50)} = -6$
 $4-\sqrt{100} = -6$
 $4-10 = -6$
 $-6 = -6$ ✓

34. $\sqrt{6c+4} = 8$

$\sqrt{6c+4} = 8$
 $6c+4 = 64$
 $6c = 60$
 $c = 10$
 $\sqrt{6(10)+4} = 8$
 $\sqrt{64} = 8$
 $8 = 8$ ✓

35. $\sqrt{4d+3} = \sqrt{7d-3}$

$\sqrt{4d+3} = \sqrt{7d-3}$
 $4d+3 = 7d-3$
 $6 = 3d$
 $d = 2$
 $\sqrt{4(2)+3} = \sqrt{7(2)-3}$
 $\sqrt{11} = \sqrt{11}$ ✓

36. $\sqrt{d+7} = 3\sqrt{4d}$

$\sqrt{d+7} = 3\sqrt{4d}$
 $d+7 = 9(4d)$
 $d+7 = 36d$
 $7 = 35d$
 $d = 5$
 $\sqrt{5+7} = 3\sqrt{4(5)}$
 $\sqrt{12} = 3\sqrt{20}$
 $2\sqrt{3} = 6\sqrt{5}$
 no solution

Solve each radical equation. Check your solution. If there is no solution write NO SOLUTION!

37. $x^2 = \sqrt{2x+8}$

$x^2 = \sqrt{2x+8}$
 $x^2 = 2x+8$
 $x^2 - 2x - 8 = 0$
 $(x+2)(x-4) = 0$
 $x = -2$
 $x = 4$
 $4 = \sqrt{2(4)+8}$
 $4 = \sqrt{16}$
 $4 = 4$ ✓

38. $m^2 = \sqrt{-6m+7}$

$m^2 = \sqrt{-6m+7}$
 $m^2 = -6m+7$
 $m^2 + 6m - 7 = 0$
 $(m+7)(m-1) = 0$
 $m = -7$
 $m = 1$
 $1 = \sqrt{-6(1)+7}$
 $1 = \sqrt{1}$
 $1 = 1$ ✓

39. $x^2 = \sqrt{3x+28}$

$x^2 = \sqrt{3x+28}$
 $x^2 = 3x+28$
 $x^2 - 3x - 28 = 0$
 $(x+4)(x-7) = 0$
 $x = -4$
 $x = 7$
 $7 = \sqrt{3(7)+28}$
 $7 = \sqrt{49}$
 $7 = 7$ ✓

40. $-n^2 = \sqrt{4n+12}$

$-n^2 = \sqrt{4n+12}$
 $-n^2 = 4n+12$
 $-n^2 - 4n - 12 = 0$
 $(n+2)(n+6) = 0$
 $n = -2$
 $n = -6$
 $-6 = \sqrt{4(-6)+12}$
 $-6 = \sqrt{-12}$
 $-6 = 2i\sqrt{3}$
 $-6 = 6i$

